TID-3097

MASTER

BIOLOGICAL EFFECTS OF IONIZING RADIATION

An Annotated Bibliography

Index

Compiled by:
MARYLOU INGRAM, M.D.

UNITED STATES ATOMIC ENERGY COMMISSION
Division of Technical Information

LEGAL NOTICE

The AEC reports listed in this document are accounts of Government sponsored work. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission:

A. Makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness, or usefulness of the information contained in these reports, or that the use of any information, apparatus, method, or process disclosed in these reports may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of any information, apparatus, method, or process disclosed in these reports.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission, or employee of such contractor, to the extent that such employee or contractor of the Commission, or employee of such contractor prepares, disseminates, or provides access to, any information pursuant to his employment or contract with the Commission, or his employment with such contractor.

Printed in USA. This bibliography consists of 2 bindings, total price ~~\$12.00~~. Available from the Clearinghouse for Federal Scientific and Technical Information, National Bureau of Standards, U. S. Department of Commerce, Springfield, Virginia. 22151

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

BIOLOGICAL EFFECTS OF IONIZING RADIATION

An Annotated Bibliography

Covering the Years 1898 - 1957

Index

Compiled by:

MARYLOU INGRAM, M.D.

Atomic Energy Project

University of Rochester

Rochester, New York

DTI Extension Issuance Date

December 1966

D

D

FOREWORD

These volumes represent the fruition of more than a dozen years of personal devotion to an objective that arose from the recognition of a gap and a need. It is only necessary to read the compiler's introduction to sense the trials and frustrations that attended the preparation of this compendium, the problems of locating the literature, of abstracting it, and of devising a system of arrangement which would enable an interrogator to find his way profitably through the accumulated information. These volumes are a tribute to the perseverance with which Dr. Marylou Ingram followed through with her chosen task.

It is perhaps unique that a branch of science should have the essential literature of its first half dozen decades of life so well represented in annotated form, as the Division of Technical Information has done with Dr. Ingram's work through the year 1957, and with Mr. Charles M. Pierce's work for the years 1958-60 (TID-3098). The rapidly expanding number of research reports in radiation biology since 1960 adds no small degree of urgency to the continuation of this program. The efforts of the Division of Technical Information to find compilers to further the program are to be commended.

Charles L. Dunham, M.D., Director
Division of Biology and Medicine
U.S. Atomic Energy Commission

INTRODUCTION AND DESCRIPTION OF CONTENTS

Originally, a review of the literature on both biological and chemical effects of ionizing radiation was begun by the compiler and Dr. W. B. Mason in preparation for a general review article which they wrote in collaboration with Dr. G. Hoyt Whipple Jr., and Dr. J. W. Howland. This review was distributed as a UR report (UR-196, 1952) and used as a general reference for students in the Department of Radiation Biology at Rochester for several years. Apparently the need for a literature review had been common to many investigators in Radiation Biology, for a surprising number of inquiries were received about the status of the literature review and its availability. As a result of such inquiries and requests for bibliographic material, the compiler (continuing to add references to the collection) agreed to make the review reasonably comprehensive (but limited to biological effects) and to publish and distribute it through the AEC's Division of Technical Information Extension (DTIE), Oak Ridge, Tennessee (formerly the Technical Information Service).

The association with the group at Oak Ridge has been a felicitous one although, in many respects, the staff of the Division of Technical Information Extension at Oak Ridge and the compiler seemed related to each other in the manner of the bread and gravy that never came out even. During long periods when the bibliography was largely an extracurricular activity of the compiler, or when the work on it was suspended entirely, the staff at Oak Ridge would often have time and facilities to handle much more than the trickle of material received from Rochester. On other occasions, chiefly during summers when academic duties were lighter and additional help could be hired on a temporary basis in Rochester, the compiler proposed a serious effort to complete the bibliography for references published up to the period ending about one year previously, only to learn that the Oak Ridge staff had just been made responsible for completing some other project quickly, hence forced to curtail work on the bibliography. By the end of each cycle more references would have been added to the bibliography, and a new proposed cutoff date for references selected. The final decision was to include references published through 1957.

This bibliography has never had a formal budget nor a permanent "home" in the Atomic Energy Project at Rochester. It has the distinction of having been nearly always the first project to be uprooted from its temporary position and shunted to another in the unflagging efforts of the AEP staff to assuage the thirst for space. In this respect, the bibliography has come to share certain characteristics usually associated with such disparate sets as orphans and bootleg activities.

In deciding about pertinence of references included in the bibliography it was sometimes necessary to be fairly arbitrary. The decisions were made on the basis of the following major criteria

1. The subject matter was restricted to the biological effects of *ionizing radiation*. Literature about the effects of non-ionizing radiation was included only if it referred to ionizing radiation, as, for example, when effects of the two types of energy were compared.

2. The subject was restricted to *biological effects*. This automatically eliminated many studies in which

radioactive isotopes were used as tracers and were assumed to have no effect in themselves. Not all tracer studies could be eliminated, however, for often they contained discussions of possible effects of the tracer, or reported studies on metabolic systems that would greatly influence the absorption, distribution or excretion of the radioisotope and therefore have important implications with respect to biological effects of doses larger than tracer doses. Many of these references are included in the section of the subject index on "Quantitative Aspects of Changes Induced by Ionizing Radiation in Living Systems."

Chemical studies carried out *in vitro* and not oriented toward biological effects have been excluded.

3. Many references in the field of Health Physics were excluded because they were concerned solely with problems of physical measurement rather than biological effects. These references, however, like the tracer study references, could not be excluded automatically. Those discussing biological effects likely to occur following exposures under conditions where radiometry was carried out were usually included.

4. Decisions about pertinence of references concerned with radiation therapy were among the most difficult. For example, reports of five year survival studies representing a group of patients receiving radiation therapy for a given kind of tumor in contrast to survival among a similar group treated by some other method, e.g., surgery, were usually excluded. Radiation therapy reports that included discussions of the mechanism of effect of radiation have been considered pertinent.

In general the search for references was less exhaustive in the area of tracer studies and clinical radiation therapy than in other areas. Bibliographies covering these subjects are included in the section, Reviews and Bibliographies in the present compilation

An extensive bibliography, *The Effects of Radiation and Radioisotopes on the Life Processes* covering literature published during 1958-1959 and 1960 has been compiled by Charlie M. Pierce and indexed by William E. Bost, Helen L. Ward and Hugh E. Voress. It is available as TID-3098 from the USAEC, Division of Technical Information, to official Government requesters. Public Availability is from the Clearinghouse for Federal Scientific and Technical Information, U. S. Department of Commerce, Springfield Virginia, 22151 for \$15.00 per copy.

It has not been possible to read all references in the original although most references in English, French or German have been read or consulted in the original. References in these and other languages may be misclassified, or inappropriately included or excluded on the basis of information contained in an abstract when that was the only information available to the compiler.

The notations at the end of many of the abstracts refer to the source in which the reference was originally found when that source was *Biological Abstracts*, *Chemical Abstracts*, or *Nuclear Science Abstracts*. The abstracts themselves of course are not the same as those in the abstract journals, except for many abstracts from *Nuclear Science Abstracts* which have been used with the permission of the Division of Technical Information Extension, Oak Ridge,

Tennessee.* The notations indicating the abstract journals have proved helpful and time saving to the compiler on countless occasions when some question about the accuracy of the reference notations arose, as, for example, when an article was not found in the volume indicated by our reference card when the article was sought in the library. In such cases a preliminary check with the abstract journal frequently showed that a simple typographical or copying error had been made in working up the reference, in which case the correction could be made and the article found promptly. The abstract journal notations are included for the convenience of users of the bibliography who may encounter similar errors when attempting to find the original articles. The letters refer to the abstract journal, CA for *Chemical Abstracts* BA for *Biological Abstracts* and NSA for *Nuclear Science Abstracts*. The first numbers indicate the abstract volume number and the last set of numbers the abstract number in the volume. For example, BA 1-1000 would be abstracted in *Biological Abstracts*, Volume 1, abstract number 1000.

The subject index for the most part represents the literature as it exists, not necessarily as one might wish it to be. An early attempt to make an outline first and fit the references to it was totally unsuccessful. For this reason, development of the subject outline was deferred until several thousand references had been collected. These were then sorted and re-sorted until a workable outline, the subject index, emerged, based on the material *per se*. Outlines of areas with which the compiler is less familiar have been outlined to the best of her ability. All sections reflect the material available.

Some decisions about the pertinence of references may appear strange, even ludicrous, to experts in the fields represented. Blame this on the limitations of the compiler's scholarship. In other instances, entirely pertinent references may have been omitted simply because they escaped the dragnet of the literature search. In no instance

was a reference excluded because of personal opinion about its scientific merit, for—as any investigator learns sooner or later—the main value of a reference to one scientist may lie in some part of the work that the author (or reviewer) considered incidental. In any event, the bibliography is not intended to be editorial in any sense.

In many instances, reasons for the subject classifications of references are not obvious from the abstract or title, and it will be necessary to consult the original article before the pertinence of the material to a particular subject heading is apparent.

Serious effort has been made to cross reference all items as completely as possible using all available information about the total contents of each publication. Indeed, this is a major reason for compiling the bibliography in its present form, *viz*, to permit one to find a large proportion of available pertinent references by searching under a few main headings without having to flip back and forth interminably between a simple alphabetical subject index and a set of abstracts. Nevertheless, it has been necessary to restrict, to some extent, the degree of subdivision of the subject index in order to keep the publication manageable in size. The outline form should be reasonably adaptable to change or addition, however. Those wishing to subdivide further certain subjects of special interest should find it relatively easy to do so by listing additional subheadings and the appropriate reference accession numbers which would all be found under the present main headings.

An obvious alternative to this type of classification of bibliographic material is a computer-contrived index. Such an index (KWIC) has been prepared for this bibliography by the Division of Technical Information Extension at Oak Ridge using titles (rewritten as necessary) as guides to the contents of the articles. Also included in this index are key words from titles appearing in the previously mentioned bibliography, *The Effects of Radiation and Radioisotopes on the Life Processes* (TID-3098). This combined index is published as TID-3099 and is also available from the Clearinghouse for Federal Scientific and Technical Information, U. S. Department of Commerce, Springfield, Virginia, 22151. This will permit comparison of the two methods of classifying bibliographic material. Perhaps, in the interest of rigorous comparison, the computer-contrived index should be based on the original title or title rewritten with the benefit only of the abstract supplied by the various abstract journals. In any event, the experiment should be something of a pioneering effort in the comparison of two systems of information storage and retrieval.

*Note by AEC DTIE Staff

Although it is not the intent to use the original abstract from other announcement journals except NSA (and it is our belief this practice has been stringently adhered to), the AEC Division of Technical Information Extension has received from the editors of *Biological Abstracts* an indication of their willingness to permit the use of BA abstracts in the original. For their generosity and cooperative spirit, the Division of Technical Information Extension is very grateful.

HOW TO USE THE BIBLIOGRAPHY

The bibliography is comprised of subject indices, in the index volume, and references in the abstract volume. References and their accompanying abstracts are arranged from references 1 through 12,726 in numerical order of accession numbers. The accession numbers were assigned according to the order in which the references were added to the bibliography. This number is the identification number used whenever an abstract is referred to in the subject outline volume.

The subject index is of a hierarchical type consisting of general categories, each followed by one or more subdivisions. Papers of comprehensive or general nature are listed under Reviews and Bibliographies. This category is further subdivided into Reviews of General Biological Effects, Reviews of the Effects on Microorganisms, Reviews on the Effects on Multicellular Plants, etc. Familiarity with this general classification scheme is essential to optimum utilization of the bibliography. The detailed subject index as well as author indices comprise the remainder of the index volume.

Under each subheading of the subject outline, references containing pertinent information are listed in order of accession number. Most references contain information pertinent to more than one classification, hence are listed under various classifications to which the compiler considered them pertinent.

To find references on a given subject, first consult the condensed subject index and then the appropriate sections of the detailed subject index. Look up the references in the reference volume(s) according to accession numbers shown under the appropriate headings and subheadings in the subject index.

For example, suppose one wished to find references pertinent to effects of acute and chronic x-irradiation of the skin. This is a broad classification and references would be found in the sections on (1) Reviews (skin), (2) Bib-

liography (skin), Morphological Effects (skin); Physiological Effects (skin), Biochemical Effects (skin), and Late Effects (skin). If one is also interested in other aspects of effects on skin, for example, studies comparing radiation effects on skin of various species, he should find all these references under the same subheadings since they would be listed according to the topic considered, regardless of what other classes they belonged to. If one is interested *only* in the comparative study, he could avoid reviewing the references on other aspects of radiation effects on skin by consulting instead the section on "differences inherent in species" under "Quantitative Aspects of Factors Influencing the Response to Irradiation," selecting only those references that pertain to skin.

If one wished to include studies on *in vitro* effects of ionizing radiation on skin, he would consult references listed under the subheading, *skin*, in sections on "Morphological Effects After *In Vitro* Irradiation" and "Physiological Effects After *In Vitro* Irradiation." On the other hand, if one wished to find *only* those references to studies in which the effects of *in vitro* irradiation of skin were compared with *in vivo* irradiation, he would consult first the subsection on *In Vitro* vs. *In Vivo* Effects, under the main heading, "Quantitative Aspects of Factors Influencing the Response to Irradiation."

Some section headings in the subject outline are followed by a notation referring to other sections that are particularly likely to contain additional pertinent references. These reminders are not substitutes for cross referencing, they are simply for the convenience of users who are not thoroughly familiar with the general outline.

In many instances the pertinence of the reference to the subject classification may not be apparent from the title or abstract presented and it will be necessary to consult the original article to find the information on which the classification was based.

ACKNOWLEDGMENTS

Many persons have assisted in the compilation of this bibliography at one time or another. Some were students working during the summer or on a part-time basis during the academic year; others were full-time employees who assisted during the course of their regular duties. The invaluable assistance of the following persons is acknowledged gratefully and with sincere pleasure: Philip Cooper, Elizabeth Crahan, Arpad Galocy, Rita Gertzog, Jacqueline Griggs, Lynn Katz, Barbara Martin, Bernice Morehouse, Kathleen Parkin, William Quinlan, Mary Schneider, Mary Schroeder, Betty Smith and Alice Struthers.

Mr. Norman Zaichick, Argonne National Laboratory, very kindly permitted me to check this bibliography against an extensive bibliography he was compiling on radioactive isotopes.

Without the encouragement, assistance and support of Mr. Hugh Voress, Dr. Helen Ward, William E. Bost, and M. Madge Spencer and their colleagues at the Division of Technical Information Extension, Oak Ridge, this bibliography would never have been distributed beyond my own card file.

This work was supported by the Atomic Energy Commission through the Atomic Energy Project at the University of Rochester, Rochester, New York.

Marylou Ingram, M D
University of Rochester
School of Medicine and Dentistry

SUBJECT INDEX

D

D

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

biological effects of ionizing radiation;
not subclassified

82	3,002	5,834	7,088	9,569	12,715
107	3,085	6,133	7,183	10,252	12,716
821	3,100	6,706	7,949	10,951	12,717
904	3,200	6,717	8,258	11,761	12,718
2,529	3,369	6,718	8,300	12,524	12,719
2,553	3,414	6,828	8,301	12,530	12,720
2,571	4,578	6,972	9,445	12,641	12,724

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

effects on microorganisms, including viruses
(see also: reviews on sterilization of foods,
etc.)

582	3,974	5,667	7,772	8,878	12,242
1,122	4,778	6,154	7,894	9,569	12,289
2,564	5,192	6,420	7,897	10,075	12,391
2,686	5,219	6,680	7,955	10,093	
2,881	5,315	6,935	7,966	11,258	
3,045	5,487	6,976	8,125	11,919	
3,414	5,593	7,003	8,219	12,096	

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

effects on multicellular plants

201	3,100	5,234	7,711	8,852	9,809
359	3,133	5,235	8,067	8,966	9,831
367	3,244	5,299	8,071	8,968	10,009
1,030	3,329	5,301	8,224	8,975	10,050
1,045	3,414	5,315	8,226	9,080	10,086
1,099	3,424	5,393	8,231	9,136	10,098
1,148	3,666	5,459	8,236	9,198	11,548
1,239	3,718	5,481	8,431	9,252	11,912
2,006	3,733	5,529	8,432	9,274	11,920
2,029	3,800	5,730	8,490	9,322	11,923
2,109	3,874	5,786	8,573	9,323	12,013
2,545	4,904	5,801	8,644	9,392	12,027
2,546	4,908	5,913	8,666	9,396	12,064
2,587	5,043	6,276	8,687	9,415	12,120
2,714	5,101	6,496	8,740	9,424	12,171
2,724	5,102	6,828	8,748	9,447	12,281
2,777	5,192	6,864	8,761	9,485	12,320
2,802	5,218	7,061	8,777	9,569	12,405
2,829	5,219	7,183	8,811	9,793	

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

cellular effects

92	2,849	6,038	7,524	9,418	11,796
523	2,877	6,133	7,799	9,463	11,823
664	3,018	6,205	7,844	9,476	11,827
822	3,432	6,374	7,852	9,559	11,899
1,528	3,435	6,545	8,014	9,572	12,028
1,959	3,443	6,586	8,047	10,075	12,029
1,969	3,578	6,599	8,102	10,510	12,042
2,002	3,579	6,601	8,127	10,700	12,055
2,029	3,974	6,666	8,364	10,749	12,061
2,071	4,030	6,667	8,388	10,772	12,062
2,136	4,146	6,680	8,480	10,779	12,140
2,248	4,701	6,688	8,494	10,786	12,171
2,260	4,735	6,734	8,630	10,803	12,213
2,307	4,827	7,003	8,727	10,808	12,242
2,384	4,954	7,004	8,763	10,837	12,279
2,637	5,272	7,152	8,774	10,844	12,320
2,670	5,391	7,191	8,864	11,559	12,326
2,710	5,673	7,229	8,922	11,574	12,342
2,741	5,843	7,286	9,205	11,593	12,346
2,759	5,856	7,488	9,232	11,609	12,484
2,829	5,878	7,507	9,401	11,744	

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

effects on embryos

19	2,271	5,754	6,303	9,169	10,313
40	2,449	5,757	7,538	9,205	10,334
93	2,718	5,767	8,079	9,309	11,890
402	2,995	5,841	8,097	9,552	12,170
771	3,123	5,848	8,457	9,978	12,171
810	3,544	5,875	8,897	10,277	12,344

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

effects of atomic bombs

627	1,499	1,798	1,911	2,175	2,416
646	1,548	1,799	1,912	2,176	2,418
909	1,549	1,807	1,917	2,178	2,466
984	1,550	1,817	1,937	2,224	2,534
1,097	1,552	1,821	1,974	2,260	2,544
1,099	1,554	1,822	1,978	2,265	2,545
1,121	1,579	1,825	2,006	2,272	2,572
1,147	1,586	1,835	2,014	2,308	2,573
1,148	1,587	1,848	2,015	2,317	2,574
1,210	1,611	1,849	2,017	2,329	2,581
1,224	1,617	1,856	2,027	2,334	2,616
1,255	1,618	1,857	2,033	2,335	2,622
1,262	1,621	1,871	2,056	2,350	2,633
1,263	1,664	1,876	2,102	2,398	2,706
1,264	1,714	1,877	2,123	2,399	2,738
1,265	1,751	1,879	2,138	2,413	2,770
1,418	1,757	1,891	2,173	2,414	2,813
1,447	1,761	1,902	2,174	2,415	2,814

2,815	4,767	6,020	6,988	8,867	10,630	12,591
2,830	4,953	6,070	7,047	8,882	10,711	12,604
2,838	4,965	6,092	7,201	8,892	10,742	12,608
2,839	4,969	6,095	7,207	8,973	10,743	12,615
2,844	4,970	6,234	7,311	8,981	10,790	12,619
2,855	5,117	6,271	7,341	9,021	11,389	12,626
2,866	5,125	6,303	7,558	9,055	11,391	12,627
2,868	5,130	6,322	7,559	9,068	11,460	12,629
2,869	5,131	6,332	7,637	9,073	11,493	12,637
2,900	5,139	6,345	7,685	9,094	11,500	12,640
2,906	5,209	6,346	7,687	9,171	11,531	12,646
2,907	5,219	6,359	7,693	9,225	11,615	12,649
2,908	5,292	6,411	7,705	9,311	11,616	12,680
2,929	5,323	6,423	7,712	9,426	11,672	12,684
2,932	5,329	6,482	7,713	9,427	11,676	12,689
2,933	5,330	6,583	7,730	9,482	11,682	12,694
2,935	5,346	6,608	7,917	9,802	11,714	12,701
2,936	5,360	6,614	7,954	10,093	11,882	12,707
2,937	5,658	6,620	7,990	10,125	12,337	12,708
2,941	5,659	6,804	8,043	10,128	12,338	12,711
2,942	5,660	6,819	8,072	10,280	12,455	12,721
2,944	5,661	6,821	8,079	10,357	12,456	12,725
3,002	5,805	6,823	8,097	10,382	12,457	
3,010	5,839	6,880	8,264	10,404	12,458	
3,012	5,848	6,891	8,284	10,422	12,459	
3,014	5,891	6,942	8,288	10,423	12,532	
3,023	5,892	6,951	8,302	10,505		
3,028	5,901	6,955	8,335	10,600		
3,034	5,970	6,956	8,338			
3,049	5,991	6,957				

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

acute radiation injury; acute radiation
syndrome

731	2,178	2,817	5,957	7,341	9,184
754	2,272	2,844	6,038	7,366	9,648
1,210	2,294	2,849	6,174	7,423	9,656
1,255	2,334	2,900	6,190	7,488	9,677
1,265	2,335	2,937	6,198	7,566	10,720
1,296	2,349	2,941	6,310	7,638	10,743
1,310	2,529	2,942	6,334	7,704	11,297
1,489	2,534	3,050	6,335	7,713	11,612
1,499	2,572	3,135	6,486	7,734	11,648
1,661	2,573	3,511	6,702	7,815	11,650
1,714	2,581	3,903	6,703	8,070	11,656
1,761	2,612	4,401	6,828	8,072	11,662
1,784	2,622	4,730	6,880	8,097	11,689
1,898	2,675	4,767	6,951	8,110	11,897
1,911	2,676	4,969	6,955	8,127	11,918
1,912	2,677	5,315	6,957	8,285	12,325
1,933	2,696	5,658	6,988	8,302	12,328
1,937	2,715	5,659	6,990	8,302	12,329
1,974	2,738	5,660	6,999	8,874	12,335
1,978	2,757	5,661	7,025	8,981	12,337
2,009	2,770	5,721	7,047	9,063	12,343
2,174	2,815	5,824	7,107	9,094	12,485
2,175	2,816	5,844	7,183	9,096	12,531

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

effects on immune mechanisms

1,294	2,604	3,963	6,522	8,471	11,886
1,700	2,799	5,824	6,595	8,880	12,276
2,603	3,189	6,093	7,724	9,103	12,330

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

effects on the blood, blood forming tissues and circulation

646	2,428	2,935	4,970	6,304	7,356
814	2,451	2,989	5,117	6,310	7,423
1,003	2,503	3,010	5,641	6,322	7,488
1,097	2,504	3,050	5,658	6,450	7,880
1,121	2,620	4,155	5,661	6,469	8,880
1,255	2,696	4,209	5,891	6,670	9,021
1,296	2,762	4,589	6,026	6,773	9,600
1,549	2,830	4,597	6,038	6,804	9,892
1,552	2,844	4,747	6,099	6,867	11,666
1,719	2,853	4,827	6,133	7,054	11,667
2,173	2,861	4,942	6,224	7,349	12,343
2,175	2,932	4,965	6,290	7,350	12,520
2,397	2,933				12,577

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

effects on the gastrointestinal system

646	1,549	2,844	3,050	5,318	7,691
1,255	2,317	3,010	3,102	5,658	

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

effects on the nervous system

499	2,465	6,302	7,250	10,167
810	3,184	6,614	8,490	10,705
961	6,038	6,733	9,334	12,325
2,376				

.

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

effects on skin

646	2,616	2,943	5,452	7,760	11,343
1,255	2,666	3,010	6,038	8,569	11,677
1,447	2,741	3,050	6,074	8,778	11,682
1,617	2,809	3,416	6,306	9,561	11,687
1,882	2,841	4,597	6,310	9,575	11,700
2,396	2,844	4,747	6,951	10,367	12,343
2,466	2,853	5,272	7,201	11,262	12,515
2,521	2,868				

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

effects on endocrine glands

270	591	5,617	12,343
497	3,082	7,327	12,531

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

effects on eyes, ears

239	1,483	2,866	6,196	7,015	10,146
379	1,825	3,103	6,234	7,016	11,915
751	2,308	4,947	6,359	7,017	11,916
752	2,348	6,195	6,482	7,018	

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

effects on respiratory system

2,873	7,350
3,051	12,523

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

effects on neoplastic tissues

252	2,476	3,695	4,208	7,508	9,652
1,883	2,596	3,754	5,208	8,175	9,780
1,988	3,005	4,012	6,412	8,436	11,492
2,304	3,047	4,079	6,667	8,623	12,028
2,461					

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

histological changes induced by radiation

79	2,176	2,942	5,315	6,592	9,476
310	2,418	3,018	5,842	6,620	10,280
1,255	2,675	3,050	6,133	6,680	10,727
1,489	2,708	3,753	6,212	7,368	10,768
1,799	2,785	4,906	6,222	7,760	11,092
1,871	2,844	4,965	6,306	7,965	11,574
2,033	2,859	5,125	6,310	8,865	11,740
2,056	2,937	5,139	6,334	9,472	12,342

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

effects of radiation protective agents and other agents or procedures modifying the response to radiation

643	1,499	1,901	5,844	7,734	9,184
645	1,548	2,060	5,850	7,862	9,209
646	1,549	2,349	6,092	8,097	9,463
647	1,550	2,379	6,554	8,181	9,629
692	1,554	2,622	6,672	8,251	9,943
908	1,586	2,675	6,914	8,686	11,352
943	1,607	2,816	7,025	8,693	11,391
1,081	1,619	2,929	7,038	8,727	11,656
1,092	1,661	3,023	7,084	8,775	11,671
1,165	1,714	3,031	7,183	8,864	11,686
1,180	1,761	5,289	7,209	8,871	11,689
1,211	1,785	5,530	7,277	8,874	12,226
1,296	1,835	5,641	7,311	9,158	12,468
1,479	1,848	5,814	7,488		

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

therapeutic uses of radiation

244	2,677	4,025	4,906	6,917	9,072
369	2,715	4,038	5,192	7,087	9,085
783	2,797	4,052	5,209	7,089	9,236
1,520	2,972	4,145	5,220	7,193	9,256
1,662	2,981	4,208	5,244	7,524	9,276
1,719	2,992	4,215	5,435	7,580	9,282
1,760	3,057	4,267	5,439	7,616	9,290
1,762	3,068	4,339	5,946	7,621	9,308
1,813	3,081	4,497	5,947	7,656	9,502
1,837	3,100	4,577	5,957	7,689	9,578
1,838	3,163	4,578	5,963	7,722	9,648
1,901	3,184	4,585	6,008	7,760	9,652
2,095	3,369	4,586	6,019	7,829	9,661
2,179	3,400	4,632	6,199	7,836	9,689
2,227	3,416	4,638	6,254	8,072	9,746
2,325	3,418	4,651	6,357	8,435	9,827
2,365	3,462	4,659	6,453	8,436	9,996
2,402	3,695	4,690	6,462	8,438	10,207
2,451	3,721	4,706	6,561	8,469	10,254
2,461	3,753	4,779	6,732	8,490	10,367
2,521	3,754	4,887	6,775	8,774	10,695
2,634	3,905	4,889	6,857	8,982	10,750

10,799	11,260	11,501	11,719	11,813	11,968
10,806	11,343	11,673	11,782	11,851	12,090
10,863	11,398	11,710	11,791	11,865	12,152
11,201	11,484	11,711	11,796		

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

radium poisoning

13	2,768	4,837	8,427	10,351	11,198
21	3,115	7,242	8,594	10,846	11,301
286	3,251	7,313	8,795	10,847	11,303
369	3,571	7,638	9,129	10,885	11,634
1,843	3,619	8,072	9,569	11,017	11,640
2,233	4,020	8,127	9,710	11,023	11,964
2,397	4,157	8,397	10,349		

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

effects of internally deposited radioactivity

308	3,053	7,424	8,981	10,727	11,361
799	3,054	7,558	9,059	10,738	11,547
1,099	3,056	7,559	9,073	10,757	11,562
1,543	3,251	7,592	9,093	10,774	11,572
1,610	4,020	7,621	9,235	10,846	11,633
1,665	4,292	7,652	9,236	10,847	11,634
1,719	4,749	7,675	9,311	10,936	11,636
1,725	5,010	7,685	9,355	11,004	11,640
1,843	5,055	7,689	9,562	11,009	11,642
1,944	5,296	7,712	9,569	11,011	11,791
1,976	5,360	7,758	9,710	11,012	11,803
2,013	5,438	7,765	9,741	11,018	11,813
2,038	5,569	7,771	9,744	11,020	12,454
2,102	5,730	7,775	9,746	11,022	12,462
2,230	5,913	7,841	10,128	11,023	12,468
2,397	5,934	7,842	10,187	11,044	12,469
2,448	6,038	7,954	10,343	11,056	12,470
2,487	6,198	7,979	10,360	11,064	12,471
2,608	6,199	7,990	10,370	11,180	12,522
2,741	6,305	7,991	10,424	11,292	12,589
2,840	6,310	8,072	10,511	11,300	12,615
2,844	6,334	8,097	10,651	11,301	12,619
2,853	6,608	8,127	10,662	11,303	12,691
2,929	6,703	8,181	10,664	11,304	12,707
2,930	6,734	8,355	10,681	11,318	
2,990	6,744	8,495	10,713		
3,021	7,242	8,867			

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

late effects including carcinogenesis

82	787	984	1,785	2,397	2,527
155	799	1,097	2,018	2,448	2,574
250	909	1,543	2,167	2,497	2,596
783	966	1,754	2,329	2,498	2,666

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

health protection; health physics

129	2,139	6,070	9,092	10,274	11,718
671	2,177	6,199	9,093	10,363	11,720
750	2,179	6,284	9,098	10,394	11,721
753	2,222	6,287	9,107	10,515	11,741
814	2,534	6,290	9,119	10,518	11,745
836	2,571	6,305	9,126	10,751	11,751
991	2,629	6,341	9,220	10,797	11,758
1,057	2,634	6,465	9,230	10,801	11,760
1,110	2,710	6,466	9,311	10,814	11,771
1,161	2,715	6,627	9,312	10,826	11,785
1,311	2,798	6,657	9,445	10,886	11,791
1,437	2,839	6,689	9,543	10,936	11,792
1,493	2,844	6,772	9,744	10,960	11,807
1,494	2,968	6,773	9,746	11,064	11,809
1,529	2,992	6,819	10,105	11,274	11,829
1,530	3,011	6,828	10,107	11,392	11,832
1,534	3,012	6,889	10,108	11,393	11,835
1,547	3,034	6,994	10,110	11,394	11,837
1,551	3,234	7,014	10,114	11,395	11,839
1,587	3,428	7,050	10,130	11,397	11,844
1,606	3,865	7,056	10,131	11,399	11,846
1,611	3,905	7,107	10,134	11,402	11,894
1,615	4,280	7,426	10,136	11,403	11,907
1,616	4,582	7,501	10,145	11,404	11,908
1,617	4,729	7,586	10,215	11,408	11,910
1,711	4,749	7,599	10,219	11,411	12,327
1,712	4,764	7,652	10,220	11,413	12,354
1,722	4,811	7,675	10,221	11,414	12,356
1,751	4,837	7,676	10,222	11,416	12,461
1,754	4,855	7,713	10,224	11,466	12,462
1,755	4,875	7,730	10,226	11,468	12,463
1,756	4,886	7,747	10,227	11,471	12,464
1,760	5,010	7,750	10,229	11,473	12,465
1,762	5,011	7,771	10,230	11,474	12,466
1,770	5,054	7,789	10,231	11,477	12,467
1,776	5,116	7,839	10,232	11,478	12,469
1,777	5,178	7,850	10,234	11,480	12,470
1,778	5,210	7,872	10,235	11,486	12,471
1,779	5,211	7,888	10,236	11,496	12,472
1,780	5,212	7,889	10,238	11,498	12,473
1,781	5,253	7,964	10,240	11,500	12,474
1,813	5,291	7,990	10,244	11,505	12,475
1,847	5,292	8,004	10,245	11,507	12,476
1,880	5,295	8,020	10,250	11,509	12,525
1,896	5,314	8,067	10,251	11,528	12,526
1,901	5,325	8,072	10,253	11,529	12,527
1,913	5,364	8,074	10,254	11,531	12,528
1,944	5,368	8,075	10,256	11,588	12,604
1,977	5,466	8,076	10,258	11,589	12,615
2,014	5,527	8,077	10,259	11,617	12,619
2,016	5,653	8,128	10,260	11,640	12,620
2,037	5,655	8,275	10,261	11,642	12,626
2,038	5,727	8,369	10,262	11,646	12,627
2,039	5,831	8,370	10,264	11,669	12,629
2,041	5,875	8,743	10,265	11,695	12,637
2,083	5,896	8,882	10,267	11,697	12,646
2,084	5,911	8,909	10,271	11,704	12,670
2,095	5,918	9,071	10,272	11,708	12,676
2,123	6,054	9,091	10,273	11,709	12,696
					12,721
					12,725

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

genetic effects

19	2,571	4,332	5,841	8,067	9,398
40	2,585	4,393	5,875	8,069	9,485
133	2,586	4,567	5,878	8,207	9,809
281	2,587	4,568	5,931	8,368	9,824
300	2,605	4,730	6,009	8,648	9,837
473	2,637	4,742	6,025	8,655	9,938
475	2,697	4,773	6,078	8,656	9,943
476	2,757	4,798	6,186	8,666	10,075
497	2,877	4,824	6,421	8,682	10,086
532	2,880	4,850	6,474	8,683	10,104
607	3,071	4,904	6,476	8,693	10,212
617	3,092	5,043	6,641	8,750	10,334
662	3,095	5,054	6,680	8,806	11,644
720	3,109	5,068	6,885	8,811	11,747
905	3,213	5,101	6,891	8,864	11,855
1,095	3,304	5,102	6,907	8,968	11,856
1,113	3,329	5,129	6,960	8,969	11,921
1,455	3,369	5,130	6,979	9,006	11,924
1,496	3,424	5,134	7,061	9,028	12,033
1,797	3,426	5,218	7,277	9,055	12,250
1,798	3,518	5,383	7,409	9,089	12,345
1,929	3,588	5,501	7,728	9,149	12,368
1,943	3,800	5,739	7,750	9,217	12,405
2,271	4,103	5,743	7,861	9,252	12,406
2,563	4,105	5,805	7,888	9,311	12,598
2,570	4,118	5,835	8,065	9,392	12,723
				9,396	

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

application of ionizing radiation in preservation of food, pharmaceutical and other perishable materials.

737	5,593	7,443	8,015	9,136	9,494
1,166	5,645	7,772	8,306	9,197	10,033
1,774	5,973	7,801	8,330	9,211	10,125
1,909	6,976	7,803	8,647	9,322	10,143
1,295	6,979	7,826	8,871	9,383	10,246
2,735	7,149	7,827	9,047	9,391	11,493
3,046	7,258	7,955	9,099	9,420	11,762
5,035	7,259	7,956	9,127		12,722

REVIEWS AND BIBLIOGRAPHIES

REVIEWS

biochemical effects

822	3,774	6,564	7,286	9,938	11,541
1,774	4,220	6,680	8,367	10,703	11,692
2,093	4,701	6,976	8,686	11,217	11,885
2,094	4,879	7,059	9,028	11,310	11,891
2,367	5,842	7,248	9,045	11,493	12,072
3,617	6,132				12,639

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

biological effects of ionizing radiation;
not subclassified

2,186	3,100	5,643	5,912	7,886	10,372	12,630
3,016	3,414	5,644	6,109	9,578	11,253	12,631
3,085	5,457	5,687	7,634	10,206	12,390	12,632
						12,633

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

effects on microorganisms

689	3,016	12,171
2,344	3,414	12,517
		12,654

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

effects on multicellular plants

100	12,655
12,517	

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

cellular effects

3,100	5,643	5,644
-------	-------	-------

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

effects on embryos and on growth and
development

5,643	12,666
-------	--------

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

effects of atomic bombs; acute radiation injury;
acute radiation syndrome

2,739	12,721
5,643	12,724
5,687	

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

effects on specific tissues or organs -
blood, blood forming tissue, vascular system

2,192	12,650	12,653
2,739	12,651	12,657
5,687	12,652	

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

effects on specific tissues or organs (cont'd)
- skin

2,222	2,739	8,984	10,680
2,521	5,644	10,450	

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

effects on reproduction and fertility

2,484

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

uses of radioactive isotopes in biology
and medicine

1,814	5,947	10,571	12,652	12,657	12,662	12,666
3,016	9,272	12,648	12,654	12,658	12,663	12,667
5,457	9,578	12,650	12,655	12,659	12,664	12,668
5,644	10,556	12,651	12,656	12,660	12,665	12,713
						12,714

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

effects of internally deposited radioactivity

1,843	3,085	9,010	9,750	12,597
3,016	5,644	9,066	10,153	12,682
				12,705

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

mechanism by which ionizing radiation produces
biological effects

3,085	5,644	9,854	12,595
5,643	5,687	12,594	12,596

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

effects of radiation protective agents and
other agents or procedures modifying the
response to radiation

692	12,597
	12,643

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

genetic effects

2,484	5,687
3,016	9,272
5,643	

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

applications of ionizing radiation in preservation
of food, pharmaceuticals and other perishable
materials

5,557	5,716	7,199	9,211	12,677
5,558	7,180	8,871	12,638	12,678
				12,679

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

biochemical effects

7,059	10,703	12,596
9,704	10,786	

REVIEWS AND BIBLIOGRAPHIES

BIBLIOGRAPHIES

health protection; health physics

991	1,658	12,356	12,643	12,712	02.01
1,057	2,739	12,369	12,704	12,724	

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING RADIATIONS ON BIOLOGICAL SYSTEMS

target theory and related concepts

5	246	609	822	977	1,352
48	387	617	870	1,009	1,411
99	432	668	876	1,062	1,470
108	482	743	911	1,151	1,471
220	581	744	958	1,247	1,475

1,481	2,876	4,620	5,954	7,255	9,869
1,491	2,877	4,639	5,999	7,295	9,895
1,504	2,880	4,653	6,030	7,451	9,945
1,528	2,881	4,656	6,035	7,575	9,946
1,531	2,884	4,662	6,052	7,657	9,964
1,557	2,898	4,663	6,124	7,660	10,013
1,570	2,923	4,666	6,137	7,680	10,051
1,588	3,043	4,668	6,153	7,721	10,064
1,593	3,045	4,682	6,159	7,814	10,075
1,603	3,182	4,700	6,160	7,867	10,102
1,642	3,252	4,730	6,184	7,890	10,173
1,653	3,294	4,734	6,205	7,897	10,531
1,775	3,315	4,736	6,253	7,965	10,546
1,788	3,318	4,762	6,267	7,966	10,553
1,794	3,384	4,773	6,286	7,979	10,557
1,800	3,415	4,778	6,308	7,984	10,564
1,804	3,432	4,801	6,324	7,985	10,582
1,805	3,478	4,879	6,330	7,986	10,599
1,823	3,500	4,917	6,340	7,994	10,702
1,840	3,562	4,955	6,343	8,012	10,704
1,948	3,580	4,959	6,352	8,102	10,716
1,959	3,611	4,960	6,377	8,104	10,723
1,965	3,734	4,962	6,381	8,125	10,749
1,969	3,756	4,964	6,414	8,169	10,779
2,002	3,764	4,971	6,420	8,194	10,786
2,004	3,768	4,973	6,421	8,276	10,796
2,020	3,793	4,995	6,425	8,290	10,802
2,028	3,853	5,029	6,447	8,337	11,006
2,093	3,974	5,041	6,473	8,339	11,069
2,135	4,030	5,052	6,477	8,346	11,258
2,136	4,050	5,084	6,509	8,347	11,310
2,162	4,069	5,085	6,510	8,349	11,350
2,270	4,073	5,107	6,545	8,350	11,351
2,274	4,107	5,124	6,547	8,351	11,887
2,287	4,120	5,128	6,585	8,366	11,899
2,321	4,128	5,134	6,586	8,650	11,925
2,346	4,146	5,146	6,592	8,656	12,104
2,378	4,151	5,152	6,596	8,692	12,180
2,472	4,177	5,159	6,599	8,758	12,217
2,501	4,178	5,199	6,601	8,763	12,221
2,502	4,219	5,200	6,644	8,775	12,228
2,511	4,221	5,250	6,674	8,792	12,246
2,517	4,228	5,288	6,675	8,806	12,288
2,519	4,282	5,322	6,681	8,829	12,306
2,537	4,290	5,370	6,718	8,858	12,331
2,551	4,309	5,416	6,719	8,872	12,381
2,605	4,327	5,495	6,727	8,878	12,402
2,627	4,330	5,502	6,734	9,032	12,403
2,638	4,348	5,524	6,751	9,062	12,405
2,648	4,357	5,539	6,789	9,132	12,406
2,653	4,371	5,605	6,843	9,250	12,430
2,682	4,430	5,606	6,914	9,381	12,431
2,686	4,431	5,669	6,978	9,407	12,453
2,693	4,434	5,673	6,989	9,453	12,489
2,711	4,439	5,719	7,003	9,454	12,490
2,713	4,441	5,735	7,028	9,456	12,681
2,719	4,486	5,745	7,046	9,484	
2,722	4,490	5,777	7,099	9,486	
2,733	4,491	5,856	7,116	9,487	
2,735	4,498	5,864	7,152	9,620	
2,746	4,509	5,878	7,161	9,630	
2,791	4,540	5,894	7,226	9,862	
2,823	4,545	5,926	7,229	9,866	
2,862	4,570	5,927	7,232		

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING RADIATIONS ON BIOLOGICAL SYSTEMS

release from cells or tissues of substances that cause or alter the observed changes

50	1,916	3,959	5,572	7,623	9,593
59	1,940	3,974	5,708	7,629	9,601
145	1,941	4,002	5,824	7,703	9,608
156	2,098	4,009	5,830	7,928	9,619
188	2,140	4,075	5,844	7,953	9,976
216	2,219	4,102	5,909	8,003	9,982
353	2,249	4,153	5,944	8,053	10,024
396	2,339	4,266	5,959	8,063	10,159
442	2,368	4,267	6,016	8,106	10,249
443	2,377	4,337	6,066	8,126	10,419
466	2,380	4,441	6,187	8,227	10,738
522	2,661	4,466	6,204	8,366	11,348
590	2,676	4,478	6,208	8,429	11,558
599	2,692	4,677	6,255	8,483	11,613
705	2,695	4,814	6,399	8,501	11,690
782	2,754	4,817	6,531	8,566	11,818
854	2,770	4,860	6,545	8,888	11,850
1,096	2,871	4,942	6,559	9,016	11,917
1,280	2,951	5,008	6,770	9,030	12,036
1,388	3,044	5,029	6,790	9,070	12,224
1,445	3,191	5,041	6,841	9,184	12,240
1,488	3,246	5,060	6,908	9,330	12,394
1,629	3,342	5,071	6,911	9,434	12,414
1,676	3,486	5,188	7,115	9,515	12,437
1,686	3,654	5,206	7,299	9,550	12,478
1,689	3,756	5,294	7,324	9,560	12,488
1,765	3,782	5,447	7,369	9,571	12,511
1,808	3,881	5,453	7,371	9,576	12,512
1,810			7,423		

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING RADIATIONS ON BIOLOGICAL SYSTEMS

alteration of metabolites, growth factors or similar substances that are required by the biological system under study

1,266	3,838	4,798	5,821	9,478	12,229
3,638	3,871	5,391	8,593	10,769	12,281
3,786	4,791	5,450	8,843	11,350	

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING RADIATIONS ON BIOLOGICAL SYSTEMS

identification of the critically important part of cell, tissue or organ in the response to irradiation

867	2,673	4,882	7,647	8,716	9,401
1,424	2,692	5,140	7,778	8,722	9,454
1,641	2,730	5,501	7,853	8,749	9,490
1,745	2,772	5,870	7,897	8,769	9,559
1,961	2,823	6,337	8,111	8,783	9,572
2,110	2,881	6,447	8,156	8,831	9,635
2,136	2,960	6,545	8,243	8,907	9,714
2,242	3,048	6,706	8,258	8,996	9,730
2,307	3,193	6,734	8,429	9,005	9,757
2,436	3,781	6,738	8,453	9,109	9,799
2,564	4,656	6,792	8,480	9,132	9,856
2,589	4,880	6,896	8,612	9,156	9,864
2,597	4,881	7,646	8,622	9,270	9,865

9,870	10,024	10,186	11,244	12,118	12,279
9,872	10,063	10,507	11,267	12,148	12,281
9,895	10,075	10,769	11,348	12,223	12,370
9,915	10,156	10,953	11,350	12,228	12,380
9,938	10,161	11,091	11,355	12,253	12,484
9,988	10,173	11,093			

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING RADIATIONS ON BIOLOGICAL SYSTEMS

deleterious effects on cell division

1	2,784	4,604	6,181	7,767	9,459
14	2,829	4,614	6,265	7,780	9,463
104	2,966	4,628	6,308	7,799	9,505
125	3,043	4,656	6,376	7,804	9,508
214	3,080	4,730	6,379	7,851	9,559
225	3,098	4,800	6,416	7,909	9,572
292	3,147	4,842	6,473	7,918	9,788
523	3,207	4,851	6,477	7,952	9,833
544	3,312	4,867	6,496	8,063	9,856
634	3,318	4,870	6,539	8,086	9,865
760	3,331	4,871	6,587	8,227	9,916
822	3,365	4,872	6,592	8,329	9,938
1,471	3,382	4,880	6,600	8,358	9,978
1,486	3,430	4,881	6,641	8,364	10,025
1,519	3,435	4,882	6,718	8,372	10,047
1,581	3,458	4,964	6,738	8,375	10,075
1,641	3,543	4,987	6,802	8,380	10,103
1,745	3,555	5,041	6,845	8,456	10,186
1,959	3,566	5,101	6,846	8,457	10,419
2,081	3,606	5,170	6,855	8,480	10,635
2,110	3,710	5,182	6,890	8,524	10,700
2,151	3,727	5,200	6,940	8,529	10,716
2,161	3,734	5,284	7,003	8,530	10,778
2,198	3,761	5,308	7,004	8,535	10,780
2,238	3,766	5,390	7,012	8,552	10,794
2,242	3,768	5,429	7,210	8,559	11,150
2,248	3,782	5,437	7,229	8,560	11,262
2,307	3,785	5,501	7,319	8,715	11,457
2,321	3,924	5,632	7,331	8,728	11,523
2,325	3,931	5,671	7,417	8,731	11,575
2,371	3,957	5,734	7,441	8,749	11,593
2,378	4,031	5,741	7,460	8,763	11,761
2,386	4,132	5,793	7,477	8,770	11,993
2,436	4,148	5,878	7,521	8,774	12,000
2,454	4,183	5,883	7,529	8,799	12,001
2,457	4,255	5,909	7,533	8,947	12,029
2,597	4,372	5,966	7,534	8,969	12,225
2,713	4,389	6,120	7,542	9,165	12,279
2,718	4,523	6,132	7,575	9,168	12,346
2,719	4,531	6,138	7,576	9,314	12,366
2,729	4,567	6,141	7,591	9,377	12,373
2,730	4,568	6,149	7,645	9,401	12,405
2,759	4,570	6,169	7,738	9,418	12,412
2,767	4,579				
	4,598				

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING RADIATIONS ON BIOLOGICAL SYSTEMS

effects on H₂O (see also the following section
on ionization, free radicals, etc.)

661	893	1,581	1,969	2,287	2,537
822	1,122	1,602	2,071	2,318	2,588
868	1,189	1,734	2,093	2,357	2,648
874	1,557	1,864	2,094	2,502	2,759

2,764	5,894	7,188	8,365	10,778	12,352	12,601
2,783	6,049	7,232	8,725	10,781	12,358	12,610
3,127	6,137	7,233	8,763	10,802	12,396	12,611
4,200	6,160	7,248	9,032	11,006	12,402	12,616
4,422	6,420	7,381	9,234	11,024	12,403	12,625
4,493	6,491	7,748	9,250	11,554	12,406	12,628
4,554	6,496	7,799	9,567	11,860	12,429	12,634
4,614	6,718	7,891	9,629	12,216	12,430	12,635
5,136	7,152	7,984	9,792	12,217	12,488	12,636
5,201	7,158	8,102	10,716	12,227	12,588	12,671
5,856				12,287	12,599	12,699
				12,326	12,600	

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING RADIATIONS ON BIOLOGICAL SYSTEMS

molecular events including ionization, free radical
formation, activation energy, energy transfer, etc.

3	1,518	2,648	4,368	6,077	7,010
50	1,528	2,671	4,422	6,101	7,019
160	1,538	2,709	4,430	6,102	7,038
237	1,570	2,722	4,432	6,106	7,063
251	1,581	2,733	4,492	6,137	7,069
259	1,600	2,764	4,540	6,153	7,077
317	1,602	2,770	4,554	6,159	7,152
432	1,642	2,773	4,614	6,160	7,158
460	1,673	2,783	4,620	6,167	7,178
482	1,734	2,858	4,622	6,184	7,188
582	1,735	2,876	4,658	6,205	7,209
615	1,794	2,896	4,663	6,255	7,229
629	1,823	2,910	4,730	6,275	7,232
641	1,824	2,938	4,734	6,307	7,233
643	1,864	3,046	4,735	6,308	7,247
645	1,948	3,048	4,778	6,324	7,248
647	1,960	3,107	4,825	6,347	7,261
657	1,965	3,124	4,840	6,352	7,277
661	1,969	3,127	4,849	6,362	7,306
664	2,002	3,128	4,872	6,379	7,378
699	2,011	3,131	4,879	6,380	7,380
743	2,028	3,142	4,959	6,381	7,390
744	2,061	3,154	5,061	6,405	7,402
822	2,071	3,185	5,085	6,419	7,438
868	2,093	3,194	5,136	6,420	7,440
874	2,094	3,214	5,201	6,447	7,441
876	2,096	3,320	5,242	6,470	7,451
893	2,160	3,390	5,287	6,491	7,528
917	2,284	3,415	5,404	6,496	7,575
961	2,287	3,432	5,487	6,508	7,597
995	2,318	3,444	5,502	6,525	7,739
997	2,321	3,470	5,505	6,564	7,748
1,052	2,341	3,504	5,526	6,586	7,755
1,054	2,355	3,535	5,627	6,588	7,799
1,081	2,357	3,543	5,667	6,592	7,862
1,084	2,358	3,562	5,673	6,600	7,867
1,122	2,369	3,580	5,690	6,601	7,891
1,131	2,378	3,644	5,692	6,718	7,965
1,151	2,384	3,651	5,694	6,719	7,966
1,187	2,386	3,734	5,700	6,730	7,984
1,189	2,401	3,853	5,719	6,737	8,050
1,194	2,444	4,030	5,742	6,743	8,102
1,234	2,502	4,069	5,745	6,752	8,104
1,266	2,513	4,073	5,747	6,753	8,153
1,279	2,517	4,107	5,758	6,754	8,198
1,299	2,537	4,166	5,817	6,756	8,254
1,344	2,549	4,167	5,856	6,850	8,347
1,349	2,561	4,177	5,862	6,858	8,365
1,356	2,577	4,200	5,864	6,859	8,366
1,406	2,579	4,254	5,878	6,900	8,368
1,452	2,588	4,330	5,894	6,914	8,407
1,459	2,605	4,331	5,999	6,934	8,410
1,515	2,608	4,339	6,049	6,996	8,470
		4,340	6,059	7,004	

8,481	9,105	9,862	10,716	11,925	12,321	12,588
8,555	9,131	9,866	10,723	11,969	12,326	12,599
8,622	9,133	9,869	10,745	12,093	12,352	12,600
8,630	9,190	9,895	10,749	12,154	12,358	12,601
8,632	9,206	9,900	10,779	12,155	12,388	12,602
8,709	9,250	9,905	10,793	12,216	12,393	12,609
8,727	9,264	9,943	10,781	12,217	12,395	12,610
8,749	9,330	9,964	10,802	12,221	12,396	12,611
8,763	9,362	9,978	11,006	12,226	12,402	12,616
8,769	9,368	9,990	11,024	12,227	12,403	12,625
8,775	9,461	10,075	11,086	12,231	12,404	12,628
8,787	9,565	10,099	11,262	12,237	12,406	12,634
8,794	9,567	10,101	11,269	12,245	12,416	12,635
8,806	9,624	10,137	11,310	12,269	12,424	12,636
8,823	9,629	10,139	11,328	12,270	12,429	12,671
8,834	9,655	10,187	11,489	12,271	12,430	12,699
8,837	9,657	10,495	11,554	12,283	12,451	
8,858	9,658	10,542	11,693	12,286	12,486	
8,872	9,704	10,557	11,830	12,294	12,487	
8,878	9,792	10,587	11,860	12,295	12,488	
9,032	9,803	10,591	11,880	12,312		
9,040	9,819	10,633	11,899	12,313		

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING RADIATIONS ON BIOLOGICAL SYSTEMS

change in molecular size or configuration,
including polymerization, depolymerization
(see also the appropriate sections under
BIOCHEMICAL CHANGE, etc.)

128	2,712	4,691	7,262	8,291	10,185	12,429
318	2,727	5,072	7,266	8,362	10,910	12,513
417	2,901	5,107	7,286	8,769	11,007	12,593
633	2,914	5,136	7,375	8,775	11,310	12,607
877	3,126	5,421	7,420	9,279	11,541	12,611
1,189	3,189	5,906	7,528	9,327	11,756	12,612
1,242	3,339	6,169	7,688	9,332	11,826	
1,247	3,454	6,214	7,739	9,334	11,885	
1,772	3,948	6,355	7,743	9,448	11,891	
1,803	3,975	6,416	7,744	9,512	12,015	
2,081	4,028	6,473	7,844	9,797	12,072	
2,096	4,035	6,496	7,853	9,864	12,172	
2,116	4,076	6,738	7,979	9,939	12,237	
2,235	4,172	6,914	8,145	9,990	12,282	
2,245	4,397	7,012	8,146	10,014	12,317	
2,287	4,572	7,045	8,235	10,064	12,374	
2,436	4,614	7,185				
	4,658	7,243				

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING RADIATIONS ON BIOLOGICAL SYSTEMS

point-heat theory

427	3,773	9,635	10,249	10,494	12,617
479	4,691	10,102	10,491	11,576	

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING RADIATIONS ON BIOLOGICAL SYSTEMS

physiological function of radioactive materials normally present in biological systems
(see also genetics section and role of radiation in species formation and evolution)

6	477	3,724	7,959	8,629	9,268
102	592	3,805	8,314	8,630	9,286
114	757	4,044	8,315	8,631	9,352
134	883	4,225	8,316	8,632	9,411
144	2,109	4,377	8,363	8,633	9,904
154	2,230	4,529	8,420	8,634	9,986
157	3,069	4,572	8,568	8,635	10,069
184	3,089	4,647	8,573	8,636	10,655
209	3,090	4,998	8,590	8,637	10,963
329	3,325	5,481	8,605	8,638	10,978
331	3,326	6,194	8,627	8,834	12,510
371	3,723	6,731	8,628	9,185	12,514
449					

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING RADIATIONS ON BIOLOGICAL SYSTEMS

comparison of mode of action of ionizing radiation and other physical or chemical agents

50	2,355	4,527	7,077	8,631	10,016
114	2,369	4,614	7,090	8,632	10,524
134	2,428	4,622	7,091	8,633	10,537
144	2,643	4,658	7,232	8,634	10,655
157	2,673	4,759	7,266	8,635	10,700
184	2,676	4,815	7,301	8,636	10,870
209	2,759	4,819	7,799	8,637	10,955
391	2,760	4,876	7,843	8,644	11,086
427	2,825	5,107	7,844	8,651	11,344
469	2,829	5,113	7,853	8,727	11,352
479	2,871	5,129	7,862	8,770	11,538
592	2,938	5,429	7,897	8,917	11,712
617	3,044	5,501	7,959	8,999	12,059
699	3,046	5,502	8,256	9,069	12,230
757	3,090	5,505	8,363	9,109	12,245
961	3,197	5,534	8,366	9,185	12,247
997	3,325	5,673	8,368	9,286	12,279
1,122	3,326	5,692	8,375	9,294	12,282
1,445	3,335	5,694	8,409	9,330	12,284
1,452	3,341	6,049	8,420	9,377	12,292
1,488	3,419	6,059	8,470	9,511	12,313
1,538	3,465	6,508	8,471	9,559	12,340
1,765	3,948	6,599	8,553	9,560	12,346
1,773	4,028	6,858	8,600	9,625	12,370
1,794	4,039	6,911	8,602	9,704	12,376
1,819	4,073	6,934	8,605	9,833	12,384
2,040	4,086	6,997	8,611	9,864	12,405
2,219	4,321	7,012	8,622	9,938	12,406
2,221	4,414	7,052	8,627	9,939	12,411
2,230	4,415	7,069	8,628	9,964	12,593
2,309	4,491	7,072	8,629	9,990	

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING RADIATIONS ON BIOLOGICAL SYSTEMS

indirect effects - molecular level

1,122	1,602	2,020	2,318	2,378	2,764
1,151	1,734	2,094	2,333	2,551	2,783
1,390	1,864	2,287	2,357	2,588	3,045

3,052	4,791	6,208	7,063	8,872	11,818
3,241	5,136	6,324	7,188	9,032	12,216
3,390	5,159	6,420	7,232	9,368	12,217
4,009	5,201	6,564	7,233	9,810	12,221
4,200	5,502	6,569	7,799	9,990	12,227
4,422	5,856	6,619	8,337	10,187	12,352
4,473	5,894	6,675	8,366	10,769	12,384
4,474	6,137	6,746	8,367	11,147	12,403
4,554	6,160	6,886			

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING
RADIATIONS ON BIOLOGICAL SYSTEMS

indirect effects - within cell or organism

5	792	2,712	3,782	5,013	6,827
23	826	2,743	3,810	5,033	6,862
45	831	2,762	3,814	5,048	6,872
50	843	2,810	3,841	5,071	6,905
52	848	2,818	3,843	5,114	6,908
67	854	2,834	3,848	5,155	6,911
71	875	2,912	3,878	5,181	6,962
72	933	2,917	3,916	5,206	6,969
87	935	2,962	3,990	5,284	7,010
98	975	2,966	4,002	5,300	7,029
116	1,000	3,005	4,075	5,347	7,049
121	1,005	3,019	4,102	5,356	7,086
145	1,017	3,039	4,112	5,431	7,092
156	1,077	3,042	4,117	5,436	7,143
161	1,082	3,044	4,182	5,496	7,165
172	1,092	3,079	4,249	5,560	7,204
175	1,102	3,089	4,267	5,564	7,250
185	1,158	3,137	4,301	5,565	7,259
188	1,211	3,140	4,337	5,572	7,273
194	1,217	3,141	4,341	5,573	7,307
216	1,266	3,156	4,346	5,574	7,339
256	1,386	3,168	4,364	5,582	7,365
276	1,451	3,169	4,398	5,617	7,369
324	1,445	3,171	4,400	5,635	7,371
328	1,512	3,187	4,411	5,683	7,387
329	1,629	3,191	4,422	5,688	7,419
339	1,724	3,197	4,423	5,806	7,439
372	1,738	3,199	4,433	5,821	7,467
377	1,832	3,223	4,444	5,842	7,492
389	1,893	3,246	4,493	5,876	7,493
392	1,916	3,249	4,510	5,879	7,508
397	1,940	3,272	4,573	5,909	7,547
443	1,964	3,325	4,600	5,959	7,623
462	1,990	3,326	4,641	5,989	7,629
467	2,098	3,336	4,655	5,998	7,645
480	2,116	3,342	4,665	6,000	7,703
508	2,124	3,345	4,671	6,016	7,791
537	2,140	3,376	4,672	6,017	7,794
547	2,219	3,384	4,677	6,040	7,808
561	2,254	3,390	4,688	6,127	7,809
590	2,339	3,487	4,739	6,187	7,831
599	2,361	3,491	4,747	6,230	7,845
667	2,362	3,540	4,753	6,392	7,851
669	2,368	3,548	4,757	6,398	7,885
678	2,374	3,563	4,777	6,399	7,887
680	2,442	3,569	4,814	6,412	7,891
703	2,502	3,689	4,842	6,526	7,943
705	2,523	3,708	4,873	6,535	7,997
731	2,525	3,723	4,942	6,556	8,050
741	2,567	3,724	4,943	6,587	8,063
762	2,631	3,727	4,945	6,708	8,158
766	2,656	3,754	4,957	6,733	8,175
771	2,661	3,755	4,996	6,738	8,202
785	2,692	3,760	4,998	6,805	8,253
					8,271

8,313	8,597	9,168	9,608	10,531	12,028
8,322	8,634	9,319	9,618	10,564	12,036
8,333	8,635	9,348	9,619	10,590	12,183
8,363	8,638	9,382	9,939	10,704	12,197
8,403	8,726	9,478	9,961	10,997	12,281
8,405	8,817	9,507	9,968	11,285	12,287
8,422	8,845	9,554	9,976	11,558	12,298
8,440	8,888	9,570	10,054	11,578	12,397
8,481	8,890	9,576	10,123	11,586	12,437
8,483	8,927	9,590	10,125	11,613	12,489
8,486	8,995	9,598	10,182	11,906	12,511
8,513	9,016	9,599	10,419	11,913	12,512
8,568	9,030	9,601	10,527	12,003	
8,593	9,088	9,607		12,025	

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING RADIATIONS ON BIOLOGICAL SYSTEMS

theoretical mathematical interpretation of radiation lethality and morbidity data (see also resistance following previous exposure and residual injury under QUANTITATIVE ASPECTS, etc.)

108	3,684	6,030	7,275	8,053	9,299
795	4,132	6,119	7,294	8,054	9,706
890	4,309	6,179	7,296	8,118	9,740
895	4,668	6,220	7,453	8,318	9,758
1,053	4,787	6,243	7,469	8,319	9,968
1,073	4,788	6,244	7,486	8,669	10,700
1,159	4,964	6,430	7,487	8,824	10,704
1,411	5,052	6,440	7,540	8,828	11,187
1,417	5,107	6,441	7,642	8,844	11,250
1,634	5,134	6,604	7,662	8,949	11,503
1,737	5,138	6,788	7,798	8,955	12,210
1,788	5,140	6,982	7,843	9,001	12,250
2,274	5,184	7,052	7,859	9,069	12,334
2,407	5,476	7,090	7,935	9,164	12,367
2,513	5,518	7,091	7,937	9,202	12,398
2,948	5,607	7,101	7,971	9,219	12,438
2,949	5,679	7,213	8,034		
2,950	5,864				

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING RADIATIONS ON BIOLOGICAL SYSTEMS

mechanism of action of radiation protective agents or other agents or procedures modifying the response to irradiation

618	1,518	2,556	5,652	7,025	7,602
641	1,546	2,579	5,679	7,038	7,603
643	1,559	2,671	5,697	7,046	7,638
645	1,673	2,717	5,817	7,069	7,734
762	1,677	2,810	6,167	7,072	7,739
934	1,718	2,871	6,273	7,084	7,745
1,054	1,729	2,901	6,338	7,085	7,755
1,081	1,747	2,902	6,554	7,158	7,790
1,131	1,785	2,910	6,564	7,183	7,862
1,159	2,011	2,947	6,718	7,194	7,975
1,179	2,042	3,104	6,723	7,209	8,073
1,242	2,119	5,365	6,737	7,233	8,102
1,279	2,251	5,407	6,756	7,277	8,109
1,338	2,256	5,429	6,816	7,379	8,249
1,349	2,358	5,502	6,837	7,380	8,250
1,350	2,366	5,578	6,850	7,385	8,347
1,406	2,444	5,594	6,879	7,387	8,365
1,479	2,459	5,641	6,914	7,440	8,410
1,516	2,530	5,651	7,004	7,536	8,678

8,709	9,430	10,537	12,226	12,272	12,377
8,727	9,478	10,720	12,231	12,286	12,388
8,775	9,731	10,752	12,232	12,292	12,407
8,823	9,783	11,262	12,233	12,293	12,420
8,832	9,813	11,352	12,235	12,302	12,421
8,993	9,821	11,353	12,236	12,303	12,481
9,036	9,943	11,502	12,267	12,304	12,482
9,040	9,953	11,650	12,268	12,305	12,505
9,209	10,022	12,199	12,269	12,352	12,516
9,250	10,063	12,200	12,270	12,371	12,601
9,320	10,524	12,225	12,271		12,610

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING
RADIATIONS ON BIOLOGICAL SYSTEMS

permeability

436	3,769	5,301	7,217	8,604	11,262
669	3,824	5,561	7,251	9,033	12,172
1,059	3,896	5,734	7,344	9,345	12,187
2,072	4,397	6,425	7,617	9,693	12,194
2,514	4,658	6,447	7,853	9,984	12,196
2,673	4,719	6,578	8,081	10,647	12,230
3,341	4,896	6,599	8,527	10,694	12,280
3,485	5,294	7,105			

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS --- LISTED
ACCORDING TO TYPE OF EFFECT

Comparison of Effects of Ionizing Radiation
with Effects Produced by Exposure to Chemical
or Physical Agents or Non-Ionizing Radiation

11	2307	3637	6304	8013	10,590
78	2342	3659	6373	8188	11,153
106	2669	4876	6405	8399	11,626
173	3041	4999	6612	8409	11,714
810	3044	5017	7002	9242	12,030
1816	3144	5319	7104	9527	12,282
2161	3161	5520	7454	10,191	12,284
2246	3263	6202	7515	10,504	12,340

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

MORPHOLOGICAL CHANGES --- LISTED ACCORDING TO TYPE
OF EFFECT

Effect on Body Weight or Contour

149	1071	1344	1844	2228	2720
150	1075	1398	1894	2232	2721
171	1085	1441	1991	2261	2806
524	1128	1473	2024	2280	2811
525	1136	1489	2063	2312	2847
763	1170	1576	2088	2351	2848
765	1256	1674	2132	2438	2875
781	1292	1741	2197	2547	2885
913	1334	1746	2199	2639	2902
930					

2909	5520	6648	7253	8593	10,159
2910	5583	6768	7254	8594	10,176
2922	5635	6791	7267	8918	10,177
2940	5662	6829	7275	8926	10,189
2954	5684	6839	7337	8945	10,308
3053	5720	6875	7422	8990	10,339
3118	5782	6877	7633	8992	10,407
3413	5787	6895	7651	9158	10,409
3565	5794	6918	7671	9202	10,422
3685	5798	6953	7716	9213	10,426
3780	5830	6961	7820	9262	11,121
3986	5854	7002	7877	9267	11,197
3988	5859	7112	7937	9271	11,261
3991	6202	7114	8003	9329	11,871
4362	6260	7123	8053	9382	11,927
4366	6261	7125	8056	9530	12,211
4946	6277	7129	8116	9537	12,235
5044	6382	7135	8158	9538	12,270
5056	6397	7164	8331	9539	12,272
5115	6433	7206	8348	9541	12,276
5157	6514	7214	8355	9806	12,300
5372	6544	7237	8463	10,054	12,480
5403	6635				

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

MORPHOLOGICAL CHANGES --- LISTED ACCORDING
TO TYPE OF EFFECT

Effect on Cells

nucleus and nucleolus, including
chromosomes, ploidy, mitotic figures

18	1588	2784	3450	4287	4938
63	1599	2794	3477	4310	4963
68	1605	2801	3478	4323	4977
98	1608	2828	3512	4329	4978
111	1691	2877	3524	4342	4979
125	1741	2884	3573	4389	4999
130	1816	2899	3650	4446	5022
139	1860	2927	3680	4506	5023
224	1868	2958	3682	4508	5054
225	1904	2976	3697	4566	5120
326	1962	3053	3704	4567	5127
384	2025	3069	3712	4591	5128
411	2152	3071	3747	4605	5175
455	2183	3072	3748	4634	5183
523	2185	3094	3763	4646	5199
558	2205	3121	3797	4675	5319
565	2247	3145	3799	4717	5490
588	2307	3172	3818	4731	5514
611	2371	3173	3819	4742	5580
631	2378	3212	3881	4754	5614
734	2386	3213	3885	4781	5693
807	2456	3231	3958	4786	5741
884	2457	3277	3998	4792	5823
943	2465	3278	4065	4800	5997
956	2469	3311	4148	4806	6146
974	2516	3316	4177	4823	6149
1028	2584	3319	4181	4829	6210
1043	2685	3323	4191	4842	6211
1273	2692	3327	4233	4860	6212
1293	2705	3328	4245	4880	6217
1413	2728	3349	4250	4881	6297
1419	2730	3392	4253	4884	6321
1460	2759	3439	4255	4909	6373
1555	2781	3445	4270	4914	6376

6475	7011	8263	9062	10,594	12,103
6581	7096	8326	9134	10,784	12,106
6587	7269	8336	9143	10,794	12,114
6602	7274	8368	9168	10,800	12,135
6625	7280	8375	9433	11,523	12,161
6640	7281	8380	9477	11,539	12,220
6641	7413	8458	9533	11,571	12,247
6666	7441	8526	9559	11,593	12,284
6713	7561	8535	9695	11,595	12,301
6720	7576	8551	9788	11,658	12,357
6745	7594	8805	9856	11,905	12,361
6830	7636	8831	9938	11,916	12,376
6855	7714	8893	9959	11,993	12,406
6874	7848	8943	10,182	11,995	12,409
6899	7883	8969	10,277	12,042	12,420
6901	8195	8996	10,296	12,059	12,450
6922	8197	9016	10,562	12,086	12,516
7009	8227	9056	10,580		

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

MORPHOLOGICAL CHANGES --- LISTED ACCORDING TO TYPE
OF EFFECT

Effect on Cells

cytoplasm and its structural components

18	2456	3680	4806	6922	10,580
111	2465	3682	4842	7252	10,590
130	2492	3697	4860	7274	10,594
139	2516	3704	4880	7280	10,784
558	2685	3797	4884	7413	10,800
565	2692	3885	4976	7441	11,539
588	2728	3958	4979	7636	11,593
611	2784	3998	5054	7714	11,764
631	2801	4065	5537	7883	11,773
943	2823	4181	5741	8380	11,905
974	2828	4245	5823	8552	11,993
1043	3053	4250	5828	8556	11,995
1067	3072	4253	5997	8604	12,059
1413	3121	4255	6149	8831	12,086
1419	3145	4257	6212	8908	12,095
1555	3172	4287	6217	8997	12,114
1574	3319	4310	6373	9016	12,161
1691	3323	4323	6376	9134	12,284
1868	3327	4329	6587	9477	12,357
2025	3392	4389	6625	9533	12,361
2085	3445	4566	6745	9695	12,409
2183	3450	4781	6830	10,182	12,420
2185	3512	4786	6874	10,277	12,450
2247	3573	4792	6899	10,562	12,516
2319	3650	4800	6901		

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRADIATION, MULTICELLULAR ANIMALS;
LISTED ACCORDING TO TISSUE

Immature Invertebrates

36	224	229	693	747	1605
124	225	299	734	901	1904

2025	3818	4233	4713	6155	8535
2685	3819	4270	4876	6173	8556
2823	3831	4388	4909	6713	8562
2960	3836	4390	4938	6720	10,854
3215	3845	4395	4976	6803	11,232
3279	3981	4453	4999	7194	11,773
3370	4031	4493	5022	7203	12,014
3578	4041	4591	5077	7576	12,020
3693	4101	4605	5079	8376	12,086
3771	4110	4635	5267	8458	12,103
3811	4177	4646	6073	8526	

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRADIATION, MULTICELLULAR ANIMALS;
LISTED ACCORDING TO TISSUE

Mature Invertebrates

106	2524	3348	4245	6001	7540
299	2685	3381	4329	6129	7583
301	3069	3521	4378	6146	8257
693	3132	3561	4426	6172	8942
1028	3196	3693	4600	6459	8943
1415	3230	3712	5079	6893	10,118
1608	3248	3748	5437	7329	12,251
2516	3328	4041	5603		

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRADIATION, MULTICELLULAR ANIMALS;
LISTED ACCORDING TO TISSUE

Zygotes and Embryos of Vertebrates

4	2112	3473	3857	6149	8375
18	2356	3474	3879	6247	8386
34	2361	3475	3950	6318	8391
39	2362	3493	3958	6319	8897
224	2390	3516	4007	6373	9169
230	2456	3585	4165	6587	10,166
243	2457	3633	4181	6745	10,277
273	2486	3661	4255	6762	10,579
373	2493	3682	4389	6799	10,975
591	2784	3708	4792	6820	11,663
631	2889	3709	4949	6830	11,727
676	2977	3710	5039	6922	11,890
771	3111	3729	5285	7325	11,993
903	3122	3759	5390	7465	11,997
974	3123	3760	5741	7477	12,040
1047	3224	3792	5744	7583	12,041
1419	3302	3799	5752	7595	12,099
1466	3319	3817	5753	7992	12,143
1597	3404	3854	5754	8043	12,160
1862	3405	3855	5910	8239	12,491
1868	3406	3856			

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRADIATION, MULTICELLULAR ANIMALS;
LISTED ACCORDING TO TISSUE

Post-embryonic Vertebrates

peripheral blood

53	1489	2047	2778	4198	6028
80	1490	2050	2782	4204	6048
116	1509	2054	2786	4265	6100
194	1524	2080	2804	4312	6185
211	1525	2105	2806	4364	6210
216	1542	2129	2810	4396	6212
241	1546	2144	2825	4400	6213
319	1552	2164	2830	4456	6224
344	1556	2173	2848	4468	6251
443	1558	2175	2853	4495	6256
489	1561	2176	2854	4542	6260
525	1573	2193	2855	4607	6261
553	1580	2196	2856	4611	6282
598	1592	2199	2857	4650	6290
600	1598	2223	2861	4684	6313
667	1644	2228	2866	4733	6322
691	1660	2233	2878	4753	6325
716	1666	2241	2885	4783	6350
719	1670	2261	2887	4785	6363
728	1671	2268	2902	4814	6367
746	1674	2274	2931	4860	6391
754	1688	2286	2947	4888	6398
778	1689	2294	2951	4930	6411
814	1707	2302	2956	4942	6425
825	1708	2314	2963	4943	6433
856	1713	2315	2970	4953	6434
861	1724	2351	2981	4986	6448
878	1741	2382	2986	5032	6450
879	1768	2417	2987	5044	6456
884	1799	2428	2989	5057	6468
942	1811	2438	2991	5064	6469
964	1812	2442	3006	5080	6497
982	1815	2451	3020	5111	6516
1003	1826	2464	3115	5115	6526
1092	1838	2473	3139	5117	6536
1116	1839	2485	3165	5157	6537
1126	1845	2489	3208	5318	6541
1129	1863	2497	3235	5363	6544
1205	1867	2503	3275	5434	6598
1209	1869	2504	3285	5484	6627
1214	1884	2522	3399	5534	6630
1260	1889	2543	3403	5564	6632
1284	1890	2567	3419	5582	6637
1288	1897	2613	3463	5588	6652
1289	1911	2614	3467	5611	6654
1301	1915	2620	3487	5612	6670
1305	1918	2625	3538	5615	6710
1334	1919	2629	3540	5637	6728
1338	1920	2639	3565	5646	6739
1341	1926	2640	3586	5657	6773
1343	1933	2678	3599	5668	6835
1365	1938	2679	3602	5820	6842
1397	1949	2707	3777	5830	6848
1398	1960	2717	3791	5845	6851
1412	1971	2723	3930	5866	6862
1416	1982	2726	3934	5874	6867
1422	1999	2736	3946	5886	6875
1425	2009	2748	3960	5891	6895
1440	2022	2753	3966	5941	6897
1473	2026	2758	4054	5944	6918
1480	2027	2762	4064	5983	6926
			4169	5994	6985

6999	7664	8833	9522	9802	11,645
7001	7665	8905	9530	9806	11,661
7002	7693	8906	9531	9929	11,666
7004	7696	8921	9532	9932	11,667
7007	7697	8933	9536	9934	11,680
7030	7707	8934	9537	9949	11,681
7041	7708	8946	9538	9955	11,696
7042	7716	8952	9539	9961	11,750
7064	7723	8953	9541	9976	11,847
7086	7749	9012	9545	9979	11,849
7122	7760	9046	9549	9980	11,852
7126	7782	9048	9550	9981	11,853
7127	7789	9067	9554	10,005	11,858
7128	7821	9079	9557	10,343	11,863
7133	7823	9081	9566	10,349	11,864
7135	7835	9088	9569	10,362	11,867
7146	7880	9120	9571	10,402	11,871
7166	7928	9125	9579	10,423	11,873
7197	7940	9135	9580	10,496	11,882
7208	7978	9137	9581	10,530	11,889
7210	7993	9147	9583	10,559	11,892
7230	8046	9156	9584	10,594	11,897
7237	8048	9201	9585	10,701	11,909
7317	8103	9203	9586	10,709	11,958
7356	8114	9207	9587	10,717	11,974
7357	8116	9208	9589	10,746	11,979
7368	8176	9214	9590	10,753	12,003
7374	8220	9230	9591	10,775	12,043
7388	8225	9236	9592	10,800	12,049
7423	8250	9242	9595	10,811	12,112
7427	8331	9254	9596	10,821	12,137
7433	8332	9259	9597	10,829	12,146
7447	8345	9271	9598	10,866	12,164
7453	8377	9278	9599	10,987	12,235
7458	8409	9290	9600	10,998	12,239
7479	8411	9357	9609	11,015	12,241
7500	8415	9380	9610	11,165	12,254
7506	8437	9386	9611	11,186	12,255
7511	8440	9387	9616	11,249	12,256
7513	8463	9468	9618	11,296	12,275
7514	8483	9470	9642	11,302	12,278
7523	8488	9471	9644	11,332	12,296
7531	8492	9472	9653	11,336	12,300
7548	8493	9473	9667	11,340	12,339
7565	8550	9475	9670	11,356	12,444
7568	8565	9492	9691	11,445	12,445
7569	8567	9495	9710	11,453	12,448
7617	8595	9497	9726	11,527	12,480
7622	8639	9499	9752	11,549	12,504
7623	8782	9504	9774	11,569	12,577
7633	8798	9515	9781	11,577	12,605
7634	8817	9516	9800	11,613	12,640
					12,706

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION , MULTICELLULAR ANIMALS

MORPHOLOGICAL CHANGES, etc. -- LISTED ACCORDING TO
TISSUE

Hematopoietic Tissue

15	306	611	830	978	1,170
74	344	707	832	982	1,188
77	370	716	861	1,003	1,211
80	421	740	865	1,005	1,214
86	422	746	875	1,066	1,245
113	496	754	882	1,067	1,255
115	525	756	948	1,092	1,257
150	566	786	964	1,156	1,260
276	590	825	975	1,169	1,284

1,289	2,778	4,402	6,536	7,993	9,570
1,301	2,810	4,433	6,543	7,999	9,571
1,305	2,848	4,456	6,598	8,091	9,582
1,306	2,855	4,655	6,630	8,092	9,584
1,341	2,857	4,784	6,632	8,116	9,592
1,365	2,859	4,834	6,652	8,210	9,594
1,366	2,879	4,858	6,654	8,211	9,606
1,398	2,902	4,859	6,670	8,225	9,610
1,412	2,903	4,861	6,728	8,238	9,611
1,428	2,909	4,862	6,739	8,279	9,612
1,434	2,918	4,884	6,774	8,329	9,614
1,460	2,924	4,885	6,820	8,331	9,615
1,462	2,925	4,888	6,839	8,332	9,617
1,473	2,927	4,942	6,867	8,385	9,618
1,524	2,939	4,953	6,871	8,452	9,643
1,537	2,940	5,019	6,875	8,460	9,711
1,546	2,947	5,032	6,877	8,471	9,714
1,560	2,956	5,044	6,878	8,490	9,727
1,592	2,987	5,059	6,895	8,517	9,728
1,598	2,989	5,070	6,897	8,533	9,749
1,644	3,010	5,080	6,933	8,833	9,751
1,650	3,026	5,095	6,961	8,906	9,761
1,674	3,042	5,111	6,975	8,916	9,781
1,682	3,118	5,117	7,007	8,935	9,804
1,741	3,120	5,125	7,070	8,946	9,806
1,799	3,147	5,132	7,101	8,950	9,811
1,838	3,155	5,184	7,103	9,004	9,829
1,860	3,165	5,231	7,124	9,088	9,878
1,863	3,206	5,258	7,133	9,094	9,879
1,887	3,235	5,362	7,155	9,120	9,880
1,890	3,267	5,375	7,200	9,135	9,961
1,918	3,275	5,465	7,202	9,147	9,980
1,919	3,285	5,485	7,216	9,177	9,982
1,982	3,287	5,516	7,230	9,201	9,997
2,036	3,372	5,520	7,237	9,203	10,191
2,054	3,403	5,534	7,269	9,207	10,328
2,056	3,413	5,537	7,274	9,213	10,339
2,129	3,419	5,543	7,275	9,236	10,343
2,144	3,490	5,562	7,296	9,242	10,349
2,169	3,493	5,574	7,317	9,243	10,551
2,176	3,546	5,578	7,368	9,277	10,588
2,185	3,552	5,580	7,376	9,357	10,594
2,196	3,565	5,664	7,387	9,386	10,616
2,199	3,599	5,665	7,416	9,387	10,640
2,205	3,658	5,711	7,433	9,388	10,701
2,206	3,702	5,765	7,439	9,430	10,717
2,217	3,706	5,782	7,440	9,433	10,765
2,219	3,707	5,783	7,447	9,464	10,837
2,233	3,722	5,818	7,485	9,465	10,866
2,245	3,741	5,887	7,499	9,466	10,987
2,250	3,791	5,921	7,541	9,467	10,995
2,314	3,797	5,983	7,565	9,468	11,015
2,315	3,814	6,005	7,583	9,469	11,027
2,334	3,827	6,026	7,590	9,470	11,129
2,342	3,850	6,047	7,596	9,471	11,130
2,383	3,881	6,056	7,622	9,472	11,136
2,439	3,882	6,166	7,623	9,473	11,165
2,451	3,885	6,182	7,666	9,474	11,233
2,459	3,986	6,202	7,673	9,475	11,249
2,485	3,991	6,210	7,681	9,504	11,301
2,504	4,075	6,211	7,719	9,507	11,303
2,507	4,111	6,212	7,722	9,526	11,332
2,567	4,114	6,222	7,754	9,531	11,333
2,568	4,131	6,224	7,760	9,532	11,373
2,578	4,137	6,246	7,761	9,537	11,376
2,606	4,164	6,256	7,781	9,538	11,445
2,613	4,205	6,288	7,810	9,540	11,453
2,639	4,249	6,360	7,820	9,541	11,508
2,688	4,265	6,384	7,821	9,542	11,571
2,712	4,310	6,431	7,856	9,545	11,577
2,717	4,370	6,433	7,941	9,548	11,645
2,762	4,398	6,497	7,978	9,569	11,661
	4,400				

11,732	11,876	12,043	12,258	12,409	12,497
11,733	11,889	12,049	12,272	12,420	12,500
11,734	11,897	12,112	12,297	12,421	12,504
11,763	11,958	12,176	12,299	12,440	12,505
11,847	11,980	12,198	12,300	12,445	12,516
11,849	12,004	12,239	12,333	12,493	12,577
11,865	12,030	12,241	12,340	12,494	12,605
					12,640

MORPHOLOGICAL CHANGES AFTER TOTAL OR ----

MORPHOLOGICAL CHANGES etc.---- LISTED ACCORDING TO TISSUE

Vascular System

91	1,935	4,114	6,617	8,385	11,208
94	2,018	4,126	6,618	8,463	11,221
109	2,030	4,169	6,622	8,497	11,225
111	2,031	4,252	6,625	8,778	11,264
159	2,076	4,359	6,649	8,873	11,315
166	2,176	4,467	6,652	8,927	11,324
182	2,199	4,479	6,658	8,946	11,370
187	2,254	4,481	6,683	9,120	11,376
205	2,319	4,494	6,764	9,125	11,513
207	2,422	4,530	6,781	9,238	11,516
253	2,515	4,597	6,877	9,272	11,518
313	2,568	4,606	6,897	9,349	11,545
369	2,603	4,615	7,345	9,356	11,571
490	2,613	4,654	7,349	9,357	11,589
525	2,743	4,806	7,353	9,472	11,637
572	2,753	4,807	7,357	9,527	11,767
575	2,809	4,819	7,358	9,541	11,770
620	2,859	4,860	7,360	9,742	11,819
754	2,909	4,862	7,363	9,971	11,864
790	2,931	4,863	7,364	9,974	11,868
875	2,953	4,877	7,368	10,191	11,869
949	2,975	4,953	7,383	10,339	11,877
1,154	3,010	5,038	7,432	10,344	11,879
1,285	3,113	5,082	7,440	10,374	11,897
1,301	3,135	5,096	7,454	10,464	11,902
1,341	3,139	5,125	7,478	10,549	11,971
1,398	3,161	5,158	7,565	10,594	12,049
1,513	3,267	5,520	7,578	10,787	12,075
1,575	3,275	6,230	7,628	10,811	12,106
1,650	3,297	6,242	7,671	10,931	12,114
1,676	3,327	6,257	7,695	10,980	12,123
1,741	3,420	6,293	7,751	10,987	12,135
1,767	3,604	6,311	7,760	10,998	12,144
1,799	3,608	6,346	7,761	11,015	12,145
1,859	3,701	6,384	7,821	11,031	12,176
1,865	3,736	6,393	7,901	11,063	12,189
1,871	3,827	6,412	7,970	11,085	12,052
1,922	3,887	6,536	8,096	11,096	12,053
1,923	3,998	6,562	8,188	11,145	
	4,041	6,613	8,334	11,206	

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL --- etc.

MORPHOLOGICAL CHANGES, etc. --- ACCORDING TO TISSUE

Endocrine Glands

8	591	1,141	1,679	2,176	2,765
75	667	1,212	1,682	2,364	2,803
123	701	1,255	1,799	2,656	2,859
221	830	1,368	1,859	2,660	2,899
328	933	1,420	1,886	2,667	2,947
378	975	1,422	2,108	2,684	2,956
480	1,005	1,435	2,127	2,689	3,010
589	1,034	1,513	2,148	2,704	3,147

3,253	5,520	6,402	7,978	9,734	11,100
3,592	5,617	6,613	8,088	9,742	11,127
3,597	5,618	6,736	8,091	9,777	11,205
3,795	5,635	6,757	8,200	9,982	11,296
3,882	5,636	6,877	8,331	10,381	11,452
4,055	5,689	6,933	8,891	10,410	11,658
4,075	5,762	6,941	8,946	10,551	11,700
4,455	5,823	7,104	8,980	10,570	11,864
4,655	5,846	7,110	8,982	10,573	11,870
4,699	5,958	7,165	8,983	10,641	11,876
4,860	5,997	7,368	9,216	10,643	11,897
5,046	6,202	7,432	9,471	10,709	12,038
5,062	6,206	7,450	9,472	10,718	12,049
5,143	6,213	7,560	9,527	10,825	12,127
5,207	6,217	7,590	9,541	10,827	12,135
5,290	6,248	7,760	9,707		
5,423	6,384	7,970			

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL etc.

MORPHOLOGICAL CHANGES etc. --- ACCORDING TO TISSUE

Exocrine Glands

8	1,799	2,518	6,735	7,760	9,804
75	1,888	2,859	6,933	7,978	10,168
119	1,955	3,398	6,941	9,255	10,551
1,238	2,010	3,565	7,314	9,472	11,031
1,574	2,030	3,886	7,368	9,477	11,700
1,679	2,036	5,705	7,505	9,788	11,876
1,682	2,176	6,384	7,742		
		6,652			

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL etc.

MORPHOLOGICAL CHANGES --- ACCORDING TO TISSUE

Connective Tissue Other Than Bone and Cartilage

91	2,254	4,341	6,897	8,946	11,031
111	2,319	4,481	7,432	9,125	11,206
825	2,603	4,495	7,454	9,146	11,221
832	2,743	4,684	7,491	9,243	11,225
1,004	2,749	4,806	7,508	9,472	11,249
1,037	2,809	5,225	7,553	9,507	11,296
1,061	3,218	5,385	7,634	9,551	11,326
1,067	3,275	5,647	7,695	9,818	11,343
1,184	3,327	5,828	7,700	9,944	11,376
1,370	3,420	5,879	7,722	9,971	11,626
1,377	3,536	6,202	7,751	10,106	11,823
1,414	3,563	6,210	7,759	10,549	11,905
1,431	3,609	6,212	7,760	10,590	11,970
1,628	3,767	6,613	7,810	10,746	12,075
1,799	3,830	6,618	8,116	10,800	12,077
1,881	3,832	6,625	8,334	10,807	12,092
1,981	4,028	6,717	8,525	10,931	12,176
2,018	4,148	6,781	8,533	10,980	12,198
2,030	4,257	6,875	8,569	10,990	12,361
2,176					12,394

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL etc.

MORPHOLOGICAL CHANGES etc. -- LISTED ACCORDING TO TISSUE

Bone and Cartilage

77	113	862	1,225	1,383	1,485
97	325	949	1,382	1,434	1,655

1,696	3,567	5,441	7,345	9,273	11,042
1,799	3,589	5,485	7,368	9,347	11,092
1,859	3,624	5,795	7,433	9,541	11,111
1,881	3,660	5,956	7,563	9,551	11,128
1,885	3,791	5,975	7,565	9,569	11,146
1,888	3,796	6,006	7,583	9,710	11,162
2,036	3,827	6,011	7,628	9,733	11,211
2,176	3,991	6,012	7,710	9,808	11,225
2,233	4,072	6,065	7,760	9,811	11,291
2,359	4,131	6,135	8,001	9,815	11,294
2,446	4,375	6,176	8,116	10,178	11,301
2,527	4,417	6,360	8,149	10,325	11,303
2,621	4,480	6,365	8,183	10,343	11,452
2,765	4,576	6,384	8,360	10,407	11,634
2,859	4,588	6,717	8,490	10,452	11,757
2,875	4,699	6,759	8,686	10,549	11,766
2,904	4,705	6,823	8,861	10,660	11,897
2,905	4,760	6,892	8,937	10,662	12,063
3,115	4,834	7,078	8,954	10,717	12,202
3,150	4,862	7,124	9,223	10,892	12,439
3,151	4,863	7,202	9,237	10,917	12,440
3,310	5,045	7,274	9,239	10,980	12,441
3,534	5,062	7,316	9,244	10,988	12,442
3,565	5,317	7,323			12,605
					12,606

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL etc.

MORPHOLOGICAL CHANGES etc. -- ACCORDING TO TISSUE

Reticulo-endothelial System (see also hematopoietic tissues and connective tissue)

291	3,010	4,402	7,235	8,385	10,843
830	3,053	4,495	7,424	8,569	10,920
832	3,118	4,684	7,447	8,988	10,931
1,067	3,145	4,806	7,485	9,321	10,990
1,178	3,206	4,885	7,531	9,357	10,995
1,255	3,372	5,177	7,565	9,388	11,027
1,293	3,659	5,403	7,596	9,472	11,195
1,513	3,702	6,210	7,760	9,540	11,233
1,799	3,707	6,217	7,761	9,542	11,249
1,863	3,722	6,224	7,820	9,594	11,333
2,176	3,741	6,246	7,821	9,606	11,334
2,183	3,791	6,871	7,843	9,611	11,571
2,206	3,797	6,875	7,882	9,617	11,897
2,217	3,882	6,897	8,091	9,643	12,136
2,288	3,901	6,901	8,116	9,714	12,177
2,319	4,204	6,933	8,279	9,816	12,198
2,778	4,383	6,954	8,332	10,775	12,201
2,920					

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY etc.

MORPHOLOGICAL CHANGES etc. -- LISTED ACCORDING TO TISSUE

Female Reproductive System

58	878	1,675	2,085	3,116	3,991
61	941	1,742	2,176	3,346	4,006
123	954	1,746	2,205	3,468	4,078
130	1,043	1,768	2,301	3,481	4,085
219	1,152	1,783	2,322	3,484	4,156
269	1,170	1,799	2,334	3,607	4,240
327	1,190	1,852	2,606	3,653	4,250
591	1,260	1,854	2,778	3,659	4,455
707	1,353	1,923	2,859	3,675	4,565
809	1,474	1,970	3,041	3,742	4,616
858	1,513	2,056	3,064	3,828	4,619

4,731	5,548	6,777	8,222	9,982	11,621
4,829	5,865	6,778	8,424	10,191	11,780
4,946	5,990	6,780	8,460	10,551	11,870
4,996	5,993	6,799	8,609	10,559	11,874
5,002	5,997	6,877	8,614	10,689	12,004
5,059	6,222	6,941	8,618	10,811	12,049
5,070	6,384	6,983	8,620	10,837	12,107
5,096	6,403	7,368	8,623	10,982	12,124
5,149	6,405	7,447	8,649	11,221	12,178
5,205	6,431	7,522	8,908	11,249	12,209
5,207	6,544	7,537	9,471	11,363	12,272
5,280	6,652	7,553	9,676	11,515	12,355
5,281	6,668	7,741	9,734	11,521	12,427
	6,739	7,843	9,804	11,618	

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL etc.

MORPHOLOGICAL CHANGES, etc. etc. --- ACCORDING TO TISSUE

Male Reproductive System

10	1,644	3,540	5,883	8,116	11,249
150	1,682	3,598	5,951	8,297	11,265
163	1,691	3,629	6,068	8,424	11,376
265	1,724	3,676	6,081	8,460	11,515
292	1,738	3,691	6,202	8,490	11,522
428	1,741	3,843	6,210	8,649	11,534
591	1,742	3,867	6,212	8,946	11,535
707	1,768	3,991	6,222	9,060	11,542
740	1,783	4,006	6,384	9,202	11,571
754	1,799	4,085	6,431	9,203	11,614
764	1,930	4,240	6,544	9,325	11,618
878	2,029	4,546	6,652	9,348	11,620
941	2,056	4,616	6,739	9,357	11,621
948	2,169	4,637	6,740	9,384	11,723
950	2,176	4,858	6,899	9,428	11,724
951	2,189	4,859	6,901	9,471	11,725
987	2,205	4,860	6,941	9,472	11,726
1,156	2,334	4,861	6,981	9,531	11,735
1,190	2,426	4,869	6,983	9,533	11,736
1,214	2,429	4,944	7,204	9,552	11,737
1,260	2,508	5,070	7,274	9,577	11,738
1,301	2,669	5,214	7,275	9,734	11,780
1,307	2,778	5,321	7,368	9,982	11,781
1,308	2,789	5,428	7,447	10,339	11,823
1,353	2,853	5,485	7,453	10,393	11,847
1,373	2,909	5,486	7,529	10,426	11,870
1,385	2,927	5,509	7,555	10,594	11,874
1,513	2,958	5,520	7,666	10,754	11,898
1,565	3,107	5,534	7,787	10,811	12,049
1,581	3,118	5,562	7,938	10,834	12,154
1,598	3,489	5,616	7,969	10,837	12,277
1,627	3,492	5,701	7,978	10,982	12,299
1,628	3,539	5,788	8,031	11,052	

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL etc.

MORPHOLOGICAL CHANGES etc., etc. --- ACCORDING TO TISSUE

Liver

150	1,426	2,183	2,774	3,218	3,484
241	1,513	2,205	2,859	3,287	3,490
525	1,682	2,212	2,871	3,297	3,658
740	1,767	2,214	2,909	3,360	3,702
832	1,799	2,248	3,053	3,374	3,704
1,072	1,808	2,288	3,118	3,436	3,741
1,124	1,881	2,485	3,151	3,450	3,797
1,293	2,176	2,731	3,206	3,479	3,830

3,889	6,384	7,530	8,385	9,714	11,622
4,655	6,405	7,565	8,490	9,749	11,700
4,784	6,536	7,590	8,507	10,339	11,864
4,892	6,550	7,673	8,935	10,344	11,865
4,953	6,652	7,760	8,946	10,374	11,876
5,019	6,877	7,820	8,950	10,551	11,991
5,188	6,897	7,821	8,985	10,717	11,994
5,297	6,901	7,832	9,243	10,920	12,004
5,428	6,933	7,883	9,257	11,027	12,049
5,578	6,954	7,978	9,388	11,185	12,150
5,633	7,117	8,035	9,472	11,233	12,176
5,880	7,129	8,263	9,541	11,249	12,299
6,213	7,368	8,279	9,645	11,334	12,420
6,328	7,440				

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL etc.

MORPHOLOGICAL CHANGES etc., etc. --- LISTED ACCORDING TO TISSUE

Kidney; Urinary Tract

94	1,881	3,266	6,652	8,116	10,374
159	2,176	3,371	6,770	8,176	10,411
182	2,199	3,609	6,877	8,385	10,464
525	2,301	3,736	6,897	8,419	10,504
576	2,667	3,737	6,901	8,497	10,551
832	2,688	4,381	6,933	8,946	10,717
949	2,859	4,860	7,274	9,075	10,955
1,021	2,870	4,892	7,368	9,243	11,153
1,154	2,909	5,060	7,447	9,342	11,249
1,255	2,947	5,520	7,530	9,433	11,764
1,293	2,956	5,880	7,565	9,472	11,847
1,315	3,010	6,213	7,590	9,541	11,864
1,334	3,041	6,384	7,666	9,733	11,876
1,513	3,143	6,405	7,673	9,749	11,897
1,768	3,166	6,536	7,760	10,189	12,004
1,783	3,206	6,550	7,970	10,191	12,037
1,799	3,209	6,562	7,978	10,339	12,049
			8,035	10,343	12,176

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL etc.

MORPHOLOGICAL CHANGES etc., etc. --- ACCORDING TO TISSUE

Respiratory System

111	2,498	4,820	7,447	9,231	10,722
150	2,595	4,860	7,454	9,346	10,843
241	2,667	4,780	7,590	9,472	10,967
570	2,732	5,062	7,601	9,530	11,129
960	2,765	5,534	7,651	9,536	11,130
1,178	2,859	6,165	7,672	9,541	11,249
1,197	2,909	6,384	7,673	9,749	11,264
1,215	2,945	6,397	7,702	9,751	11,373
1,334	3,010	6,409	7,760	9,761	11,452
1,387	3,011	6,652	8,035	10,053	11,518
1,513	3,051	6,759	8,283	10,176	11,763
1,682	3,198	6,769	8,297	10,189	11,864
1,799	3,604	7,274	8,496	10,328	11,897
1,859	3,608	7,345	8,795	10,349	12,049
1,881	3,677	7,368	8,946	10,701	12,077
2,176	3,741	7,384	9,203	10,716	12,089
2,485	4,500				

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL etc.

MORPHOLOGICAL CHANGES, etc. etc. --- ACCORDING TO TISSUE

Eyes					
55	1,143	2,443	6,111	7,213	9,472
285	1,169	2,475	6,195	7,238	9,786
289	1,202	2,623	6,196	7,260	10,116
379	1,237	2,866	6,234	7,275	10,146
453	1,261	2,892	6,339	7,377	10,474
484	1,262	3,101	6,376	7,473	10,508
514	1,386	3,103	6,482	7,478	10,923
588	1,413	3,280	6,536	7,572	11,322
614	1,483	3,281	6,624	7,618	11,506
653	1,706	3,323	6,625	7,661	11,516
654	1,816	3,582	6,686	7,707	11,533
660	1,818	3,879	6,758	7,913	11,639
718	1,825	4,019	6,759	8,033	11,714
752	1,881	4,331	6,831	8,117	11,778
764	1,935	4,765	6,869	8,124	11,779
780	2,117	5,331	7,015	8,140	11,869
818	2,244	5,560	7,016	8,266	11,875
866	2,308	5,670	7,017	8,285	12,122
878	2,310	5,872	7,018	8,288	12,324
892	2,348	5,907	7,060	8,399	12,389
984	2,422	5,996	7,074	8,400	12,392
1,026	2,424	6,018	7,144	8,946	12,683
1,078	2,437	6,043	7,170	9,078	12,689

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL etc.

MORPHOLOGICAL CHANGES, etc., etc. --- ACCORDING TO TISSUE

Gastrointestinal System					
15	1,783	3,569	6,056	7,832	10,197
16	1,799	3,677	6,144	7,978	10,339
68	1,851	3,882	6,222	8,053	10,551
91	1,865	3,901	6,331	8,176	10,594
150	1,881	4,125	6,384	8,190	10,640
525	1,908	4,370	6,409	8,196	10,717
716	1,955	4,467	6,652	8,308	10,811
738	2,036	4,479	6,735	8,385	10,994
740	2,056	4,481	6,759	8,497	11,015
746	2,176	4,655	6,818	8,596	11,085
754	2,205	4,699	6,839	8,907	11,136
875	2,317	4,809	6,845	8,916	11,206
894	2,334	4,860	6,875	8,946	11,249
959	2,400	4,890	6,895	8,963	11,315
973	2,485	4,946	6,897	8,985	11,337
989	2,492	4,953	6,933	9,094	11,539
1,086	2,515	5,092	6,941	9,134	11,594
1,255	2,606	5,125	6,980	9,203	11,700
1,260	2,613	5,141	7,130	9,213	11,857
1,301	2,688	5,157	7,147	9,255	11,864
1,342	2,778	5,279	7,212	9,315	11,897
1,362	2,859	5,318	7,274	9,357	11,991
1,398	2,909	5,532	7,275	9,472	12,049
1,473	2,927	5,534	7,314	9,477	12,079
1,513	3,009	5,561	7,368	9,481	12,080
1,574	3,010	5,578	7,447	9,526	12,123
1,598	3,102	5,613	7,555	9,544	12,272
1,644	3,147	5,637	7,666	9,557	12,351
1,650	3,327	5,733	7,754	9,573	12,420
1,682	3,479	5,940	7,760	9,975	12,423
1,741	3,490	6,053			12,605

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL etc.

MORPHOLOGICAL CHANGES, etc. etc. --- ACCORDING TO TISSUE

Skin and Appendages

11	1,444	2,875	4,407	6,411	8,143
15	1,484	2,905	4,416	6,429	8,144
76	1,502	2,931	4,425	6,437	8,179
77	1,510	2,943	4,452	6,438	8,259
78	1,520	3,010	4,480	6,440	8,289
91	1,555	3,038	4,481	6,441	8,342
112	1,567	3,041	4,495	6,443	8,414
150	1,648	3,086	4,496	6,461	8,569
173	1,682	3,111	4,507	6,470	8,574
223	1,696	3,113	4,526	6,536	8,594
224	1,698	3,118	4,530	6,562	8,625
240	1,705	3,139	4,545	6,567	8,778
330	1,783	3,156	4,575	6,569	8,837
410	1,799	3,157	4,597	6,597	8,861
416	1,853	3,215	4,612	6,611	8,875
420	1,859	3,233	4,649	6,612	8,877
451	1,865	3,257	4,706	6,615	8,927
455	1,873	3,259	4,733	6,618	8,946
456	1,874	3,260	4,740	6,619	8,948
478	1,881	3,263	4,765	6,621	8,985
481	1,882	3,334	4,860	6,622	8,994
483	1,921	3,389	4,869	6,627	9,226
484	1,952	3,392	5,009	6,636	9,247
490	1,981	3,413	5,017	6,652	9,275
500	1,989	3,416	5,042	6,678	9,292
502	2,018	3,417	5,088	6,684	9,344
525	2,031	3,421	5,158	6,715	9,472
527	2,035	3,433	5,165	6,758	9,515
528	2,036	3,434	5,168	6,759	9,561
542	2,056	3,479	5,241	6,784	9,569
546	2,074	3,514	5,262	6,836	9,573
558	2,126	3,536	5,263	6,852	9,733
567	2,176	3,555	5,283	6,948	9,739
575	2,188	3,563	5,319	6,951	9,769
580	2,234	3,583	5,378	7,045	9,817
604	2,246	3,599	5,405	7,123	9,913
612	2,254	3,684	5,414	7,141	9,966
685	2,277	3,690	5,441	7,160	9,971
724	2,319	3,710	5,498	7,173	9,982
738	2,320	3,776	5,499	7,201	10,106
749	2,334	3,783	5,507	7,211	10,165
754	2,335	3,834	5,528	7,315	10,269
770	2,408	3,883	5,772	7,345	10,386
797	2,410	3,887	5,828	7,357	10,602
800	2,411	3,907	5,849	7,358	10,624
828	2,412	3,914	5,923	7,360	10,682
853	2,414	3,965	5,929	7,368	10,787
878	2,476	4,018	5,962	7,373	10,793
896	2,478	4,028	5,976	7,383	10,837
956	2,495	4,056	5,977	7,397	10,887
957	2,518	4,065	6,006	7,456	11,031
1,004	2,521	4,127	6,011	7,509	11,042
1,049	2,579	4,158	6,017	7,510	11,092
1,145	2,592	4,216	6,066	7,517	11,208
1,201	2,594	4,217	6,071	7,521	11,263
1,205	2,610	4,239	6,074	7,587	11,296
1,246	2,616	4,241	6,171	7,637	11,313
1,255	2,655	4,246	6,197	7,695	11,343
1,270	2,666	4,247	6,242	7,704	11,444
1,302	2,749	4,256	6,292	7,707	11,506
1,346	2,750	4,271	6,293	7,760	11,511
1,364	2,751	4,325	6,294	7,773	11,513
1,367	2,807	4,338	6,306	7,781	11,545
1,369	2,809	4,341	6,317	7,828	11,571
1,370	2,853	4,359	6,323	7,884	11,589
1,418	2,867	4,372	6,366	7,896	11,626
1,434	2,868	4,375	6,405	8,013	11,631
				8,099	

11,637	11,790	11,972	12,052	12,154	12,362
11,647	11,863	12,010	12,053	12,156	12,399
11,672	11,876	12,011	12,054	12,182	12,438
11,677	11,878	12,016	12,073	12,189	12,443
11,682	11,879	12,023	12,082	12,199	12,444
11,683	11,881	12,039	12,123	12,218	12,478
11,687	11,970	12,049	12,132	12,266	12,515
11,688	11,971	12,051	12,144	12,360	
			12,145		

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL etc.

MORPHOLOGICAL CHANGES, etc., etc. --- ACCORDING TO TISSUE

Striated Muscle (for Heart, see Vascular System)

109	2,859	5,784	6,877	8,333	10,209
150	4,481	6,365	7,368	8,490	10,417
446	5,520	6,384	7,553	9,733	11,510
1,881	5,778	6,550	8,289		

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL etc.

MORPHOLOGICAL CHANGES, etc., etc. --- ACCORDING TO TISSUE

Nervous System

369	3,144	4,781	6,269	6,761	8,873
487	3,156	4,786	6,270	6,763	8,996
526	3,183	4,860	6,311	6,764	8,997
790	3,229	4,930	6,312	6,765	9,024
810	3,281	4,994	6,345	6,766	9,094
818	3,284	5,038	6,346	6,806	9,255
1,083	3,308	5,062	6,349	7,066	9,273
1,121	3,333	5,227	6,384	7,108	9,349
1,143	3,338	5,400	6,393	7,110	9,472
1,232	3,445	5,534	6,488	7,111	9,541
1,255	3,472	5,568	6,501	7,136	9,816
1,259	3,512	5,860	6,504	7,250	10,167
1,472	3,513	5,879	6,505	7,308	10,551
1,676	3,626	5,919	6,521	7,368	11,282
1,749	3,627	5,988	6,536	7,440	11,425
1,799	3,628	6,098	6,552	7,525	11,516
1,885	3,637	6,111	6,613	7,615	11,585
1,922	3,642	6,180	6,614	7,759	11,694
2,176	3,701	6,183	6,615	7,760	11,765
2,347	3,795	6,217	6,616	7,785	11,819
2,410	3,998	6,227	6,617	7,854	11,869
2,465	4,091	6,228	6,634	7,913	11,877
2,828	4,253	6,229	6,649	7,960	11,897
2,834	4,331	6,230	6,652	8,285	11,901
2,859	4,416	6,231	6,766	8,385	11,902
2,975	4,470	6,236	6,683	8,496	12,088
3,084	4,615	6,237	6,687	8,571	12,127
3,121	4,748				

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL etc.

MORPHOLOGICAL CHANGES etc. -- ACCORDING TO TISSUE

Neoplastic Tissue

17	208	523	812	1,256	1,838
63	326	565	858	1,287	1,960
125	383	718	1,043	1,293	1,988
139	452	732	1,197	1,377	2,030
205	462	807	1,223	1,675	2,034

2,085	3,767	4,800	7,111	8,592	10,919
2,161	3,906	4,842	7,252	8,603	10,990
2,212	3,907	4,958	7,368	8,624	11,243
2,301	3,913	5,038	7,413	8,845	11,249
2,325	3,956	5,175	7,515	8,982	11,260
2,371	3,994	5,208	7,533	9,236	11,264
2,451	4,080	5,282	7,542	9,577	11,302
2,476	4,126	5,543	7,590	9,642	11,343
2,606	4,135	5,682	7,722	9,644	11,511
2,645	4,136	5,879	7,787	9,664	11,517
2,743	4,161	5,880	7,788	9,695	11,523
2,819	4,191	5,966	7,926	9,701	11,539
2,904	4,250	5,971	8,195	9,761	11,595
2,966	4,300	5,988	8,227	9,780	11,902
3,080	4,323	5,997	8,243	9,844	11,905
3,145	4,370	6,312	8,313	10,174	11,968
3,153	4,383	6,412	8,322	10,325	11,973
3,172	4,405	6,504	8,428	10,478	11,995
3,362	4,553	6,589	8,433	10,549	12,067
3,421	4,566	6,667	8,436	10,746	12,134
3,573	4,579	6,741	8,463	10,778	12,220
3,601	4,583	6,752	8,490	10,780	12,284
3,604	4,612	6,753	8,525	10,794	12,422
3,650	4,690	6,754	8,560	10,800	12,450
3,753	4,792	6,874			

**MORPHOLOGICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS**

MORPHOLOGICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS -- IN TISSUES OTHER
THAN THOSE IRRADIATED (See also this subheading under
PHYSIOLOGICAL CHANGES etc. and BIOCHEMICAL CHANGES etc.
and the section on Indirect Effects under THEORETICAL CONSIDERA-
TIONS etc.)

98	2,567	3,310	4,943	5,879	9,571
109	2,660	3,540	4,996	8,200	9,618
480	2,834	3,653	5,617	8,483	10,191
590	2,924	4,455	5,823	9,570	12,362
975	3,137	4,655			

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO,
LISTED ACCORDING TO SOURCE OF CELLS OR TISSUES OBSERVED

Cytological Effects

36	3,162	4,615	5,230	8,548	10,338
72	3,282	4,671	5,585	8,555	11,150
733	3,591	4,744	5,890	9,086	11,523
736	3,612	4,845	6,776	9,148	11,723
1,116	3,634	4,870	6,921	9,165	11,823
1,641	3,680	4,871	7,336	9,613	11,888
2,309	3,902	4,883	7,508	9,864	12,161
2,543	3,936	5,073	7,636	9,916	12,223
2,728	4,106	5,133	7,883	9,939	12,385
2,952	4,418	5,135	8,031	10,292	12,407
3,033	4,420	5,145	8,474	10,296	

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO,
LISTED ACCORDING TO SOURCE OF CELLS OR TISSUES
OBSERVED

Neoplastic Tissues or Cells

3,936	4,744	5,648	6,921	7,508	11,150
4,027	4,845	5,890	7,241	8,474	11,523
4,139	4,883	6,412	7,336	8,612	12,407
4,370					

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO,
LISTED ACCORDING TO SOURCE OF CELLS OR TISSUES OBSERVED

Embryonic Tissues or Cells

72	3,282	4,420	4,871	8,548	12,223
733	3,680	4,845	6,539	9,916	12,376
2,728	3,902	4,870	7,336	12,025	12,407
3,162	4,027				

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO,
LISTED ACCORDING TO SOURCE OF CELLS OR TISSUES OBSERVED

Blood

1,116	2,952	4,106	5,230	9,613	12,161
2,309	3,033	5,133	6,776	12,146	12,385
2,543	3,634	5,135			

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO,
LISTED ACCORDING TO SOURCE OF CELLS OR TISSUES OBSERVED

Hematopoietic Tissue

736	3,591	3,634	4,845	5,073	9,507
2,309	3,612	4,671	4,894	7,157	12,161
3,033				7,636	

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO,
LISTED ACCORDING TO SOURCE OF CELLS OR TISSUES OBSERVED

Vascular Tissue, exclusive of Heart

8,783
12,025

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO,
LISTED ACCORDING TO SOURCE OF CELLS OR TISSUES OBSERVED

Heart

4,027	8,548
4,845	12,223

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO,
LISTED ACCORDING TO SOURCE OF CELLS OR TISSUES OBSERVED

Endocrine Glands

5,420

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO,
LISTED ACCORDING -----

Connective Tissue

736	3,634	7,714	9,939	12,407
2,728	7,157	9,507	12,376	
	7,336			

MORPHOLOGICAL CHANGES -----

Liver

736	7,883
3,680	12,376

MORPHOLOGICAL CHANGES -----

Respiratory System

12,376

MORPHOLOGICAL CHANGES -----

Gastro-Intestinal System

736
12,376

MORPHOLOGICAL CHANGES -----

Urinary Tract

736	4,845
3,282	9,148

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO

MORPHOLOGICAL CHANGES AFTER IRRADIATION IN VITRO, LISTED ACCORDING TO SOURCE OF CELLS OR TISSUES OBSERVED

Muscles

1,024
5,778

MORPHOLOGICAL CHANGES -----

Nervous System

3,162 4,615
3,680 07.03

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES AFTER etc.----LISTED ACCORDING TO TYPE OF EFFECT

Comparison of Effects of Ionizing Radiation with
Effects Produced by Exposure to Chemical or Physical
Agents or Non-ionizing Radiation

11	1,737	3,239	5,429	7,606	10,535
52	1,741	3,337	5,553	7,844	10,560
70	1,816	3,380	5,597	7,943	10,741
82	1,903	3,419	5,733	7,948	11,075
118	1,916	3,514	5,767	8,088	11,153
173	2,047	3,570	5,827	8,303	11,240
206	2,089	3,623	5,833	8,375	11,259
305	2,161	3,637	5,897	8,380	11,325
306	2,223	3,652	5,914	8,399	11,597
313	2,246	3,659	5,991	8,408	11,599
391	2,247	3,770	6,012	8,409	11,626
414	2,269	3,776	6,029	8,461	11,692
467	2,279	3,888	6,043	8,465	11,714
498	2,407	3,919	6,045	8,471	11,786
512	2,428	3,947	6,056	8,517	11,798
550	2,455	4,044	6,152	8,536	11,813
574	2,499	4,065	6,225	8,553	11,830
587	2,535	4,066	6,259	8,574	12,030
605	2,583	4,075	6,282	8,599	12,058
757	2,598	4,107	6,304	8,602	12,059
760	2,604	4,125	6,344	8,891	12,074
763	2,615	4,209	6,358	8,921	12,113
770	2,669	4,213	6,373	8,986	12,153
857	2,721	4,223	6,463	8,999	12,192
969	2,760	4,225	6,486	9,025	12,211
1,040	2,804	4,299	6,392	9,113	12,212
1,058	2,817	4,426	6,411	9,114	12,255
1,071	2,825	4,466	6,616	9,183	12,276
1,232	2,833	4,478	6,845	9,267	12,282
1,234	2,852	4,497	6,869	9,277	12,284
1,303	2,920	4,527	6,888	9,294	12,300
1,334	2,921	4,543	6,911	9,321	12,301
1,366	2,956	4,728	6,924	9,558	12,302
1,395	2,977	4,777	6,925	9,686	12,309
1,419	3,044	4,819	7,002	9,727	12,340
1,445	3,141	4,876	7,012	10,175	12,343
1,512	3,150	4,901	7,098	10,362	12,399
1,519	3,160	5,032	7,240	10,374	12,427
1,561	3,221	5,070	7,376	10,386	12,443
1,666	3,222	5,216	7,454	10,421	12,448
1,708	3,223	5,259	7,485	10,504	12,491
1,718	3,225	5,380	7,515		

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY IRRADIATION,
MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES -- ACCORDING TO TYPE OF EFFECT

Effect on Growth, Development, Regeneration, Repair

8	1,509	2,928	3,825	5,320	6,799
18	1,526	2,938	3,827	5,344	6,823
35	1,570	2,974	3,831	5,390	6,829
37	1,589	2,977	3,836	5,429	6,830
39	1,590	2,984	3,855	5,441	6,834
124	1,591	2,994	3,856	5,485	6,846
172	1,597	2,995	3,857	5,508	6,882
188	1,649	2,998	3,879	5,509	6,906
226	1,669	3,111	3,942	5,635	6,918
230	1,695	3,112	3,950	5,730	6,922
243	1,742	3,122	3,953	5,738	6,936
264	1,745	3,123	3,958	5,752	7,078
316	1,746	3,186	3,984	5,753	7,112
361	1,795	3,187	3,988	5,767	7,121
430	1,818	3,225	4,022	5,788	7,123
455	1,862	3,243	4,024	5,794	7,125
496	1,868	3,254	4,072	5,830	7,133
514	1,885	3,257	4,101	5,860	7,186
524	1,888	3,259	4,110	5,910	7,215
580	1,890	3,279	4,156	5,921	7,236
585	1,904	3,289	4,169	5,933	7,260
588	1,946	3,302	4,181	5,950	7,285
606	1,958	3,319	4,225	5,951	7,325
608	2,036	3,347	4,251	5,955	7,412
676	2,073	3,357	4,298	5,956	7,415
738	2,088	3,364	4,342	5,967	7,417
747	2,112	3,370	4,358	5,976	7,428
765	2,122	3,380	4,362	5,977	7,441
767	2,170	3,401	4,389	5,978	7,461
799	2,171	3,402	4,390	6,011	7,465
805	2,198	3,405	4,398	6,012	7,483
824	2,209	3,406	4,417	6,013	7,526
854	2,212	3,433	4,418	6,014	7,538
863	2,248	3,446	4,425	6,015	7,583
913	2,266	3,456	4,453	6,045	7,595
917	2,328	3,471	4,454	6,051	7,645
950	2,356	3,475	4,493	6,057	7,716
965	2,390	3,493	4,551	6,073	7,791
969	2,408	3,516	4,576	6,135	7,871
974	2,410	3,517	4,588	6,141	7,877
1,031	2,437	3,531	4,593	6,149	7,976
1,047	2,446	3,532	4,596	6,155	8,043
1,075	2,456	3,552	4,603	6,174	8,054
1,085	2,463	3,567	4,608	6,202	8,079
1,090	2,493	3,585	4,628	6,221	8,126
1,105	2,518	3,602	4,635	6,247	8,147
1,107	2,523	3,607	4,739	6,281	8,149
1,136	2,531	3,615	4,760	6,314	8,162
1,170	2,550	3,642	4,777	6,318	8,163
1,187	2,552	3,661	4,851	6,319	8,239
1,196	2,566	3,682	4,862	6,321	8,264
1,242	2,640	3,683	4,863	6,349	8,289
1,250	2,660	3,685	4,876	6,382	8,290
1,259	2,664	3,688	4,949	6,418	8,310
1,267	2,707	3,693	5,021	6,439	8,329
1,298	2,718	3,694	5,038	6,514	8,340
1,307	2,761	3,708	5,045	6,535	8,341
1,325	2,786	3,710	5,145	6,539	8,355
1,329	2,801	3,725	5,176	6,566	8,375
1,353	2,806	3,726	5,206	6,590	8,376
1,370	2,831	3,742	5,251	6,610	8,379
1,418	2,836	3,771	5,266	6,648	8,380
1,421	2,848	3,787	5,271	6,656	8,384
1,434	2,875	3,796	5,275	6,714	8,386
1,466	2,889	3,798	5,284	6,745	8,391
1,484	2,926	3,811	5,317	6,762	8,403
		3,817		6,794	

8,424	8,594	9,676	10,448	11,668	12,160
8,444	8,621	9,705	10,457	11,775	12,168
8,456	8,869	9,757	10,489	11,776	12,169
8,457	8,899	9,788	10,528	11,777	12,170
8,459	9,020	9,835	10,636	11,833	12,202
8,500	9,037	9,847	10,663	11,859	12,248
8,504	9,038	9,900	10,701	11,874	12,266
8,523	9,044	10,054	10,788	11,884	12,286
8,524	9,160	10,081	10,984	11,984	12,338
8,530	9,165	10,119	10,988	12,014	12,344
8,551	9,169	10,123	11,044	12,031	12,347
8,553	9,228	10,166	11,133	12,100	12,389
8,555	9,237	10,182	11,197	12,101	12,439
8,561	9,259	10,358	11,232	12,102	12,441
8,562	9,269	10,399	11,348	12,115	12,442
8,568	9,303	10,407	11,546	12,116	12,480
8,583	9,347	10,422	11,555	12,143	12,491
8,593	9,645	10,426	11,663	12,157	

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES AFTER etc.----TYPE OF EFFECT

Effect on Wound Healing and Inflammatory Lesion

195	1,768	3,492	5,399	8,244	10,787
206	1,845	3,536	5,908	8,320	10,788
207	1,921	3,558	5,929	8,352	10,807
412	1,945	3,563	6,019	8,360	11,063
420	2,190	3,589	6,043	8,398	11,094
424	2,319	3,624	6,150	8,495	11,296
429	2,396	3,649	6,162	8,550	11,326
433	2,423	3,810	6,197	8,778	11,370
434	2,424	3,849	6,210	9,125	11,475
455	2,478	3,890	6,212	9,173	11,593
505	2,489	4,115	6,411	9,212	11,597
541	2,618	4,158	6,522	9,238	11,626
583	2,630	4,238	6,557	9,239	11,637
597	2,663	4,267	6,576	9,269	11,647
724	2,734	4,277	6,624	9,310	11,672
801	2,749	4,467	6,781	9,316	11,677
860	2,841	4,478	7,287	9,499	11,682
1,035	2,868	4,520	7,323	9,509	11,687
1,044	2,943	4,544	7,368	9,540	11,763
1,072	3,170	4,623	7,454	9,911	11,790
1,184	3,184	4,684	7,474	9,952	11,886
1,358	3,218	4,725	7,496	10,257	11,922
1,362	3,225	4,780	7,596	10,346	12,075
1,367	3,254	4,819	7,634	10,402	12,130
1,370	3,271	4,878	7,706	10,417	12,191
1,377	3,307	4,890	7,884	10,461	12,244
1,387	3,310	5,099	7,912	10,481	12,412
1,404	3,345	5,158	8,043	10,509	12,436
1,573	3,437	5,380	8,218	10,746	

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES ETC.---- ACCORDING TO TYPE OF EFFECT

Effect on Exercise Tolerance

1018	2137	2366	5825	6645	8869
1269	2290	2468	5917	8294	10,667
1433	2292	5534	6370		

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES ETC. --- ACCORDING TO TYPE OF EFFECT

Effect on Respiration and Ventilation

1395	2249	4930	7339	7649	8986
1715	2732	5703	7345	8544	9187
1916	4066	6528	7480	8570	10,053
2180					

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES ETC. --- ACCORDING TO TYPE OF EFFECT

Radiation Sickness; Acute Radiation Syndrome

52	1310	1903	2306	2813	4848
210	1313	1910	2311	2815	4864
332	1333	1911	2334	2816	4907
525	1341	1912	2335	2817	4930
550	1350	1920	2349	2827	4932
560	1363	1933	2350	2842	4933
650	1374	1937	2380	2843	4934
703	1375	1938	2391	2847	4953
716	1376	1949	2392	2858	4970
730	1387	1974	2402	2871	4985
731	1388	1996	2413	2885	5008
754	1391	2009	2416	2887	5018
758	1399	2029	2421	2893	5036
776	1456	2040	2430	2900	5117
777	1473	2043	2440	2909	5123
815	1480	2044	2455	2910	5216
816	1488	2053	2485	2911	5217
829	1499	2054	2520	2922	5222
838	1508	2056	2530	2929	5270
839	1513	2062	2534	2934	5318
840	1548	2063	2536	2937	5329
841	1549	2064	2568	2941	5341
842	1550	2065	2572	2942	5408
919	1552	2067	2573	2948	5422
944	1554	2068	2581	2951	5467
975	1558	2069	2595	2963	5468
989	1581	2070	2612	3010	5472
1001	1619	2076	2613	3019	5473
1018	1622	2089	2617	3025	5478
1033	1643	2096	2622	3029	5534
1061	1645	2105	2628	3044	5540
1074	1650	2124	2637	3053	5555
1087	1660	2127	2639	3114	5582
1088	1661	2130	2641	3118	5601
1093	1689	2131	2649	3285	5609
1144	1708	2144	2650	3309	5612
1160	1713	2156	2675	3422	5624
1169	1714	2163	2676	3457	5637
1175	1715	2165	2677	3486	5638
1176	1735	2175	2696	3490	5657
1181	1741	2178	2699	3511	5658
1182	1752	2180	2702	3755	5659
1210	1759	2187	2716	3985	5660
1211	1761	2219	2734	4125	5661
1230	1763	2231	2752	4203	5665
1254	1784	2249	2753	4278	5678
1255	1825	2258	2756	4612	5684
1263	1861	2261	2758	4613	5695
1264	1871	2272	2770	4718	5701
1282	1898	2275	2775	4732	5703
1301	1899	2294	2811	4767	5708
				4785	5713
					5717

5720	6755	7431	8062	8992	10,692
5721	6758	7441	8066	8993	10,720
5724	6768	7467	8094	8995	10,800
5728	6770	7469	8103	9027	10,821
5732	6785	7472	8106	9063	10,917
5790	6791	7474	8107	9067	10,998
5794	6813	7485	8108	9070	11,022
5796	6820	7488	8110	9094	11,121
5798	6870	7490	8111	9096	11,187
5820	6872	7496	8113	9113	11,475
5824	6880	7506	8114	9116	11,544
5830	6888	7514	8121	9128	11,545
5833	6894	7568	8123	9135	11,588
5840	6895	7569	8132	9137	11,612
5844	6912	7570	8158	9139	11,641
5888	6917	7578	8169	9146	11,648
5889	6927	7581	8170	9156	11,650
5891	6932	7596	8186	9157	11,656
5914	6933	7600	8192	9175	11,657
5916	6939	7605	8196	9176	11,666
5917	6946	7608	8204	9181	11,674
5958	6950	7614	8205	9184	11,675
5984	6955	7615	8208	9208	11,680
6003	6967	7617	8212	9210	11,684
6020	6973	7622	8215	9224	11,685
6037	6980	7623	8220	9226	11,689
6038	6985	7631	8244	9263	11,690
6039	6987	7632	8250	9265	11,850
6047	6998	7633	8251	9267	11,864
6061	6999	7647	8260	9270	11,875
6107	7006	7649	8267	9271	11,876
6144	7025	7681	8268	9278	11,881
6174	7039	7690	8278	9280	11,911
6190	7047	7694	8285	9284	11,976
6204	7101	7703	8286	9294	11,977
6216	7102	7704	8287	9313	12,002
6256	7112	7706	8292	9316	12,006
6261	7114	7732	8293	9356	12,026
6277	7123	7734	8294	9375	12,049
6322	7126	7752	8295	9430	12,079
6331	7129	7760	8296	9443	12,080
6334	7135	7766	8320	9465	12,137
6336	7167	7778	8390	9472	12,186
6346	7179	7792	8462	9481	12,197
6358	7187	7794	8465	9506	12,198
6361	7189	7807	8497	9515	12,201
6391	7192	7815	8509	9526	12,212
6406	7218	7821	8532	9544	12,238
6411	7244	7837	8571	9547	12,240
6416	7291	7838	8596	9550	12,272
6454	7292	7864	8686	9560	12,278
6458	7303	7908	8726	9573	12,296
6463	7305	7922	8827	9576	12,298
6479	7332	7923	8862	9649	12,324
6497	7333	7924	8865	9686	12,325
6498	7337	7925	8869	9779	12,328
6511	7341	7927	8874	9806	12,329
6536	7352	7936	8883	9818	12,333
6540	7356	7940	8896	9967	12,335
6541	7366	7953	8905	9975	12,337
6543	7373	7968	8914	10,008	12,339
6544	7382	7978	8915	10,109	12,343
6558	7385	7981	8916	10,198	12,372
6613	7387	7997	8926	10,301	12,375
6614	7388	8016	8933	10,308	12,398
6621	7392	8017	8935	10,310	12,414
6628	7396	8018	8951	10,311	12,423
6635	7399	8037	8958	10,332	12,480
6653	7402	8039	8974	10,333	12,485
6670	7408	8041	8978	10,335	12,488
6695	7422	8042	8980	10,382	12,586
6702	7423	8052	8986	10,385	12,685
6703	7427	8056	8987	10,464	
6722	7429	8060	8990	10,559	

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES ETC. --- ACCORDING TO TYPE OF EFFECT

Effect on Tolerance to Toxic Substances

136	2560	4865	5863	7347	8464
152	2659	4878	5905	7446	8500
361	2852	5082	5945	7450	9030
391	3119	5319	6016	7475	9113
485	3375	5338	6148	7480	9175
666	3379	5375	6278	7608	9388
1171	3419	5379	6593	7650	9517
1235	4084	5399	6684	7881	9536
1676	4214	5475	6784	7909	9802
1731	4244	5488	6814	7922	10,191
2115	4277	5571	6822	7923	10,843
2214	4325	5678	6916	7975	11,213
2444	4573	5768	6925	8320	11,871
2450	4817	5779	7062	8415	12,181
2509	4843	5827	7163		
			7310		

PHYSIOLOGICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES FOLLOWING TOTAL OR PARTIAL
BODY IRRADIATION, MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TYPE OF EFFECT

Effect on Immune Phenomena

immune response to organisms native to
the irradiated animal or present before
irradiation or response to common
environmental pathogens; also auto-
immunity

210	1558	2593	5682	7506	9242
409	1674	2649	5724	7681	9210
414	1700	2650	5794	7693	9248
441	1716	2963	5796	7696	9279
505	1727	2690	5809	7706	9357
554	1741	3010	6061	7724	9471
644	1759	3152	6093	7924	9496
768	1784	3189	6174	7927	9530
815	1871	3273	6188	8035	9541
904	1911	3354	6613	8037	9550
918	1938	3376	6787	8041	9571
988	1945	3602	6795	8042	10,417
1018	1990	3603	6870	8205	10,594
1037	1996	3668	6912	8206	10,595
1058	2063	3669	6927	8286	10,649
1086	2064	3901	6932	8287	11,187
1087	2065	4293	6941	8356	11,233
1088	2068	4479	6956	8402	11,354
1093	2069	4757	6967	8405	11,475
1119	2144	4946	6973	8599	11,597
1181	2168	5318	6980	8876	11,690
1182	2187	5363	7085	8935	11,798
1341	2199	5442	7192	8987	11,886
1355	2269	5467	7375	8992	11,917
1362	2302	5543	7396	9027	11,980
1363	2313	5598	7398	9103	12,113
1374	2314	5599	7407	9116	12,137
1399	2339	5624	7429	9156	12,198
1468	2430	5637	7454	9167	12,201
1497	2485	5638	7479	9173	12,333
1539	2536	5650	7496		12,586

PHYSIOLOGICAL CHANGES FOLLOWING TOTAL OR PARTIAL
BODY IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES FOLLOWING TOTAL OR PARTIAL
BODY IRRADIATION, MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TYPE OF EFFECT

Effect on Immune Phenomena

immune response to neoplasia or
tissue transplantation

168	2247	4117	5632	7856	9154
172	2269	4126	5648	7903	9159
215	2278	4136	5688	7983	9161
323	2280	4139	5723	8025	9168
324	2307	4170	5897	8026	9246
392	2340	4196	5998	8091	9279
462	2351	4197	6051	8092	9280
469	2523	4269	6256	8138	9281
470	2665	4272	6265	8161	9337
508	2805	4384	6351	8175	9382
523	2973	4400	6358	8281	9430
559	3005	4423	6556	8313	9528
586	3088	4429	6572	8322	9558
667	3145	4469	6810	8325	9970
680	3164	4519	6812	8428	9973
687	3188	4626	6847	8486	10,019
709	3221	4672	6853	8514	10,661
776	3227	4673	6977	8518	10,670
777	3283	4676	7036	8536	10,697
792	3301	4680	7049	8541	10,755
857	3376	4701	7057	8575	11,349
859	3458	4744	7065	8576	11,365
913	3461	4756	7087	8592	11,768
927	3573	4856	7268	8614	11,836
965	3594	4945	7275	8784	12,200
1141	3595	4957	7416	8817	12,219
1244	3603	4986	7425	8833	12,226
1254	3640	5016	7457	8880	12,234
1303	3663	5020	7494	8907	12,235
1332	3678	5094	7508	8919	12,236
1446	3946	5246	7521	8924	12,253
1541	3961	5259	7542	8956	12,259
1564	3962	5284	7571	8961	12,299
1568	3963	5289	7626	8990	12,366
1629	3990	5320	7642	8993	12,343
1732	3994	5331	7643	9004	12,377
1739	4004	5343	7683	9112	12,382
1748	4005	5347	7696	9114	12,481
1792	4036	5409	7746	9123	12,505
2195	4080	5630	7762	9147	12,506
2200	4097	5631	7782	9152	12,507
2215					

PHYSIOLOGICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, LISTED ACCORDING
TO TYPE OF EFFECT

Effect on Immune Phenomena

immune response to administered antigens; response
to histamine or histamine liberators

27	195	290	391	424	529
96	210	291	399	441	701
152	231	352	409	471	735
153	242	370	414	503	775

860	1,973	4,325	5,945	7,899	9,114
904	2,023	4,335	6,016	7,905	9,181
919	2,232	4,438	6,093	7,906	9,207
981	2,275	4,511	6,094	7,921	9,229
1,025	2,316	4,520	6,114	7,922	9,280
1,029	2,351	4,590	6,150	7,923	9,297
1,068	2,375	4,624	6,174	7,927	9,686
1,085	2,524	4,649	6,210	8,026	11,044
1,087	2,603	4,682	6,212	8,107	11,233
1,096	2,604	4,684	6,278	8,108	11,255
1,119	2,615	4,753	6,570	8,113	11,261
1,133	2,630	4,757	6,573	8,154	11,296
1,139	2,635	4,782	6,584	8,218	11,597
1,188	2,703	4,817	6,595	8,244	11,886
1,213	2,755	4,951	6,663	8,262	12,021
1,231	2,804	4,986	6,795	8,269	12,117
1,235	2,825	5,088	6,796	8,280	12,138
1,248	2,854	5,098	6,871	8,320	12,139
1,283	2,878	5,151	6,956	8,377	12,153
1,294	3,008	5,168	6,973	8,405	12,158
1,323	3,140	5,181	7,073	8,408	12,181
1,339	3,189	5,228	7,075	8,447	12,188
1,379	3,228	5,266	7,102	8,453	12,192
1,415	3,271	5,399	7,231	8,454	12,201
1,431	3,363	5,442	7,263	8,455	12,275
1,436	3,378	5,453	7,392	8,466	12,276
1,438	3,379	5,493	7,421	8,471	12,330
1,451	3,469	5,570	7,474	8,473	12,343
1,468	3,492	5,597	7,475	8,517	12,378
1,508	3,550	5,600	7,485	8,534	12,399
1,527	3,610	5,601	7,491	8,578	12,493
1,573	3,649	5,682	7,541	8,600	12,494
1,595	3,679	5,711	7,634	8,609	12,495
1,625	3,681	5,746	7,674	8,907	12,496
1,639	3,739	5,790	7,677	8,924	12,497
1,699	3,919	5,809	7,678	8,934	12,499
1,700	3,935	5,824	7,724	8,977	12,500
1,829	4,277	5,888	7,725	9,008	12,503
1,905	4,293	5,916	7,782	9,023	12,504
1,906	4,321	5,941	7,824	9,103	12,508
1,964			7,838		
			7,884		

PHYSIOLOGICAL CHANGES FOLLOWING TOTAL OR PARTIAL
BODY IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES FOLLOWING TOTAL OR PARTIAL
BODY IRRADIATION, MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TYPE OF EFFECT

Effect on Immune Phenomena

immune response to pre-existing infection

414	2988	4780	7167	8045	9952
554	3271	4782	7368	8352	10,188
1294	3437	4841	7554	8398	10,276
1640	3438	4878	7596	8830	10,367
1720	3681	5418	7756	8933	10,509
1945	3849	5980	7804	9242	10,945
2062	4042	6018	7805	9310	11,975
2190	4158	6019	7819	9341	12,036
2423	4267	6093	7864	9540	12,153
2474	4513	6624	7912	9542	12,244
2594	4520	7087	8044	9836	12,498
2779	4544				

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES --- ACCORDING TO TYPE OF EFFECT

Effect on Spontaneous Activity and Conditioned Reflexes

462	2,568	5,414	6,943	7,779	9,301
1,002	2,640	5,587	7,123	7,785	9,335
1,044	2,681	5,781	7,134	7,892	9,336
1,074	2,827	6,261	7,162	7,893	9,378
1,090	3,387	6,590	7,164	8,123	9,472
1,345	3,685	6,613	7,184	8,216	9,530
1,389	3,701	6,614	7,283	8,359	9,806
1,594	4,111	6,635	7,284	8,907	9,811
1,736	4,745	6,758	7,444	8,971	10,054
2,189	5,373	6,791	7,669	9,300	11,868
2,315	5,374	6,806			12,710

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL IRRADIATION,
MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES --- ACCORDING TO TYPE OF EFFECT

Effect on Blood Pressure and Circulation Generally

71	1,715	3,161	5,640	7,359	8,544
156	1,765	3,229	5,806	7,361	8,571
372	2,103	3,808	5,889	7,364	8,986
461	2,130	4,066	6,261	7,365	9,003
537	2,249	4,278	6,277	7,367	9,265
560	2,282	4,359	6,463	7,369	9,517
599	2,372	4,573	6,562	7,480	9,560
625	2,591	4,597	6,770	7,514	9,785
705	2,598	4,769	6,872	7,543	10,001
804	2,631	4,860	6,897	7,623	10,182
816	2,771	4,864	7,035	7,785	10,344
817	2,818	4,873	7,135	7,808	10,496
825	2,870	4,930	7,264	7,873	10,537
1,038	2,953	5,060	7,333	7,981	11,063
1,170	3,053	5,125	7,344	8,106	11,145
1,415	3,106	5,281	7,346	8,292	11,370
1,445	3,135	5,382	7,351	8,296	11,571
1,473	3,137	5,471	7,352	8,427	11,576
1,488	3,160	5,637	7,353	8,496	12,343

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES --- ACCORDING TO TYPE OF EFFECT

Lethal Effects

17	630	729	815	915	993
122	644	748	829	918	1,000
127	645	750	837	920	1,014
195	649	754	839	921	1,015
210	650	758	841	927	1,027
314	654	760	855	928	1,029
316	659	762	860	940	1,035
332	660	768	861	944	1,042
369	681	778	866	946	1,047
525	690	781	871	962	1,058
543	697	782	876	968	1,074
549	708	788	878	979	1,076
576	716	791	890	981	1,079
606	718	795	891	982	1,085
615	719	808	904	986	1,086
628	728	811	914	990	1,087

1,088	1,508	1,942	2,391	2,885	3,854
1,092	1,513	1,960	2,392	2,887	3,882
1,093	1,523	1,983	2,395	2,897	3,884
1,094	1,527	1,984	2,404	2,900	3,894
1,104	1,532	1,985	2,413	2,902	3,901
1,118	1,536	1,994	2,430	2,909	3,932
1,127	1,540	2,009	2,438	2,911	3,964
1,128	1,542	2,032	2,455	2,922	3,977
1,160	1,544	2,040	2,459	2,928	3,984
1,168	1,545	2,062	2,460	2,929	3,985
1,169	1,549	2,063	2,464	2,937	3,991
1,174	1,550	2,064	2,468	2,942	4,040
1,175	1,552	2,065	2,477	2,947	4,042
1,176	1,553	2,068	2,479	2,948	4,053
1,178	1,554	2,069	2,481	2,955	4,073
1,181	1,558	2,070	2,485	2,956	4,093
1,182	1,563	2,078	2,486	2,957	4,101
1,183	1,571	2,090	2,493	2,959	4,107
1,208	1,572	2,097	2,511	2,963	4,111
1,209	1,576	2,099	2,519	2,971	4,143
1,211	1,588	2,112	2,523	2,974	4,167
1,231	1,590	2,119	2,526	2,984	4,181
1,235	1,597	2,127	2,528	2,985	4,208
1,252	1,600	2,130	2,530	2,986	4,219
1,253	1,630	2,131	2,532	2,991	4,251
1,254	1,631	2,132	2,533	3,010	4,268
1,264	1,632	2,133	2,536	3,013	4,278
1,269	1,634	2,137	2,539	3,019	4,322
1,271	1,638	2,144	2,540	3,025	4,330
1,272	1,645	2,153	2,547	3,043	4,370
1,278	1,647	2,156	2,556	3,053	4,381
1,282	1,649	2,159	2,572	3,110	4,453
1,283	1,656	2,163	2,573	3,114	4,472
1,292	1,667	2,164	2,576	3,117	4,495
1,300	1,670	2,174	2,583	3,148	4,540
1,301	1,672	2,175	2,613	3,258	4,543
1,310	1,673	2,178	2,622	3,267	4,549
1,312	1,674	2,180	2,626	3,268	4,593
1,325	1,676	2,187	2,640	3,270	4,596
1,328	1,690	2,196	2,641	3,279	4,600
1,332	1,702	2,197	2,647	3,285	4,612
1,334	1,708	2,200	2,649	3,337	4,615
1,341	1,709	2,202	2,650	3,346	4,621
1,344	1,716	2,203	2,658	3,347	4,655
1,345	1,726	2,219	2,671	3,354	4,674
1,349	1,728	2,225	2,691	3,357	4,711
1,362	1,730	2,237	2,700	3,368	4,717
1,363	1,732	2,244	2,701	3,413	4,730
1,374	1,736	2,247	2,711	3,417	4,754
1,387	1,737	2,251	2,717	3,433	4,767
1,391	1,741	2,256	2,725	3,434	4,783
1,393	1,747	2,261	2,738	3,446	4,787
1,394	1,752	2,262	2,745	3,490	4,788
1,398	1,759	2,284	2,748	3,511	4,789
1,399	1,763	2,289	2,753	3,534	4,851
1,400	1,788	2,290	2,756	3,565	4,860
1,404	1,808	2,292	2,761	3,585	4,901
1,414	1,809	2,293	2,763	3,599	4,930
1,421	1,818	2,306	2,769	3,619	4,992
1,428	1,830	2,312	2,770	3,633	5,008
1,438	1,836	2,314	2,774	3,635	5,019
1,441	1,844	2,328	2,800	3,636	5,034
1,457	1,855	2,334	2,810	3,645	5,036
1,459	1,861	2,343	2,811	3,658	5,044
1,464	1,894	2,349	2,815	3,683	5,047
1,473	1,904	2,350	2,817	3,685	5,056
1,479	1,911	2,351	2,826	3,697	5,060
1,480	1,915	2,356	2,835	3,745	5,061
1,487	1,928	2,360	2,836	3,771	5,070
1,489	1,932	2,361	2,848	3,782	5,079
1,497	1,933	2,362	2,860	3,784	5,091
1,499	1,938	2,366	2,872	3,793	5,117
				3,795	

5,121	5,663	6,108	6,670	7,025	7,399
5,125	5,665	6,113	6,684	7,036	7,401
5,131	5,666	6,128	6,685	7,044	7,404
5,145	5,668	6,134	6,695	7,047	7,415
5,184	5,679	6,144	6,698	7,048	7,421
5,185	5,684	6,150	6,728	7,057	7,423
5,202	5,697	6,161	6,751	7,070	7,424
5,213	5,701	6,167	6,755	7,071	7,427
5,271	5,709	6,168	6,758	7,084	7,429
5,290	5,713	6,174	6,768	7,085	7,431
5,308	5,721	6,178	6,771	7,086	7,433
5,312	5,722	6,179	6,784	7,094	7,434
5,315	5,724	6,216	6,787	7,098	7,437
5,331	5,726	6,220	6,788	7,100	7,441
5,343	5,728	6,222	6,790	7,102	7,453
5,344	5,732	6,243	6,791	7,112	7,461
5,345	5,738	6,244	6,807	7,114	7,467
5,346	5,741	6,247	6,808	7,117	7,469
5,363	5,753	6,256	6,810	7,118	7,474
5,380	5,764	6,259	6,811	7,123	7,479
5,382	5,780	6,261	6,813	7,125	7,487
5,392	5,791	6,272	6,814	7,126	7,488
5,395	5,794	6,277	6,815	7,136	7,490
5,407	5,796	6,279	6,816	7,142	7,494
5,409	5,797	6,306	6,820	7,147	7,496
5,422	5,798	6,309	6,821	7,153	7,498
5,427	5,806	6,310	6,822	7,154	7,506
5,448	5,815	6,321	6,829	7,163	7,514
5,463	5,816	6,322	6,832	7,166	7,563
5,464	5,817	6,328	6,833	7,167	7,568
5,467	5,820	6,329	6,837	7,182	7,572
5,472	5,821	6,334	6,839	7,189	7,573
5,476	5,833	6,338	6,850	7,192	7,574
5,488	5,840	6,352	6,870	7,200	7,578
5,490	5,855	6,358	6,871	7,206	7,581
5,491	5,859	6,371	6,872	7,208	7,604
5,504	5,867	6,382	6,876	7,219	7,614
5,511	5,871	6,397	6,880	7,220	7,619
5,512	5,872	6,408	6,882	7,225	7,620
5,513	5,873	6,409	6,893	7,227	7,622
5,517	5,887	6,415	6,895	7,228	7,623
5,518	5,888	6,426	6,897	7,234	7,626
5,519	5,889	6,434	6,906	7,236	7,630
5,521	5,891	6,464	6,912	7,246	7,633
5,530	5,895	6,511	6,914	7,253	7,642
5,534	5,903	6,514	6,915	7,257	7,651
5,538	5,905	6,529	6,916	7,265	7,662
5,540	5,914	6,530	6,919	7,267	7,666
5,542	5,916	6,532	6,924	7,269	7,671
5,543	5,917	6,534	6,927	7,270	7,678
5,544	5,933	6,535	6,928	7,275	7,682
5,554	5,941	6,536	6,929	7,285	7,694
5,563	5,950	6,538	6,932	7,287	7,696
5,570	5,955	6,540	6,937	7,294	7,697
5,580	5,958	6,541	6,939	7,299	7,698
5,587	5,959	6,543	6,940	7,302	7,701
5,591	5,972	6,544	6,942	7,303	7,704
5,594	5,984	6,548	6,950	7,326	7,706
5,598	5,985	6,573	6,953	7,328	7,709
5,599	6,020	6,577	6,956	7,333	7,720
5,603	6,027	6,579	6,961	7,337	7,731
5,607	6,039	6,592	6,962	7,341	7,734
5,612	6,042	6,604	6,964	7,365	7,755
5,624	6,044	6,605	6,973	7,366	7,758
5,629	6,047	6,613	6,974	7,374	7,762
5,637	6,061	6,614	6,975	7,387	7,768
5,638	6,086	6,618	6,980	7,389	7,774
5,641	6,087	6,632	6,982	7,390	7,782
5,650	6,096	6,635	6,988	7,392	7,785
5,656	6,097	6,645	6,998	7,393	7,790
5,657	6,100	6,653	6,999	7,396	7,792
5,658	6,103	6,654	7,012	7,398	7,795

7,798	8,160	8,980	9,505	10,675	11,942
7,806	8,169	8,987	9,508	10,688	11,945
7,821	8,170	8,990	9,525	10,689	12,004
7,822	8,176	8,992	9,526	10,692	12,049
7,838	8,192	8,993	9,530	10,697	12,079
7,843	8,197	9,008	9,531	10,701	12,080
7,847	8,203	9,025	9,534	10,714	12,101
7,849	8,205	9,027	9,536	10,715	12,198
7,863	8,206	9,030	9,560	10,720	12,200
7,864	8,212	9,037	9,576	10,727	12,201
7,869	8,213	9,038	9,611	10,734	12,210
7,871	8,225	9,040	9,617	10,738	12,211
7,903	8,248	9,041	9,686	10,756	12,226
7,908	8,249	9,043	9,731	10,791	12,232
7,914	8,250	9,044	9,740	10,811	12,234
7,916	8,255	9,096	9,758	10,867	12,235
7,921	8,260	9,102	9,790	10,883	12,236
7,924	8,281	9,115	9,811	10,884	12,238
7,927	8,283	9,123	9,813	10,922	12,259
7,934	8,287	9,128	9,821	11,015	12,260
7,935	8,293	9,132	9,840	11,044	12,266
7,936	8,294	9,137	9,921	11,076	12,267
7,937	8,295	9,138	9,954	11,094	12,268
7,939	8,297	9,147	9,967	11,121	12,270
7,953	8,298	9,152	9,969	11,129	12,271
7,968	8,299	9,156	9,982	11,136	12,272
7,971	8,311	9,159	10,005	11,164	12,273
7,972	8,318	9,161	10,019	11,180	12,275
7,973	8,319	9,163	10,054	11,186	12,276
7,974	8,320	9,172	10,057	11,246	12,291
7,975	8,348	9,173	10,081	11,250	12,292
7,977	8,381	9,181	10,109	11,345	12,299
7,978	8,390	9,203	10,198	11,354	12,304
8,007	8,411	9,208	10,218	11,359	12,316
8,016	8,417	9,213	10,277	11,365	12,324
8,017	8,455	9,218	10,286	11,446	12,332
8,019	8,457	9,228	10,303	11,475	12,333
8,025	8,461	9,232	10,308	11,483	12,334
8,026	8,497	9,234	10,311	11,485	12,335
8,032	8,533	9,248	10,333	11,502	12,337
8,035	8,535	9,262	10,335	11,503	12,339
8,036	8,541	9,265	10,339	11,520	12,343
8,037	8,561	9,267	10,343	11,569	12,344
8,038	8,579	9,271	10,358	11,571	12,353
8,041	8,594	9,280	10,386	11,577	12,367
8,042	8,726	9,294	10,396	11,583	12,371
8,053	8,732	9,302	10,464	11,597	12,375
8,054	8,865	9,303	10,508	11,628	12,377
8,056	8,866	9,304	10,528	11,641	12,398
8,062	8,869	9,305	10,535	11,650	12,420
8,064	8,874	9,317	10,537	11,661	12,421
8,093	8,876	9,320	10,538	11,663	12,423
8,103	8,880	9,337	10,543	11,680	12,451
8,106	8,883	9,357	10,559	11,685	12,477
8,107	8,906	9,378	10,590	11,836	12,481
8,108	8,907	9,430	10,594	11,850	12,482
8,109	8,916	9,433	10,595	11,875	12,485
8,113	8,926	9,434	10,628	11,876	12,488
8,121	8,945	9,460	10,640	11,882	12,494
8,134	8,955	9,465	10,642	11,918	12,503
8,138	8,959	9,472	10,646	11,932	12,504
8,148	8,961	9,480	10,649	11,936	12,505
8,153	8,964	9,481	10,661	11,937	12,506
8,159	8,974	9,496			12,507
					12,586
					12,685

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES --- ACCORDING TO TYPE OF EFFECT

Hemorrhagic Phenomena

703	1,713	2,486	5,008	6,468	8,114
716	1,741	2,499	5,036	6,482	8,214
728	1,784	2,533	5,060	6,497	8,384
738	1,809	2,535	5,117	6,498	8,497
763	1,810	2,699	5,125	6,511	8,979
782	1,825	2,753	5,157	6,598	9,002
839	1,861	2,756	5,222	6,618	9,137
921	1,871	2,788	5,385	6,722	9,146
944	1,903	2,866	5,637	6,895	9,156
980	1,911	2,887	5,658	6,897	9,208
1,061	1,915	2,890	5,703	6,911	9,254
1,096	1,933	2,937	5,708	6,985	9,350
1,341	1,938	2,951	5,790	7,128	9,357
1,343	1,945	2,953	5,820	7,135	9,465
1,375	1,949	3,003	5,826	7,285	9,806
1,439	1,986	3,010	5,840	7,333	9,982
1,473	2,009	3,013	5,891	7,337	10,998
1,480	2,053	3,025	5,958	7,356	11,370
1,552	2,062	3,050	5,972	7,423	11,446
1,661	2,076	3,053	6,047	7,578	11,453
1,666	2,144	3,139	6,216	7,623	11,641
1,676	2,169	3,267	6,256	7,666	11,680
1,683	2,219	3,658	6,261	7,694	12,049
1,684	2,294	4,278	6,322	7,696	12,240
1,688	2,350	4,495	6,346	7,940	12,343
1,689	2,455	4,767	6,464	8,046	12,520
1,708		4,785			

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES --- ACCORDING TO TYPE OF EFFECT

Effect on Water Intake

236	1,341	2,720	5,889	7,694	8,292
620	1,535	2,847	6,260	7,716	8,416
701	1,539	2,893	6,261	7,873	8,427
930	1,676	2,954	6,277	8,088	8,958
1,163	2,144	3,166	7,305	8,106	10,527
1,286	2,568	4,154	7,352	8,215	

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES --- ACCORDING TO TYPE OF EFFECT

Effect on Mitosis in Tissues

73	1,320	2,541	4,102	5,042	7,883
75	1,413	2,639	4,148	5,092	7,909
125	1,599	2,759	4,226	5,200	8,031
214	1,816	2,784	4,255	5,508	8,063
326	1,958	3,080	4,300	5,532	8,156
448	2,034	3,147	4,341	6,043	8,211
455	2,189	3,155	4,446	6,149	8,364
523	2,212	3,319	4,531	6,162	8,916
565	2,248	3,799	4,579	6,212	9,168
956	2,307	3,837	4,792	6,376	9,315
974	2,378	3,906	4,800	6,412	9,559
1,063	2,410	3,913	4,884	6,845	9,645
1,094	2,456	3,958	5,041	6,874	9,727
				7,767	

10,419	10,786	11,575	12,239	12,366	12,423
10,580	10,794	11,593	12,258	12,412	12,450
10,784	10,998	12,001	12,284		

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES --- ACCORDING TO TYPE OF EFFECT

Permeability of Capillaries and Tissues (see BIOCHEM.
CHANGES for cell permeability)

111	2,105	3,229	5,967	7,472	9,339
206	2,107	3,236	6,277	7,634	9,350
309	2,218	3,271	6,490	7,670	9,357
340	2,282	3,375	6,613	7,694	9,530
703	2,319	3,557	6,683	7,732	9,693
816	2,350	3,632	6,875	7,761	10,001
825	2,455	4,127	6,894	7,785	11,370
839	2,594	4,359	6,980	7,844	11,886
988	2,663	4,367	7,035	8,106	12,079
1,094	2,852	4,864	7,045	8,107	12,080
1,270	2,892	4,896	7,264	8,108	12,184
1,375	3,106	5,125	7,357	8,244	12,185
1,431	3,135	5,385	7,358	8,603	12,198
1,446	3,139	5,711	7,392	8,935	12,343
2,076	3,160	5,905	7,396	9,125	12,478
					12,479

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES --- ACCORDING TO TYPE OF EFFECT

Effects of Eating Irradiated Foods or Administration
of Irradiated Pharmaceuticals, Chemicals, etc.

103	2,808	5,683	7,809	8,202	9,101	12,616
972	3,052	5,821	7,956	8,271	9,512	12,623
1,166	3,359	6,088	8,009	8,425	9,794	12,645
1,266	4,473	6,301	8,050	8,888	10,140	12,697
1,295	5,436	6,908	8,112	8,890	10,513	
1,909	5,592	7,420	8,152			

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRADIATION --- LISTED ACCORDING TO
ORGAN OR TISSUE

Immature Invertebrates

7	535	747	1325	1904	2711
17	543	748	1329	1961	2725
57	549	767	1536	2025	2801
124	552	819	1570	2153	2926
127	573	855	1588	2198	2928
193	584	863	1590	2328	2938
226	585	917	1591	2460	2984
227	606	986	1605	2511	3110
228	609	1007	1649	2519	3186
264	615	1038	1709	2576	3203
314	717	1196	1745	2681	3217
408	734	1242	1795	2691	3220

3258	3831	4418	5603	7012	8942
3268	3836	4451	5629	7044	8943
3270	3845	4452	5666	7098	9127
3279	3884	4453	5792	7142	9132
3337	3894	4493	5821	7194	9038
3357	3942	4512	5955	7203	9044
3368	3964	4540	6045	7219	9234
3370	3989	4543	6073	7389	9304
3415	4032	4549	6087	7412	9790
3417	4042	4551	6097	7415	9969
3434	4053	4581	6155	7526	10,081
3446	4060	4593	6161	7622	10,646
3456	4073	4605	6181	7645	11,133
3517	4092	4612	6314	7859	11,212
3578	4093	4628	6321	7871	11,232
3581	4101	4635	6371	7914	11,532
3585	4107	4674	6439	8126	11,859
3615	4109	4717	6530	8197	11,984
3620	4110	4739	6534	8252	11,998
3621	4122	4754	6535	8376	12,014
3635	4133	4777	6539	8417	12,019
3636	4140	4844	6552	8444	12,020
3638	4143	4851	6577	8458	12,022
3693	4156	4876	6590	8504	12,059
3694	4167	4901	6751	8526	12,060
3726	4219	4992	6790	8529	12,065
3745	4298	5021	6792	8530	12,083
3771	4322	5077	6794	8535	12,115
3778	4330	5079	6808	8551	12,168
3784	4342	5091	6882	8552	12,170
3785	4343	5202	6893	8553	12,248
3787	4374	5266	6906	8555	12,266
3789	4377	5436	6924	8556	12,273
3793	4380	5508	6929	8561	12,286
3811	4390	5521	6937	8562	12,347
3824	4395	5591	6993		

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRAD. -- ACCORDING TO ORGAN OR TISSUE

Mature Invertebrates

106	3230	3969	5365	7124	9343
190	3247	4008	5436	7389	9525
204	3311	4060	5437	7466	9790
301	3322	4084	5603	7540	10,118
368	3348	4245	5622	7583	10,246
407	3381	4293	5629	7606	10,667
507	3447	4304	5642	7622	11,563
615	3476	4378	5682	7623	11,841
693	3561	4386	5793	7630	11,884
717	3593	4426	5799	7701	11,990
1070	3662	4600	5935	7871	11,998
1153	3663	4652	5953	8257	12,066
1482	3692	4670	6001	8357	12,131
1588	3693	4724	6033	8555	12,273
2601	3694	4853	6044	8837	12,311
2808	3697	4891	6045	8839	12,314
2984	3750	4983	6051	8881	12,315
3069	3778	5079	6106	9127	12,514
3077	3779	5106	6129	9164	12,518
3196	3790	5118	6893	9227	12,519
3211	3931	5266	7027	9328	12,644

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRAD. --- ACCORDING TO ORGAN OR TISSUE

Zygotes or Embryos of Vertebrates

18	2266	3708	5490	8043	10,281
35	2343	3710	5572	8093	10,313
37	2356	3760	5738	8159	10,579
39	2361	3782	5752	8162	10,663
188	2362	3792	5753	8163	10,975
196	2390	3798	5757	8239	10,984
230	2437	3799	5767	8290	11,035
243	2456	3817	5910	8355	11,261
273	2486	3837	5933	8375	11,348
361	2493	3854	5950	8379	11,424
373	2523	3855	5951	8380	11,479
447	2531	3856	5959	8381	11,546
448	2566	3857	5967	8384	11,555
588	2664	3879	6057	8386	11,663
608	2718	3950	6075	8391	11,727
655	2761	3953	6141	8456	11,775
676	2836	3958	6149	8457	11,776
771	2889	3977	6247	8459	11,777
789	2977	3984	6318	8461	11,884
854	2995	4085	6319	8500	11,888
855	3060	4165	6566	8523	11,890
878	3111	4181	6610	8524	11,984
891	3112	4222	6714	8561	11,985
903	3122	4251	6745	8579	11,986
969	3123	4284	6762	8583	11,987
974	3254	4389	6799	8621	11,988
1047	3302	4454	6830	8869	11,989
1077	3319	4581	6834	8897	11,993
1090	3347	4596	6846	8899	11,997
1150	3364	4603	6922	9020	12,008
1187	3380	4636	6936	9037	12,009
1250	3402	4641	7186	9160	12,031
1259	3405	4949	7236	9165	12,040
1267	3406	5039	7260	9169	12,099
1466	3473	5047	7285	9228	12,100
1509	3475	5145	7325	9269	12,101
1526	3493	5251	7417	9303	12,102
1589	3516	5271	7441	9505	12,116
1597	3544	5275	7461	9508	12,143
1695	3552	5284	7465	9676	12,160
1862	3584	5299	7477	9705	12,169
1868	3633	5311	7538	9847	12,170
1958	3645	5320	7595	9900	12,272
1960	3658	5344	7791	9921	12,316
2112	3661	5390	7843	10,057	12,338
2170	3682	5392	7915	10,123	12,344
2171	3683	5395	7939	10,166	12,491
2209	3688	5429	7992	10,277	

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRAD. --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates

peripheral blood

12	965	1947	3991	5414	6456
23	971	1949	4003	5418	6457
53	980	1960	4047	5422	6468
70	982	1986	4063	5453	6516
80	983	1995	4145	5468	6518
116	993	2022	4155	5473	6519
120	1019	2049	4168	5474	6526
145	1026	2053	4169	5483	6527
187	1041	2076	4195	5484	6541
192	1066	2140	4205	5560	6584
194	1068	2189	4209	5582	6598
210	1074	2196	4265	5611	6609
216	1075	2197	4267	5612	6630
256	1085	2199	4301	5615	6631
272	1096	2204	4335	5624	6632
284	1098	2274	4365	5637	6654
295	1126	2315	4370	5641	6670
304	1138	2350	4396	5646	6722
306	1142	2499	4400	5657	6728
309	1247	2535	4411	5668	6795
335	1257	2613	4466	5708	6796
344	1260	2625	4495	5782	6798
409	1284	2699	4515	5787	6835
414	1317	2707	4542	5794	6842
441	1337	2786	4607	5800	6862
443	1343	2825	4611	5820	6883
525	1354	2845	4641	5826	6897
561	1355	2851	4650	5830	6909
568	1375	2857	4684	5866	6910
574	1416	2887	4733	5874	6911
600	1425	2890	4757	5887	6926
613	1439	2951	4767	5889	6939
630	1473	2953	4783	5891	6985
691	1480	2963	4784	5905	7002
703	1489	3004	4785	5941	7004
705	1509	3020	4814	5944	7007
716	1519	3040	4858	5983	7122
719	1524	3050	4861	6028	7132
746	1560	3053	4884	6037	7135
754	1585	3114	4888	6040	7147
763	1651	3117	4930	6107	7166
782	1666	3139	4942	6117	7230
785	1669	3141	4943	6170	7237
814	1683	3160	4946	6189	7343
825	1685	3170	4948	6193	7356
839	1688	3208	4953	6213	7357
843	1689	3298	4970	6222	7392
856	1690	3487	5032	6224	7423
859	1708	3538	5060	6251	7500
860	1713	3565	5080	6282	7506
861	1719	3652	5088	6304	7511
875	1735	3707	5111	6313	7527
878	1784	3728	5115	6325	7569
879	1809	3777	5117	6333	7613
887	1815	3814	5125	6367	7617
891	1825	3849	5137	6369	7622
909	1838	3903	5217	6398	7693
913	1839	3917	5243	6417	7696
917	1858	3930	5362	6425	7697
920	1889	3960	5363	6434	7706
932	1903	3966	5376	6442	7723
942	1915	3976	5409	6450	7725

7749	8567	9536	10,362	11,261	11,864
7821	8595	9554	10,367	11,266	11,867
7823	8817	9563	10,382	11,332	11,871
7873	8833	9569	10,385	11,336	11,873
7925	8906	9589	10,396	11,340	11,882
7928	8918	9593	10,410	11,453	11,883
7940	8934	9596	10,419	11,527	11,889
7953	8979	9598	10,423	11,549	11,892
8029	9002	9599	10,426	11,569	11,897
8046	9016	9601	10,527	11,571	11,909
8114	9030	9608	10,532	11,613	11,958
8116	9113	9609	10,709	11,645	11,974
8145	9125	9616	10,717	11,666	11,979
8170	9137	9617	10,753	11,667	11,999
8176	9156	9619	10,798	11,680	12,003
8220	9178	9806	10,811	11,681	12,036
8244	9207	9912	10,829	11,696	12,050
8325	9236	9949	10,866	11,815	12,056
8345	9254	9958	10,913	11,816	12,058
8401	9297	9976	10,987	11,819	12,076
8405	9386	9980	10,991	11,821	12,126
8448	9470	9981	10,998	11,831	12,164
8455	9471	10,210	11,015	11,833	12,195
8463	9473	10,266	11,022	11,847	12,198
8465	9501	10,276	11,165	11,849	12,224
8486	9503	10,329	11,180	11,850	12,257
8518	9504	10,343	11,186	11,858	12,275
8533	9524	10,349	11,257	11,863	12,511
8565					12,577
					12,640
					12,706

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY IRRAD. --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates

hematopoietic tissue

71	756	1188	1542	1918	2247
74	769	1209	1546	1919	2250
80	778	1211	1552	1933	2268
86	785	1245	1560	1938	2314
113	786	1254	1585	1997	2315
115	831	1257	1592	2022	2334
156	839	1260	1650	2045	2350
272	859	1284	1660	2046	2382
276	860	1289	1668	2047	2403
295	861	1305	1670	2054	2406
306	876	1326	1671	2076	2417
319	882	1332	1703	2080	2428
339	887	1341	1707	2091	2451
344	897	1366	1718	2105	2457
370	909	1375	1719	2125	2459
421	934	1386	1724	2129	2497
450	937	1398	1784	2144	2500
496	944	1423	1811	2146	2503
525	946	1428	1815	2169	2504
536	964	1461	1818	2175	2507
566	982	1462	1825	2196	2509
568	1013	1473	1829	2199	2522
611	1066	1519	1838	2217	2575
628	1092	1527	1894	2219	2578
716	1105	1533	1911	2238	2600
754	1158	1535	1915	2241	2613
755	1169	1537	1916	2245	2639

2654	4249	5684	6867	7697	9114
2678	4265	5701	6871	7698	9116
2712	4301	5711	6875	7704	9120
2717	4370	5800	6883	7707	9122
2758	4364	5810	6888	7708	9123
2762	4398	5820	6895	7719	9135
2786	4400	5830	6897	7722	9137
2810	4402	5866	6902	7733	9147
2851	4438	5874	6910	7736	9152
2855	4456	5886	6926	7754	9154
2856	4468	5887	6985	7761	9156
2861	4495	5891	6996	7782	9159
2871	4531	5921	7002	7789	9172
2918	4542	5983	7004	7806	9177
2924	4641	6005	7007	7810	9178
2925	4650	6026	7029	7821	9207
2939	4733	6039	7030	7823	9214
2940	4757	6047	7040	7833	9236
2947	4766	6056	7043	7834	9246
2965	4767	6100	7049	7856	9259
2970	4783	6107	7064	7880	9263
2972	4814	6117	7086	7928	9266
2981	4834	6166	7093	7941	9271
2987	4857	6182	7119	7948	9277
2989	4885	6189	7122	7993	9302
3019	4930	6193	7127	7999	9320
3020	4942	6211	7128	8024	9354
3042	4943	6222	7133	8026	9375
3050	4946	6224	7147	8048	9380
3053	4953	6251	7197	8103	9386
3114	4986	6256	7200	8168	9387
3134	5019	6260	7218	8210	9430
3141	5032	6261	7230	8211	9464
3147	5057	6288	7237	8220	9465
3155	5060	6300	7268	8225	9466
3165	5078	6304	7269	8249	9467
3210	5080	6322	7275	8303	9468
3267	5095	6325	7280	8311	9469
3285	5111	6357	7304	8356	9470
3287	5117	6360	7317	8411	9471
3403	5125	6363	7356	8415	9473
3413	5132	6367	7376	8437	9474
3487	5185	6369	7387	8448	9475
3490	5243	6372	7388	8453	9492
3546	5259	6391	7401	8533	9495
3552	5298	6398	7416	8550	9504
3565	5318	6417	7423	8565	9507
3586	5362	6431	7427	8567	9522
3599	5409	6433	7445	8597	9526
3623	5418	6434	7446	8639	9531
3706	5426	6447	7453	8782	9532
3707	5434	6448	7479	8798	9535
3739	5447	6468	7480	8817	9537
3797	5484	6469	7485	8833	9538
3814	5511	6497	7491	8906	9540
3826	5537	6516	7492	8921	9542
3934	5542	6526	7493	8934	9548
3960	5543	6538	7496	8950	9554
4003	5545	6543	7499	8957	9557
4009	5546	6544	7506	8970	9569
4043	5553	6568	7523	8995	9579
4054	5560	6624	7531	9004	9580
4063	5564	6630	7548	9012	9582
4064	5574	6631	7565	9019	9583
4075	5576	6632	7569	9021	9586
4112	5588	6637	7583	9034	9587
4114	5611	6654	7605	9048	9590
4137	5641	6670	7613	9079	9592
4155	5646	6728	7622	9081	9593
4168	5658	6820	7633	9094	9594
4169	5661	6842	7693	9112	9597
4198	5668	6851	7696	9113	9598
4205					
4224					

9599	9806	10,717	11,373	11,882	12,298
9606	9879	10,765	11,436	11,883	12,300
9608	9929	10,775	11,445	11,889	12,324
9609	9949	10,798	11,453	11,897	12,339
9610	9961	10,837	11,508	11,906	12,375
9611	9968	10,866	11,571	11,946	12,382
9612	9980	10,913	11,577	11,980	12,398
9615	10,019	10,987	11,586	11,999	12,401
9617	10,181	10,995	11,613	12,021	12,421
9618	10,210	11,015	11,661	12,030	12,428
9642	10,298	11,022	11,696	12,036	12,440
9643	10,328	11,027	11,732	12,112	12,445
9653	10,343	11,034	11,733	12,153	12,446
9667	10,349	11,136	11,734	12,161	12,447
9668	10,394	11,165	11,749	12,176	12,448
9670	10,396	11,180	11,763	12,200	12,480
9679	10,419	11,195	11,813	12,212	12,493
9683	10,434	11,233	11,815	12,241	12,494
9689	10,532	11,261	11,816	12,252	12,495
9690	10,538	11,278	11,821	12,253	12,497
9691	10,545	11,296	11,831	12,254	12,503
9696	10,547	11,301	11,833	12,255	12,504
9726	10,559	11,303	11,847	12,258	12,505
9727	10,588	11,332	11,849	12,259	12,520
9774	10,616	11,333	11,850	12,272	12,577
9781	10,666	11,340	11,865	12,296	12,608
9802	10,697	11,356	11,867	12,297	12,640
					12,650
					12,651
					12,687

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY IRRADIATION --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates

vascular system

17	716	1911	2890	4066	5078
45	738	1922	2951	4089	5125
91	754	1933	2953	4114	5157
111	757	1935	3003	4126	5158
136	782	1964	3053	4169	5203
173	785	1973	3089	4239	5262
185	797	2074	3106	4252	5281
205	798	2076	3114	4359	5385
206	816	2105	3135	4444	5405
207	817	2126	3139	4467	5417
234	825	2131	3160	4479	5484
235	828	2144	3161	4494	5637
253	853	2196	3208	4514	5640
345	1074	2199	3243	4526	5791
369	1089	2218	3264	4530	5972
442	1270	2254	3271	4553	6047
461	1341	2319	3275	4597	6230
490	1375	2350	3297	4606	6242
525	1398	2455	3360	4641	6257
570	1445	2533	3389	4649	6311
572	1539	2592	3420	4747	6317
575	1575	2603	3546	4769	6346
587	1648	2613	3558	4806	6412
592	1650	2663	3595	4819	6437
595	1705	2707	3632	4860	6464
620	1713	2753	3701	4864	6517
625	1765	2788	3776	4874	6562
704	1825	2851	3810	4877	6613
705	1861	2852	3986	4896	6618
			4018	5060	6624

6633	7369	8188	9125	10,931	11,677
6658	7383	8283	9175	10,980	11,767
6770	7440	8308	9238	10,987	11,770
6781	7467	8323	9265	10,998	11,819
6836	7478	8325	9320	11,015	11,850
6841	7514	8334	9349	11,022	11,864
6842	7567	8363	9350	11,063	11,869
6852	7578	8415	9356	11,085	11,877
6911	7589	8463	9517	11,096	11,897
7128	7623	8467	9573	11,145	11,971
7250	7671	8486	9584	11,206	12,010
7264	7751	8571	9599	11,208	12,011
7344	7760	8627	9971	11,324	12,016
7345	7761	8632	9974	11,370	12,039
7346	7776	8637	9999	11,513	12,051
7349	7808	8638	10,001	11,516	12,052
7350	7821	8778	10,344	11,518	12,075
7351	7832	8873	10,374	11,571	12,123
7353	7943	8880	10,496	11,576	12,176
7356	7981	8927	10,602	11,589	12,184
7357	7982	8935	10,682	11,637	12,185
7358	7987	8948	10,787	11,641	12,187
7361	8006	8986	10,800	11,647	12,218
7367	8096	9120	10,887	11,672	12,436

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRAD. --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates

endocrine glands

8	935	2300	3187	4547	5586
24	975	2305	3253	4565	5617
42	983	2374	3310	4586	5618
71	985	2425	3468	4608	5634
75	1017	2426	3491	4641	5635
123	1102	2449	3592	4699	5688
141	1141	2631	3596	4726	5695
186	1149	2656	3597	4727	5696
219	1199	2660	3607	4731	5760
221	1217	2667	3653	4769	5788
269	1230	2684	3735	4816	5823
270	1359	2704	3742	4893	5833
327	1363	2736	3794	4930	5846
328	1368	2744	3815	4943	5853
374	1381	2771	3864	4996	5857
378	1395	2803	3932	5048	5876
467	1420	2806	3993	5143	5914
480	1422	2818	4002	5207	5989
486	1435	2833	4009	5213	5992
491	1535	2864	4022	5255	5993
492	1568	2871	4024	5280	6055
537	1746	2912	4043	5281	6069
589	1886	2921	4075	5290	6116
591	1893	2994	4078	5298	6127
626	2029	3019	4145	5423	6166
667	2096	3027	4182	5431	6206
742	2103	3039	4188	5449	6217
808	2148	3063	4333	5470	6248
826	2156	3140	4337	5497	6268
885	2163	3147	4346	5513	6361
933	2182	3168	4399	5573	6398
934	2276	3169	4474	5582	6402

6411	7249	8572	9707	11,097	11,679
6418	7290	8726	9741	11,100	11,692
6483	7303	8827	9742	11,124	11,700
6533	7405	8845	9785	11,125	11,813
6574	7419	8876	10,057	11,126	11,830
6591	7432	8891	10,115	11,127	11,831
6613	7450	8919	10,151	11,189	11,833
6651	7490	8941	10,286	11,192	11,854
6757	7532	8972	10,381	11,205	11,861
6807	7535	8978	10,509	11,207	11,864
6833	7538	8982	10,570	11,296	11,868
6861	7560	8983	10,573	11,420	11,870
6918	7610	9031	10,576	11,424	11,897
6920	7646	9142	10,588	11,452	11,901
6941	7658	9216	10,709	11,497	11,903
6947	7659	9294	10,718	11,530	11,953
6977	7793	9309	10,720	11,536	12,038
6987	7796	9314	10,771	11,545	12,078
7007	8049	9319	10,824	11,567	12,091
7086	8088	9346	10,825	11,578	12,135
7110	8200	9382	10,827	11,591	12,197
7143	8280	9434	10,828	11,594	12,205
7165	8290	9519	10,830	11,599	12,397
7197	8331	9520	11,013	11,629	12,438
7224	8412	9550	11,022	11,658	12,479
7246	8571	9552			12,652
					12,653

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRAD. --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates
exocrine glands

8	1,400	3,569	5,983	8,158	11,497
141	1,505	4,009	5,992	8,389	11,545
255	1,858	4,043	6,460	8,393	11,623
464	1,888	4,640	6,726	8,571	11,700
574	1,955	4,769	6,735	8,900	11,967
885	2,295	5,245	6,818	9,477	12,026
894	2,506	5,279	6,941	9,789	12,045
973	2,566	5,298	7,330	9,804	12,046
1,002	2,742	5,453	7,335	9,950	12,070
1,064	2,812	5,733	7,532	11,124	12,114
1,381	3,249	5,965	7,793	11,125	

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRAD. --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates
connective tissue other than bone and
cartilage

455	1,256	1,705	3,275	3,767	4,684
765	1,370	2,254	3,289	3,832	5,225
1,004	1,377	2,319	3,420	3,849	5,385
1,061	1,414	2,749	3,536	3,890	5,437
1,184	1,431	3,218	3,609	4,148	5,647

5,711	7,508	8,845	10,106	10,990	11,905
5,828	7,700	9,125	10,461	11,101	11,970
5,905	7,722	9,243	10,602	11,102	12,075
6,619	7,751	9,507	10,800	11,206	12,077
6,624	7,759	9,551	10,807	11,326	12,092
7,045	7,810	9,944	10,931	11,343	12,198
7,240	8,244	9,971	10,980	11,626	12,224
					12,394

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION --- ACCORDING TO TISSUE OR ORGAN

Mature Vertebrates,
bone and cartilage

97	3,150	5,045	7,124	9,815	11,162
415	3,257	5,176	7,323	9,835	11,211
430	3,307	5,317	7,345	9,911	11,222
541	3,534	5,430	7,448	10,325	11,225
583	3,567	5,441	7,583	10,343	11,291
799	3,589	5,485	7,628	10,407	11,294
801	3,624	5,701	7,653	10,452	11,301
862	3,660	5,795	7,722	10,660	11,303
934	3,796	5,921	8,001	10,662	11,331
1,256	3,827	5,956	8,136	10,859	11,452
1,382	4,072	5,993	8,149	10,892	11,634
1,485	4,131	6,011	8,183	10,917	11,668
1,655	4,225	6,012	8,310	10,938	11,757
1,885	4,417	6,013	8,360	10,980	11,766
1,888	4,484	6,029	8,937	10,988	11,897
2,036	4,529	6,065	8,954	10,999	11,922
2,143	4,588	6,176	9,223	11,022	12,063
2,446	4,694	6,360	9,237	11,042	12,191
2,527	4,699	6,648	9,239	11,051	12,202
2,552	4,705	6,656	9,244	11,061	12,439
2,593	4,725	6,696	9,299	11,092	12,440
2,768	4,760	6,759	9,347	11,111	12,441
2,875	4,834	6,823	9,569	11,128	12,442
2,998	4,862	7,078	9,693	11,146	12,606

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates
reticulo-endothelial system

43	596	1,093	2,092	3,120	3,658
53	628	1,254	2,103	3,145	3,706
140	635	1,268	2,146	3,218	3,707
291	691	1,317	2,187	3,228	3,797
294	755	1,337	2,212	3,264	3,849
346	793	1,377	2,319	3,271	3,890
376	857	1,415	2,417	3,299	3,910
409	897	1,527	2,450	3,309	4,003
424	920	1,539	2,603	3,419	4,164
438	1,041	1,573	2,707	3,480	4,223
470	1,086	1,731	2,920	3,558	4,224
538	1,091	1,990	3,088	3,623	4,267

4,272	5,763	7,102	7,912	9,112	10,920
4,402	5,814	7,120	7,961	9,114	10,931
4,513	5,941	7,235	7,988	9,152	10,990
4,514	6,210	7,310	8,026	9,156	10,995
4,590	6,217	7,392	8,107	9,161	11,012
4,684	6,224	7,396	8,108	9,279	11,022
4,757	6,225	7,424	8,137	9,302	11,195
4,761	6,246	7,446	8,218	9,321	11,233
4,806	6,584	7,485	8,244	9,357	11,819
4,885	6,593	7,491	8,292	9,536	11,897
4,951	6,796	7,493	8,293	9,540	12,136
4,957	6,824	7,531	8,294	9,542	12,177
4,986	6,844	7,596	8,311	9,551	12,198
5,177	6,854	7,650	8,405	9,606	12,201
5,181	6,870	7,725	8,486	9,727	12,275
5,403	6,871	7,761	8,934	10,421	12,278
5,418	6,927	7,843	8,979	10,775	12,296
5,447	6,933	7,882	8,988	10,843	12,495
5,711	6,980	7,883			12,586

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY IRRAD. --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates

female reproductive system

35	1,704	3,607	5,470	7,537	11,518
37	1,746	3,622	5,513	7,538	11,521
40	1,818	3,646	5,554	7,554	11,536
42	1,854	3,659	5,560	7,760	11,537
43	1,925	3,675	5,848	8,049	11,567
58	1,926	3,742	5,991	8,165	11,570
60	1,927	3,767	5,992	8,209	11,586
61	1,970	3,782	5,997	8,222	11,599
62	1,975	3,864	6,055	8,280	11,618
123	2,027	4,006	6,069	8,356	11,621
130	2,156	4,022	6,185	8,579	11,629
186	2,334	4,043	6,403	8,918	11,747
219	2,373	4,076	6,411	8,941	11,780
269	2,425	4,078	6,566	8,972	11,830
316	2,449	4,156	6,574	9,041	11,854
327	2,566	4,565	6,591	9,309	11,859
328	2,694	4,616	6,650	9,804	11,861
491	2,744	4,619	6,716	10,056	11,868
492	2,806	4,726	6,777	10,057	11,870
554	2,912	4,727	6,778	10,399	11,872
591	2,996	4,731	6,780	10,457	11,874
809	3,050	4,816	6,799	10,509	11,901
858	3,063	4,829	6,861	10,575	11,906
878	3,064	4,930	6,941	10,588	11,953
941	3,109	4,984	6,983	10,759	11,996
1,026	3,116	5,096	7,290	10,837	12,040
1,192	3,153	5,149	7,327	10,869	12,091
1,260	3,224	5,203	7,419	10,982	12,107
1,314	3,265	5,207	7,427	11,022	12,124
1,331	3,299	5,280	7,453	11,363	12,209
1,353	3,468	5,281	7,514	11,364	12,214
1,381	3,510	5,449	7,522	11,515	12,483
1,505					12,427

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRAD. --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates

male reproductive system

126	1,628	3,867	6,210	9,530	11,623
140	1,724	3,932	6,354	9,533	11,724
163	1,738	3,953	6,386	9,552	11,725
164	1,784	4,006	6,533	9,577	11,726
292	1,818	4,010	6,650	10,338	11,728
316	1,926	4,011	6,716	10,393	11,729
328	1,930	4,289	6,740	10,457	11,730
470	2,027	4,355	6,861	10,509	11,731
475	2,029	4,547	6,941	10,759	11,735
497	2,156	4,616	6,962	10,760	11,736
528	2,189	4,637	6,981	10,823	11,737
591	2,334	4,858	6,983	10,834	11,738
754	2,425	4,869	7,204	10,835	11,780
878	2,426	4,884	7,327	10,837	11,781
913	2,508	4,984	7,431	10,982	11,847
926	2,669	5,030	7,453	11,022	11,856
941	2,789	5,214	7,529	11,052	11,862
950	2,853	5,298	7,535	11,265	11,868
951	2,958	5,486	7,594	11,261	11,870
987	2,980	5,509	7,760	11,364	11,872
1,104	2,996	5,513	7,887	11,515	11,874
1,192	3,050	5,554	8,031	11,522	11,898
1,260	3,427	5,560	8,559	11,534	12,024
1,307	3,489	5,562	8,594	11,535	12,040
1,331	3,510	5,577	8,918	11,542	12,162
1,353	3,540	5,701	9,116	11,578	12,214
1,373	3,598	5,751	9,340	11,614	12,277
1,381	3,629	6,068	9,382	11,618	12,339
1,385	3,670	6,081	9,384	11,620	12,483
1,581	3,691	6,118	9,428	11,621	

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRAD. --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates

liver

525	2,464	4,054	5,810	7,632	8,950
536	2,659	4,213	6,225	7,792	8,985
538	3,053	4,337	6,328	7,800	9,257
691	3,114	4,931	6,653	7,883	9,261
808	3,141	4,953	6,787	7,908	9,279
835	3,151	5,019	6,824	7,909	9,307
1,072	3,216	5,060	6,854	7,953	9,320
1,124	3,222	5,177	6,954	7,988	9,375
1,171	3,223	5,217	7,022	8,179	9,550
1,245	3,238	5,297	7,117	8,263	9,645
1,423	3,297	5,379	7,119	8,267	9,977
1,707	3,360	5,398	7,159	8,274	10,008
1,744	3,374	5,403	7,214	8,303	10,344
1,765	3,435	5,417	7,218	8,422	10,721
2,103	3,490	5,426	7,446	8,483	10,920
2,212	3,558	5,633	7,470	8,507	11,027
2,241	3,797	5,699	7,471	8,571	11,060
2,248	3,986	5,712	7,493	8,862	11,110
2,288	4,009	5,759	7,514	8,904	11,185
2,445	4,043	5,773	7,631	8,935	11,233

11,334	11,622	11,777	11,865	11,994	12,176
11,435	11,700	11,864	11,991	12,071	12,412

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRAD. --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates

kidney; urinary tract

94	1,844	3,738	6,562	8,446	10,189
118	2,301	3,808	6,824	8,464	10,504
136	2,568	3,909	6,854	8,497	10,955
159	2,667	4,043	7,202	8,499	11,153
169	2,720	4,381	7,218	8,522	11,261
525	2,847	4,382	7,312	8,598	11,347
576	2,870	5,060	7,333	8,907	11,377
666	3,114	5,417	7,359	8,920	11,847
758	3,143	5,633	7,514	8,989	11,864
804	3,166	5,728	8,106	9,075	11,897
1,074	3,209	5,832	8,116	9,320	12,007
1,286	3,216	5,994	8,176	9,342	12,017
1,334	3,371	6,261	8,215	10,159	12,018
1,656	3,609	6,277	8,416	10,163	12,037
1,730	3,736	6,368	8,419	10,176	12,176
1,768	3,737				

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRAD. --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates

respiratory system

111	2,732	4,513	7,672	10,135	11,373
570	2,873	4,780	7,702	10,159	11,452
696	3,011	4,841	7,898	10,349	11,518
793	3,056	5,453	8,006	10,358	11,636
1,091	3,114	6,594	8,303	10,701	11,685
1,197	3,198	6,759	8,496	10,709	11,763
1,215	3,221	6,824	8,544	10,843	11,774
1,216	3,375	7,345	8,795	10,927	11,778
1,387	3,604	7,350	8,863	10,967	11,779
1,844	3,933	7,384	9,346	11,022	11,864
1,916	4,040	7,514	9,530	11,062	11,897
1,934	4,043	7,563	9,536	11,129	12,077
2,092	4,066	7,601	9,693	11,225	12,089
2,394	4,292	7,649	9,952	11,264	12,092
2,667	4,438	7,651	10,053	11,266	12,523
2,674	4,500				

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates

eye; ear

55	1,483	3,935	6,195	7,170	9,273
285	1,816	4,115	6,196	7,175	9,539
453	1,819	4,158	6,339	7,198	10,116
484	1,825	4,328	6,426	7,238	10,146
514	1,935	4,544	6,482	7,260	10,454
653	2,244	4,765	6,624	7,377	10,474
752	2,279	4,767	6,625	7,478	11,136
780	2,308	4,947	6,686	7,572	11,322
866	2,310	5,189	6,758	7,618	11,506
878	2,348	5,331	6,759	7,661	11,516
892	2,424	5,450	6,831	7,707	11,533
1,094	2,443	5,560	6,869	8,033	11,639
1,143	2,892	5,654	6,896	8,084	11,653
1,169	3,103	5,670	7,015	8,117	11,714
1,202	3,195	5,871	7,016	8,285	11,857
1,234	3,280	5,872	7,017	8,288	11,869
1,261	3,323	5,907	7,018	8,304	12,074
1,262	3,504	5,996	7,060	8,399	12,122
1,321	3,570	6,018	7,074	8,400	12,389
1,356	3,582	6,043	7,144	9,251	12,392
1,386	3,879	6,162			12,683
					12,689

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRAD. --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates

gastrointestinal system

16	1,400	2,758	5,125	6,261	7,732
26	1,473	2,811	5,141	6,331	7,754
68	1,574	2,812	5,157	6,336	7,766
110	1,645	3,009	5,217	6,436	7,832
210	1,650	3,053	5,245	6,460	7,838
255	1,784	3,102	5,279	6,490	8,052
309	1,826	3,114	5,318	6,493	8,053
372	1,851	3,147	5,426	6,735	8,057
464	1,865	3,236	5,532	6,759	8,058
525	1,911	3,249	5,540	6,818	8,061
536	1,933	3,433	5,561	6,854	8,094
630	1,934	3,438	5,597	6,894	8,107
632	2,010	3,490	5,609	6,980	8,176
716	2,075	3,569	5,613	7,130	8,190
738	2,088	3,639	5,637	7,147	8,196
754	2,106	3,700	5,658	7,167	8,205
758	2,144	3,755	5,718	7,190	8,268
803	2,295	3,986	5,720	7,212	8,292
894	2,317	4,125	5,733	7,335	8,307
959	2,334	4,278	5,756	7,337	8,308
973	2,381	4,370	5,790	7,392	8,348
988	2,400	4,467	5,965	7,401	8,389
1,074	2,442	4,479	5,983	7,406	8,393
1,086	2,471	4,640	6,041	7,472	8,497
1,135	2,492	4,699	6,053	7,514	8,515
1,260	2,506	4,809	6,056	7,568	8,596
1,342	2,611	4,890	6,067	7,690	8,925
1,362	2,613	5,060	6,144	7,691	8,963
1,398	2,702	5,092	6,163	7,694	8,974

8,985	9,477	10,642	11,359	11,857	11,977
9,018	9,481	10,994	11,545	11,864	11,991
9,094	9,526	11,015	11,571	11,875	12,006
9,116	9,563	11,022	11,589	11,883	12,026
9,263	9,573	11,085	11,594	11,897	12,045
9,271	9,950	11,121	11,596	11,911	12,046
9,307	9,967	11,206	11,674	11,918	12,079
9,315	9,975	11,261	11,685	11,967	12,080
9,339	10,197	11,337	11,700	11,976	12,272
9,375	10,332				12,477

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY
IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRADIATION --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates

skin and appendages

9	957	2320	3215	4546	6066
11	1004	2334	3221	4574	6071
17	1031	2335	3243	4575	6171
76	1063	2376	3257	4580	6197
91	1107	2396	3386	4597	6242
126	1145	2408	3389	4606	6306
173	1246	2410	3413	4612	6317
206	1270	2411	3416	4649	6323
234	1280	2412	3433	4706	6366
316	1298	2414	3434	4733	6411
317	1346	2420	3514	4747	6429
382	1364	2463	3532	4765	6437
397	1367	2495	3536	4767	6438
411	1369	2519	3563	4769	6440
412	1370	2521	3595	4806	6461
416	1444	2579	3598	4896	6506
420	1484	2592	3599	5042	6562
433	1485	2594	3641	5074	6569
434	1502	2595	3684	5158	6597
442	1510	2610	3776	5165	6619
455	1558	2630	3799	5168	6621
456	1573	2659	3829	5261	6636
490	1648	2661	3883	5262	6684
525	1695	2662	3907	5263	6715
528	1698	2663	3912	5357	6758
546	1705	2666	3947	5378	6759
567	1784	2740	3995	5405	6781
572	1865	2741	4018	5414	6784
575	1873	2742	4065	5441	6817
580	1874	2750	4089	5452	6836
587	1882	2751	4102	5499	6840
597	1921	2754	4127	5507	6841
612	1964	2788	4238	5528	6852
685	1973	2809	4239	5640	6948
696	1989	2853	4246	5772	7045
724	2035	2868	4325	5880	7141
738	2036	2931	4338	5905	7160
754	2074	2943	4341	5908	7173
770	2075	2969	4360	5929	7201
797	2089	3038	4372	5977	7211
828	2105	3086	4417	5978	7240
853	2234	3139	4425	6011	7287
896	2254	3147	4452	6014	7315
922	2277	3156	4507	6015	7357
923	2306	3157	4520	6017	7358
956	2319	3160	4526	6063	7361
			4530		

7373	8259	9292	10,461	11,513	11,972
7379	8299	9344	10,602	11,545	12,016
7397	8323	9515	10,624	11,571	12,023
7456	8342	9561	10,682	11,589	12,051
7473	8405	9569	10,684	11,626	12,053
7509	8414	9573	10,787	11,631	12,054
7510	8569	9575	10,793	11,637	12,073
7521	8574	9759	10,800	11,647	12,082
7583	8778	9817	10,837	11,672	12,083
7587	8877	9836	10,887	11,677	12,185
7693	8927	9913	10,999	11,682	12,189
7695	8948	9966	11,042	11,687	12,199
7707	8976	9971	11,092	11,688	12,218
7773	8985	10,052	11,208	11,790	12,266
7828	8994	10,106	11,262	11,868	12,339
7884	9034	10,269	11,263	11,878	12,360
7895	9117	10,301	11,313	11,879	12,362
8013	9146	10,346	11,343	11,881	12,437
8099	9226	10,367	11,444	11,883	12,438
8107	9247	10,386	11,506	11,970	12,443
8179	9275	10,394	11,511	11,971	12,478
					12,515

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRAD. --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates

striated muscle (for heart; see vascular
system)

331	5350	5784	7632	8315	11,510
1559	5778	6347	8289	8869	

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR
PARTIAL BODY IRRAD. -- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates

nervous system

95	843	1594	2407	3184	3685
110	878	1736	2465	3195	3701
313	961	1749	2568	3229	3735
369	969	1885	2591	3249	3914
397	1044	1900	2594	3308	3993
487	1090	1922	2707	3333	4091
499	1094	1933	2732	3338	4337
526	1121	1940	2852	3375	4366
537	1143	1968	2931	3387	4367
539	1232	2075	2953	3459	4416
561	1256	2130	2982	3491	4473
572	1264	2131	3119	3504	4527
637	1270	2279	3137	3570	4745
803	1298	2314	3144	3587	4748
810	1321	2339	3156	3626	4860
818	1345	2376	3161	3627	4902
824	1389	2381	3183	3642	4930

5060	6219	6568	7383	8285	9785
5189	6229	6579	7385	8320	10,167
5332	6230	6613	7391	8359	10,308
5338	6231	6614	7444	8415	10,310
5341	6236	6616	7480	8496	10,418
5343	6237	6617	7481	8571	10,454
5373	6245	6634	7493	8726	10,705
5374	6252	6652	7514	8873	10,997
5389	6258	6683	7525	8883	11,022
5400	6269	6733	7583	8899	11,282
5401	6270	6758	7615	8914	11,389
5408	6296	6761	7647	8971	11,425
5422	6302	6763	7648	8995	11,516
5540	6311	6764	7649	8996	11,545
5568	6312	6765	7669	8997	11,591
5587	6313	6806	7759	9003	11,602
5609	6344	6820	7778	9024	11,694
5678	6345	6824	7779	9094	11,765
5732	6346	6862	7784	9234	11,819
5781	6349	6896	7785	9255	11,869
5791	6356	6943	7808	9267	11,877
5806	6364	7066	7854	9273	11,897
5840	6401	7081	7892	9291	11,901
5860	6407	7083	7893	9296	11,902
5863	6408	7134	7943	9300	12,074
5877	6435	7162	7950	9301	12,088
5879	6455	7164	7960	9326	12,125
6041	6464	7166	7968	9335	12,197
6098	6485	7175	7975	9336	12,218
6152	6488	7184	7997	9378	12,325
6163	6501	7218	8123	9480	12,436
6180	6505	7250	8155	9495	12,438
6183	6515	7283	8169	9550	12,515
6210	6521	7284	8186	9575	12,516
6217	6552	7382	8216		12,624
					12,642
					12,710

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRADIATION

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL
BODY IRRAD. --- ACCORDING TO ORGAN OR TISSUE

Mature Vertebrates

neoplastic tissue

73	609	1520	2382	3153	3678
125	680	1564	2403	3167	3695
205	755	1629	2451	3188	3754
214	812	1792	2476	3199	3767
311	858	1811	2618	3210	3770
312	913	1838	2619	3221	3783
323	924	1883	2645	3243	3913
326	929	1940	2659	3264	3962
360	956	1960	2664	3286	3987
393	1055	1987	2743	3336	3994
418	1173	1997	2805	3362	4036
439	1197	2034	2819	3376	4079
451	1223	2091	2856	3433	4080
452	1256	2161	2861	3443	4135
468	1287	2195	2913	3461	4136
470	1331	2212	2966	3559	4139
512	1377	2300	2973	3595	4160
523	1414	2313	3005	3602	4161
547	1446	2325	3046	3603	4170
565	1464	2337	3130	3604	4197
586	1476	2340	3136	3641	4208
596	1505	2360	3145	3646	4248
				3654	

4264	5094	6589	8328	9668	11,150
4265	5108	6609	8428	9671	11,224
4287	5148	6624	8433	9679	11,243
4291	5208	6667	8436	9683	11,260
4300	5220	6741	8452	9689	11,264
4361	5226	6752	8463	9694	11,302
4370	5259	6753	8486	9695	11,343
4423	5274	6853	8525	9696	11,349
4424	5282	6947	8536	9701	11,420
4469	5331	7007	8560	9719	11,511
4477	5528	7040	8565	9730	11,517
4483	5595	7289	8574	9780	11,523
4518	5630	7334	8576	9787	11,591
4519	5631	7413	8592	9972	11,593
4531	5632	7491	8603	9973	11,595
4552	5682	7515	8623	10,151	11,699
4553	5879	7520	8624	10,167	11,768
4566	5880	7533	8845	10,174	11,813
4579	5897	7542	8863	10,278	11,816
4612	5949	7571	8938	10,434	11,821
4650	5966	7708	8963	10,478	11,902
4659	5971	7722	8982	10,496	11,905
4661	5988	7733	9236	10,562	11,968
4676	5998	7767	9290	10,580	11,974
4680	6056	7787	9318	10,588	11,978
4688	6082	7788	9346	10,666	11,995
4690	6208	7836	9492	10,678	12,028
4706	6236	7926	9497	10,686	12,048
4766	6270	7948	9504	10,710	12,067
4784	6312	8000	9518	10,721	12,084
4792	6316	8010	9522	10,746	12,087
4800	6352	8085	9528	10,755	12,090
4842	6356	8156	9558	10,778	12,134
4849	6412	8175	9577	10,780	12,196
4852	6417	8195	9583	10,784	12,284
4856	6438	8227	9642	10,794	12,322
4956	6485	8243	9644	10,919	12,366
4957	6556	8299	9652	10,947	12,407
4958	6572	8313	9654	10,983	12,422
5033	6575	8322	9661	10,990	12,435
5038	6588		9664		12,687

PHYSIOLOGICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN TISSUES OTHER THAN THOSE IRRADIATED

PHYSIOLOGICAL EFFECTS FOLLOWING TOTAL OR PARTIAL
BODY IRRADIATION IN TISSUES OTHER THAN THOSE
IRRADIATED, LISTED ACCORDING TO ORGAN OR TISSUE

Peripheral Blood

12	741	2442	3557	4745	9607
339	965	2503	3810	4943	9618
443	1158	2504	3916	5564	11,906
467	1270	3170	4002	5582	12,511
537	2368	3239	4009	8597	12,512
561	2407	3487	4112	9571	

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL CHANGES -- ACCORDING TO ORGAN OR TISSUE

Hematopoietic Tissue

339	843	1193	4655	5564	8597
741	965	2442	4745	6040	9570
831	1158	2567	4943	8486	
		3141			
		3546			

PHYSIOLOGICAL CHANGES OTHER THAN THOSE IRRADIATED

PHYSIOLOGICAL EFFECTS --- ACCORDING TO ORGAN OR TISSUE

Vascular System

71	965	2818	4112	8571	9571
156	1935	3546	4873	9283	9785
599	2631	3557	4942		

PHYSIOLOGICAL CHANGES OTHER THAN THOSE IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Endocrine Glands

480	3039	4009	4873	5788	8726
667	3137	4182	5255	6248	8845
678	3229	4337	5347	6403	9314
731	3546	4346	5402	6418	9649
826	3653	4398	5582	7419	11,901
1102	3735	4608	5617	7609	11,903
1193	3794	4655	5635	7887	12,197
1217	4002	4726	5688	8200	
2374					
2656					

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Exocrine Glands

3169
4655

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Connective Tissue Other Than Bone and Cartilage

23	172	4341
67	741	8845

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Bone and Cartilage

3310

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Reticulo-Endothelial System

123	4957
470	8486

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Female Reproductive System

2912	3187	4182	4726	5155	6651
3039	3653	4346	4996	6403	7796
3137	3742	4608		6418	

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Male Reproductive System

328	3510	4398
1217	4249	4608

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Liver

4655

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Kidney; Urinary Tract

5206

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Lungs

1916

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Eyes

24	4002
1217	6483
	9649

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Gastrointestinal System

741	3249	4479	5282
3169	4400	4655	5609

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN THOSE
IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Skin and Appendages

741	4102	12,438
2661	6016	

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Striated Muscle (for Heart, see Vascular System)

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL EFFECTS IN TISSUES etc. LISTED
ACCORDING TO ORGAN OR TISSUE

Nervous System

599	4002	7943	9283
1512	6733	8481	

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Neoplastic Tissue

172	3005	8845
1629	8322	
2966		

PHYSIOLOGICAL CHANGES IN TISSUES OTHER THAN IRRADIATED

PHYSIOLOGICAL EFFECTS -- ACCORDING TO ORGAN OR TISSUE

Generalized

71	599
156	6016
172	7547

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

(Tissues studied in vitro after in vivo irradiation are classified under the previous sections.)

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION -- LISTED ACCORDING TO TYPE OF EFFECT

Comparison of Effects of Ionizing Radiation with
with Effects Produced by Exposure to Chemical
or Physical Agents or to Non-Ionizing Radiation

93	209	851	2,309	4,510	8,611
134	213	854	2,728	4,685	8,627
144	217	1,052	2,938	4,719	8,634
154	400	1,372	3,062	6,151	9,277
157	509	1,449	3,108	6,347	9,754
184	523	1,646	3,324	7,791	9,865
185	535	1,745	3,488	8,535	12,085
188	593	1,966	3,761	8,582	12,098
189	594	2,216	4,027		

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION,
MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES --- ACCORDING TO TYPE OF EFFECT

Lethal Effects

14	544	1,372	2,801	3,566	4,269
20	594	1,449	2,886	3,591	4,340
23	682	1,596	3,105	3,594	4,418
72	733	1,641	3,108	3,600	4,419
81	765	1,677	3,110	3,634	4,420
93	802	1,745	3,134	3,643	4,421
217	850	1,792	3,220	3,680	4,452
287	851	1,939	3,269	3,696	4,523
323	867	2,157	3,301	3,727	4,551
400	996	2,160	3,312	3,806	4,604
468	1,010	2,309	3,368	3,837	4,610
535	1,052	2,338	3,460	4,117	4,626
540	1,320	2,728	3,461	4,206	4,627

4,685	5,293	7,005	7,952	9,124	11,993
4,790	5,693	7,098	7,994	9,148	12,000
4,830	5,862	7,319	8,178	9,467	12,035
4,831	5,890	7,336	8,381	9,498	12,098
4,845	5,995	7,338	8,402	9,505	12,142
4,846	6,037	7,368	8,440	9,508	12,161
4,856	6,274	7,400	8,456	9,613	12,219
4,870	6,377	7,411	8,457	9,754	12,223
4,871	6,392	7,502	8,474	9,865	12,225
4,883	6,412	7,508	8,529	9,916	12,290
4,894	6,491	7,521	8,548	9,972	12,305
4,911	6,539	7,525	8,574	10,599	12,346
4,935	6,575	7,636	8,575	11,349	12,376
4,967	6,606	7,683	8,612	11,400	12,385
5,020	6,776	7,714	9,016	11,546	12,407
5,081	7,000	7,780	9,086	11,899	12,425
5,100					

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES --- ACCORDING TO TYPE OF EFFECT

Effect on Agglutination, rbc aggregation

2,727	3,288	10,599	12,128
3,062	6,518	12,050	

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION, MULTICELLULAR ANIMALS

PHYSIOLOGICAL CHANGES --- ACCORDING TO TYPE OF EFFECT

Effect on Motility and Ciliary Action

213	2,642	3,634	4,610	7,336	10,292
850	3,272	3,727	4,703	7,338	10,305
867	3,482	4,475	4,993	8,610	10,338
1,024	3,488	4,523	5,229	9,165	12,085
2,157	3,591	4,528	6,905	9,754	12,161

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES --- ACCORDING TO TYPE OF EFFECT

Effect on Metabolic Activity Generally;
Respiration (see also BIOCHEMICAL CHANGES etc)

867	2,960	3,727	5,420	8,450	9,362
1,734	2,979	3,989	6,492	9,005	9,910
2,938	3,482	5,419	7,321		

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES --- ACCORDING TO TYPE OF EFFECT

Effect on Permeability (see also BIOCHEMICAL CHANGES)

183	3,824	4,414	6,425	9,109	12,187
233	4,035	4,415	6,578	12,111	12,193
436	4,106	4,512	6,903	12,174	12,194
669	4,189	4,719	8,611	12,184	12,385
2,952	4,397	5,133	9,033	12,185	

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION
PHYSIOLOGICAL CHANGES --- ACCORDING TO TYPE OF EFFECT
 Effect on Phagocytic Activity

593	1,646	8,475	8,934
1,317	2,116	8,610	9,588

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION
PHYSIOLOGICAL CHANGES --- ACCORDING TO TYPE OF EFFECT
 Effect on Fertilizing Capacity of Sperm;
 Pronuclear Fusion; Fertility of Ova

1,329	4,634	8,376	8,526	9,362	11,546
3,368	4,810	8,381	8,529	9,508	12,035
4,418	4,993	8,456	8,535	9,546	12,095
4,523	5,081	8,457	8,555	9,921	12,118
4,551	5,201	8,459	8,895	10,292	12,168
4,617	6,905	8,523	9,033	10,305	12,169
4,618	7,412	8,524	9,165	10,338	

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION
PHYSIOLOGICAL CHANGES etc. --- ACCORDING TO TYPE OF EFFECT
 Secretory activity

5,419	6,726	8,555
5,420	7,411	

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION
PHYSIOLOGICAL CHANGES etc. --- ACCORDING TO
TYPE OF EFFECT

Nerve conduction

3,570	6,800	7,514	7,784
5,877	7,020	7,598	8,558
6,237			

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION
PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION
etc. --- LISTED ACCORDING TO TYPE OF EFFECT

Effect on Contractility of Muscles

134	509	2,357	3,989	7,347	8,632
144	704	3,090	4,044	7,514	8,634
154	760	3,324	4,528	8,028	8,635
157	1,024	3,325	4,604	8,582	8,636
184	1,317	3,326	5,229	8,605	8,637
185	1,327	3,335	5,778	8,627	9,185
209	1,831	3,358	6,041	8,628	9,286
371	1,966	3,373	6,347	8,629	12,510

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION, LISTED ACCORDING TO TYPE OF EFFECT

Effect on Hemolytic or Cytolytic Action of
Serum or Antibody and Spontaneous Cell
Lysis (see also Lethal Effects)

70	5,133	7,994	8,449	9,958	12,173
2,072	6,037	8,402	8,554	9,969	12,174
3,388	6,425	8,407	9,113	11,798	12,175
4,397	7,321	8,430			
4,414					

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION --- LISTED ACCORDING TO SOURCE OF TISSUE OR CELLS

Neoplastic Tissue

125	996	3,962	4,845	7,241	8,817
145	1,449	4,027	4,846	7,336	9,005
168	1,504	4,047	4,856	7,413	9,498
183	1,596	4,117	4,883	7,508	9,916
287	1,677	4,133	4,967	7,521	9,972
311	1,792	4,196	5,020	7,525	10,599
323	1,939	4,269	5,094	7,683	11,349
400	2,216	4,370	5,100	7,952	11,400
468	3,301	4,550	5,148	8,178	11,833
709	3,458	4,626	5,648	8,440	12,194
792	3,461	4,661	5,862	8,474	12,219
802	3,566	4,672	5,890	8,574	12,223
820	3,594	4,685	6,265	8,575	12,290
851	3,705	4,756	6,412	8,612	12,376
914	3,806	4,831	6,575	8,614	12,425

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE OF TISSUES OR CELLS

Embryonic Tissue

20	733	2,801	3,761	4,685	7,502
23	851	2,886	3,837	4,845	7,791
72	852	2,960	4,027	4,870	8,548
188	854	3,108	4,044	4,871	9,916
189	915	3,220	4,340	6,539	11,212
217	1,052	3,269	4,420	6,606	12,000
400	1,372	3,301	4,510	7,098	12,142
417	1,596	3,460	4,523	7,336	12,225
523	1,641	3,483	4,604	7,368	12,376
544	2,216	3,643	4,610	7,400	12,407
594					

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE OF TISSUE OR CELLS

Blood

70	2,695	4,397	6,518	8,449	9,969
213	2,727	4,414	6,776	8,450	10,170
233	2,952	4,415	6,903	8,475	11,798
247	3,062	4,421	7,319	8,554	12,050
593	3,272	4,719	7,321	8,591	12,111
669	3,288	4,790	7,338	8,610	12,128
850	3,388	4,821	7,994	8,611	12,141
867	3,488	4,935	8,178	8,934	12,146
1,317	3,634	4,967	8,402	9,016	12,161
1,449	3,824	5,100	8,407	9,113	12,173
1,646	3,916	5,133	8,423	9,613	12,174
2,072	4,063	6,037	8,430	9,910	12,175
2,116	4,106	6,392	8,440	9,958	12,376
2,309	4,189	6,425			
2,338					

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE OF TISSUE OR CELLS

Hematopoietic Tissue

81	2,309	4,671	4,967	7,636	9,754
189	3,134	4,703	5,100	9,016	10,156
247	3,591	4,790	6,151	9,124	12,161
276	3,634	4,845	7,000	9,277	12,305
765	4,421	4,894	7,319	9,467	12,385
2,157	4,475	4,935	7,338		

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE OF TISSUE OR CELLS

Vascular System and Heart

114	436	1,766	3,761	7,514	8,634
134	509	1,831	3,989	7,543	8,635
144	704	2,642	4,027	8,028	8,636
154	760	3,090	4,044	8,548	8,637
157	852	3,324	4,685	8,605	8,783
184	854	3,325	4,845	8,627	9,185
185	1,316	3,326	5,693	8,628	9,286
188	1,317	3,373	6,606	8,629	12,184
209	1,327	3,643	7,347	8,632	12,510
248					

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE OF TISSUE OR CELLS

Endocrine Glands

5,419
5,420
6,726

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION
PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE
OF TISSUE OR CELLS

Eye

3,570
5,995
6,701

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION
PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE
OF TISSUE OR CELLS

Fibroblasts, Connective Tissue

23	2,886	3,591	4,830	6,274	12,098
400	3,105	3,634	4,831	6,377	12,142
1,010	3,108	4,047	4,846	7,005	12,407
1,052	3,566	4,340	5,293	7,714	12,376
2,728	3,570	4,610			

PHYSIOLOGICAL CHANGES IN VITRO IRRADIATION
PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE
OF TISSUE OR CELLS

Striated or Smooth Muscle (Heart, Vascular
System and Heart and GI Tract listed
separately)

371	2,357	3,358	4,604	6,347	8,558
1,024	3,226	4,528	5,778	7,502	9,910
1,641					

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION
PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE
OF TISSUE OR CELLS

Gastrointestinal Tract

736	3,335	6,041
834	5,229	7,514

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION
PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE
OF TISSUE OR CELLS

Female Reproductive System; isolated ova

3,335	6,491	8,381	8,526	8,582	9,508
3,368	7,411	8,456	8,529	8,895	9,921
4,418	7,412	8,457	8,535	9,033	12,095
4,523	7,514	8,524	8,555	9,362	12,118
					12,169

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE
OF TISSUE OR CELLS

Male Reproductive System; sperm

540	4,418	5,081	6,905	8,459	10,292
1,449	4,523	5,201	8,376	8,529	10,338
1,734	4,634	6,491	8,456	9,165	12,118
2,938	4,790	6,492	8,457	9,546	12,168
2,979	4,993				

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE
OF TISSUE OR CELLS

Urinary Tract

736	8,513
4,510	9,109
4,845	9,148

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES --- ACCORDING TO TISSUE
OR CELLS

Skin

436	6,578
3,301	12,185
4,027	12,376

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE
OF TISSUE OR CELLS

Respiratory System

12,376
12,385

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE
OF TISSUE OR CELLS

Liver

736	9,005
2,658	12,194

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE
OF TISSUE OR CELLS

Bone and Cartilage

PHYSIOLOGICAL CHANGES AFTER IN VITRO IRRADIATION

PHYSIOLOGICAL CHANGES --- ACCORDING TO SOURCE
OF TISSUE OR CELLS

Nervous System

961	3,570	6,800	7,598	7,791
1,320	5,877	7,020	7,784	8,558
1,596	6,237			

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING IN
VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION; LISTED ACCORDING TO TYPE OF
EFFECT

Comparison of biochemical changes following
exposure to ionizing radiation with changes
following exposure to chemical or physical
agents or non-ionizing radiation.

173	1886	3466	6241	8363	10,117
347	2221	3623	6316	8465	10,307
396	2369	3652	6347	8481	10,421
445	2509	3888	6416	8482	10,519
498	2721	4213	6454	8501	10,870
699	2833	4435	6492	8542	11,491
736	2903	4466	6619	8543	11,541
761	2921	4691	6638	8584	11,692
808	2938	4728	6760	8611	11,712
834	3168	5001	7266	8628	11,786
897	3222	5066	7344	9109	12,071
969	3223	5107	7395	9242	12,072
1023	3238	5430	7421	9294	12,212
1039	3239	5608	7459	9560	12,230
1297	3272	5861	7646	9716	12,411
1684	3339	5914	8088	9718	12,623
				9727	12,645

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION; LISTED ACCORDING TO TYPE OF
EFFECT

Oxygen utilization, metabolic rate in cells,
tissues or entire organism

8	260	493	819	930	1023
24	334	498	834	969	1501
116	428	501	835	985	1559

1735	2979	4023	5488	7267	9172
1750	3135	4097	5503	7321	9187
1768	3167	4113	5633	7324	9262
1850	3207	4127	5806	7527	9263
2024	3216	4134	5854	7624	9283
2115	3226	4322	5995	8029	9320
2172	3241	4543	6010	8040	9910
2180	3247	4602	6104	8104	10,062
2184	3286	4745	6181	8126	10,156
2197	3287	4880	6261	8261	10,570
2250	3343	4881	6454	8268	10,572
2252	3357	4882	6493	8353	10,952
2290	3464	4930	6495	8420	11,205
2292	3483	5001	6549	8450	11,207
2366	3503	5066	6550	8474	11,321
2509	3533	5118	6700	8509	11,868
2639	3547	5275	6791	8570	12,006
2858	3615	5328	6806	8598	12,230
2922	3726	5331	6920	8615	12,346
2938	3727	5387	7113	8686	12,409
2954	3811	5419	7206	8986	12,410
2960	3916	5420	7241	9109	12,479

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL
BODY IRRADIATION, MULTICELLULAR ANIMALS, AND
FOLLOWING IN VITRO IRRADIATION; LISTED ACCORDING
TO TYPE OF EFFECT

Protein metabolism; Protein structure

49	1050	2124	3652	5523	6820
59	1064	2146	3654	5525	6921
113	1071	2165	3689	5534	6975
118	1120	2189	3737	5547	6998
151	1169	2250	3812	5702	7094
169	1226	2311	3832	5703	7095
212	1313	2312	3909	5712	7105
236	1334	2327	3975	5759	7118
271	1337	2440	4028	5773	7141
277	1371	2541	4144	5776	7200
279	1388	2557	4154	5780	7206
280	1412	2594	4213	5807	7214
318	1539	2703	4270	5809	7218
417	1541	2712	4365	5855	7244
445	1578	2721	4381	5861	7262
466	1595	2736	4397	5930	7264
485	1632	2775	4435	5931	7266
489	1646	2847	4691	5942	7291
506	1687	2858	4848	5948	7342
511	1688	2903	4863	6214	7371
620	1701	2919	4897	6225	7375
633	1730	2991	4907	6261	7386
648	1772	3053	5060	6277	7395
655	1786	3126	5066	6323	7402
669	1801	3128	5114	6328	7407
695	1803	3152	5137	6329	7455
723	1894	3166	5254	6415	7458
838	1972	3272	5356	6531	7471
916	2096	3282	5367	6638	7476
918	2106	3422	5398	6653	7518
924	2113	3482	5427	6785	7550
996	2115	3483	5494	6786	7570
1026	2118	3486	5496	6791	7646
		3502			
		3647			

7699	8094	8515	9242	10,821	11,889
7739	8111	8522	9261	10,987	11,891
7743	8141	8572	9270	11,007	12,002
7744	8214	8584	9271	11,048	12,015
7752	8267	8598	9279	11,212	12,017
7754	8291	8603	9298	11,213	12,018
7792	8295	8686	9307	11,257	12,072
7795	8312	8896	9327	11,261	12,147
7800	8343	8904	9501	11,430	12,164
7802	8353	8907	9571	11,435	12,172
7837	8362	8915	9757	11,436	12,198
7860	8367	8924	9774	11,512	12,238
7902	8402	8944	9797	11,692	12,350
7908	8416	8989	9977	11,756	12,359
7921	8423	9025	10,008	11,818	12,366
7925	8426	9042	10,176	11,826	12,389
8030	8445	9116	10,311	11,828	12,408
8040	8482	9157	10,382	11,833	12,421
8062	8488	9186	10,701	11,836	12,502
8066	8509	9224		11,875	12,611
				11,885	

**BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING IN VITRO
IRRADIATION**

**BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION; LISTED ACCORDING TO TYPE OF
EFFECT**

Carbohydrate metabolism; amount, structure
etc. of carbohydrates

33	1477	3615	6410	7952	9864
41	1539	3698	6436	8018	10,156
101	1768	3735	6490	8066	10,720
132	2005	3794	6493	8088	11,060
135	2058	3812	6499	8135	11,257
260	2067	3900	6589	8220	11,261
271	2115	3946	6643	8261	11,321
279	2124	3993	6700	8268	11,355
315	2165	4113	6711	8367	11,512
347	2187	4134	6712	8422	12,359
428	2232	4144	6791	8427	12,363
537	2357	4147	6820	8429	12,397
584	2367	4369	6860	8446	12,410
648	2376	4474	6944	8462	12,413
695	2440	4879	6975	8499	12,512
700	2547	5033	7029	8547	
834	2582	5060	7045	8571	
835	2639	5328	7159	8580	
886	2658	5367	7190	8598	
1023	2721	5375	7241	8670	
1026	2736	5428	7265	8686	
1089	2858	5488	7279	8862	
1094	2910	5503	7339	9005	
1125	2960	5561	7403	9074	
1149	3207	5584	7471	9243	
1203	3236	5712	7472	9339	
1330	3239	5773	7581	9518	
1340	3241	5833	7632	9519	
1369	3282	5852	7634	9520	
1371	3286	5855	7809	9524	
1386	3515	5863	7855	9676	
1476	3574	6406	7913	9757	

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION; LISTED ACCORDING TO TYPE OF
EFFECT

Fat metabolism; amount, structure, etc. of fats

121	2231	4381	6048	7699	8951
333	2246	4435	6163	7802	9101
377	2440	4543	6202	7876	9187
389	2471	4863	6442	8040	9257
435	2540	4880	6558	8057	9294
489	2676	4881	6559	8058	9314
547	2721	4931	6643	8066	9553
626	2833	5019	6712	8088	9783
633	2919	5060	6791	8112	9894
666	3166	5143	6919	8135	9967
808	3207	5257	6921	8292	10,052
849	3340	5350	6944	8295	10,307
1005	3436	5379	6998	8333	10,387
1027	3457	5403	7202	8367	10,720
1236	3465	5417	7210	8383	10,821
1371	3466	5427	7244	8422	10,868
1412	3491	5534	7306	8498	11,257
1432	3515	5589	7322	8542	11,512
1808	3549	5590	7332	8563	11,869
1826	3707	5712	7340	8564	12,151
1972	3812	5773	7408	8617	12,197
2050	3878	5807	7422	8686	12,229
2124	3902	5833	7470	8726	12,359
2165	3915	5855	7527	8862	12,365
2172	4144	6003	7536	8896	

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS AND FOLLOWING IN
VITRO IRRADIATION; LISTED ACCORDING TO TYPE OF EFFECT

Nucleic acid metabolism; amount, structure, etc.
of nucleic acids

701	1304	2280	4882	5560	6882
723	1430	2291	4956	5608	6887
736	1453	2454	4966	5672	6940
761	1472	2525	5013	5703	6975
769	1478	2541	5044	5706	6995
800	1701	2597	5150	5771	7029
812	1744	2639	5206	5809	7031
918	1772	2729	5296	5836	7103
924	1803	2731	5339	5855	7105
970	1836	2787	5348	5883	7109
1040	1886	2901	5381	5909	7151
1048	1908	2966	5426	5971	7171
1125	1950	3207	5430	6115	7217
1135	2052	3992	5465	6416	7230
1173	2081	4213	5488	6524	7245
1179	2152	4531	5494	6738	7262
1193	2194	4598	5522	6741	7331
1220	2238	4766	5525	6779	7394
1281	2245	4879	5547	6797	7395

7459	7860	8309	9270	10,561	12,357
7470	7909	8321	9306	10,778	12,366
7484	7910	8364	9332	10,910	12,373
7623	8095	8543	9727	11,262	12,374
7670	8141	8686	9829	11,278	12,379
7688	8156	8907	9843	11,756	12,389
7698	8210	8916	9864	11,833	12,410
7783	8214	9177	10,181	11,836	12,411
7795	8227	9186	10,185	12,229	12,412
7830	8235	9243	10,192	12,235	12,501
7831	8292	9255	10,449	12,284	12,502
7851				12,290	12,607
					12,612

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING IN
VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION; LISTED ACCORDING TO TYPE OF
EFFECT

Mineral metabolism (for internal radioactive
substances see sections on radioactive sub-
stances internally and on differences inherent
in tissues under QUANTITATIVE ASPECTS --- BIO-
LOGICAL, BIOCHEMICAL, PHYSIOLOGICAL FACTORS
INFLUENCING RADIOSENSITIVITY---).

41	2376	4892	7309	8979	10,859
101	2406	4911	7322	9015	10,983
277	2407	5048	7393	9019	11,038
346	2552	5296	7450	9020	11,205
410	2568	5413	7536	9122	11,220
512	2575	5423	7592	9208	11,222
589	2600	5469	7609	9216	11,261
601	2704	5497	7610	9223	11,278
723	2736	5646	7613	9224	11,291
742	2913	5695	7830	9266	11,316
897	2919	5696	7999	9302	11,428
985	2994	5717	8024	9524	11,573
1027	3083	5886	8136	9718	11,622
1125	3150	6126	8210	9730	11,679
1297	3168	6127	8292	9742	11,786
1326	3171	6213	8293	9757	11,868
1363	3246	6500	8294	9783	11,962
1391	3372	6648	8296	10,163	11,963
1432	3568	6695	8340	10,180	12,097
1668	3601	6798	8341	10,379	12,105
1724	3623	6883	8387	10,421	12,156
1729	3795	6904	8479	10,468	12,196
2124	3918	6910	8482	10,470	12,212
2165	4400	6996	8572	10,520	12,259
2187	4471	7000	8686	10,547	12,272
2194	4531	7127	8891	10,606	12,278
2239	4564	7147	8957	10,709	12,296
2240	4766	7246	8970	10,738	12,297
2246	4863	7275	8976	10,822	12,447
		7304			12,687

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS AND FOLLOWING
IN VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL
BODY IRRADIATION, MULTICELLULAR ANIMALS, AND
FOLLOWING IN VITRO IRRADIATION; LISTED ACCORDING
TO TYPE OF EFFECT

Electrolyte metabolism; acid base balance

26	952	3300	4897	7179	9243
122	973	3336	4911	7334	9261
149	1026	3448	5245	7339	9506
151	1040	3502	5382	7352	9522
158	1064	3547	5475	7365	9759
165	1175	3564	5703	7367	10,198
167	1318	3568	5876	7414	10,311
173	1341	3639	5889	7491	10,332
212	1395	3689	5965	7670	10,641
232	1400	3812	6004	7694	10,647
236	1643	3881	6063	7740	10,716
266	2107	3899	6126	7998	10,729
277	2124	4144	6164	8404	10,821
381	2144	4154	6328	8416	11,159
410	2165	4199	6394	8462	12,002
454	2246	4367	6406	8465	12,017
489	2440	4415	6415	8481	12,018
493	2568	4543	6499	8482	12,026
601	2720	4613	6619	8488	12,070
625	2736	4719	6712	8532	12,105
654	2919	4833	6791	8602	12,186
656	3083	4848	6894	8686	12,193
675	3135	4864	6903	8974	12,194
758	3166	4892	6921	9187	12,379
888	3246				
	3249				

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS AND FOLLOWING
IN VITRO IRRADIATION; LISTED ACCORDING TO TYPE OF EFFECT

Changes in sulfhydryl containing compounds,
sulfhydryl levels

699	1951	2858	5340	6569	7393
700	2119	2919	5620	6760	7908
1125	2221	3548	5670	6824	9264
1562	2258	3838	5780	7169	11,048
1688	2411	4144	6316	7279	11,328
1729	2807	4182	6347		12,389

**BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING IN
VITRO IRRADIATION**

**BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION--MULTICELLULAR ANIMALS AND FOLLOWING
IN VITRO IRRADIATION; LISTED ACCORDING TO TYPE OF
EFFECT**

Fluid balance, hydration, osmotic pressure
(cells, tissues or entire organism)

158	2152	4106	5141	6903	8604
247	2163	4144	5290	6921	8627
278	2165	4154	5294	7035	9033
340	2282	4189	5428	7081	9693
381	2543	4190	5471	7105	9783
436	2720	4339	5483	7179	9864
512	2892	4367	5560	7217	10,332
669	2919	4397	5561	7251	10,647
675	2954	4414	5612	7288	10,709
701	3048	4415	5637	7303	10,800
758	3135	4613	5855	7352	11,213
930	3185	4719	5889	7536	11,370
952	3229	4821	5967	7670	11,995
1071	3252	4863	6063	7671	12,017
1341	3388	4864	6089	7694	12,018
1371	3436	4892	6126	7740	12,059
1416	3502	4896	6174	8081	12,111
1539	3601	4897	6202	8088	12,187
1850	3824	5060	6328	8106	12,193
2072	3979	5078	6394	8427	12,194
2096	4032	5137	6425	8482	12,196
2144				8602	

**BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION**

**BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS AND FOLLOWING
IN VITRO IRRADIATION; LISTED ACCORDING TO TYPE OF
EFFECT**

Changes in enzymes; enzyme levels

41	989	1,569	2,688	3,877	5,381
51	1,002	1,685	2,731	3,907	5,399
101	1,038	1,686	2,736	4,009	5,488
114	1,039	1,735	2,787	4,094	5,496
138	1,040	1,774	2,858	4,096	5,503
141	1,064	1,858	2,960	4,097	5,505
241	1,089	1,886	2,964	4,147	5,513
271	1,135	1,894	3,024	4,203	5,545
280	1,140	1,907	3,129	4,322	5,571
396	1,171	2,115	3,199	4,337	5,670
426	1,172	2,127	3,222	4,363	5,680
437	1,187	2,132	3,223	4,484	5,684
510	1,228	2,252	3,238	4,735	5,712
522	1,232	2,280	3,249	4,879	5,770
557	1,241	2,326	3,252	5,044	5,773
618	1,266	2,357	3,286	5,060	5,776
623	1,344	2,369	3,340	5,326	5,779
656	1,354	2,376	3,342	5,328	5,780
767	1,356	2,450	3,533	5,331	5,836
773	1,452	2,490	3,567	5,339	5,851
803	1,453	2,509	3,568	5,348	5,852
888	1,562	2,520	3,705	5,362	5,854
921	1,566	2,600	3,786	5,375	5,863
			3,832		

5,906	7,022	7,731	8,274	9,186	11,030
5,998	7,029	7,737	8,309	9,255	11,133
6,031	7,031	7,742	8,333	9,262	11,262
6,062	7,059	7,753	8,367	9,264	11,278
6,067	7,070	7,754	8,440	9,278	11,310
6,104	7,081	7,764	8,445	9,284	11,321
6,194	7,103	7,766	8,469	9,332	11,351
6,315	7,141	7,783	8,473	9,339	11,355
6,329	7,168	7,801	8,476	9,571	11,692
6,415	7,171	7,913	8,483	9,676	11,703
6,496	7,216	8,027	8,506	9,712	11,761
6,502	7,267	8,039	8,508	9,713	11,818
6,557	7,279	8,055	8,542	9,717	11,860
6,638	7,298	8,105	8,543	9,995	11,955
6,660	7,302	8,109	8,566	10,117	12,172
6,695	7,306	8,121	8,618	10,062	12,237
6,793	7,330	8,132	8,670	10,122	12,286
6,805	7,405	8,168	8,686	10,156	12,291
6,818	7,459	8,169	8,939	10,181	12,318
6,849	7,491	8,193	8,962	10,192	12,370
6,882	7,622	8,194	9,005	10,200	12,389
6,921	7,623	8,214	9,042	10,286	12,401
6,975	7,646	8,266	9,139	10,400	12,609
7,021	7,727	8,270	9,179	10,519	12,610
				10,991	12,614
				11,027	12,642

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS AND FOLLOWING
IN VITRO IRRADIATION; LISTED ACCORDING TO TYPE OF
EFFECT

Changes in vitamins; vitamin levels

171	1,774	3,907	5,857	7,809	8,361
657	2,450	3,908	5,914	7,933	9,260
695	2,689	4,301	6,316	8,088	9,294
722	2,702	4,833	6,336	8,141	9,314
1,229	2,721	5,018	6,820	8,152	10,374
1,236	2,752	5,313	6,882	8,208	10,720
1,266	2,846	5,450	6,975	8,260	11,913
1,516	2,858	5,829	7,129	8,270	12,197
1,718	3,032				12,583

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY IRRADIATION,
MULTICELLULAR ANIMALS, FOLLOWING IN VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING IN
VITRO IRRADIATION; LISTED ACCORDING TO TYPE OF EFFECT

Detoxification and excretion of toxic metabolic products or administered materials other than radioisotopes (which are considered under QUANT. ASPECTS ---- BIOLOGICAL, BIOCHEMICAL, PHYSIOLOGICAL FACTORS INFLUENCING RADIOSENSITIVITY ---and under CHEMICAL and PHARMACEUTICAL AGENTS --- agents influencing rate of uptake or excretion of radioisotopes)

118	1,632	2,951	3,881	5,379	5,807
485	1,730	3,135	3,909	5,488	5,855
666	1,731	3,166	4,214	5,571	5,861
1,026	2,473	3,422	4,244	5,633	5,994
1,171	2,692	3,486	4,277	5,699	6,225
1,395	2,736	3,647	5,254	5,759	6,323

6,328	7,070	7,901	8,416	8,584	10,176
6,415	7,094	7,902	8,426	8,598	10,525
6,499	7,206	7,961	8,464	8,915	11,327
6,593	7,324	7,998	8,479	9,030	11,875
6,653	7,386	8,030	8,488	9,090	12,017
6,793	7,518	8,292	8,509	9,109	12,018
6,975	7,631	8,293	8,522	9,224	12,230
7,022	7,752	8,294	8,580	9,279	12,697

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY IRRADIATION,
MULTICELLULAR ANIMALS, AND FOLLOWING IN VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION; LISTED ACCORDING TO TYPE OF EFFECT

Histamine, histamine levels

1,488	2,380	4,466	6,399	7,421	8,294
1,808	2,754	5,399	6,559	8,292	10,332
2,219	3,044	5,447	6,841	8,293	10,400

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION; LISTED ACCORDING TO TYPE
OF EFFECT

Electrical conductivity, action potentials, surface
charge and related bioelectric phenomena (see also
THEORETICAL ASPECTS ---)

56	1,831	3,373	6,571	7,342	8,632
67	2,049	3,459	6,578	7,648	8,633
206	2,286	3,464	6,800	7,671	8,637
340	3,087	3,888	6,896	7,844	10,800
418	3,135	4,687	7,020	8,554	12,164
961	3,252	5,877	7,198	8,630	12,193
1,750	3,341	6,237			
		6,347			

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION; LISTED ACCORDING TO TYPE OF
EFFECT

Viscosity, surface tension (see also THEORETICAL
ASPECTS ---)

49	3,160	4,916	6,507	7,844	10,527
1,685	3,838	5,072	7,252	7,994	11,370
1,688	4,190	5,906	7,338	8,604	12,095
2,953	4,911	6,416	7,536	9,783	
3,126					

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY IRRADIATION,
MULTICELLULAR ANIMALS, AND FOLLOWING IN VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY IRRADIATION,
MULTICELLULAR ANIMALS, AND FOLLOWING IN VITRO IRRADIATION; LISTED
ACCORDING TO TYPE OF EFFECT

Porphyrin and pigment metabolism

241	2,250	6,226	7,402	8,270	11,692
1,786	2,473	6,241	7,424	8,591	12,296
2,113	2,736	6,883	7,925	9,969	12,297
2,246	3,128	7,141	7,961	10,062	
	6,225				

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY IRRADIATION,
MULTICELLULAR ANIMALS, AND FOLLOWING IN VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION, MULTICELLULAR ANIMALS, AND FOLLOWING
IN VITRO IRRADIATION; LISTED ACCORDING TO TYPE OF EFFECT

Hemolytic, cytolytic effect (see also section on
cellular permeability under this main section)

669	4,190	6,425	8,434	8,611	12,113
1,416	4,414	6,903	8,449	8,618	12,117
2,072	4,415	7,994	8,463	9,167	12,141
3,388	4,719	8,402	8,483	9,471	12,296
4,106	5,483	8,407	8,554	9,958	12,297
4,189	5,612	8,430		11,798	

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Immature Invertebrates

682	1,569	3,581	3,824	4,322	8,530
767	1,772	3,585	4,032	5,387	8,604
819	2,025	3,615	4,094	5,508	11,133
863	2,960	3,726	4,203	5,603	11,321
917	3,357	3,811	4,270	6,882	12,286
970	3,483				

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Mature Invertebrates

1,038
3,247
5,603

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Embryos and Zygotes of Vertebrates

584	969	4,687	7,245	9,020
655	1,173	6,820	8,290	11,239
918	3,698	6,995	8,296	12,196

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Post-Embryonic Vertebrates

peripheral blood

41	1,039	1,903	2,953	4,009	5,861
59	1,096	1,949	2,981	4,144	5,889
101	1,104	1,951	3,106	4,199	5,994
118	1,138	1,972	3,135	4,213	6,003
120	1,142	1,986	3,152	4,214	6,004
122	1,149	1,995	3,168	4,266	6,028
132	1,169	2,049	3,171	4,365	6,048
135	1,172	2,050	3,199	4,381	6,062
165	1,175	2,053	3,222	4,435	6,170
167	1,297	2,067	3,223	4,466	6,213
169	1,313	2,118	3,238	4,474	6,225
192	1,326	2,124	3,246	4,564	6,260
212	1,334	2,165	3,272	4,611	6,261
241	1,343	2,221	3,273	4,677	6,398
284	1,344	2,231	3,300	4,728	6,415
304	1,363	2,240	3,336	4,785	6,436
315	1,388	2,241	3,340	4,833	6,454
333	1,391	2,242	3,342	4,881	6,457
377	1,412	2,258	3,376	5,008	6,497
381	1,416	2,280	3,422	5,033	6,498
389	1,432	2,311	3,448	5,048	6,500
435	1,439	2,350	3,457	5,060	6,507
510	1,476	2,351	3,465	5,114	6,519
522	1,488	2,376	3,466	5,222	6,527
537	1,539	2,406	3,486	5,356	6,557
547	1,566	2,407	3,491	5,376	6,558
613	1,632	2,440	3,533	5,382	6,559
654	1,651	2,445	3,548	5,398	6,598
656	1,666	2,499	3,549	5,447	6,643
699	1,683	2,535	3,564	5,468	6,654
700	1,684	2,557	3,647	5,469	6,711
705	1,685	2,568	3,652	5,484	6,712
728	1,686	2,575	3,654	5,513	6,760
763	1,687	2,582	3,689	5,533	6,791
773	1,688	2,594	3,707	5,589	6,797
782	1,689	2,594	3,782	5,612	6,798
785	1,708	2,676	3,812	5,615	6,841
839	1,724	2,679	3,877	5,620	6,860
849	1,730	2,699	3,878	5,646	6,883
856	1,765	2,712	3,900	5,702	6,904
897	1,768	2,736	3,909	5,708	6,910
921	1,786	2,775	3,916	5,717	6,919
980	1,801	2,845	3,918	5,770	6,961
1,005	1,826	2,887	3,946	5,807	6,985
1,026	1,858	2,890	3,993	5,820	6,998
1,027	1,894	2,951	3,996	5,826	7,021
					7,035

7,118	7,536	8,295	8,618	9,806	11,428
7,127	7,550	8,296	8,862	9,894	11,453
7,132	7,613	8,312	8,944	9,910	11,666
7,159	7,622	8,325	8,957	9,912	11,680
7,197	7,634	8,333	8,970	9,958	11,692
7,202	7,743	8,343	9,015	9,977	11,756
7,210	7,792	8,353	9,019	9,995	11,786
7,230	7,795	8,383	9,074	10,161	11,815
7,246	7,925	8,402	9,122	10,180	11,828
7,322	7,998	8,404	9,139	10,301	11,836
7,334	7,999	8,426	9,179	10,307	11,889
7,340	8,029	8,427	9,208	10,311	12,002
7,356	8,039	8,462	9,242	10,382	12,105
7,365	8,040	8,465	9,266	10,385	12,151
7,367	8,062	8,482	9,278	10,387	12,172
7,371	8,114	8,488	9,302	10,421	12,186
7,402	8,121	8,498	9,501	10,701	12,198
7,407	8,126	8,501	9,503	10,821	12,224
7,408	8,141	8,563	9,519	10,991	12,238
7,422	8,168	8,566	9,520	10,998	12,278
7,423	8,220	8,571	9,524	11,038	12,297
7,455	8,292	8,578	9,717	11,153	12,343
7,458	8,293	8,591	9,718	11,161	12,397
7,471	8,294	8,598	9,783	11,257	12,512
7,527					12,687

**BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS**

**BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN**

Post-Embryonic Vertebrates

hematopoietic tissue

51	2,119	5,339	6,010	7,394	9,266
346	2,132	5,362	6,089	7,476	9,306
527	2,172	5,375	6,104	7,484	9,320
557	2,194	5,381	6,154	7,624	9,727
701	2,238	5,417	6,241	7,737	9,766
769	2,239	5,426	6,524	7,754	9,829
1,040	2,245	5,465	6,695	7,999	9,843
1,048	2,250	5,469	6,779	8,024	10,170
1,140	2,406	5,488	6,824	8,055	10,181
1,172	2,509	5,503	6,849	8,105	10,192
1,193	2,575	5,523	6,883	8,109	10,561
1,226	2,600	5,525	6,940	8,121	11,027
1,304	2,639	5,537	6,975	8,132	11,278
1,326	2,688	5,545	6,996	8,135	11,436
1,344	2,712	5,547	7,029	8,141	12,212
1,453	2,787	5,562	7,103	8,210	12,235
1,566	2,858	5,684	7,147	8,214	12,447
1,668	2,901	5,765	7,171	8,261	12,259
1,701	2,919	5,771	7,216	8,309	12,272
1,786	3,372	5,779	7,217	8,321	12,278
1,836	3,881	5,782	7,230	8,670	12,291
1,886	4,009	5,783	7,241	9,122	12,296
1,892	4,531	5,852	7,267	9,172	12,297
1,894	4,766	5,854	7,275	9,177	12,374
1,907	5,114	5,855	7,280	9,243	12,401
2,113	5,328	5,886	7,302	9,262	12,501
2,115	5,331	5,994	7,331	9,263	

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Post-Embryonic Vertebrates

vascular system, including heart

601	1,539	5,930	7,578	7,901	9,320
773	5,382	6,194	7,671	8,363	12,187
888	5,545	6,760	7,740	8,632	

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL
BODY IRRADIATION IN VIVO; MULTICELLULAR ANIMALS
LISTED ACCORDING TO TISSUE OR ORGAN

Post-Embryonic Vertebrates

endocrine glands

24	1,420	2,833	5,618	7,610	8,571
334	1,595	2,858	5,696	7,860	8,726
486	1,718	2,864	5,829	8,088	8,891
722	1,886	2,919	5,833	8,106	8,896
808	1,892	2,921	5,876	8,121	8,978
885	2,115	2,994	6,089	8,141	9,216
1,005	2,127	3,548	6,876	8,208	9,294
1,017	2,541	4,893	6,975	8,214	9,314
1,094	2,689	5,143	6,987	8,361	10,448
1,149	2,702	5,255	7,303	8,367	10,720
1,152	2,721	5,290	7,405	8,412	11,287
1,359	2,736	5,586	7,450	8,476	12,197

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Post-embryonic Vertebrates

exocrine glands

741	1,149	5,756	7,742	8,055	9,255
1,002	1,238	7,330	7,860	8,141	12,291
1,064	1,858				

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Post-embryonic Vertebrates

connective tissue other than bone
and cartilage

111	5,385	6,619	7,414	9,243	
1,562	5,906	7,045	7,491	12,224	

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Post-embryonic Vertebrates

bone and cartilage

557	3,567	6,648	9,223	10,917	11,220
623	4,471	7,309	9,757	10,988	11,251
1,038	4,863	8,136	10,178	10,999	11,278
1,230	5,044	8,340	10,379	11,009	11,291
1,521	6,089	8,341	10,407	11,092	11,692
2,541	6,315	8,939	10,507		11,962
3,150		8,962	10,519		

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Post-embryonic Vertebrates

reticulo-endothelial system

346	2,736	3,623	5,348	7,902	9,727
2,654	3,209	3,707	6,593	9,279	12,278

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Post-embryonic Vertebrates

female reproductive system

1,152	5,331	7,393
3,341	6,824	9,676

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Post-embryonic Vertebrates

male reproductive system

2,115	2,721	7,766	8,135
2,541	5,883	8,132	

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Post-embryonic Vertebrates

liver

241	2,005	5,060	6,524	7,792	9,298
280	2,052	5,206	6,760	7,855	9,307
377	2,058	5,257	6,793	7,908	9,320
435	2,115	5,328	6,824	7,909	9,977
538	2,127	5,379	6,860	8,018	10,008
648	2,194	5,381	6,887	8,055	10,192
695	2,239	5,398	6,940	8,088	10,200
701	2,258	5,403	6,944	8,111	10,387
741	2,369	5,417	7,021	8,121	10,449
808	2,445	5,430	7,022	8,132	10,720
835	2,450	5,469	7,031	8,135	10,721
886	2,464	5,494	7,129	8,141	11,027
897	2,525	5,496	7,171	8,214	11,060
1,125	2,702	5,522	7,265	8,267	11,185
1,171	2,721	5,545	7,298	8,274	11,622
1,203	2,731	5,584	7,306	8,321	12,071
1,236	2,858	5,590	7,332	8,333	12,229
1,330	3,222	5,620	7,371	8,422	12,259
1,340	3,223	5,633	7,470	8,445	12,278
1,386	3,207	5,672	7,471	8,483	12,291
1,430	3,238	5,680	7,484	8,571	12,296
1,432	3,241	5,699	7,631	8,862	12,297
1,478	3,877	5,712	7,632	8,896	12,350
1,516	4,009	5,773	7,634	8,904	12,359
1,562	4,213	5,780	7,646	8,951	12,363
1,566	4,435	5,833	7,699	9,042	
1,744	4,833	5,851	7,743	9,074	
1,808	4,892	6,089	7,768	9,257	
1,892	4,931	6,225	7,783	9,270	
	5,019			9,279	
				9,284	

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Post-embryonic Vertebrates

kidney

53	1,432	4,381	6,653	7,768	8,974
118	1,566	4,892	6,760	7,961	9,224
511	1,735	5,206	6,785	8,055	9,243
656	2,187	5,331	6,786	8,106	9,320
666	2,239	5,417	6,824	8,121	10,192
758	2,252	5,469	6,940	8,132	10,311
897	2,568	5,545	7,021	8,135	10,387
921	2,688	5,780	7,206	8,446	11,153
1,125	2,736	5,914	7,386	8,499	11,162
1,220	2,858	6,089	7,393	8,522	12,017
1,241	2,921	6,268	7,484	8,598	12,018
1,315	3,027	6,328	7,624	8,627	12,291
1,334	3,909	6,329	7,752	8,879	12,296
1,363	4,337	6,531	7,753	8,915	

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY...

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Post-embryonic Vertebrates

respiratory system

241	4,154	6,940	8,121	9,692
2,541	6,824	7,393	8,570	

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Post-embryonic Vertebrates

eyes, ears

24	2,892	5,906	7,198	7,913	8,266
334	5,450	6,339	7,279	8,027	12,389
1,356	5,560	6,896			
2,282	5,670				
2,689					

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL
BODY IRRADIATION...

Post-embryonic Vertebrates

gastro-intestinal system

110	1,241	3,249	5,756	7,393	8,321
165	1,400	3,372	5,965	7,484	8,916
255	1,701	3,639	5,983	7,646	9,018
464	1,908	4,154	6,063	7,699	9,255
557	1,950	4,640	6,067	7,754	9,263
723	2,052	5,141	6,089	7,766	9,271
758	2,115	5,206	6,490	8,055	9,307
761	2,326	5,245	6,493	8,094	9,771
973	2,327	5,471	6,524	8,111	10,449
989	2,490	5,547	6,695	8,135	11,596
1,094	2,600	5,561	6,940	8,196	11,967
1,135	2,688	5,718	7,021	8,268	12,291
1,179	3,236	5,733	7,190		

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Post-embryonic Vertebrates

skin and appendages

173	410	773	1,371	2,411	3,087
278	741	1,369	2,246	2,807	3,422

3,547	4,966	6,323	7,393	10,507	12,105
3,915	5,326	6,506	7,414	10,999	12,156
4,127	5,399	6,569	8,976	11,092	12,362
4,471	5,471	6,840	9,186	11,262	12,410
4,531	6,089	7,045	9,759	11,313	

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO; MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO, MULTICELLULAR ANIMALS LISTED
ACCORDING TO TISSUE OR ORGAN

Post-embryonic Vertebrates

muscle (heart listed with vascular system)

428	5,350	6,760	8,040	8,315	9,224
886	5,471	7,632	8,121	8,333	9,910
4,471	6,089	7,727			

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO, MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO, MULTICELLULAR ANIMALS, LISTED
ACCORDING TO TISSUE OR ORGAN

Post-embryonic Vertebrates

nervous systems

969	2,658	5,545	6,820	7,648	9,255
1,472	3,229	5,863	6,824	7,913	9,283
1,512	3,341	6,089	6,896	8,132	9,326
2,115	3,459	6,175	7,081	8,169	12,193
2,376	3,888	6,806	7,241	8,214	12,397
2,541				8,481	12,624
					12,642

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL BODY
IRRADIATION IN VIVO, MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING TOTAL OR PARTIAL
BODY IRRADIATION IN VIVO, MULTICELLULAR ANIMALS
LISTED ACCORDING TO TISSUE OR ORGAN

Post-Embryonic Vertebrates

neoplastic tissue

924	3,918	5,150	6,549	7,339	8,563
1,886	4,363	5,257	6,589	7,342	8,564
2,525	4,484	5,971	6,741	7,830	8,978
2,913	4,564	6,127	6,940	8,156	10,117
2,966	4,766	6,316	7,105	8,227	10,721
3,286	4,882	6,499	7,241	8,321	12,196
3,336	4,956	6,524	7,252	8,429	12,284
3,601	5,013				12,366

BIOCHEMICAL CHANGES FOLLOWING IN VITRO IRRADIATION

BIOCHEMICAL CHANGES FOLLOWING IN VITRO IRRADIATION; TISSUES FROM MULTICELLULAR ANIMALS; LISTED ACCORDING TO TISSUE OR ORGAN

Neoplastic tissue

512	6,700	7,342	7,952	9,005	12,194
1,318	6,921	7,403	8,474	9,939	12,196
4,147	7,241	7,831	8,924	11,355	12,290
6,660					

BIOCHEMICAL CHANGES FOLLOWING IN VITRO IRRADIATION; TISSUES FROM MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING IN VITRO IRRADIATION; TISSUES FROM MULTICELLULAR ANIMALS; LISTED ACCORDING TO TISSUE OR ORGAN

Embryonic Tissue

247	1,318	3,482	4,147	7,395	11,836
417	2,960	3,786	4,369	7,403	12,059
512	3,282				

BIOCHEMICAL CHANGES FOLLOWING IN VITRO IRRADIATION; TISSUES FROM MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING IN VITRO IRRADIATION; TISSUES FROM MULTICELLULAR ANIMALS; LISTED ACCORDING TO TISSUE OR ORGAN

Blood

33	867	3,824	5,413	8,193	8,611
49	1,318	3,990	5,995	8,407	9,327
241	1,646	4,106	6,394	8,420	11,756
247	2,072	4,189	6,903	8,423	12,015
435	3,272	4,190	7,321	8,430	12,111
445	3,339	4,414	7,375	8,449	12,141
522	3,340	4,415	7,994	8,450	12,147
623	3,567	4,719	8,112	8,542	12,164
669	3,807	5,001	8,169	8,554	12,408
848					

BIOCHEMICAL CHANGES FOLLOWING IN VITRO IRRADIATION; TISSUES FROM MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING IN VITRO IRRADIATION; TISSUES FROM MULTICELLULAR ANIMALS; LISTED ACCORDING TO TISSUE OR ORGAN

Hematopoietic Tissue

51	247	1,228	6,700	7,157	12,373
151	736	1,803	7,000	7,262	12,411
				10,117	

BIOCHEMICAL CHANGES FOLLOWING IN VITRO IRRADIATION;
TISSUES FROM MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING IN VITRO IRRADIATION;
TISSUES FROM MULTICELLULAR ANIMALS; LISTED ACCORDING
TO TISSUE OR ORGAN

Heart, Vascular Tissue

888	1,831	3,989	8,629
1,750	3,373	8,628	12,187

BIOCHEMICAL CHANGES.....etc.

BIOCHEMICAL CHANGES etc.

Endocrine Glands

5,419
5,420

BIOCHEMICAL CHANGES ...etc.

Bone and Cartilage

3,567	11,220
11,020	12,365

BIOCHEMICAL CHANGESetc.

Liver

241	5,863	7,095	8,862	9,491	10,122
280	6,660	7,129	8,907	9,261	12,194
736	6,700	7,306	9,005	9,284	12,318
3,129	6,805			10,117	
5,494					

BIOCHEMICAL CHANGES ... etc.

Kidney

623	1,735	3,786	3,902	6,700	9,109
736	2,252	3,838	4,113	7,251	10,117
1,094	3,282				12,230

BIOCHEMICAL CHANGES ... etc.

Skin

151	347	3,547	6,700	7,288
278	3,464	6,578	7,157	

BIOCHEMICAL CHANGES FOLLOWING IN VITRO IRRADIATION;
TISSUES FROM MULTICELLULAR ANIMALS

BIOCHEMICAL CHANGES FOLLOWING IN VITRO IRRADIATION;
TISSUES FROM MULTICELLULAR ANIMALS; LISTED ACCORDING
TO TISSUE OR ORGAN

Muscle Other Than Heart

138	3,226	5,776	6,347	7,169	8,187
623	3,848	5,948	6,805	7,727	8,270
2,357	5,335	6,031	7,168	7,764	10,117
3,129					12,193

BIOCHEMICAL CHANGES ... etc.

Reproductive System; Ova and Sperm

819	2,979	6,492	8,602
2,184	4,665	6,700	8,617
2,938	5,909	7,403	9,362

BIOCHEMICAL CHANGES FOLLOWING IN VITRO IRRADIATION;
TISSUES ...etc.

Gastrointestinal Tract

736	6,067
834	8,081

BIOCHEMICAL CHANGES FOLLOWING IN VITRO ... etc.

Brain, Nerve Tissue

3,848	6,800	8,193	8,611
4,147	7,020	8,194	

BIOCHEMICAL CHANGES FOLLOWING IN VITRO IRRADIATION;
... etc.

eye
1,094
5,995
7,403

BIOCHEMICAL CHANGES FOLLOWING IN VITRO ... etc.

Fibroblasts, connective tissue

4,369
7,157
8,081

QUANTITATIVE ASPECTS OF FACTORS INFLUENCING THE RESPONSE
TO IRRADIATION

BIOLOGICAL AND PHYSIOLOGICAL FACTORS

Biological and Physiological Factors Influencing Response
of Entire Multicellular Organism (Plant or Animal)

QUANTITATIVE ASPECTS OF FACTORS INFLUENCING THE RESPONSE
TO IRRADIATION

BIOLOGICAL AND PHYSIOLOGICAL FACTORS

Age

187	2,446	4,194	6,575	8,726	10,612
295	2,485	4,318	6,574	8,732	10,614
316	2,488	4,398	6,591	8,863	10,629
352	2,498	4,576	6,610	8,873	10,645
361	2,518	4,588	6,635	8,887	10,716
430	2,550	4,608	6,647	8,905	10,845
450	2,552	4,727	6,648	9,008	10,916
491	2,610	4,757	6,684	9,022	10,937
672	2,640	4,777	6,696	9,043	10,940
738	2,660	4,788	6,716	9,168	10,966
747	2,800	4,862	6,764	9,184	10,988
766	2,857	4,863	6,803	9,209	10,992
791	2,863	5,045	6,823	9,259	10,999
799	2,875	5,101	6,869	9,276	11,000
855	2,948	5,165	6,918	9,314	11,009
907	2,950	5176	6,962	9,324	11,025
909	2,953	5,198	6,977	9,347	11,039
917	2,994	5,298	6,983	9,385	11,050
944	2,998	5,317	7,078	9,535	11,054
951	3,039	5,378	7,121	9,700	11,092
969	3,187	5,398	7,124	9,707	11,160
990	3,196	5,441	7,135	9,722	11,162
1,031	3,308	5,477	7,182	9,723	11,166
1,118	3,322	5,545	7,253	9,736	11,184
1,214	3,346	5,560	7,272	9,757	11,200
1,340	3,433	5,563	7,279	9,758	11,230
1,373	3,445	5,567	7,280	9,835	11,250
1,413	3,512	5,726	7,294	10,283	11,251
1,501	3,567	5,795	7,325	10,304	11,261
1,575	3,596	5,810	7,333	10,316	11,270
1,634	3,598	5,860	7,374	10,322	11,299
1,647	3,607	5,921	7,404	10,341	11,316
1,656	3,642	5,956	7,479	10,358	11,359
1,695	3,685	5,961	7,483	10,373	11,386
1,709	3,691	5,976	7,562	10,381	11,421
1,801	3,693	5,977	7,606	10,399	11,516
1,906	3,694	5,978	7,609	10,407	11,542
1,927	3,742	5,993	7,820	10,410	11,551
1,946	3,750	6,174	7,823	10,413	11,668
2,073	3,759	6,201	7,863	10,422	11,777
2,078	3,776	6,206	7,869	10,448	11,830
2,124	3,796	6,223	7,916	10,449	11,952
2,128	3,827	6,248	7,937	10,452	12,202
2,131	3,854	6,285	7,970	10,467	12,287
2,196	3,867	6,309	8,046	10,476	12,389
2,244	3,879	6,318	8,053	10,489	12,398
2,312	3,886	6,349	8,208	10,522	12,439
2,320	3,914	6,368	8,264	10,525	12,441
2,322	3,932	6,376	8,299	10,534	
2,407	3,958	6,404	8,340	10,565	
2,408	4,072	6,524	8,341	10,611	
2,410	4,094	6,536	8,460		
2,443	4,107	6,566	8,499		

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

Metabolic rate

17	1,196	2,774	4,838	7,138	10,315
135	1,345	2,800	5,508	7,270	10,340
288	1,605	3,134	5,714	7,337	10,648
724	1,630	3,148	5,715	7,417	11,284
725	1,853	3,581	5,836	8,378	11,286
791	1,855	3,781	5,855	8,827	11,359
888	1,942	4,246	5,874	8,926	11,830
955	1,994	4,425	5,960	8,944	12,100
1,017	2,203	4,452	6,033	9,156	12,266
1,089	2,366	4,575	6,404	9,163	12,353
1,118	2,392	4,635	6,837	10,304	12,372
1,156	2,481	4,687	7,080		

Activity

4	1,018	2,292	5,534	6,370	10,240
18	1,269	2,366	5,903	6,456	10,850
28	2,137	4,309	5,917	6,645	10,940
907	2,290	5,520			

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism developmental stage

31	810	2,036	3,121	3,633	3,958
60	818	2,112	3,122	3,638	3,964
61	819	2,153	3,185	3,642	4,007
62	903	2,170	3,203	3,645	4,015
70	936	2,171	3,220	3,658	4,016
124	969	2,182	3,254	3,661	4,041
162	970	2,266	3,302	3,682	4,085
243	1,031	2,390	3,322	3,691	4,093
358	1,047	2,408	3,330	3,693	4,094
361	1,150	2,437	3,347	3,698	4,095
373	1,187	2,443	3,357	3,709	4,100
380	1,250	2,486	3,380	3,771	4,121
404	1,259	2,493	3,405	3,781	4,122
447	1,325	2,511	3,406	3,786	4,181
448	1,329	2,518	3,445	3,793	4,222
457	1,419	2,550	3,456	3,798	4,388
507	1,466	2,576	3,474	3,817	4,389
615	1,526	2,610	3,475	3,836	4,390
654	1,589	2,691	3,493	3,854	4,395
660	1,590	2,776	3,512	3,855	4,525
676	1,597	2,784	3,516	3,856	4,540
718	1,695	2,836	3,517	3,857	4,628
747	1,740	2,889	3,532	3,860	4,635
748	1,795	2,995	3,552	3,869	4,713
771	1,862	3,074	3,581	3,879	4,730
789	1,885	3,110	3,585	3,886	4,739
799	1,961	3,112	3,598	3,950	4,862

4,863	5,950	7,124	8,895	10,315	11,424
4,904	5,951	7,389	8,897	10,316	11,479
4,962	5,955	7,452	9,037	10,381	11,516
5,039	5,976	7,465	9,044	10,422	11,555
5,047	5,977	7,483	9,155	10,512	11,569
5,074	6,050	7,516	9,169	10,522	11,775
5,130	6,057	7,538	9,180	10,525	11,776
5,239	6,206	7,791	9,228	10,575	11,777
5,267	6,221	7,823	9,237	10,579	11,890
5,271	6,247	7,859	9,239	10,581	11,939
5,275	6,281	7,869	9,245	10,600	11,984
5,284	6,285	7,915	9,259	10,852	11,985
5,285	6,314	7,992	9,289	10,988	11,986
5,311	6,318	8,043	9,303	11,000	11,987
5,344	6,319	8,079	9,314	11,009	11,988
5,371	6,349	8,093	9,323	11,025	11,989
5,390	6,389	8,159	9,373	11,035	11,997
5,392	6,439	8,162	9,508	11,080	11,998
5,560	6,610	8,163	9,535	11,081	12,008
5,606	6,681	8,164	9,705	11,092	12,009
5,738	6,714	8,174	9,847	11,105	12,022
5,741	6,762	8,280	9,855	11,115	12,065
5,744	6,794	8,384	9,896	11,128	12,100
5,753	6,823	8,386	9,900	11,160	12,101
5,754	6,825	8,457	9,969	11,210	12,102
5,757	6,830	8,461	9,978	11,231	12,157
5,836	6,922	8,504	10,011	11,239	12,170
5,860	6,936	8,579	10,081	11,261	12,272
5,921	6,937	8,583	10,120	11,316	12,273
5,933	7,121	8,873	10,166	11,421	12,338
					12,344
					12,585

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

pregnancy, pseudopregnancy, oestrus, lactation
 (See also "effects of endocrine preparations"
 under Chemical, Pharmaceutical and Miscellaneous
 Agents Influencing Response)

352	6,206	7,992	10,446	10,652	11,181
1,704	6,215	9,046	10,487	10,656	11,226
2,566	6,248	10,057	10,503	10,687	11,268
2,747	6,454	10,286	10,512	10,709	11,298
3,299	6,648	10,370	10,550	10,875	11,421
3,886	7,121	10,398	10,579	11,115	11,424
5,560	7,386	10,435	10,615	11,160	11,859
5,990	7,787				

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism disease states and trauma

80	212	418	777	918	1,102
111	333	451	783	959	1,138
116	340	454	807	964	1,168
121	381	462	849	982	1,283
130	389	466	856	983	1,321
195	411	493	897	1,083	1,350

1,362	3,343	5,544	7,998	9,689	10,721
1,366	3,345	5,615	8,019	9,690	10,725
1,387	3,376	5,636	8,052	9,702	10,726
1,404	3,391	5,810	8,138	9,722	10,729
1,440	3,448	5,826	8,161	9,723	10,813
1,468	3,467	5,846	8,191	9,775	10,824
1,550	3,491	5,853	8,312	9,782	10,828
1,582	3,533	5,895	8,325	9,894	10,865
1,583	3,549	5,992	8,387	9,919	10,896
1,584	3,564	6,018	8,416	9,954	10,944
1,585	3,572	6,040	8,498	10,151	10,947
1,626	3,603	6,127	8,547	10,184	10,983
1,697	3,646	6,271	8,572	10,188	10,989
1,727	3,654	6,316	8,618	10,195	11,001
1,839	3,689	6,411	8,620	10,203	11,061
1,876	3,735	6,417	8,921	10,242	11,063
1,877	3,737	6,427	8,933	10,243	11,083
1,935	3,794	6,438	8,993	10,266	11,094
1,945	3,878	6,483	9,002	10,278	11,134
1,995	3,947	6,488	9,008	10,284	11,140
2,085	3,962	6,527	9,022	10,304	11,152
2,225	3,995	6,609	9,031	10,325	11,168
2,280	3,996	6,631	9,067	10,329	11,177
2,286	4,041	6,633	9,184	10,357	11,213
2,301	4,145	6,677	9,248	10,368	11,234
2,339	4,214	6,696	9,313	10,378	11,235
2,372	4,323	6,698	9,316	10,389	11,251
2,392	4,366	6,712	9,338	10,397	11,289
2,423	4,468	6,880	9,346	10,406	11,311
2,449	4,517	6,926	9,518	10,410	11,375
2,466	4,602	7,001	9,536	10,413	11,380
2,481	4,611	7,007	9,553	10,414	11,385
2,488	4,677	7,035	9,580	10,421	11,387
2,489	4,727	7,040	9,590	10,427	11,556
2,504	4,735	7,041	9,591	10,429	11,566
2,593	4,757	7,120	9,593	10,453	11,567
2,611	4,783	7,143	9,594	10,471	11,633
2,618	4,784	7,234	9,595	10,477	11,763
2,622	4,837	7,243	9,598	10,499	11,813
2,625	4,838	7,254	9,609	10,502	11,814
2,631	4,848	7,287	9,617	10,519	11,815
2,707	4,875	7,312	9,639	10,529	11,816
2,736	4,885	7,334	9,640	10,562	11,821
2,755	4,900	7,339	9,642	10,586	11,851
2,770	4,946	7,340	9,644	10,593	11,900
2,786	5,032	7,341	9,646	10,612	11,905
2,872	5,033	7,410	9,647	10,617	11,913
2,913	5,109	7,474	9,650	10,629	12,056
2,972	5,282	7,491	9,653	10,632	12,063
2,981	5,290	7,524	9,664	10,635	12,078
2,988	5,356	7,548	9,665	10,637	12,195
3,152	5,363	7,550	9,667	10,645	12,205
3,167	5,380	7,620	9,668	10,679	12,239
3,169	5,418	7,647	9,671	10,681	12,254
3,171	5,425	7,682	9,679	10,684	12,278
3,195	5,430	7,724	9,682	10,686	12,414
3,210	5,483	7,768	9,683	10,691	12,515
3,252	5,484	7,787	9,684	10,716	
3,336	5,522	7,802	9,687	10,719	
3,342	5,543	7,977			

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism
oxygen effect

164	1,600	5,004	6,103	7,417	9,835
618	1,602	5,429	6,167	7,608	9,877
639	1,630	5,478	6,208	7,749	9,878
643	1,764	5,508	6,255	7,863	9,880
645	1,773	5,579	6,404	7,942	9,900
676	2,081	5,594	6,814	7,970	9,914
680	2,189	5,622	6,850	8,217	9,919
721	2,193	5,623	6,925	8,247	10,004
725	2,199	5,641	6,969	8,248	10,067
791	2,245	5,684	6,993	8,249	10,508
808	2,289	5,697	7,010	8,365	10,537
861	2,292	5,700	7,072	8,793	10,636
943	2,387	5,706	7,080	8,794	10,648
1,037	2,391	5,745	7,173	8,926	10,767
1,109	2,392	5,765	7,174	8,932	11,243
1,118	2,456	5,782	7,194	9,160	11,348
1,195	2,480	5,783	7,241	9,218	11,349
1,252	2,601	5,817	7,269	9,226	12,220
1,279	2,885	5,827	7,270	9,237	12,286
1,406	3,130	5,855	7,326	9,239	12,433
1,460	3,443	5,862	7,379	9,251	12,434
1,559	4,214	5,935	7,397	9,296	12,442
1,571	4,246	6,077	7,413	9,565	12,393
1,591	4,452				

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism
Effect of gases other than oxygen

211	2,081	5,622	6,209	6,822	9,240
516	3,590	5,623	6,387	6,969	9,914
639	3,618	5,684	6,454	7,084	10,316
1,773	3,847	5,745	6,548	7,326	10,767
1,936	3,937	5,855	6,814	9,160	12,294

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism
Plants vs. animals

1,421	3,804	5,623	7,558	10,011	12,320
3,059	4,159	5,676	9,938	11,594	12,346
3,211	4,340				

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism
differences inherent in phylum; class,
order, family, genus, species, individuals

38	1,634	2,888	4,462	5,562	6,625
82	1,668	2,909	4,463	5,567	6,630
111	1,706	2,920	4,466	5,576	6,639
122	1,718	2,998	4,494	5,589	6,651
166	1,724	3,013	4,537	5,606	6,653
207	1,729	3,018	4,559	5,608	6,654
210	1,737	3,020	4,561	5,630	6,660
212	1,738	3,055	4,569	5,635	6,666
254	1,788	3,058	4,587	5,645	6,670
298	1,836	3,059	4,616	5,665	6,691
315	1,837	3,077	4,633	5,684	6,692
347	1,839	3,084	4,677	5,695	6,728
352	1,850	3,114	4,681	5,731	6,739
358	1,875	3,133	4,733	5,739	6,743
369	1,883	3,134	4,739	5,770	6,755
370	1,887	3,140	4,753	5,778	6,758
382	1,937	3,154	4,757	5,780	6,773
440	1,973	3,183	4,760	5,800	6,793
450	2,103	3,188	4,772	5,801	6,795
546	2,132	3,189	4,774	5,802	6,800
663	2,147	3,211	4,777	5,857	6,806
684	2,165	3,225	4,828	5,891	6,848
693	2,169	3,237	4,847	5,929	6,878
720	2,196	3,244	4,851	5,939	6,882
805	2,218	3,308	4,854	5,941	6,883
818	2,237	3,399	4,859	5,970	6,897
825	2,259	3,423	4,860	6,002	6,918
828	2,267	3,429	4,866	6,020	6,974
830	2,268	3,430	4,904	6,093	6,998
861	2,271	3,434	4,967	6,098	7,004
895	2,277	3,479	4,988	6,144	7,020
915	2,283	3,489	5,016	6,178	7,022
931	2,319	3,530	5,020	6,179	7,074
938	2,325	3,593	5,030	6,281	7,085
945	2,331	3,615	5,037	6,306	7,113
946	2,332	3,635	5,056	6,350	7,117
955	2,350	3,641	5,057	6,353	7,120
990	2,371	3,673	5,058	6,363	7,122
1,037	2,420	3,690	5,059	6,379	7,123
1,073	2,421	3,697	5,070	6,382	7,127
1,095	2,427	3,728	5,079	6,383	7,192
1,096	2,449	3,744	5,095	6,390	7,210
1,119	2,474	3,765	5,111	6,392	7,221
1,182	2,483	3,772	5,125	6,400	7,243
1,207	2,485	3,775	5,130	6,408	7,256
1,211	2,487	3,781	5,156	6,430	7,257
1,272	2,516	3,831	5,184	6,432	7,292
1,285	2,542	3,874	5,222	6,433	7,326
1,334	2,556	3,875	5,241	6,456	7,337
1,336	2,570	3,894	5,260	6,497	7,355
1,386	2,592	3,982	5,282	6,516	7,366
1,413	2,613	4,018	5,288	6,536	7,374
1,422	2,617	4,065	5,308	6,540	7,413
1,434	2,630	4,072	5,315	6,541	7,415
1,441	2,655	4,146	5,345	6,542	7,418
1,469	2,685	4,158	5,363	6,543	7,427
1,489	2,707	4,159	5,414	6,544	7,431
1,517	2,757	4,184	5,415	6,546	7,434
1,523	2,758	4,276	5,497	6,560	7,437
1,524	2,796	4,358	5,507	6,562	7,448
1,537	2,827	4,380	5,543	6,572	7,469
1,542	2,837	4,390	5,545	6,593	7,479
1,546	2,877	4,394	5,546	6,598	7,497
1,553	2,879	4,416	5,551	6,604	7,514
1,589				6,605	
1,630					

7,544	8,571	9,475	10,320	10,825	11,819	12,582
7,554	8,676	9,476	10,327	10,838	11,836	12,615
7,558	8,684	9,525	10,336	10,884	11,841	12,619
7,566	8,697	9,532	10,343	10,926	11,855	12,620
7,619	8,711	9,545	10,348	10,941	11,859	12,622
7,635	8,722	9,549	10,352	10,948	11,888	12,637
7,642	8,837	9,563	10,358	10,949	11,917	12,646
7,643	8,854	9,573	10,364	10,952	11,937	12,682
7,668	8,856	9,574	10,370	10,956	11,940	12,686
7,669	8,862	9,581	10,420	11,000	12,078	12,691
7,690	8,867	9,595	10,435	11,002	12,079	12,707
7,710	8,869	9,596	10,443	11,047	12,081	12,708
7,733	8,873	9,641	10,448	11,060	12,156	12,711
7,766	8,874	9,659	10,449	11,064	12,186	12,723
7,768	8,886	9,703	10,453	11,077	12,198	
7,786	8,887	9,736	10,460	11,088	12,205	
7,795	8,889	9,739	10,464	11,096	12,215	
7,798	8,915	9,768	10,477	11,113	12,232	
7,905	8,947	9,772	10,486	11,136	12,241	
7,928	8,948	9,780	10,505	11,140	12,247	
7,934	8,959	9,782	10,506	11,173	12,248	
7,935	9,019	9,820	10,507	11,174	12,250	
7,965	9,022	9,847	10,538	11,193	12,253	
7,974	9,028	9,893	10,550	11,208	12,256	
7,976	9,041	9,924	10,551	11,244	12,261	
7,978	9,043	9,932	10,555	11,266	12,263	
7,988	9,050	9,958	10,559	11,298	12,266	
8,048	9,052	10,017	10,560	11,327	12,275	
8,071	9,054	10,037	10,620	11,410	12,276	
8,098	9,058	10,059	10,637	11,465	12,281	
8,099	9,060	10,113	10,651	11,482	12,284	
8,166	9,067	10,128	10,658	11,485	12,285	
8,176	9,083	10,161	10,659	11,486	12,291	
8,224	9,094	10,170	10,665	11,504	12,308	
8,225	9,156	10,175	10,689	11,525	12,311	
8,265	9,164	10,177	10,701	11,545	12,332	
8,277	9,168	10,188	10,717	11,547	12,342	
8,293	9,173	10,216	10,718	11,551	12,346	
8,295	9,201	10,255	10,727	11,554	12,367	
8,298	9,205	10,300	10,729	11,569	12,398	
8,299	9,208	10,301	10,736	11,594	12,406	
8,304	9,225	10,302	10,738	11,608	12,407	
8,367	9,233	10,308	10,739	11,633	12,417	
8,463	9,292	10,310	10,746	11,701	12,418	
8,490	9,329	10,311	10,768	11,702	12,457	
8,539	9,435	10,314	10,785	11,704	12,474	
8,549	9,470	10,315	10,797	11,815	12,483	
8,569	9,472	10,316	10,819		12,512	

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

differences inherent in tissues (see also
vascularity in this section)

3	105	210	338	439	512
15	106	222	358	450	528
21	113	232	369	466	536
31	115	283	370	480	539
44	123	286	379	483	591
45	125	287	400	484	596
52	126	289	415	485	614
58	150	295	418	489	623
80	151	297	430	497	628
104	187	315	436	510	635

7,686	8,174	8	667	1,358	2,009	2,654	3,207	3,986
7,688	8,175	8	676	1,368	2,020	2,656	3,248	4,005
7,689	8,178	8	678	1,380	2,027	2,665	3,250	4,012
7,703	8,180	8	693	1,382	2,029	2,667	3,259	4,019
7,708	8,191	8	694	1,383	2,036	2,668	3,260	4,020
7,710	8,195	8	716	1,384	2,038	2,685	3,261	4,043
7,712	8,198	8	732	1,397	2,041	2,708	3,267	4,046
7,716	8,200	8	755	1,398	2,045	2,715	3,287	4,047
7,720	8,225	8	758	1,419	2,051	2,757	3,289	4,064
7,722	8,243	8	789	1,421	2,056	2,761	3,296	4,067
7,723	8,245	8	790	1,422	2,119	2,765	3,297	4,068
7,733	8,255	8	792	1,449	2,121	2,766	3,300	4,085
7,743	8,258	8	794	1,456	2,129	2,767	3,301	4,098
7,757	8,262	8	799	1,465	2,143	2,768	3,330	4,100
7,758	8,272	8	803	1,466	2,144	2,778	3,375	4,116
7,760	8,273	8	810	1,477	2,145	2,781	3,402	4,131
7,761	8,292	8	826	1,492	2,152	2,782	3,413	4,133
7,765	8,296	8	830	1,495	2,161	2,784	3,479	4,134
7,771	8,303	8	832	1,513	2,169	2,796	3,508	4,145
7,787	8,310	8	833	1,519	2,182	2,797	3,511	4,157
7,788	8,311	8	844	1,521	2,183	2,803	3,532	4,159
7,789	8,316	8	851	1,554	2,194	2,804	3,534	4,161
7,793	8,328	8	852	1,582	2,213	2,811	3,538	4,169
7,810	8,329	8	856	1,592	2,226	2,815	3,563	4,205
7,818	8,331	8	862	1,598	2,228	2,819	3,565	4,209
7,820	8,335	8	865	1,610	2,229	2,821	3,566	4,213
7,821	8,345	8	866	1,611	2,241	2,831	3,573	4,224
7,825	8,352	8	871	1,620	2,244	2,840	3,579	4,225
7,830	8,355	8	876	1,621	2,261	2,844	3,582	4,252
7,841	8,356	8	878	1,622	2,300	2,845	3,593	4,257
7,842	8,364	8	894	1,643	2,304	2,849	3,595	4,265
7,849	8,370	8	897	1,645	2,305	2,853	3,599	4,283
7,851	8,384	8	909	1,650	2,314	2,856	3,600	4,291
7,877	8,385	8	918	1,655	2,322	2,858	3,609	4,313
7,878	8,409	8	929	1,663	2,325	2,861	3,616	4,323
7,879	8,411	8	948	1,674	2,342	2,867	3,619	4,337
7,889	8,416	8	949	1,682	2,345	2,888	3,623	4,341
7,898	8,419	8	954	1,695	2,351	2,889	3,633	4,370
7,926	8,427	8	959	1,705	2,364	2,913	3,646	4,375
7,928	8,433	8	960	1,719	2,376	2,920	3,658	4,376
7,948	8,440	8	966	1,724	2,389	2,927	3,660	4,378
7,965	8,442	8	975	1,725	2,390	2,930	3,661	4,383
7,973	8,452	8	985	1,738	2,397	2,942	3,677	4,386
7,974	8,453	8	988	1,741	2,417	2,961	3,680	4,402
7,988	8,454	8	994	1,745	2,419	2,981	3,682	4,403
7,995	8,455	8	1,001	1,747	2,422	2,989	3,688	4,405
8,000	8,461	8	1,019	1,758	2,427	2,990	3,693	4,471
8,001	8,463	8	1,022	1,795	2,429	2,994	3,698	4,476
8,010	8,474	8	1,023	1,811	2,437	2,995	3,702	4,483
8,048	8,490	8	1,047	1,815	2,439	2,998	3,709	4,500
8,049	8,492	8	1,056	1,818	2,451	2,999	3,728	4,515
8,059	8,493	8	1,065	1,826	2,452	3,004	3,741	4,531
8,064	8,496	8	1,066	1,827	2,486	3,011	3,754	4,542
8,085	8,499	8	1,075	1,828	2,488	3,030	3,779	4,550
8,098	8,506	8	1,080	1,833	2,489	3,042	3,781	4,583
8,099	8,522	8	1,083	1,834	2,504	3,051	3,791	4,600
8,100	8,544	8	1,084	1,838	2,507	3,053	3,795	4,606
8,103	8,545	8	1,108	1,843	2,508	3,054	3,797	4,607
8,115	8,560	8	1,143	1,844	2,518	3,055	3,830	4,632
8,116	8,567	8	1,149	1,847	2,523	3,061	3,835	4,650
8,124	8,574	8	1,169	1,862	2,525	3,086	3,856	4,654
8,135	8,577	8	1,173	1,881	2,554	3,112	3,857	4,659
8,136	8,581	8	1,188	1,883	2,596	3,122	3,864	4,661
8,137	8,589	8	1,212	1,918	2,600	3,135	3,877	4,667
8,141	8,595	8	1,216	1,919	2,606	3,142	3,882	4,668
8,150	8,639	8	1,223	1,926	2,617	3,147	3,899	4,676
8,151	8,776	8	1,230	1,933	2,629	3,154	3,903	4,705
8,163	8,798	8	1,238	1,937	2,632	3,178	3,917	4,706
8,164	8,824	8	1,252	1,939	2,638	3,185	3,930	4,729
8,168	8,828	8	1,256	1,960	2,640	3,188	3,933	4,745
8,170	8,856	8	1,284	1,976	2,645	3,190	3,943	4,783
8,173	8,861	8	1,306	1,990	2,651	3,206	3,950	4,784
							3,962	
							3,971	

667	1,358	2,009	2,654	3,207	3,986
676	1,368	2,020	2,656	3,248	4,005
678	1,380	2,027	2,665	3,250	4,012
693	1,382	2,029	2,667	3,259	4,019
694	1,383	2,036	2,668	3,260	4,020
716	1,384	2,038	2,685	3,261	4,043
732	1,397	2,041	2,708	3,267	4,046
755	1,398	2,045	2,715	3,287	4,047
758	1,419	2,051	2,757	3,289	4,064
789	1,421	2,056	2,761	3,296	4,067
790	1,422	2,119	2,765	3,297	4,068
792	1,449	2,121	2,766	3,300	4,085
794	1,456	2,129	2,767	3,301	4,098
799	1,465	2,143	2,768	3,330	4,100
803	1,466	2,144	2,778	3,375	4,116
810	1,477	2,145	2,781	3,402	4,131
826	1,492	2,152	2,782	3,413	4,133
830	1,495	2,161	2,784	3,479	4,134
832	1,513	2,169	2,796	3,508	4,145
833	1,519	2,182	2,797	3,511	4,157
844	1,521	2,183	2,803	3,532	4,159
851	1,554	2,194	2,804	3,534	4,161
852	1,582	2,213	2,811	3,538	4,169
856	1,592	2,226	2,815	3,563	4,205
862	1,598	2,228	2,819	3,565	4,209
865	1,610	2,229	2,821	3,566	4,213
866	1,611	2,241	2,831	3,573	4,224
871	1,620	2,244	2,840	3,579	4,225
876	1,621	2,261	2,844	3,582	4,252
878	1,622	2,300	2,845	3,593	4,257
894	1,643	2,304	2,849	3,595	4,265
897	1,645	2,305	2,853	3,599	4,283
909	1,650	2,314	2,856	3,600	4,291
918	1,655	2,322	2,858	3,609	4,313
929	1,663	2,325	2,861	3,616	4,323
948	1,674	2,342	2,867	3,619	4,337
949	1,682	2,345	2,888	3,623	4,341
954	1,695	2,351	2,889	3,633	4,370
959	1,705	2,364	2,913	3,646	4,375
960	1,719	2,376	2,920	3,658	4,376
966	1,724	2,389	2,927	3,660	4,378
975	1,725	2,390	2,930	3,661	4,383
985	1,738	2,397	2,942	3,677	4,386
988	1,741	2,417	2,961	3,680	4,402
994	1,745	2,419	2,981	3,682	4,403
1,001	1,747	2,422	2,989	3,688	4,405
1,019	1,758	2,427	2,990	3,693	4,471
1,022	1,795	2,429	2,994	3,698	4,476
1,023	1,811	2,437	2,995	3,702	4,483
1,047	1,815	2,439	2,998	3,709	4,500
1,056	1,818	2,451	2,999	3,728	4,515
1,065	1,826	2,452	3,004	3,741	4,531
1,066	1,827	2,486	3,011	3,754	4,542
1,075	1,828	2,488	3,030	3,779	4,550
1,080	1,833	2,489	3,042	3,781	4,583
1,083	1,834	2,504	3,051	3,791	4,583
1,084	1,838	2,507	3,053	3,795	4,600
1,108	1,843	2,508	3,054	3,797	4,606
1,143	1,844	2,518	3,055	3,830	4,607
1,149	1,847	2,523	3,061	3,835	4,632
1,169	1,862	2,525	3,086	3,856	4,650
1,173	1,881	2,554	3,112	3,857	4,654
1,188	1,883	2,596	3,122	3,864	4,659
1,212	1,918	2,600	3,135	3,877	4,661
1,216	1,919	2,606	3,142	3,882	4,667
1,223	1,926	2,617	3,147	3,899	4,668
1,230	1,933	2,629	3,154	3,903	4,676
1,238	1,937	2,632	3,178	3,917	4,705
1,252	1,939	2,638	3,185	3,930	4,706
1,256	1,960	2,640	3,188	3,933	4,729
1,284	1,976	2,645	3,190	3,943	4,745
1,306	1,990	2,651	3,206	3,950	4,783
				3,962	4,784
				3,971	

4,787	5,489	6,134	6,499	6,882	7,292
4,807	5,510	6,144	6,503	6,892	7,293
4,812	5,527	6,145	6,513	6,901	7,313
4,831	5,530	6,163	6,514	6,918	7,317
4,834	5,541	6,165	6,521	6,920	7,331
4,837	5,544	6,176	6,528	6,931	7,370
4,846	5,546	6,177	6,533	6,940	7,373
4,849	5,554	6,192	6,542	6,947	7,375
4,858	5,560	6,199	6,546	6,952	7,384
4,859	5,569	6,200	6,549	6,953	7,418
4,860	5,573	6,201	6,556	6,954	7,424
4,861	5,575	6,202	6,572	6,959	7,431
4,862	5,582	6,203	6,575	6,973	7,432
4,869	5,583	6,206	6,589	6,974	7,433
4,875	5,588	6,208	6,592	6,996	7,434
4,884	5,608	6,210	6,598	6,999	7,445
4,898	5,609	6,213	6,608	7,004	7,447
4,915	5,611	6,215	6,609	7,006	7,450
4,942	5,619	6,221	6,614	7,007	7,452
4,950	5,625	6,222	6,623	7,009	7,453
4,966	5,635	6,225	6,624	7,019	7,462
4,989	5,636	6,236	6,625	7,023	7,466
5,012	5,663	6,237	6,629	7,030	7,469
5,033	5,682	6,247	6,630	7,040	7,484
5,044	5,689	6,248	6,631	7,042	7,490
5,047	5,720	6,251	6,633	7,051	7,493
5,055	5,727	6,259	6,634	7,052	7,495
5,056	5,731	6,262	6,643	7,055	7,499
5,057	5,738	6,265	6,647	7,056	7,503
5,058	5,744	6,270	6,648	7,058	7,515
5,060	5,747	6,280	6,650	7,093	7524
5,062	5,757	6,289	6,666	7,104	7,529
5,063	5,769	6,290	6,670	7,111	7,530
5,070	5,788	6,291	6,677	7,112	7,531
5,105	5,793	6,310	6,680	7,113	7,533
5,108	5,795	6,311	6,683	7,117	7,544
5,109	5,800	6,312	6,685	7,118	7,547
5,115	5,806	6,316	6,690	7,119	7,552
5,116	5,810	6,322	6,691	7,120	7,553
5,142	5,813	6,331	6,692	7,121	7,554
5,156	5,819	6,334	6,693	7,122	7,558
5,163	5,830	6,335	6,695	7,124	7,560
5,175	5,842	6,340	6,696	7,125	7,563
5,177	5,846	6,350	6,697	7,126	7,565
5,188	5,853	6,352	6,698	7,128	7,570
5,208	5,857	6,354	6,700	7,129	7,580
5,211	5,865	6,360	6,704	7,130	7,581
5,243	5,868	6,369	6,705	7,131	7,583
5,244	5,875	6,382	6,717	7,133	7,587
5,257	5,879	6,383	6,728	7,135	7,588
5,259	5,881	6,384	6,729	7,143	7,590
5,277	5,896	6,388	6,739	7,145	7,592
5,296	5,934	6,389	6,744	7,155	7,607
5,297	5,938	6,395	6,745	7,156	7,608
5,316	5,939	6,397	6,749	7,159	7,610
5,320	5,950	6,400	6,750	7,165	7,621
5,327	5,959	6,405	6,757	7,171	7,624
5,330	5,961	6,409	6,758	7,189	7,628
5,337	5,966	6,417	6,767	7,194	7,645
5,343	5,971	6,424	6,769	7,200	7,655
5,372	5,975	6,426	6,774	7,202	7,658
5,378	5,984	6,427	6,777	7,210	7,659
5,388	5,997	6,431	6,820	7,224	7,663
5,389	6,007	6,433	6,829	7,235	7,664
5,391	6,029	6,438	6,835	7,241	7,665
5,414	6,038	6,444	6,844	7,242	7,666
5,415	6,065	6,445	6,854	7,243	7,668
5,422	6,072	6,449	6,862	7,256	7,671
5,423	6,100	6,451	6,867	7,271	7,675
5,425	6,107	6,453	6,868	7,272	7,676
5,472	6,108	6,462	6,875	7,274	7,683
5,477	6,116	6,485	6,877	7,289	7,685
	6,117	6,495			

7,686	8,174	8,867	9,303	9,684	9,924
7,688	8,175	8,868	9,311	9,688	9,935
7,689	8,178	8,869	9,312	9,689	9,950
7,703	8,180	8,879	9,324	9,690	9,972
7,708	8,191	8,891	9,338	9,691	9,975
7,710	8,195	8,896	9,347	9,692	9,980
7,712	8,198	8,901	9,348	9,694	9,982
7,716	8,200	8,904	9,355	9,695	9,986
7,720	8,225	8,907	9,375	9,696	10,005
7,722	8,243	8,909	9,410	9,698	10,008
7,723	8,245	8,910	9,439	9,699	10,015
7,733	8,255	8,911	9,457	9,700	10,061
7,743	8,258	8,916	9,458	9,702	10,080
7,757	8,262	8,920	9,473	9,705	10,082
7,758	8,272	8,923	9,474	9,707	10,126
7,760	8,273	8,925	9,475	9,709	10,127
7,761	8,292	8,929	9,476	9,710	10,128
7,765	8,296	8,930	9,497	9,711	10,129
7,771	8,303	8,931	9,500	9,714	10,135
7,787	8,310	8,937	9,507	9,716	10,142
7,788	8,311	8,938	9,524	9,719	10,145
7,789	8,316	8,954	9,526	9,720	10,150
7,793	8,328	8,959	9,527	9,721	10,151
7,810	8,329	8,960	9,528	9,722	10,152
7,818	8,331	8,982	9,530	9,723	10,154
7,820	8,335	8,985	9,531	9,725	10,155
7,821	8,345	8,991	9,535	9,730	10,157
7,825	8,352	9,022	9,536	9,733	10,158
7,830	8,355	9,026	9,537	9,734	10,160
7,841	8,356	9,031	9,541	9,736	10,161
7,842	8,364	9,034	9,542	9,738	10,162
7,849	8,370	9,035	9,544	9,741	10,163
7,851	8,384	9,041	9,553	9,744	10,164
7,877	8,385	9,059	9,554	9,745	10,166
7,878	8,409	9,061	9,555	9,748	10,167
7,879	8,411	9,068	9,557	9,749	10,169
7,889	8,416	9,072	9,569	9,751	10,171
7,898	8,419	9,073	9,571	9,756	10,172
7,926	8,427	9,082	9,572	9,757	10,174
7,928	8,433	9,106	9,573	9,760	10,176
7,948	8,440	9,110	9,574	9,761	10,177
7,965	8,442	9,111	9,611	9,763	10,178
7,973	8,452	9,128	9,615	9,768	10,183
7,974	8,453	9,130	9,621	9,770	10,184
7,988	8,454	9,142	9,628	9,771	10,188
7,995	8,455	9,164	9,639	9,773	10,189
8,000	8,461	9,166	9,640	9,774	10,190
8,001	8,463	9,168	9,641	9,775	10,193
8,010	8,474	9,170	9,642	9,777	10,195
8,048	8,490	9,180	9,643	9,778	10,197
8,049	8,492	9,184	9,644	9,780	10,201
8,059	8,493	9,213	9,646	9,781	10,202
8,064	8,496	9,222	9,651	9,782	10,203
8,085	8,499	9,223	9,652	9,787	10,204
8,098	8,506	9,225	9,653	9,789	10,208
8,099	8,522	9,226	9,657	9,793	10,210
8,100	8,544	9,230	9,658	9,800	10,213
8,103	8,545	9,232	9,660	9,803	10,214
8,115	8,560	9,235	9,662	9,804	10,218
8,116	8,567	9,236	9,664	9,806	10,223
8,124	8,574	9,237	9,665	9,808	10,233
8,135	8,577	9,239	9,666	9,811	10,255
8,136	8,581	9,244	9,667	9,815	10,266
8,137	8,589	9,245	9,668	9,817	10,267
8,141	8,595	9,249	9,669	9,827	10,270
8,150	8,639	9,256	9,670	9,839	10,278
8,151	8,776	9,267	9,671	9,844	10,282
8,163	8,798	9,276	9,674	9,879	10,283
8,164	8,824	9,282	9,678	9,886	10,285
8,168	8,828	9,285	9,679	9,887	10,286
8,170	8,856	9,292	9,682	9,888	10,287
8,173	8,861	9,299	9,683	9,895	10,288

10,289	10,422	10,562	10,697	10,865	10,977
10,290	10,423	10,563	10,699	10,866	10,979
10,293	10,426	10,565	10,701	10,869	10,980
10,300	10,429	10,567	10,707	10,871	10,981
10,301	10,430	10,568	10,710	10,872	10,982
10,302	10,433	10,569	10,711	10,873	10,983
10,304	10,434	10,570	10,713	10,874	10,984
10,306	10,435	10,572	10,716	10,875	10,987
10,308	10,436	10,573	10,717	10,876	10,988
10,310	10,439	10,575	10,718	10,877	10,989
10,311	10,440	10,579	10,719	10,878	10,990
10,312	10,441	10,583	10,721	10,879	10,991
10,314	10,444	10,584	10,722	10,880	10,993
10,316	10,447	10,585	10,725	10,881	10,995
10,318	10,449	10,586	10,727	10,882	10,996
10,319	10,451	10,588	10,728	10,883	10,999
10,320	10,452	10,590	10,729	10,884	11,000
10,321	10,453	10,594	10,730	10,893	11,001
10,322	10,454	10,597	10,734	10,894	11,002
10,323	10,455	10,601	10,735	10,895	11,004
10,325	10,456	10,603	10,737	10,896	11,005
10,326	10,460	10,604	10,738	10,897	11,008
10,327	10,461	10,606	10,739	10,898	11,009
10,328	10,463	10,609	10,744	10,899	11,010
10,331	10,464	10,610	10,746	10,900	11,011
10,336	10,467	10,613	10,757	10,901	11,012
10,339	10,468	10,614	10,771	10,902	11,013
10,340	10,469	10,615	10,778	10,903	11,014
10,341	10,470	10,616	10,789	10,904	11,015
10,342	10,471	10,617	10,792	10,905	11,016
10,343	10,472	10,619	10,797	10,906	11,017
10,344	10,473	10,621	10,798	10,907	11,018
10,348	10,475	10,622	10,804	10,908	11,019
10,349	10,476	10,623	10,806	10,909	11,020
10,350	10,477	10,625	10,809	10,914	11,021
10,352	10,479	10,627	10,810	10,918	11,022
10,355	10,485	10,628	10,811	10,920	11,023
10,356	10,487	10,629	10,812	10,921	11,024
10,358	10,489	10,631	10,813	10,924	11,025
10,359	10,490	10,632	10,815	10,925	11,027
10,361	10,492	10,634	10,817	10,926	11,028
10,363	10,498	10,635	10,818	10,927	11,029
10,365	10,499	10,637	10,819	10,930	11,030
10,366	10,502	10,638	10,820	10,931	11,031
10,368	10,503	10,640	10,821	10,932	11,032
10,369	10,504	10,641	10,824	10,935	11,034
10,370	10,505	10,642	10,825	10,937	11,035
10,371	10,506	10,643	10,827	10,938	11,036
10,373	10,507	10,644	10,828	10,939	11,037
10,374	10,508	10,645	10,830	10,942	11,038
10,375	10,509	10,650	10,831	10,947	11,039
10,376	10,511	10,651	10,836	10,949	11,040
10,377	10,512	10,652	10,838	10,950	11,041
10,378	10,516	10,653	10,839	10,952	11,042
10,379	10,517	10,654	10,841	10,953	11,044
10,383	10,520	10,656	10,842	10,954	11,046
10,384	10,521	10,657	10,845	10,955	11,049
10,390	10,522	10,660	10,846	10,957	11,050
10,391	10,525	10,661	10,847	10,958	11,051
10,397	10,528	10,662	10,848	10,959	11,053
10,398	10,529	10,666	10,849	10,961	11,054
10,403	10,530	10,667	10,850	10,962	11,055
10,406	10,538	10,670	10,851	10,964	11,056
10,407	10,540	10,671	10,852	10,965	11,057
10,409	10,544	10,676	10,853	10,966	11,059
10,410	10,545	10,677	10,855	10,967	11,060
10,411	10,549	10,678	10,856	10,968	11,061
10,412	10,550	10,679	10,859	10,969	11,062
10,413	10,551	10,681	10,860	10,971	11,063
10,414	10,554	10,684	10,861	10,972	11,066
10,415	10,555	10,686	10,862	10,974	
10,416	10,559	10,690	10,864	10,976	

11,067	11,165	11,279	11,417	11,572	11,830
11,068	11,168	11,281	11,419	11,579	11,831
11,069	11,170	11,282	11,421	11,582	11,833
11,071	11,171	11,283	11,422	11,583	11,836
11,072	11,172	11,284	11,423	11,584	11,840
11,073	11,173	11,286	11,424	11,587	11,841
11,074	11,174	11,287	11,426	11,590	11,848
11,075	11,175	11,288	11,427	11,592	11,850
11,078	11,177	11,289	11,429	11,594	11,852
11,080	11,176	11,290	11,431	11,598	11,853
11,081	11,178	11,291	11,432	11,599	11,857
11,082	11,179	11,292	11,433	11,600	11,859
11,083	11,180	11,294	11,434	11,601	11,865
11,084	11,181	11,295	11,437	11,603	11,872
11,087	11,182	11,296	11,438	11,604	11,874
11,088	11,183	11,298	11,439	11,605	11,875
11,089	11,184	11,299	11,440	11,606	11,889
11,090	11,188	11,300	11,441	11,607	11,900
11,091	11,189	11,301	11,442	11,608	11,911
11,092	11,190	11,302	11,443	11,610	11,918
11,093	11,191	11,303	11,444	11,611	11,927
11,095	11,192	11,304	11,447	11,613	11,928
11,097	11,193	11,305	11,449	11,615	11,929
11,098	11,195	11,306	11,450	11,616	11,932
11,099	11,196	11,307	11,451	11,624	11,933
11,100	11,198	11,308	11,452	11,627	11,934
11,101	11,200	11,311	11,453	11,628	11,935
11,102	11,203	11,312	11,454	11,630	11,936
11,103	11,204	11,315	11,455	11,632	11,937
11,104	11,205	11,316	11,456	11,633	11,938
11,106	11,211	11,317	11,462	11,634	11,939
11,108	11,214	11,319	11,463	11,636	11,940
11,109	11,220	11,320	11,464	11,638	11,941
11,111	11,221	11,325	11,465	11,642	11,942
11,113	11,222	11,327	11,467	11,649	11,943
11,114	11,223	11,329	11,472	11,650	11,946
11,115	11,224	11,330	11,479	11,651	11,947
11,117	11,225	11,334	11,482	11,652	11,948
11,118	11,227	11,336	11,483	11,654	11,949
11,119	11,228	11,337	11,484	11,655	11,950
11,120	11,229	11,338	11,485	11,658	11,951
11,121	11,230	11,345	11,486	11,660	11,952
11,122	11,231	11,346	11,487	11,664	11,953
11,124	11,236	11,347	11,488	11,665	11,954
11,125	11,237	11,349	11,490	11,670	11,955
11,126	11,238	11,357	11,491	11,673	11,956
11,127	11,239	11,359	11,494	11,681	11,958
11,128	11,241	11,360	11,497	11,685	11,960
11,129	11,242	11,366	11,499	11,694	11,961
11,130	11,243	11,367	11,504	11,699	11,962
11,132	11,244	11,368	11,512	11,701	11,963
11,134	11,245	11,371	11,519	11,702	11,964
11,135	11,246	11,372	11,524	11,704	11,965
11,138	11,247	11,373	11,525	11,716	11,966
11,139	11,248	11,374	11,526	11,717	11,968
11,142	11,249	11,375	11,540	11,722	11,977
11,143	11,251	11,376	11,543	11,738	11,978
11,144	11,252	11,377	11,547	11,748	11,985
11,146	11,254	11,378	11,549	11,749	11,986
11,148	11,256	11,379	11,550	11,774	11,987
11,151	11,259	11,381	11,551	11,786	11,988
11,154	11,260	11,382	11,553	11,808	11,989
11,155	11,261	11,383	11,556	11,812	11,991
11,156	11,266	11,384	11,557	11,813	11,992
11,157	11,267	11,385	11,560	11,814	11,994
11,158	11,270	11,390	11,561	11,815	11,997
11,160	11,271	11,406	11,562	11,816	12,004
11,161	11,272	11,407	11,563	11,817	12,006
11,162	11,273	11,410	11,564	11,819	12,007
11,163	11,274	11,412	11,565	11,821	12,011
11,164	11,275	11,415	11,569	11,822	12,026
	11,277			11,825	12,048
					12,049

12,063	12,205	12,312	12,397	12,474	12,613	12,664
12,067	12,206	12,324	12,398	12,475	12,618	12,686
12,069	12,219	12,328	12,409	12,477	12,650	12,691
12,079	12,239	12,335	12,414	12,485	12,651	12,693
12,080	12,241	12,336	12,420	12,491	12,652	12,701
12,083	12,242	12,339	12,428	12,579	12,653	12,703
12,090	12,254	12,341	12,439	12,580	12,657	12,705
12,094	12,265	12,342	12,440	12,581	12,659	12,708
12,112	12,271	12,343	12,445	12,585	12,660	12,714
12,176	12,276	12,350	12,448	12,592	12,661	
12,202	12,284	12,375	12,468	12,605	12,662	
12,203	12,301	12,376	12,472	12,606	12,663	

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE
BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

differences inherent in cells composing
a tissue including selective accumulation
or excretion of radio-isotopes

3	1,368	2,314	3,327	4,198	5,198
9	1,377	2,319	3,346	4,226	5,205
80	1,397	2,325	3,348	4,230	5,207
90	1,419	2,371	3,402	4,233	5,226
104	1,420	2,376	3,479	4,241	5,294
123	1,449	2,382	3,481	4,265	5,317
162	1,502	2,406	3,512	4,298	5,321
164	1,519	2,412	3,517	4,329	5,330
221	1,524	2,429	3,544	4,360	5,391
327	1,533	2,507	3,552	4,402	5,395
385	1,537	2,508	3,591	4,407	5,401
407	1,555	2,518	3,659	4,425	5,437
455	1,556	2,578	3,670	4,494	5,498
461	1,565	2,606	3,675	4,506	5,560
468	1,582	2,620	3,676	4,515	5,588
591	1,584	2,629	3,691	4,542	5,611
606	1,585	2,640	3,706	4,547	5,616
716	1,592	2,705	3,710	4,564	5,632
732	1,628	2,723	3,722	4,576	5,634
749	1,636	2,761	3,741	4,607	5,740
770	1,679	2,778	3,791	4,616	5,774
783	1,691	2,781	3,797	4,619	5,791
799	1,709	2,782	3,814	4,650	5,823
807	1,724	2,786	3,826	4,659	5,830
812	1,738	2,804	3,827	4,668	5,877
818	1,742	2,828	3,843	4,670	5,886
850	1,767	2,849	3,850	4,703	5,921
856	1,811	2,856	3,851	4,724	5,950
909	1,812	2,861	3,855	4,731	5,953
950	1,815	2,877	3,864	4,783	5,959
951	1,838	2,878	3,867	4,800	5,987
954	1,853	2,884	3,879	4,829	5,989
957	1,863	2,927	3,882	4,858	5,990
1,019	1,883	2,942	3,903	4,861	6,005
1,066	1,884	2,956	3,917	4,884	6,026
1,067	1,887	2,958	3,922	4,885	6,100
1,072	1,890	2,965	3,930	4,942	6,111
1,075	1,900	2,975	3,953	4,944	6,151
1,108	1,918	2,978	3,962	4,967	6,211
1,116	1,926	2,989	3,966	5,002	6,212
1,129	1,930	3,004	3,998	5,044	6,213
1,135	1,997	3,033	4,006	5,045	6,221
1,152	2,031	3,042	4,018	5,057	6,246
1,187	2,045	3,117	4,054	5,060	6,313
1,223	2,046	3,120	4,064	5,092	6,418
1,237	2,129	3,165	4,078	5,100	6,322
1,250	2,161	3,196	4,161	5,106	6,333
1,284	2,169	3,210	4,165	5,109	6,433
1,287	2,204	3,230	4,173	5,132	6,468
1,338	2,294	3,235	4,195	5,177	6,526
	2,304	3,319			6,533

6,546	7,432	8,378	9,586	10,366	11,454
6,575	7,529	8,379	9,592	10,380	11,495
6,613	7,533	8,448	9,595	10,388	11,527
6,614	7,535	8,455	9,596	10,410	11,566
6,617	7,544	8,460	9,597	10,428	11,622
6,630	7,553	8,492	9,600	10,431	11,681
6,631	7,555	8,493	9,606	10,456	11,723
6,632	7,562	8,560	9,610	10,473	11,724
6,633	7,572	8,567	9,612	10,485	11,725
6,650	7,587	8,595	9,617	10,502	11,736
6,654	7,594	8,649	9,640	10,530	11,738
6,666	7,611	8,782	9,643	10,562	11,812
6,668	7,628	8,814	9,665	10,580	11,823
6,670	7,633	8,831	9,669	10,590	11,852
6,680	7,636	8,881	9,679	10,713	11,853
6,683	7,650	8,935	9,683	10,717	11,874
6,694	7,664	8,953	9,690	10,730	11,875
6,720	7,665	9,088	9,691	10,775	11,889
6,736	7,708	9,114	9,695	10,778	11,892
6,739	7,722	9,125	9,726	10,792	11,974
6,740	7,723	9,168	9,727	10,809	11,988
6,745	7,733	9,201	9,728	10,811	11,989
6,761	7,761	9,208	9,734	10,824	12,035
6,795	7,767	9,209	9,759	10,843	12,040
6,796	7,773	9,214	9,769	10,862	12,091
6,806	7,785	9,232	9,780	10,933	12,118
6,835	7,788	9,236	9,781	10,965	12,161
6,845	7,789	9,237	9,800	10,980	12,162
6,862	7,791	9,239	9,816	10,987	12,178
6,867	7,810	9,255	9,843	10,994	12,209
6,869	7,882	9,318	9,934	11,012	12,215
6,878	7,883	9,340	9,955	11,018	12,239
6,890	7,948	9,347	9,972	11,029	12,249
6,899	7,968	9,372	9,979	11,052	12,254
6,901	7,969	9,375	9,997	11,126	12,255
6,910	8,011	9,384	10,042	11,129	12,258
7,000	8,103	9,465	10,168	11,139	12,275
7,030	8,156	9,468	10,170	11,171	12,315
7,041	8,165	9,477	10,188	11,214	12,335
7,122	8,175	9,507	10,199	11,233	12,342
7,128	8,178	9,526	10,205	11,236	12,343
7,133	8,210	9,531	10,266	11,249	12,392
7,213	8,225	9,535	10,298	11,270	12,427
7,271	8,244	9,542	10,301	11,295	12,433
7,281	8,328	9,548	10,302	11,302	12,435
7,314	8,329	9,552	10,306	11,309	12,448
7,317	8,331	9,553	10,309	11,333	12,454
7,319	8,336	9,554	10,314	11,336	12,516
7,338	8,345	9,557	10,362		
7,427	8,364	9,569			
		9,585			

Plants Soil, Nutr.

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

soil, nutritive factors (plants)

1,171	6,629	7,427	8,734	9,095	9,621
1,336	6,825	8,316	8,791	9,106	9,715
4,235	6,968	8,667	8,849	9,457	9,931
6,145					

Animals Diet

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

diet (animals)

50	1,405	5,790	7,243	8,964	10,974
171	1,412	5,797	7,284	9,245	11,148
346	1,516	5,933	7,337	9,685	11,160
375	2,025	5,991	7,421	9,687	11,177
524	2,312	6,047	7,448	9,735	11,180
679	2,340	6,223	7,568	9,765	11,197
711	2,464	6,241	7,620	10,377	11,200
765	2,540	6,486	7,623	10,407	11,213
805	3,000	6,565	7,802	10,500	11,261
813	4,225	6,635	7,825	10,520	11,347
849	4,457	6,696	8,038	10,555	11,385
940	4,676	6,698	8,050	10,601	11,448
1,018	5,519	6,786	8,196	10,612	11,561
1,032	5,706	6,787	8,212	10,645	11,563
1,173	5,709	7,035	8,260	10,651	11,913
1,198	5,720	7,202	8,593	10,943	12,078
1,348	5,766	7,214	8,915	10,962	

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

fasting; deprivation of nutritive elements, plants or animals

805	1,203	3,083	6,247	7,137	10,039
886	1,432	5,417	6,860	7,422	10,332
1,018	1,801	5,597	6,894	7,699	10,441
1,037	2,050	5,833	6,925	9,300	10,625
1,124	2,312	6,149	6,961	9,557	11,197
1,125	2,721	6,241	6,967		

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

complexion, coloring

2,277
3,776
6,443
7,427

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

vascularity of tissue

164	2,424	3,776	4,667	9,880	10,584
590	2,904	3,781	6,412	10,174	10,729
724	3,690	4,218	8,175	10,439	11,029
817	3,754	4,452	8,938	10,537	12,067
1,266			9,528		

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

effects of shielding various body regions, tissues or organs

52	1,248	2,712	6,042	7,458	9,184
210	1,328	2,717	6,358	7,461	9,769
264	1,331	2,810	6,411	7,487	9,829
295	1,363	2,811	6,529	7,490	9,840
447	1,410	2,833	6,559	7,492	9,950
630	1,414	2,902	6,614	7,570	9,970
654	1,427	2,919	6,637	7,585	10,182
658	1,527	2,959	6,639	7,609	10,192
659	1,614	2,962	6,768	7,623	10,559
681	1,623	3,403	6,770	7,662	10,636
694	1,624	3,693	6,778	7,730	10,661
754	1,625	3,901	6,779	7,742	11,197
756	1,626	3,985	6,786	7,798	11,661
760	1,667	4,054	6,872	7,856	12,199
764	1,668	4,942	6,927	7,863	12,200
766	1,669	5,185	6,975	7,893	12,253
781	1,728	5,213	7,029	7,938	12,259
860	2,029	5,270	7,043	7,972	12,272
875	2,042	5,328	7,049	8,024	12,297
876	2,133	5,375	7,068	8,117	12,301
888	2,189	5,523	7,070	8,126	12,375
908	2,195	5,542	7,186	8,132	12,392
914	2,197	5,546	7,189	8,140	12,409
919	2,220	5,574	7,204	8,221	12,423
928	2,247	5,634	7,237	8,262	12,438
979	2,251	5,651	7,238	8,269	12,447
1,057	2,261	5,679	7,303	8,277	12,477
1,085	2,316	5,695	7,357	8,294	12,480
1,105	2,351	5,718	7,377	8,298	12,482
1,155	2,377	5,720	7,394	8,311	12,485
1,170	2,438	5,728	7,428	8,461	12,491
1,172	2,567	5,806	7,434	8,952	12,493
1,211	2,575	5,830	7,437	9,012	12,494
1,237	2,689	5,879	7,439	9,048	
		5,903	7,453		

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

parabiosis

194	971	2,256	4,814	6,075	7,442
443	1,212	2,661	5,512	6,941	7,627
871	2,080	2,762	5,867	7,064	7,864
875	2,098	4,018	5,959		

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

peritoneal dialysis and related procedures

690
2,146
2,164

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

partial or complete ablation of organs - spleen

306	918	2,022	5,078	6,871	7,873
553	1,173	2,315	5,612	7,043	8,986
762	1,248	3,042	5,726	7,086	9,840
764	1,412	3,623	5,763	7,490	10,538
871	1,604	4,948			

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

partial or complete ablation of organs - hypophysis

1,512	6,833	7,490	9,314	10,520	10,567
2,124	6,915	7,623	10,383	10,548	10,598
3,019	7,165	8,018	10,449	10,618	12,438
5,833	7,303	8,106			

Adrenal

156	1,428	2,225	5,448	7,216	8,571
993	1,540	2,957	5,463	7,303	8,958
1,016	1,726	2,985	5,496	7,376	9,030
1,125	1,991	4,655	6,042	7,490	9,070
1,212	2,124	5,002	6,166	8,018	9,434
1,241	2,194	5,254	6,448	8,106	10,192
1,297	2,213	5,407	6,807	8,248	12,421
1,423				8,249	

Phlebotomy

7,030
7,787

Gastrectomy

8,348
10,642

Castration

933	2,163	3,540	5,554	8,160
1,568	2,207	5,046	7,143	11,226
1,604	3,224	5,246	7,787	

Thyroidectomy

934	2,481
983	2,800
1,141	9,319

Thymectomy

1,604
7,983

Hepatectomy

691
871

918

Pancreatectomy

10,395

Nerve section

7,647
12,218

Nephrectomy

8,577
9,608

Removal of Leukocytes

5,810	7,421	9,269
6,888	7,973	10,913

Parathyroidectomy

2,481
5,341

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

amount of functional tissue present at time of radiation

982	2,965	6,633	7,937	10,329	11,815
1,042	5,032	6,636	8,085	10,443	12,239
1,697	5,363	6,876	8,164	10,913	12,276
2,786	6,256	6,926	8,517	11,302	12,366
2,957	6,631	7,374	9,843	11,726	

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

body size or weight characteristic of genus, species, etc.

945	2,078	3,413	7,798	10,304	10,640
1,441	2,320	4,772	8,034	10,311	10,689
1,469	2,608	4,788	9,729	10,315	10,736
1,544	2,610	6,390	9,758	10,316	12,260
1,782	2,628	6,605	10,141	10,634	12,414

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

sex differences

232	3,039	5,372	6,861	8,277	10,449
722	3,063	5,545	6,876	8,918	10,457
909	3,074	5,554	6,906	9,008	10,483
1,325	3,203	5,698	7,009	9,049	10,489
1,794	3,709	5,811	7,011	9,209	10,534
1,962	3,747	5,982	7,079	10,333	10,551
2,078	3,750	6,001	7,122	10,335	10,575
2,165	3,776	6,046	7,123	10,359	10,589
2,276	3,851	6,297	7,581	10,373	10,625
2,297	3,988	6,309	7,606	10,399	10,630
2,320	4,008	6,443	7,708	10,401	10,964
2,345	4,014	6,581	7,843	10,405	11,868
2,556	4,085	6,604	7,848	10,408	12,210
2,655	4,165	6,605	7,863	10,409	12,214
2,689	4,206	6,650	7,934	10,411	12,241
2,796	5,039	6,780	7,973	10,412	12,249
2,897	5,246	6,783	8,160	10,413	12,266
2,956	5,327	6,788	8,245	10,448	12,291
					12,398

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

population density before, during or after irradiation.

352	2,626	3,561	11,405
864	2,774	6,964	

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

resistance, residual injury or repair
phenomena following prior irradiation

Plants	1,973	5,080	6,593	8,534	11,781
	2,032	5,095	6,604	8,569	11,854
198	2,042	5,121	6,625	8,876	11,861
419	2,046	5,204	6,630	8,891	11,926
3,714	2,070	5,226	6,716	8,906	11,974
4,232	2,146	5,272	6,728	8,916	12,199
4,804	2,197	5,280	6,740	8,921	12,209
10,120	2,268	5,376	6,788	8,980	12,210
	2,315	5,395	6,810	9,096	12,212
Animals	2,417	5,414	6,830	9,102	12,241
8	2,507	5,476	6,846	9,135	12,258
43	2,626	5,512	6,848	9,292	12,259
411	2,806	5,517	6,922	9,302	12,266
440	2,835	5,518	6,925	9,313	12,296
469	2,873	5,532	6,949	9,318	12,298
491	2,888	5,562	7,052	9,533	12,301
492	3,060	5,574	7,096	9,535	12,332
560	3,165	5,578	7,128	9,537	12,367
781	3,458	5,615	7,387	9,553	12,398
792	3,581	5,616	7,453	9,554	12,435
851	3,583	5,630	7,458	9,606	
885	3,585	5,631	7,487	9,612	Both or
890	3,587	5,679	7,520	9,706	not
895	3,621	5,742	7,521	9,955	specified
946	3,706	5,921	7,523	10,210	261
974	3,854	5,940	7,546	10,538	1,053
985	3,913	6,027	7,622	10,545	2,460
987	4,060	6,068	7,662	10,572	2,760
1,017	4,161	6,119	7,693	10,714	3,111
1,042	4,240	6,210	7,773	10,729	3,651
1,073	4,251	6,211	7,820	10,734	3,804
1,102	4,358	6,212	7,905	10,765	5,853
1,141	4,378	6,288	7,935	10,994	6,340
1,217	4,530	6,315	8,008	11,265	6,680
1,331	4,616	6,367	8,032	11,297	7,090
1,355	4,852	6,376	8,053	11,522	7,091
1,461	4,858	6,434	8,054	11,549	7,921
1,546	4,859	6,440	8,103	11,578	8,907
1,671	4,862	6,441	8,211	11,613	9,080
1,707	4,863	6,544	8,258	11,614	12,281
1,863	4,890	6,546	8,287	11,629	12,334
1,887	5,030	6,556	8,289	11,667	
1,918	5,042	6,572	8,311	11,747	
1,928	5,044	6,584	8,513		
1,942					

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

in vivo vs. in vitro

168	2,665	5,313	7,521	8,843	11,321
185	2,764	5,328	7,525	8,934	11,467
244	2,796	5,447	7,543	8,962	11,542
280	3,030	5,494	7,729	9,016	11,798
287	3,146	5,504	7,743	9,086	11,828
323	3,189	5,862	7,744	9,088	11,833
391	3,339	5,863	7,760	9,113	11,975
435	3,340	5,906	7,780	9,168	12,050
522	3,359	6,037	7,791	9,260	12,146
523	3,458	6,041	7,819	9,284	12,151
623	3,600	6,067	7,831	9,459	12,161
792	3,837	6,151	7,876	9,467	12,164
848	3,871	6,363	8,095	9,507	12,184
854	4,063	6,412	8,169	9,526	12,196
1,228	4,094	6,545	8,353	9,601	12,269
1,242	4,117	6,575	8,364	9,613	12,271
1,417	4,370	6,660	8,367	9,713	12,281
1,735	4,411	7,004	8,440	9,958	12,287
1,743	4,474	7,241	8,469	9,972	12,298
1,792	4,573	7,272	8,476	10,007	12,305
1,839	4,728	7,306	8,513	10,117	12,318
1,939	4,791	7,375	8,542	10,122	12,408
2,195	4,833	7,403	8,603	10,181	12,409
2,253	5,094	7,413	8,615	10,468	12,447
2,368	5,148	7,740	8,623	10,481	12,451
2,369	5,246	7,508	8,817	11,020	12,388
2,657		7,514		11,281	

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Entire Organism

radioactive substances internally; effect of
route and rate of administration

Listed according to isotope:

Ac	At	Be	Ca	Co	F	H ³	Ionium	Li
Ag	Au	Br	Ce	Cr	Fe	Hf	Ir	Lu
Am	B	C	Cl	Cs	Ga	I	K	Mn
As	Ba	Ru	Cm	Cu	Ge	In	La	N
Pu	Rb	S	Si	Te	U	Y	More than	Na
Pb	Re	Se	Sn	Th	V	Zn	one isotope	P
Ra	Rn		Sr	Tl	Xe	Zr	or isotope	Po
							not specified	

Actinium	Americium	2,364	Gold	2,920	7,820
5,583	10,164	2,614	86	3,118	7,821
7,418	11,439	5,635	755	5,343	8,155
11,628	11,929	5,800	918	5,398	8,303
		6,116	1,072	5,810	8,866
Silver	Arsenic	7,023	1,256	6,717	9,711
9,749	10,278	7,093	1,306	6,774	9,719
10,554	10,469	8,891	1,377	6,854	9,730
10,605	10,477	9,778	2,226	6,875	9,738
10,953		10,150	2,241	7,042	9,751
11,245	Astatine	10,825	2,288	7,761	9,760
11,443	2,182	10,830	2,450	7,810	9,761
			2,518		

Gold (cont'd)

10,287 10,288
10,375 10,316
10,391 10,525
10,415 10,603
10,549 10,881
10,562 10,934
10,563 10,937
10,588 10,959
10,735 10,965
10,746 10,970
10,839 11,009
10,876 11,065
10,947 11,076
10,990 11,079
11,018 11,109
11,029 11,175
11,031 11,219
11,032 11,268
11,034 11,299
11,087 11,550
11,104
11,114
11,129 6,390
11,130 6,422
11,154 6,424
11,157 6,750
11,185 10,368
11,221 10,439
11,225 10,506
11,373 11,028
11,743 11,050
11,821 11,312
11,317
Boron
929
1,083
Barium
6,769
7,310
10,295
11,143
Beryllium
6,704
10,976
Bromine
10,190
10,912
11,098
11,368
Carbon
596
753
1,758
1,980
2,447
5,786
6,176
6,177
6,201
6,388
6,389
6,487
6,513
6,659
6,729
7,503
9,735

Calcium

Cerium

Chlorine

Curium

Cobalt

Chromium

11,120
11,420
11,487
Cesium
1,185
8,879
11,148
11,174
11,360
11,504

Copper

Fluorine

Iron

1,703
3,623
4,951
5,109
5,830
6,910
7,275
7,743
8,370
9,663
10,170
10,188
10,918
10,964
11,214
11,215
11,236
11,601
11,817
12,579
Gallium
10,267
10,301
10,302
10,308
10,310
10,311
10,312
10,352
10,678
11,060
11,061
11,069
11,070
11,071
11,089
Germanium
11,062
11,388
Tritium
2,121
2,198
5,337
6,112
8,115
8,283
10,247
10,303
10,328

10,355
10,936
11,246
11,248
11,604
11,611
11,722
Hafnium
10,628

Iodine

667
678
789
826
894
985
1,019
1,034
1,217
1,230
1,384
1,386
1,501
1,971
2,108
2,305
2,419
2,452
2,473
2,656
2,667
2,684
2,737
2,765
2,803
2,914
2,994
2,995
5,062
5,423
5,425
5,573
5,636
5,689
5,696
5,731
5,846
6,117
6,206
6,248
6,677
6,757
6,946
6,947
7,104
7,155
7,165
7,224
7,370
7,373
7,432
7,450
7,560
7,590
7,658
7,659
7,793
7,879
7,995

8,191
8,200
8,331
8,353
8,982
9,031
9,130
9,142
9,707
9,741
9,776
9,777
9,789
10,151
10,152
10,195
10,381
10,414
10,429
10,435
10,436
10,451
10,452
10,453
10,520
10,570
10,572
10,573
10,575
10,580
10,771
10,824
10,836
10,852
10,853
10,869
10,935
10,956
10,982
11,005
11,059
11,068
11,097
11,100
11,105
11,117
11,127
11,134
11,205
11,207
11,252
11,283
11,284
11,286
11,287
11,288
11,289
11,298
11,329
11,330
11,421
11,424
11,452
11,482
11,606
11,658
12,205

Indium

8,868
8,930
11,825

Ionium

135

Iridium

11,840

Lanthanum

8,985
10,686

Lithium

11,378
11,563

Lutetium

3,089
7,588
10,293
10,616

Manganese

11,049
11,357

Nitrogen

2,091

Phosphorus

113
222
679
796
948
949
954
1,011
1,021
1,066
1,067
1,325
1,397
1,492
1,497
1,513
1,582
1,583
1,584
1,585
1,598
1,695
1,696
1,717
1,741
1,791
1,838
1,842
1,954
1,995

Phosphorus (cont'd)

2,036	7,425	11,346	11,549	11,584	4,375
2,051	7,708	11,430	11,554	11,587	4,376
2,057	7,722	11,453	11,630	11,590	4,403
2,125	7,948	11,540	11,927	11,592	4,705
2,285	7,988	11,812	11,945		4,716
2,330	7,994	11,816	11,946	Lead	4,745
2,331	8,772	11,900	11,953		4,811
2,343	8,854	11,936	11,958	852	4,834
2,355	8,938	11,938	12,336	4,592	4,837
2,363	9,170	12,254			5,099
2,451	9,228	12,381	Plutonium	Radium	5,116
2,507	9,236	12,492			5,151
2,508	9,303	12,639	1,065	21	5,156
2,512	9,621		1,465	44	5,211
2,606	9,639	Polonium	1,622	115	5,477
2,625	9,640	307	1,815	286	5,575
2,640	9,641	994	1,828	315	5,701
2,645	9,642	1,674	2,020	415	5,868
2,685	9,643	1,990	3,053	511	5,975
2,722	9,644	2,254	3,151	539	6,142
2,761	9,646	2,351	4,213	623	6,251
2,790	9,652	3,521	5,010	833	6,396
2,856	9,653	4,183	5,297	960	6,623
2,972	9,664	5,418	5,388	967	6,881
2,993	9,667	5,519	5,819	1,205	6,892
3,004	9,668	5,625	6,091	1,246	7,131
3,013	9,670	6,829	6,310	1,289	7,133
3,033	9,671	7,058	6,495	1,347	7,293
3,241	9,679	7,145	6,629	1,358	7,313
4,265	9,683	7,271	7,117	1,400	8,001
4,515	9,689	7,300	7,121	1,592	8,345
4,542	9,690	7,447	7,122	1,655	8,411
4,564	9,691	7,530	7,292	1,768	8,418
4,650	9,692	7,531	7,563	1,843	8,454
4,652	9,694	7,663	7,710	2,181	8,463
4,784	9,696	7,666	8,168	2,229	8,479
5,177	9,701	7,668	8,170	2,233	8,492
5,327	9,702	7,716	8,925	2,417	8,497
5,344	9,705	7,720	9,305	2,768	8,505
5,595	9,721	8,048	9,771	3,020	8,544
5,611	9,774	8,049	9,772	3,115	8,577
5,642	9,775	8,059	9,773	3,119	8,578
5,730	10,082	8,245	9,811	3,190	8,581
5,738	10,089	8,246	10,662	3,198	8,589
5,766	10,183	8,273	10,810	3,251	8,598
5,775	10,210	8,960	10,897	3,297	8,834
5,865	10,218	9,839	10,898	3,371	9,524
6,073	10,266	10,005	10,899	3,374	9,628
6,100	10,464	10,169	10,900	3,375	9,710
6,203	10,475	10,171	10,901	3,511	9,726
6,213	10,551	10,172	10,902	3,534	9,727
6,221	10,594	10,430	10,903	3,537	9,728
6,291	10,595	10,528	10,904	3,565	9,763
6,417	10,597	10,540	10,905	3,599	9,767
6,426	10,798	10,602	10,906	3,600	9,985
6,633	10,809	10,717	10,907	3,609	10,060
6,647	10,921	10,727	10,946	3,624	10,178
6,696	10,925	10,950	10,984	3,647	10,318
6,698	10,926	10,952	11,161	3,660	10,347
6,714	10,983	10,989	11,204	3,791	10,349
6,777	10,993	11,022	11,273	3,933	10,468
6,825	11,037	11,142	11,275	4,020	10,470
6,901	11,038	11,144	11,277	4,043	10,478
6,906	11,054	11,170	11,290	4,046	10,827
6,968	11,110	11,188	11,407	4,047	10,846
6,970	11,180	11,191	11,422	4,116	10,847
7,040	11,231	11,195	11,434	4,131	10,849
7,235	11,135	11,267	11,437	4,157	10,858
7,331	11,249	11,279	11,438	4,188	10,859
7,375	11,271	11,336		4,333	

Radium (cont'd)		7,143	11,307	7,120	1,844		
		10,380	11,315	7,127	2,129		
10,871	7,898	11,122	11,316	7,430	2,143		
10,885	8,116	11,367	11,369	7,544	2,798		
10,987	8,385	11,520	11,371	7,655	2,867		
11,004	8,439		11,382	7,816	2,888		
11,017	8,455	Strontium	11,385	7,841	2,998		
11,023	8,477		11,442	8,137	2,999		
11,035	8,493		11,543	8,272	3,000		
11,042	8,495		11,937	8,509	3,030		
11,051	8,496		11,942	8,565	3,055		
11,082	8,533		12,202	8,567	3,150		
11,103	8,540		12,203	8,568	4,388		
11,111	8,545		12,439	8,570	5,491		
11,121	8,547		12,440	8,603	5,662		
11,128	9,433		12,605	9,501	6,029		
11,169	9,536	12,606	9,611	7,132			
11,172	10,126	12,618	9,714	7,462			
11,198	11,716	12,644	9,718	7,624			
11,220	11,774	Tellurium	9,720	7,889			
11,222	12,004		9,806	8,255			
11,306	Ruthenium		9,716	10,142	8,419		
11,333			11,046	10,155	8,427		
11,386			7,607	10,157	8,499		
11,490			9,082	10,184	8,522		
11,551			9,111	272	10,202	8,911	
11,552			9,222	279	10,358	8,920	
11,866			10,193	308	10,371	9,087	
11,943			10,194	440	10,503	9,164	
11,955		11,033	586	10,685	9,530		
11,964		11,337	832	10,701	9,535		
11,966	Sulfur	1,056	10,757	9,541			
11,992		1,620	10,812	9,743			
12,112		1,833	10,838	9,768			
12,449		1,976	10,920	9,804			
12,474		2,183	10,927	9,817			
Rubidium			3,056	10,931	10,154		
		10,932	3,061	10,995	10,158		
		11,019	3,206	11,012	10,160		
		11,025	3,299	11,027	10,161		
		11,308	3,401	11,063	10,163		
	11,410	3,503	11,115	10,175			
		3,508	11,196	10,176			
		3,658	11,233	10,177			
		3,678	11,254	10,189			
		3,702	11,300	10,346			
	3,741	11,304	10,374				
	3,752	11,334	10,401				
	3,797	11,384	10,405				
	3,830	11,426	10,408				
	3,835	11,649	10,411				
	3,877	11,694	10,412				
	4,068	11,786	10,457				
	4,209	12,153	10,481				
	4,224	12,428	10,489				
	4,273	12,448	10,504				
	4,283	Thallium	10,535				
	4,313		10,860				
	4,402		10,864				
	4,476		10,955				
	4,517		10,967				
	4,806		11,000				
	4,807		11,002				
	4,889						
	5,115						
	5,881						
	5,925	Tin	11,156				
	6,134						
	6,852						
	6,931		Uranium				
	6,954			1,022			
	6,994			1,315			
	7,119			1,724			

Vanadium	1,042	2,709	5,727	6,959	8,335
	1,045	2,766	5,769	6,974	8,355
10,162	1,102	2,796	5,787	6,996	8,356
	1,169	2,797	5,853	7,051	8,426
Xenon	1,171	2,840	5,875	7,055	8,631
	1,173	2,853	5,896	7,056	8,639
10,929	1,211	2,883	5,901	7,125	8,667
	1,336	2,930	5,934	7,156	8,795
Yttrium	1,380	2,990	5,938	7,200	8,867
	1,382	3,011	5,970	7,202	8,869
1,080	1,383	3,142	5,984	7,210	8,886
2,128	1,385	3,197	6,007	7,242	8,901
2,525	1,398	3,250	6,038	7,256	8,904
3,054	1,417	3,287	6,065	7,272	8,907
7,108	1,421	3,420	6,072	7,317	8,909
7,112	1,422	4,045	6,108	7,384	8,910
7,128	1,495	4,055	6,198	7,424	8,929
7,129	1,521	4,066	6,199	7,431	8,936
7,130	1,610	4,174	6,200	7,433	8,954
7,788	1,621	4,257	6,215	7,445	8,973
9,733	1,665	4,292	6,225	7,448	8,991
11,095	1,682	4,358	6,259	7,452	9,026
11,155	1,694	4,385	6,262	7,453	9,035
11,164	1,719	4,483	6,289	7,466	9,041
11,266	1,725	4,500	6,322	7,558	9,059
11,376	1,752	4,632	6,334	7,559	9,063
11,519	1,786	4,647	6,346	7,565	9,068
11,607	1,793	4,651	6,354	7,581	9,072
11,608	1,827	4,659	6,360	7,583	9,083
11,610	1,834	4,667	6,382	7,584	9,084
11,624	1,847	4,729	6,383	7,592	9,093
11,633	1,998	4,812	6,400	7,610	9,106
11,653	2,001	4,989	6,409	7,621	9,107
11,665	2,013	5,012	6,427	7,635	9,110
11,933	2,027	5,047	6,449	7,672	9,121
11,941	2,029	5,055	6,451	7,675	9,128
	2,038	5,057	6,453	7,676	9,166
Zinc	2,039	5,058	6,462	7,684	9,180
	2,041	5,060	6,503	7,685	9,189
1,149	2,055	5,070	6,517	7,686	9,223
5,108	2,092	5,083	6,528	7,689	9,225
5,142	2,102	5,105	6,553	7,712	9,244
5,276	2,122	5,113	6,556	7,733	9,245
6,395	2,145	5,187	6,594	7,758	9,249
10,585	2,146	5,244	6,598	7,765	9,256
10,721	2,147	5,256	6,608	7,771	9,276
11,036	2,164	5,277	6,609	7,774	9,282
11,072	2,184	5,296	6,616	7,775	9,285
11,124	2,227	5,302	6,648	7,825	9,299
11,125	2,228	5,309	6,657	7,840	9,312
11,126	2,230	5,314	6,665	7,842	9,324
11,311	2,248	5,316	6,670	7,878	9,328
11,491	2,286	5,331	6,684	7,990	9,338
	2,389	5,334	6,685	8,004	9,355
Zirconium	2,393	5,360	6,695	8,064	9,457
	2,397	5,364	6,697	8,071	9,458
5,510	2,427	5,414	6,744	8,098	9,537
	2,431	5,438	6,749	8,099	9,563
More than	2,487	5,489	6,758	8,100	9,569
one isotope	2,488	5,527	6,767	8,150	9,698
	2,489	5,529	6,819	8,151	9,708
262	2,524	5,541	6,820	8,173	9,709
450	2,539	5,543	6,835	8,180	9,744
628	2,542	5,544	6,847	8,198	9,745
844	2,554	5,546	6,864	8,243	9,800
856	2,574	5,552	6,865	8,256	9,808
862	2,596	5,560	6,868	8,284	9,886
878	2,600	5,569	6,882	8,292	9,887
915	2,608	5,608	6,918	8,296	9,888
966	2,617	5,619	6,920	8,316	9,933
1,038	2,632	5,663	6,952	8,317	9,935
	2,674	5,682			
		5,723			

More than one isotope (cont'd)

9,942	10,550	10,954	11,163	11,524	11,947	12,615
9,987	10,559	10,957	11,186	11,553	11,949	12,619
9,999	10,565	10,960	11,201	11,562	11,960	12,650
10,037	10,579	10,966	11,223	11,583	11,961	12,651
10,048	10,638	10,968	11,237	11,594	11,962	12,652
10,061	10,641	10,971	11,238	11,599	12,069	12,653
10,121	10,643	10,972	11,243	11,602	12,094	12,680
10,125	10,645	10,974	11,244	11,603	12,206	12,684
10,127	10,660	10,977	11,260	11,605	12,252	12,686
10,128	10,666	10,978	11,261	11,615	12,265	12,691
10,129	10,671	10,979	11,270	11,616	12,320	12,694
10,135	10,699	10,980	11,274	11,619	12,328	12,701
10,144	10,707	10,981	11,282	11,634	12,330	12,714
10,145	10,709	10,988	11,291	11,636	12,339	
10,187	10,710	10,991	11,292	11,638	12,341	
10,260	10,713	10,996	11,295	11,664	12,342	
10,270	10,716	11,008	11,296	11,673	12,444	
10,298	10,718	11,010	11,301	11,692	12,445	
10,339	10,722	11,011	11,303	11,701	12,454	
10,343	10,725	11,013	11,305	11,702	12,455	
10,363	10,729	11,014	11,338	11,703	12,456	
10,366	10,738	11,020	11,339	11,717	12,457	
10,376	10,739	11,021	11,345	11,748	12,458	
10,377	10,744	11,026	11,347	11,749	12,459	
10,378	10,806	11,040	11,374	11,769	12,460	
10,379	10,811	11,044	11,377	11,789	12,468	
10,410	10,815	11,053	11,390	11,803	12,470	
10,421	10,817	11,055	11,404	11,811	12,471	
10,426	10,818	11,056	11,406	11,813	12,473	
10,433	10,819	11,064	11,419	11,814	12,475	
10,444	10,820	11,066	11,425	11,815	12,518	
10,449	10,842	11,067	11,427	11,819	12,519	
10,454	10,877	11,075	11,431	11,830	12,580	
10,460	10,878	11,088	11,433	11,831	12,581	
10,505	10,884	11,090	11,449	11,833	12,582	
10,508	10,908	11,091	11,472	11,836	12,585	
10,511	10,909	11,092	11,483	11,841	12,592	
10,519	10,911	11,093	11,484	11,848		
10,521	10,928	11,106	11,485	11,850		
10,538	10,938	11,107	11,499	11,865		
10,545	10,942	11,158	11,512	11,932		
	10,945	11,160	11,514	11,935		

QUANTITATIVE ASPECTS OF FACTORS INFLUENCING THE RESPONSE TO IRRADIATION

BIOLOGICAL AND PHYSIOLOGICAL FACTORS

Biological and Physiological Factors Influencing
Response of Entire Multicellular Organism (Plant
or Animal)

bacterial flora

2,168	6,967	7,392
3,755	7,167	

QUANTITATIVE ASPECTS OF FACTORS INFLUENCING THE RESPONSE TO IRRADIATION

BIOLOGICAL AND PHYSIOLOGICAL FACTORS

Biological and Physiological Factors Influencing
Response of Entire Multicellular Organisms
(Plant or Animal)

acclimatization to real or simulated high
altitude

7,942

QUANTITATIVE ASPECTS OF FACTORS INFLUENCING THE RESPONSE
TO IRRADIATION

BIOLOGICAL AND PHYSIOLOGICAL FACTORS

Biological and Physiological Factors Influencing
Response of Individual Cells, Including Viruses
effect of culture medium on response

6	2,211	4,554	5,714	7,400	9,946
47	2,318	4,559	5,749	7,625	10,030
131	2,355	4,617	5,761	7,629	10,063
177	2,653	4,618	5,804	7,692	10,543
247	3,191	4,750	5,859	7,718	10,580
249	3,216	5,071	6,049	7,726	10,596
459	3,324	5,133	6,413	7,777	10,716
642	3,335	5,335	6,535	7,809	10,854
669	3,356	5,336	6,564	7,862	11,159
677	3,367	5,349	6,709	7,984	11,400
767	3,390	5,358	6,756	8,219	12,183
806	3,470	5,365	6,782	8,253	12,225
854	3,471	5,369	6,827	8,365	12,242
874	3,527	5,396	6,838	8,366	12,280
910	3,816	5,440	6,900	9,352	12,513
912	3,824	5,500	6,971	9,358	12,381
1,043	4,017	5,559	7,046	9,602	12,384
1,233	4,150	5,572	7,092	9,620	
1,504	4,200	5,685	7,174	9,862	
1,832	4,319	5,686	7,205	9,876	
2,081	4,428	5,710	7,378	9,945	

QUANTITATIVE ASPECTS OF FACTORS

BIOLOGICAL AND PHYSIOLOGICAL

Biological and Physiological Factors: Cells
effect of radiation on water of culture
medium

640	1,864	4,422	5,201	6,137	7,233
806	2,094	4,452	5,336	6,492	9,525
854	2,357	4,493	5,440	6,496	10,182
912	2,938	4,617	5,856	6,805	10,716
1,122	3,191	4,618	5,862	6,879	10,781
1,581	3,390	4,663	6,059	6,886	11,024
1,734	3,848	4,911	6,077	6,905	11,269

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOLOGICAL AND PHYSIOLOGICAL

Biological and physiological Factors: Cells
effect of pH

891	2,589	4,311	5,336	6,807	8,724
1,292	3,454	4,425	5,407	7,004	9,792
1,312	3,618	4,442	5,576	7,378	9,876
1,373	3,847	4,663	5,627	7,491	11,159
1,808	3,982	4,935	5,714	7,809	12,183
1,925	4,167	4,967	6,039	8,421	12,280
					12,622

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOLOGICAL AND PHYSIOLOGICAL

Biological and Physiological Factors: Cells
in vitro vs in vivo effects

168	3,727	6,412	8,600	10,156	12,164
241	4,135	6,446	8,769	10,292	12,233
276	4,269	6,738	8,830	10,338	12,305
1,116	4,420	7,004	9,088	10,769	12,321
1,319	4,421	7,177	9,260	10,778	12,352
1,358	4,870	7,205	9,456	10,933	12,363
1,939	5,148	7,617	9,498	11,321	12,374
3,438	5,151	8,090	9,810	11,353	12,408
3,461	5,572	8,235	9,812	11,534	12,409
3,705	6,037	8,367	9,968	11,542	12,430
					12,453

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOLOGICAL AND PHYSIOLOGICAL

Biological and Physiological: Cells
hydration

636	3,731	4,587	6,554	8,417	9,810
714	3,925	4,628	6,730	8,519	9,826
847	4,100	4,629	6,884	8,537	10,023
911	4,184	4,669	7,044	8,725	10,099
955	4,232	5,086	7,181	8,757	10,101
1,557	4,234	5,153	7,381	8,825	10,777
2,516	4,274	5,377	7,436	8,869	10,781
2,589	4,275	5,416	7,464	8,870	12,217
3,192	4,349	5,584	7,557	8,932	12,289
3,528	4,441	5,602	7,809	9,133	12,321
3,616	4,535	5,884	8,193	9,423	12,430
3,720	4,538	5,904	8,346	9,603	

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOLOGICAL AND PHYSIOLOGICAL

Biological and Physiological: Cells
age and developmental stage in
differentiating cells

162	2,408	3,691	4,397	5,774	8,087
385	2,546	3,856	4,411	5,953	8,165
540	2,958	3,880	4,418	6,139	8,523
606	2,978	3,922	4,662	6,554	8,869
1,108	3,070	3,953	4,669	6,745	9,437
1,250	3,134	3,971	4,801	6,899	9,881
1,402	3,174	4,006	4,829	6,910	9,923
1,709	3,316	4,167	5,167	7,000	11,052
1,771	3,384	4,173	5,198	7,096	11,723
1,924	3,493	4,219	5,390	7,281	11,738
1,953	3,526	4,233	5,395	7,378	11,874
1,962	3,552	4,298	5,616	7,562	12,118
2,281	3,686	4,329	5,740	8,011	12,178

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOLOGICAL AND PHYSIOLOGICAL

Biological and Physiological: Cells

oxygen effects

616	2,081	5,686	7,063	8,695	10,702
619	2,093	5,804	7,077	8,696	11,003
621	2,142	5,856	7,080	8,724	11,043
640	2,160	5,862	7,188	8,770	11,293
641	2,470	5,943	7,195	8,779	11,349
712	2,551	5,986	7,378	8,823	11,353
714	2,653	6,059	7,379	8,829	12,220
765	2,894	6,105	7,380	8,832	12,221
806	2,916	6,110	7,412	8,870	12,226
820	3,162	6,208	7,413	8,932	12,231
925	3,443	6,379	7,575	9,062	12,233
1,081	3,806	6,394	7,597	9,195	12,245
1,106	3,925	6,413	7,602	9,250	12,246
1,191	4,150	6,414	7,757	9,362	12,295
1,200	4,418	6,554	7,862	9,487	12,320
1,273	4,450	6,701	7,891	9,490	12,407
1,279	4,686	6,731	7,914	9,622	12,409
1,287	5,100	6,746	7,945	9,828	12,416
1,299	5,153	6,756	8,336	9,862	12,426
1,372	5,242	6,808	8,365	9,877	12,432
1,390	5,307	6,809	8,366	9,948	12,452
1,528	5,336	6,838	8,368	9,964	12,486
1,557	5,349	6,850	8,410	10,048	12,347
1,596	5,358	6,879	8,538	10,156	12,352
1,602	5,565	7,004	8,678	10,203	12,396
2,011	5,685	7,008			

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOLOGICAL AND PHYSIOLOGICAL

Biological and Physiological: Cells

effects of gases other than oxygen

642	2,470	5,153	5,804	8,696	9,948
712	2,916	5,410	6,809	8,832	11,293
1,106	3,813	5,565	8,444	9,017	12,452
1,390	3,925	5,685	8,695	9,195	12,486
2,142	4,311	5,686			

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOLOGICAL AND PHYSIOLOGICAL

Biological and Physiological: Cells

effect of mitotic activity or stage
of cell division on response

73	358	584	819	1,413	1,870
275	363	585	847	1,486	1,883
287	513	631	851	1,492	1,959
288	523	642	1,046	1,522	2,151
293	549	715	1,177	1,744	2,161

2,201	3,616	4,681	6,534	8,825	9,900
2,212	3,644	4,689	6,546	8,831	9,916
2,307	3,667	4,707	6,631	8,895	9,921
2,338	3,671	4,708	6,640	8,902	9,946
2,386	3,680	4,717	6,838	9,062	10,025
2,403	3,686	4,754	6,890	9,083	10,047
2,433	3,731	4,800	6,937	9,168	10,081
2,435	3,765	4,829	7,004	9,192	10,103
2,436	3,782	4,851	7,032	9,193	10,635
2,441	3,793	4,867	7,093	9,196	10,716
2,456	3,802	4,871	7,098	9,239	10,778
2,457	3,813	4,909	7,196	9,370	11,038
2,705	3,836	4,919	7,282	9,375	11,249
2,728	3,952	4,973	7,362	9,381	11,703
2,730	3,977	5,025	7,380	9,414	11,812
2,767	4,095	5,032	7,400	9,505	11,813
2,776	4,101	5,067	7,502	9,508	11,814
2,786	4,122	5,091	7,529	9,510	11,816
2,880	4,140	5,182	7,576	9,572	11,888
2,958	4,152	5,390	7,579	9,620	12,000
3,043	4,173	5,412	7,582	9,653	12,042
3,086	4,183	5,508	7,657	9,662	12,065
3,098	4,211	5,584	7,767	9,664	12,100
3,110	4,233	5,604	7,770	9,666	12,103
3,132	4,326	5,645	7,851	9,667	12,142
3,147	4,373	5,772	7,914	9,668	12,223
3,202	4,379	5,800	8,257	9,669	12,242
3,312	4,412	5,926	8,336	9,679	12,320
3,319	4,459	5,961	8,346	9,682	12,405
3,407	4,486	6,149	8,379	9,843	12,411
3,430	4,490	6,239	8,559	9,830	12,412
3,435	4,509	6,247	8,560	9,834	12,415
3,440	4,535	6,253	8,660	9,841	12,426
3,456	4,605	6,308	8,700	9,856	12,502
3,517	4,614	6,314	8,728	9,862	12,346
3,556	4,630	6,320	8,790	9,865	12,373
3,613	4,661	6,378	8,804	9,873	12,387

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOLOGICAL AND PHYSIOLOGICAL

Biological and Physiological; Cells

recovery and repair phenomena

151	1,122	2,523	4,080	4,845	5,412
363	1,123	2,565	4,093	4,870	5,458
564	1,273	2,570	4,110	4,871	5,500
566	1,411	2,643	4,151	4,894	5,539
712	1,486	2,728	4,179	4,903	5,616
713	1,522	2,781	4,192	4,914	5,734
733	1,602	2,794	4,207	4,922	5,735
772	1,745	2,877	4,226	4,939	5,777
807	1,788	2,880	4,285	4,955	5,909
847	1,789	2,894	4,297	4,979	5,986
851	1,794	2,976	4,371	5,005	6,139
867	1,959	3,093	4,420	5,006	6,157
930	2,031	3,134	4,522	5,028	6,233
950	2,040	3,217	4,558	5,053	6,239
951	2,066	3,319	4,570	5,054	6,240
1,009	2,114	3,382	4,614	5,107	6,265
1,010	2,248	3,407	4,636	5,120	6,274
1,040	2,253	3,686	4,637	5,127	6,330
1,053	2,328	3,726	4,668	5,162	6,337
1,089	2,386	3,754	4,710	5,293	6,340
1,106	2,460	3,957	4,734	5,371	6,414
1,114	2,467	4,006	4,751	5,410	6,421

6,473	6,935	8,082	9,253	9,853	11,401
6,475	6,965	8,347	9,365	9,884	11,542
6,477	6,966	8,366	9,368	9,890	11,939
6,496	7,003	8,368	9,369	9,916	12,149
5,580	7,046	8,378	9,370	9,940	12,225
6,602	7,052	8,669	9,381	9,964	12,246
6,640	7,090	8,678	9,399	10,030	12,266
6,641	7,091	8,714	9,400	10,077	12,274
6,642	7,096	8,717	9,407	10,088	12,289
6,655	7,150	8,775	9,409	10,173	12,320
6,666	7,223	8,789	9,448	10,543	12,346
6,673	7,441	8,822	9,488	10,663	12,349
6,709	7,451	8,823	9,489	10,683	12,405
6,782	7,715	8,832	9,490	10,786	12,406
6,790	7,726	8,907	9,498	10,844	12,416
6,802	7,745	8,947	9,510	10,994	12,419
6,809	7,767	9,036	9,564	11,003	12,432
6,826	7,859	9,062	9,841	11,045	12,492
6,879	7,862	9,145	9,852	11,194	12,509
6,882	7,891	9,230		11,400	12,526

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOLOGICAL AND PHYSIOLOGICAL

Biological and Physiological: Cells

differences of unspecified nature inherent
in like cells

247	1,401	4,418	4,955	6,425	9,572
340	1,402	4,533	5,238	6,545	9,862
432	1,411	4,631	5,310	6,585	9,972
543	1,924	4,662	5,390	6,708	10,557
585	2,281	4,720	5,800	6,838	10,704
706	3,493	4,735	5,882	7,721	10,840
819	3,705	4,758	6,235	8,118	11,823
947	3,967	4,831	6,414	8,480	11,899
1,329	4,093	4,846			12,386

QUANTITATIVE ASPECTS OF FACTORS INFLUENCING RESPONSE

BIOLOGICAL AND PHYSIOLOGICAL

Biol. and Physiol.; Cells

difference in species (unicellular
organisms)

341	1,471	3,775	4,714	5,882	7,441
388	1,800	3,781	4,720	5,898	7,579
459	2,370	3,831	4,741	6,131	7,581
505	2,491	3,962	4,746	6,154	7,654
555	2,832	3,967	4,751	6,308	7,680
673	2,862	3,997	4,778	6,379	7,715
677	3,091	4,146	4,794	6,555	7,812
713	3,256	4,149	5,028	6,580	7,890
869	3,494	4,421	5,111	6,585	7,930
1,123	3,505	4,437	5,146	6,596	7,932
1,218	3,575	4,487	5,167	6,802	7,966
1,249	3,615	4,545	5,238	6,893	8,089
1,403	3,635	4,630	5,354	7,003	8,219
1,448	3,705	4,631	5,536	7,150	8,351
1,467	3,756	4,653	5,864	7,413	8,365

8,366	9,205	9,889	10,017	10,840	12,285
8,401	9,288	9,941	10,018	11,280	12,289
8,530	9,525	9,993	10,031	11,723	12,384
8,546	9,622	10,000	10,035	12,276	12,452
8,610	9,807	10,010	10,533	12,279	12,490
9,014	9,862				

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOL. and PHYSIOL.

Biol. and Physiol.; Cells

difference in cellular components

3	3,230	4,458	5,773	7,966	9,959
5	3,284	4,531	5,801	8,219	9,988
92	3,319	4,533	5,858	8,263	10,003
292	3,331	4,536	5,879	8,265	10,013
301	3,341	4,537	5,890	8,276	10,156
340	3,365	4,571	5,968	8,336	10,388
521	3,408	4,591	5,999	8,337	10,488
526	3,450	4,614	6,030	8,351	10,546
540	3,472	4,634	6,052	8,364	10,574
807	3,600	4,656	6,214	8,457	10,582
812	3,648	4,662	6,232	8,458	10,592
947	3,705	4,675	6,247	8,459	10,598
997	3,751	4,698	6,308	8,535	10,721
1,303	3,763	4,700	6,337	8,561	10,780
1,424	3,768	4,762	6,348	8,583	10,854
1,471	3,785	4,774	6,414	8,612	10,868
1,531	3,786	4,778	6,539	8,716	10,919
1,609	3,803	4,880	6,545	8,722	11,027
1,641	3,823	4,881	6,549	8,783	11,110
1,745	3,851	4,882	6,596	8,797	11,262
1,961	3,853	4,917	6,599	8,799	11,401
2,081	3,888	4,922	6,641	8,996	11,417
2,136	3,896	4,950	6,666	8,997	11,622
2,243	3,936	4,973	6,694	9,132	11,703
2,259	3,981	5,001	6,707	9,168	11,723
2,297	4,012	5,076	6,734	9,270	11,764
2,307	4,030	5,087	6,789	9,375	11,773
2,309	4,050	5,104	6,792	9,401	11,896
2,321	4,067	5,162	6,882	9,451	11,899
2,325	4,073	5,163	6,938	9,454	12,086
2,371	4,120	5,170	7,106	9,484	12,095
2,378	4,132	5,182	7,116	9,486	12,118
2,492	4,151	5,288	7,226	9,510	12,222
2,564	4,172	5,328	7,261	9,559	12,223
2,692	4,174	5,416	7,338	9,572	12,247
2,719	4,183	5,432	7,524	9,799	12,279
2,772	4,206	5,495	7,591	9,863	12,309
2,823	4,230	5,524	7,623	9,864	12,320
2,837	4,371	5,539	7,660	9,865	12,350
2,881	4,379	5,614	7,714	9,869	12,380
2,960	4,391	5,628	7,735	9,870	12,418
3,162	4,407	5,669	7,883	9,895	12,453
3,193	4,413	5,693	7,945	9,938	12,484
3,202					

QUANTITATIVE ASPECTS; FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Cells

cell size

2,862	4,720	5,124	5,560	6,585	8,337
4,175	4,778	5,288	6,414	7,890	8,351
4,714	4,960				

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Cells

difference in rate of cellular metabolism

715	3,616	5,559	8,053	9,510	10,970
1,401	3,726	6,481	8,082	9,876	12,057
1,429	3,781	6,701	8,177	9,878	12,114
1,557	3,813	6,935	8,365	9,880	12,242
1,509	3,826	6,945	8,366	9,945	12,280
2,320	3,924	6,962	8,378	9,946	12,379
2,328	3,973	6,986	8,381	10,027	12,386
2,412	4,096	7,196	8,417	10,199	12,419
2,926	4,231	7,348	8,559	10,596	12,425
2,960	4,630	7,381	8,825	10,965	12,426
3,248	4,751	7,468	8,831	10,966	12,452
3,443	5,349	7,654	9,373	10,968	12,502
3,559	5,539	7,756	9,490		12,563

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Cells

resistance or residual injury following prior exposure

734	1,475	7,636	8,669	9,842	11,045
807	7,533	8,347	9,318	10,084	12,149
851	7,612	8,421	9,498	10,994	12,426
1,266					

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Cells

pre-existing cell injury (not radiation-induced)

200	2,319	4,831	5,631	10,994	
631	2,722	5,007	9,878	11,045	
783	4,397	5,539	9,880	12,425	

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Cells

hormonal environment of cell

123
1,038

QUANTITATIVE ASPECTS OF FACTORS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Cells

population density (suspension density, etc.)

513	2,318	4,452	4,630	6,666	7,804
571	2,979	4,493	5,159	6,886	9,602
806	3,509	4,554	5,335	6,962	9,814
1,122	3,756	4,617	5,685	7,155	10,596
1,864	4,428	4,618	6,492	7,468	11,269

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOL. AND PHYSIOL.

Biol. and Physiol.; Cells

ploidy

298	2,713	5,606	7,148	7,966	9,450
807	2,837	5,812	7,255	8,265	9,484
947	3,477	5,836	7,354	8,297	9,486
1,352	3,951	5,858	7,380	8,337	9,513
1,471	4,173	5,864	7,463	8,339	9,841
1,531	4,537	6,414	7,497	8,650	9,874
1,603	4,681	6,545	7,593	8,660	9,941
1,717	4,698	6,681	7,606	8,676	10,013
1,961	4,774	6,898	7,657	8,697	10,716
2,153	4,805	6,906	7,721	8,722	12,279
2,281	4,968	6,924	7,830	9,141	12,308
2,298	5,170	7,004	7,918	9,145	12,348
2,331	5,288	7,093	7,931	9,436	12,426

QUANTITATIVE ASPECTS OF FACTORS INFLUENCING THE RESPONSE TO IRRADIATION

INFLUENCE OF CHEMICAL COMPOSITION OF CELLS OR TISSUES ON RESPONSE TO IRRADIATION (see also heavier elements under chemical and pharmaceutical agents in this section)

267	1,167	3,142	3,972	4,559	5,579
288	1,274	3,192	4,067	4,623	5,682
312	1,478	3,250	4,068	4,679	5,882
360	1,505	3,296	4,149	4,918	5,949
413	2,196	3,356	4,236	4,951	6,060
459	2,384	3,419	4,306	4,973	6,147
801	2,577	3,470	4,315	5,034	6,225
928	2,579	3,527	4,408	5,061	6,419
1,008	2,831	3,738	4,424	5,232	6,470
1,083	2,961	3,768	4,477	5,337	6,525
1,084	2,999	3,816	4,483	5,365	6,554
	3,043				

6,565	6,864	8,365	9,674	10,698	11,296
6,588	6,968	8,406	9,715	10,745	11,321
6,619	7,004	8,410	9,729	10,872	11,486
6,622	7,051	8,421	9,792	10,928	11,538
6,661	7,194	8,622	9,843	10,966	12,063
6,662	7,261	8,787	9,937	10,967	12,237
6,696	7,289	8,907	10,124	10,969	12,312
6,697	7,427	9,032	10,610	10,977	12,323
6,743	7,577	9,095	10,622	10,992	12,352
6,752	7,639	9,358	10,624	10,995	12,366
6,753	8,000	9,514	10,657	11,013	12,370
6,754	8,010	9,621	10,669	11,208	12,404
6,838	8,256	9,651	10,696	11,275	12,613

QUANTITATIVE ASPECTS OF FACTORS INFLUENCING THE RESPONSE TO IRRADIATION

PHYSICAL FACTORS INFLUENCING RESPONSE TO IRRADIATION

Type of Radiation, wave length, etc.

3	460	864	1,256	1,642	2,100
22	481	865	1,267	1,646	2,110
26	500	866	1,274	1,648	2,117
34	506	877	1,275	1,682	2,132
36	527	878	1,302	1,694	2,145
64	534	890	1,306	1,696	2,158
65	540	896	1,326	1,703	2,159
84	545	899	1,347	1,706	2,162
89	547	904	1,361	1,710	2,164
91	551	913	1,378	1,741	2,167
109	552	929	1,385	1,775	2,169
112	556	953	1,397	1,782	2,177
127	558	955	1,398	1,792	2,191
138	568	968	1,400	1,793	2,196
142	582	977	1,403	1,800	2,201
155	586	986	1,408	1,802	2,210
170	587	992	1,413	1,804	2,214
179	595	995	1,417	1,805	2,244
211	604	1,006	1,422	1,815	2,248
213	609	1,008	1,469	1,817	2,255
215	616	1,012	1,471	1,818	2,257
218	622	1,037	1,482	1,819	2,273
219	627	1,046	1,483	1,830	2,277
223	628	1,052	1,487	1,834	2,281
224	634	1,060	1,489	1,837	2,284
226	636	1,063	1,498	1,868	2,286
228	652	1,069	1,502	1,869	2,301
238	653	1,073	1,506	1,871	2,306
240	660	1,078	1,515	1,872	2,310
246	702	1,083	1,517	1,875	2,321
251	708	1,084	1,519	1,881	2,323
260	733	1,098	1,520	1,945	2,327
267	734	1,102	1,521	1,948	2,341
271	744	1,117	1,523	1,950	2,346
273	746	1,122	1,528	1,952	2,348
283	748	1,127	1,534	1,956	2,351
302	749	1,132	1,536	1,958	2,357
312	754	1,145	1,544	1,960	2,384
314	764	1,151	1,553	1,963	2,386
317	786	1,153	1,564	1,971	2,389
342	797	1,169	1,565	2,000	2,396
388	801	1,174	1,570	2,025	2,401
394	807	1,177	1,588	2,028	2,404
401	845	1,194	1,593	2,055	2,405
413	850	1,230	1,612	2,061	2,414
433	853	1,246	1,627	2,074	2,421
450	856	1,252	1,638	2,081	2,424

2,427	2,961	3,448	4,032	4,612	5,220
2,434	2,974	3,455	4,038	4,620	5,224
2,450	2,986	3,458	4,044	4,623	5,231
2,451	2,990	3,466	4,046	4,625	5,243
2,473	3,001	3,470	4,053	4,629	5,244
2,488	3,007	3,483	4,065	4,630	5,262
2,489	3,011	3,484	4,069	4,639	5,263
2,512	3,020	3,488	4,074	4,642	5,273
2,519	3,022	3,489	4,093	4,653	5,293
2,521	3,032	3,495	4,095	4,661	5,301
2,524	3,033	3,506	4,109	4,662	5,302
2,528	3,036	3,551	4,113	4,674	5,322
2,529	3,037	3,559	4,115	4,685	5,331
2,538	3,038	3,565	4,133	4,691	5,345
2,539	3,041	3,570	4,138	4,704	5,359
2,545	3,043	3,588	4,143	4,706	5,393
2,546	3,046	3,589	4,153	4,710	5,394
2,549	3,050	3,590	4,156	4,729	5,395
2,554	3,053	3,594	4,185	4,733	5,404
2,555	3,064	3,615	4,186	4,735	5,411
2,565	3,065	3,636	4,194	4,746	5,412
2,570	3,067	3,643	4,201	4,761	5,414
2,576	3,068	3,644	4,202	4,765	5,415
2,577	3,090	3,654	4,208	4,766	5,416
2,580	3,101	3,682	4,215	4,773	5,418
2,590	3,111	3,692	4,217	4,783	5,459
2,596	3,113	3,697	4,219	4,789	5,486
2,602	3,118	3,727	4,243	4,807	5,487
2,605	3,124	3,733	4,251	4,808	5,497
2,607	3,128	3,751	4,256	4,824	5,506
2,608	3,133	3,756	4,257	4,825	5,507
2,623	3,154	3,761	4,264	4,827	5,516
2,638	3,158	3,762	4,265	4,832	5,519
2,651	3,160	3,770	4,271	4,840	5,526
2,659	3,175	3,775	4,279	4,849	5,528
2,668	3,182	3,788	4,282	4,872	5,538
2,670	3,194	3,789	4,288	4,876	5,550
2,672	3,215	3,792	4,290	4,887	5,551
2,680	3,219	3,816	4,294	4,897	5,556
2,687	3,232	3,822	4,306	4,901	5,560
2,691	3,233	3,829	4,310	4,906	5,562
2,706	3,247	3,834	4,320	4,929	5,563
2,709	3,257	3,838	4,328	4,942	5,568
2,711	3,258	3,856	4,331	4,954	5,575
2,725	3,259	3,862	4,338	4,992	5,584
2,733	3,260	3,883	4,347	4,994	5,586
2,735	3,261	3,887	4,348	5,003	5,598
2,742	3,262	3,892	4,370	5,034	5,602
2,751	3,266	3,903	4,372	5,044	5,605
2,768	3,274	3,907	4,380	5,056	5,608
2,772	3,276	3,908	4,383	5,057	5,613
2,783	3,294	3,912	4,405	5,060	5,619
2,789	3,305	3,928	4,412	5,061	5,626
2,792	3,306	3,929	4,417	5,066	5,636
2,801	3,324	3,956	4,419	5,070	5,649
2,819	3,326	3,964	4,432	5,077	5,664
2,824	3,334	3,965	4,439	5,082	5,667
2,836	3,337	3,973	4,454	5,085	5,673
2,847	3,338	3,980	4,472	5,113	5,674
2,849	3,339	3,986	4,483	5,115	5,675
2,851	3,343	3,989	4,490	5,132	5,676
2,860	3,356	3,990	4,493	5,135	5,681
2,862	3,367	3,991	4,497	5,146	5,682
2,876	3,368	3,992	4,498	5,151	5,719
2,877	3,371	4,001	4,511	5,152	5,722
2,878	3,388	4,005	4,540	5,171	5,725
2,881	3,394	4,012	4,548	5,175	5,729
2,891	3,395	4,013	4,550	5,180	5,736
2,895	3,415	4,014	4,551	5,186	5,737
2,896	3,417	4,015	4,557	5,191	5,742
2,898	3,434	4,022	4,584	5,202	5,745
2,955	3,436	4,024	4,598	5,215	5,750
	3,441	4,027			

5,758	6,449	6,991	7,684	8,341	8,942
5,769	6,451	6,996	7,717	8,342	8,943
5,785	6,453	6,999	7,735	8,348	8,963
5,786	6,461	7,005	7,758	8,349	8,983
5,787	6,470	7,008	7,760	8,350	8,994
5,789	6,477	7,015	7,770	8,355	9,026
5,804	6,480	7,016	7,774	8,374	9,038
5,811	6,520	7,017	7,775	8,388	9,041
5,817	6,523	7,018	7,780	8,390	9,051
5,830	6,532	7,019	7,798	8,395	9,054
5,849	6,534	7,024	7,811	8,396	9,062
5,862	6,540	7,028	7,813	8,399	9,078
5,865	6,541	7,034	7,820	8,401	9,080
5,871	6,542	7,040	7,836	8,402	9,097
5,887	6,543	7,067	7,844	8,406	9,108
5,890	6,544	7,076	7,846	8,429	9,117
5,907	6,552	7,079	7,853	8,441	9,120
5,915	6,556	7,082	7,854	8,443	9,122
5,954	6,560	7,098	7,858	8,473	9,128
5,955	6,565	7,100	7,867	8,485	9,142
5,966	6,567	7,123	7,875	8,501	9,174
5,971	6,577	7,130	7,931	8,516	9,184
5,988	6,585	7,147	7,932	8,530	9,189
6,008	6,600	7,152	7,936	8,531	9,190
6,032	6,601	7,155	7,938	8,551	9,191
6,052	6,614	7,158	7,939	8,554	9,244
6,065	6,622	7,170	7,947	8,555	9,247
6,074	6,623	7,178	7,948	8,558	9,250
6,077	6,632	7,203	7,955	8,561	9,262
6,087	6,633	7,211	7,958	8,565	9,267
6,108	6,634	7,215	7,984	8,569	9,276
6,138	6,640	7,220	8,012	8,587	9,285
6,155	6,653	7,221	8,016	8,590	9,290
6,171	6,662	7,235	8,017	8,604	9,291
6,174	6,665	7,242	8,021	8,614	9,295
6,189	6,666	7,254	8,022	8,623	9,303
6,195	6,673	7,255	8,028	8,625	9,304
6,196	6,674	7,274	8,032	8,631	9,323
6,200	6,678	7,275	8,033	8,632	9,328
6,203	6,685	7,289	8,056	8,634	9,336
6,205	6,701	7,292	8,073	8,637	9,357
6,208	6,731	7,296	8,080	8,662	9,358
6,225	6,743	7,297	8,086	8,663	9,364
6,228	6,744	7,319	8,095	8,679	9,376
6,237	6,749	7,329	8,148	8,680	9,393
6,263	6,752	7,336	8,149	8,699	9,411
6,307	6,753	7,350	8,150	8,702	9,413
6,310	6,754	7,366	8,153	8,706	9,423
6,315	6,788	7,401	8,155	8,713	9,433
6,322	6,801	7,413	8,168	8,726	9,436
6,324	6,821	7,427	8,170	8,730	9,437
6,328	6,831	7,453	8,173	8,744	9,443
6,334	6,832	7,479	8,198	8,751	9,454
6,340	6,834	7,489	8,199	8,753	9,457
6,352	6,835	7,497	8,201	8,773	9,461
6,363	6,836	7,519	8,203	8,776	9,462
6,366	6,839	7,521	8,221	8,787	9,496
6,371	6,861	7,533	8,228	8,794	9,498
6,375	6,869	7,539	8,240	8,798	9,514
6,376	6,874	7,553	8,254	8,809	9,525
6,377	6,895	7,560	8,255	8,815	9,533
6,384	6,913	7,564	8,276	8,823	9,545
6,385	6,920	7,565	8,278	8,837	9,546
6,405	6,932	7,574	8,297	8,858	9,555
6,409	6,935	7,581	8,298	8,875	9,556
6,411	6,937	7,601	8,299	8,892	9,563
6,417	6,939	7,610	8,304	8,902	9,564
6,419	6,942	7,621	8,305	8,907	9,587
6,421	6,945	7,639	8,310	8,912	9,588
6,427	6,946	7,643	8,318	8,918	9,589
6,437	6,984	7,644	8,319	8,932	9,590
6,440	6,986	7,681	8,337	8,939	9,603
6,441					
6,443					

9,630	10,041	10,793	11,127	11,606	12,227
9,633	10,043	10,794	11,131	11,631	12,252
9,651	10,044	10,796	11,135	11,640	12,254
9,654	10,048	10,800	11,158	11,692	12,260
9,655	10,058	10,811	11,160	11,709	12,266
9,656	10,073	10,821	11,180	11,715	12,273
9,657	10,099	10,822	11,189	11,740	12,274
9,658	10,138	10,878	11,192	11,782	12,285
9,672	10,139	10,901	11,199	11,790	12,312
9,673	10,173	10,902	11,208	11,813	12,313
9,674	10,191	10,903	11,237	11,823	12,314
9,675	10,266	10,904	11,238	11,830	12,315
9,697	10,298	10,905	11,241	11,839	12,316
9,709	10,303	10,906	11,246	11,850	12,317
9,712	10,392	10,907	11,249	11,883	12,320
9,713	10,393	10,908	11,254	11,888	12,331
9,729	10,482	10,909	11,274	11,904	12,332
9,766	10,538	10,922	11,285	11,962	12,333
9,780	10,542	10,923	11,291	11,984	12,336
9,800	10,546	10,928	11,293	11,995	12,341
9,803	10,559	10,938	11,296	12,004	12,342
9,805	10,610	10,942	11,297	12,012	12,346
9,819	10,622	10,954	11,301	12,023	12,404
9,825	10,633	10,980	11,302	12,044	12,406
9,827	10,634	11,006	11,304	12,047	12,414
9,832	10,636	11,013	11,315	12,052	12,416
9,844	10,640	11,014	11,358	12,053	12,418
9,845	10,646	11,015	11,390	12,054	12,429
9,869	10,649	11,018	11,396	12,068	12,442
9,870	10,675	11,020	11,398	12,072	12,450
9,888	10,677	11,029	11,461	12,083	12,457
9,898	10,682	11,031	11,472	12,084	12,468
9,941	10,695	11,035	11,483	12,085	12,469
9,945	10,706	11,040	11,486	12,098	12,472
9,946	10,714	11,044	11,508	12,104	12,473
9,964	10,724	11,053	11,571	12,154	12,474
9,965	10,736	11,055	11,595	12,155	12,475
9,968	10,745	11,056	11,512	12,159	12,483
9,991	10,754	11,064	11,517	12,161	12,490
10,003	10,756	11,075	11,520	12,162	12,510
10,015	10,768	11,076	11,534	12,167	12,514
10,021	10,779	11,079	11,545	12,173	12,611
10,023	10,786	11,121	11,549	12,179	12,614
10,038	10,791		11,569	12,180	12,625
				12,220	12,673

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

PHYSICAL FACTORS

Dose per unit time (dose rate)

3	1,517	2,275	3,269	4,251	4,904
43	1,528	2,321	3,435	4,255	5,000
320	1,638	2,348	3,446	4,297	5,021
352	1,641	2,485	3,478	4,307	5,060
627	1,647	2,486	3,635	4,310	5,071
890	1,670	2,565	3,696	4,311	5,082
895	1,676	2,577	3,804	4,327	5,126
922	1,752	2,600	3,884	4,363	5,154
923	1,789	2,835	3,948	4,371	5,194
992	1,830	2,886	3,957	4,374	5,197
1,009	1,853	2,909	3,969	4,443	5,215
1,012	1,869	3,050	4,003	4,502	5,274
1,143	1,875	3,064	4,037	4,509	5,351
1,275	1,909	3,159	4,056	4,570	5,400
1,320	1,924	3,247	4,092	4,610	5,485
1,402	2,035	3,257	4,231	4,777	5,535
1,440	2,131	3,268	4,248	4,901	5,543

5,619	6,537	7,679	8,574	9,832	11,358
5,645	6,544	7,681	8,625	9,850	11,631
5,665	6,587	7,684	8,669	9,940	11,820
5,667	6,671	7,717	8,706	10,015	11,888
5,762	6,684	7,784	8,709	10,017	11,993
5,770	6,695	7,844	8,726	10,029	12,159
5,845	6,716	7,848	8,870	10,044	12,210
6,100	6,739	7,854	8,955	10,173	12,246
6,119	6,832	7,978	9,008	10,386	12,266
6,174	6,965	8,060	9,034	10,683	12,288
6,220	7,033	8,237	9,062	10,729	12,320
6,265	7,176	8,319	9,304	10,867	12,331
6,274	7,225	8,347	9,369	11,004	12,333
6,311	7,391	8,531	9,414	11,137	12,347
6,441	7,502	8,533	9,461	11,297	12,434
6,530	7,648	8,552	9,555	11,331	12,486

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

PHYSICAL FACTORS

Total dose delivered or absorbed.

3	323	593	779	945	1,104
8	325	594	786	948	1,111
21	352	600	792	949	1,116
30	363	604	795	953	1,117
31	368	606	796	954	1,120
43	369	609	797	964	1,121
48	370	614	798	965	1,122
50	378	619	802	966	1,127
52	379	627	804	974	1,129
55	382	630	805	975	1,134
76	387	634	806	977	1,137
82	398	635	810	978	1,141
91	408	638	811	985	1,143
96	409	650	814	988	1,145
100	414	654	818	996	1,146
102	415	672	819	999	1,150
122	418	675	826	1,001	1,153
124	425	682	829	1,004	1,155
138	437	683	834	1,010	1,157
140	450	684	841	1,019	1,170
146	457	693	843	1,022	1,174
177	470	697	851	1,024	1,176
186	477	700	858	1,026	1,188
198	481	703	865	1,027	1,192
201	484	704	871	1,031	1,196
210	514	706	875	1,039	1,197
212	529	708	877	1,042	1,201
215	538	709	878	1,045	1,203
217	541	713	879	1,049	1,207
221	543	717	884	1,052	1,213
225	545	718	887	1,062	1,216
227	551	719	890	1,063	1,230
242	557	727	891	1,064	1,231
245	562	733	895	1,067	1,241
249	564	738	901	1,068	1,247
255	565	740	914	1,069	1,261
262	568	742	915	1,071	1,262
272	571	743	922	1,073	1,267
279	573	746	923	1,074	1,270
282	580	748	926	1,075	1,271
283	581	750	930	1,086	1,275
287	582	753	931	1,089	1,280
289	583	754	933	1,090	1,284
304	585	757	935	1,094	1,288
316	591	766		1,102	1,300

1,305	1,641	2,057	2,393	2,682	2,974
1,307	1,643	2,064	2,404	2,683	2,975
1,315	1,645	2,070	2,405	2,684	2,979
1,319	1,646	2,074	2,406	2,693	2,983
1,325	1,647	2,075	2,407	2,699	2,984
1,338	1,648	2,081	2,408	2,701	2,987
1,343	1,650	2,099	2,410	2,704	2,988
1,355	1,653	2,104	2,412	2,705	2,989
1,359	1,655	2,110	2,414	2,720	2,993
1,369	1,669	2,111	2,417	2,721	2,994
1,378	1,670	2,112	2,420	2,731	2,995
1,381	1,674	2,131	2,424	2,745	3,011
1,383	1,676	2,133	2,426	2,748	3,015
1,384	1,679	2,142	2,427	2,749	3,018
1,389	1,705	2,144	2,429	2,755	3,022
1,397	1,717	2,154	2,434	2,759	3,032
1,399	1,724	2,155	2,439	2,761	3,037
1,400	1,725	2,160	2,446	2,763	3,039
1,404	1,731	2,164	2,449	2,765	3,040
1,411	1,738	2,165	2,457	2,770	3,042
1,419	1,740	2,166	2,460	2,776	3,045
1,422	1,741	2,169	2,463	2,780	3,053
1,423	1,742	2,180	2,468	2,781	3,054
1,425	1,752	2,185	2,472	2,787	3,058
1,426	1,767	2,193	2,475	2,792	3,059
1,432	1,769	2,195	2,485	2,794	3,061
1,433	1,771	2,198	2,486	2,795	3,067
1,440	1,775	2,208	2,489	2,801	3,069
1,442	1,788	2,210	2,492	2,803	3,078
1,443	1,790	2,214	2,493	2,807	3,081
1,456	1,795	2,217	2,494	2,808	3,084
1,463	1,796	2,218	2,503	2,809	3,086
1,464	1,800	2,223	2,504	2,812	3,087
1,467	1,803	2,234	2,508	2,819	3,091
1,469	1,812	2,237	2,516	2,820	3,097
1,472	1,815	2,242	2,525	2,823	3,098
1,473	1,818	2,243	2,528	2,826	3,109
1,474	1,819	2,244	2,538	2,831	3,110
1,475	1,823	2,245	2,549	2,832	3,111
1,483	1,827	2,248	2,556	2,836	3,113
1,486	1,844	2,259	2,563	2,837	3,115
1,487	1,850	2,266	2,565	2,845	3,116
1,489	1,853	2,274	2,570	2,847	3,133
1,490	1,859	2,282	2,580	2,848	3,146
1,491	1,862	2,283	2,584	2,857	3,158
1,500	1,867	2,285	2,589	2,861	3,159
1,501	1,875	2,288	2,592	2,877	3,160
1,504	1,884	2,300	2,594	2,878	3,161
1,513	1,886	2,301	2,610	2,879	3,162
1,514	1,890	2,305	2,613	2,883	3,164
1,517	1,906	2,307	2,615	2,884	3,174
1,520	1,907	2,310	2,617	2,889	3,179
1,524	1,924	2,313	2,623	2,892	3,181
1,528	1,927	2,314	2,626	2,893	3,186
1,534	1,930	2,317	2,628	2,896	3,187
1,536	1,933	2,319	2,629	2,909	3,189
1,542	1,937	2,321	2,630	2,912	3,192
1,544	1,941	2,322	2,631	2,914	3,196
1,553	1,942	2,328	2,639	2,922	3,206
1,556	1,946	2,331	2,640	2,928	3,217
1,565	1,950	2,333	2,642	2,931	3,220
1,566	1,953	2,337	2,643	2,945	3,221
1,572	1,962	2,338	2,645	2,946	3,238
1,573	1,966	2,353	2,653	2,948	3,244
1,580	1,971	2,355	2,654	2,949	3,245
1,594	1,992	2,360	2,655	2,953	3,253
1,605	1,995	2,363	2,656	2,955	3,257
1,608	1,998	2,366	2,660	2,959	3,259
1,626	2,003	2,370	2,665	2,960	3,265
1,630	2,025	2,383	2,667	2,962	3,268
1,637	2,035	2,384	2,671	2,967	3,269
1,640	2,050	2,386	2,672	2,973	3,270
					3,279

3,292	3,635	3,930	4,182	4,443	4,744
3,307	3,641	3,932	4,188	4,451	4,746
3,314	3,645	3,944	4,193	4,453	4,748
3,315	3,655	3,948	4,195	4,454	4,753
3,337	3,659	3,953	4,197	4,461	4,758
3,346	3,673	3,954	4,199	4,462	4,760
3,353	3,675	3,963	4,201	4,465	4,770
3,357	3,676	3,964	4,205	4,469	4,772
3,358	3,677	3,965	4,206	4,470	4,775
3,360	3,683	3,967	4,208	4,473	4,777
3,370	3,688	3,969	4,212	4,474	4,781
3,377	3,692	3,976	4,213	4,475	4,787
3,378	3,693	3,980	4,216	4,489	4,788
3,389	3,694	3,983	4,217	4,490	4,790
3,394	3,697	3,984	4,223	4,494	4,793
3,398	3,711	3,987	4,224	4,495	4,800
3,402	3,713	3,988	4,228	4,496	4,804
3,413	3,715	3,989	4,229	4,504	4,810
3,415	3,731	3,991	4,231	4,508	4,814
3,422	3,736	3,992	4,242	4,515	4,816
3,427	3,739	3,993	4,252	4,525	4,822
3,433	3,742	3,997	4,253	4,526	4,826
3,436	3,749	4,001	4,257	4,537	4,830
3,441	3,751	4,004	4,258	4,538	4,831
3,442	3,754	4,005	4,259	4,540	4,834
3,448	3,757	4,007	4,260	4,543	4,845
3,456	3,758	4,008	4,261	4,545	4,846
3,459	3,764	4,012	4,263	4,546	4,847
3,460	3,773	4,014	4,269	4,551	4,851
3,464	3,777	4,015	4,274	4,554	4,853
3,478	3,779	4,018	4,276	4,560	4,855
3,481	3,780	4,019	4,277	4,563	4,858
3,483	3,783	4,023	4,281	4,564	4,859
3,484	3,784	4,024	4,284	4,569	4,860
3,489	3,787	4,032	4,285	4,570	4,861
3,494	3,789	4,037	4,288	4,571	4,862
3,499	3,790	4,047	4,289	4,576	4,869
3,501	3,793	4,051	4,293	4,580	4,870
3,503	3,798	4,054	4,294	4,581	4,871
3,508	3,803	4,056	4,297	4,588	4,876
3,516	3,804	4,059	4,303	4,593	4,878
3,517	3,822	4,063	4,305	4,596	4,880
3,525	3,825	4,065	4,310	4,608	4,883
3,528	3,828	4,070	4,318	4,610	4,884
3,529	3,832	4,071	4,320	4,616	4,890
3,531	3,845	4,072	4,324	4,621	4,891
3,532	3,846	4,080	4,329	4,626	4,893
3,533	3,849	4,085	4,338	4,627	4,894
3,538	3,850	4,089	4,343	4,630	4,904
3,542	3,852	4,091	4,345	4,631	4,909
3,547	3,854	4,094	4,348	4,633	4,911
3,555	3,857	4,102	4,349	4,636	4,913
3,557	3,860	4,105	4,350	4,637	4,915
3,561	3,861	4,107	4,351	4,639	4,922
3,575	3,873	4,111	4,359	4,644	4,927
3,576	3,879	4,113	4,360	4,645	4,940
3,578	3,882	4,116	4,368	4,647	4,942
3,583	3,885	4,117	4,369	4,654	4,949
3,585	3,887	4,119	4,374	4,671	4,952
3,587	3,889	4,122	4,378	4,672	4,957
3,588	3,896	4,129	4,394	4,673	4,961
3,593	3,897	4,135	4,398	4,682	4,962
3,594	3,898	4,136	4,403	4,683	4,966
3,595	3,900	4,137	4,405	4,684	4,972
3,596	3,901	4,153	4,413	4,687	4,976
3,598	3,902	4,160	4,417	4,694	4,980
3,602	3,904	4,164	4,418	4,703	4,984
3,607	3,906	4,165	4,421	4,705	4,988
3,608	3,917	4,170	4,428	4,729	4,993
3,609	3,923	4,171	4,433	4,730	4,996
3,623	3,924	4,172	4,434	4,738	5,000
3,632	3,927	4,177	4,441	4,739	5,003

5,004	5,290	5,663	6,011	6,377	6,645
5,007	5,293	5,665	6,014	6,382	6,646
5,020	5,298	5,666	6,018	6,383	6,650
5,021	5,310	5,668	6,026	6,384	6,651
5,027	5,311	5,683	6,030	6,386	6,654
5,030	5,316	5,690	6,033	6,397	6,656
5,038	5,318	5,692	6,037	6,408	6,663
5,042	5,319	5,698	6,041	6,411	6,666
5,044	5,321	5,704	6,044	6,415	6,670
5,045	5,324	5,711	6,050	6,416	6,673
5,054	5,327	5,712	6,052	6,419	6,674
5,057	5,328	5,717	6,074	6,422	6,675
5,060	5,338	5,725	6,084	6,425	6,678
5,062	5,339	5,738	6,093	6,426	6,685
5,063	5,341	5,744	6,096	6,430	6,686
5,065	5,345	5,745	6,097	6,431	6,698
5,070	5,350	5,748	6,098	6,432	6,701
5,071	5,352	5,753	6,100	6,433	6,716
5,072	5,354	5,757	6,103	6,434	6,720
5,074	5,369	5,758	6,104	6,437	6,735
5,079	5,372	5,760	6,111	6,438	6,736
5,084	5,375	5,762	6,113	6,439	6,739
5,087	5,377	5,770	6,118	6,441	6,740
5,094	5,381	5,772	6,119	6,443	6,751
5,095	5,387	5,774	6,123	6,448	6,758
5,100	5,390	5,775	6,124	6,459	6,768
5,104	5,392	5,784	6,125	6,471	6,769
5,106	5,393	5,788	6,134	6,475	6,773
5,111	5,395	5,790	6,136	6,484	6,774
5,112	5,400	5,794	6,138	6,492	6,777
5,119	5,405	5,798	6,144	6,493	6,780
5,121	5,414	5,801	6,150	6,496	6,781
5,126	5,422	5,802	6,161	6,515	6,783
5,128	5,424	5,803	6,174	6,527	6,788
5,130	5,445	5,806	6,178	6,532	6,791
5,132	5,460	5,808	6,185	6,534	6,793
5,135	5,462	5,811	6,202	6,536	6,794
5,136	5,469	5,826	6,203	6,538	6,802
5,137	5,484	5,829	6,206	6,539	6,803
5,143	5,485	5,830	6,210	6,540	6,804
5,145	5,496	5,844	6,211	6,541	6,805
5,149	5,498	5,845	6,212	6,542	6,806
5,151	5,499	5,854	6,213	6,544	6,821
5,154	5,515	5,858	6,238	6,545	6,823
5,155	5,517	5,869	6,240	6,547	6,829
5,157	5,518	5,877	6,242	6,550	6,830
5,162	5,538	5,879	6,246	6,552	6,831
5,163	5,548	5,880	6,248	6,559	6,832
5,165	5,549	5,883	6,251	6,566	6,835
5,167	5,551	5,885	6,260	6,569	6,843
5,172	5,552	5,887	6,261	6,572	6,848
5,174	5,560	5,905	6,267	6,575	6,860
5,177	5,562	5,907	6,274	6,576	6,870
5,179	5,563	5,921	6,277	6,580	6,875
5,180	5,564	5,933	6,279	6,584	6,877
5,184	5,567	5,936	6,285	6,589	6,879
5,188	5,568	5,940	6,288	6,592	6,882
5,190	5,574	5,941	6,307	6,593	6,885
5,197	5,577	5,953	6,308	6,596	6,892
5,205	5,580	5,954	6,311	6,600	6,897
5,214	5,600	5,955	6,313	6,605	6,899
5,217	5,607	5,956	6,315	6,612	6,902
5,222	5,609	5,960	6,321	6,613	6,905
5,238	5,613	5,971	6,337	6,614	6,906
5,239	5,618	5,978	6,342	6,625	6,919
5,250	5,621	5,984	6,348	6,627	6,922
5,254	5,630	5,987	6,350	6,630	6,932
5,264	5,631	5,990	6,354	6,632	6,933
5,265	5,639	5,994	6,357	6,634	6,936
5,268	5,642	5,999	6,366	6,636	6,937
5,273	5,645	6,000	6,375	6,640	6,938
5,280	5,646	6,005	6,376	6,644	6,939

6,940	7,264	7,566	7,822	8,169	8,552
6,943	7,265	7,568	7,830	8,173	8,556
6,946	7,275	7,570	7,843	8,174	8,558
6,949	7,282	7,572	7,846	8,176	8,567
6,950	7,293	7,579	7,847	8,178	8,568
6,962	7,294	7,581	7,849	8,179	8,570
6,973	7,296	7,583	7,854	8,180	8,576
6,977	7,297	7,590	7,863	8,182	8,592
6,981	7,306	7,594	7,865	8,183	8,594
6,982	7,307	7,595	7,866	8,185	8,596
6,985	7,308	7,606	7,871	8,194	8,613
6,994	7,310	7,609	7,875	8,196	8,621
6,999	7,313	7,624	7,877	8,198	8,623
7,001	7,317	7,636	7,879	8,199	8,625
7,003	7,318	7,639	7,883	8,203	8,626
7,005	7,319	7,642	7,890	8,215	8,663
7,006	7,321	7,648	7,896	8,219	8,676
7,007	7,323	7,649	7,902	8,221	8,684
7,011	7,329	7,657	7,914	8,222	8,691
7,022	7,330	7,658	7,916	8,223	8,692
7,023	7,332	7,659	7,923	8,225	8,705
7,026	7,335	7,661	7,935	8,229	8,714
7,031	7,352	7,663	7,941	8,231	8,722
7,041	7,355	7,664	7,943	8,237	8,728
7,053	7,361	7,665	7,953	8,240	8,730
7,068	7,364	7,666	7,958	8,242	8,733
7,073	7,366	7,668	7,961	8,249	8,736
7,079	7,370	7,671	7,969	8,250	8,744
7,100	7,371	7,672	7,970	8,254	8,771
7,101	7,372	7,679	7,971	8,255	8,772
7,103	7,373	7,681	7,972	8,258	8,776
7,112	7,376	7,683	7,978	8,263	8,778
7,114	7,391	7,684	7,989	8,280	8,780
7,117	7,394	7,686	7,993	8,281	8,788
7,118	7,403	7,688	7,995	8,283	8,796
7,121	7,413	7,690	8,003	8,289	8,797
7,122	7,418	7,694	8,012	8,297	8,798
7,123	7,427	7,698	8,013	8,303	8,799
7,124	7,430	7,700	8,019	8,304	8,824
7,125	7,431	7,703	8,026	8,305	8,837
7,126	7,432	7,708	8,029	8,310	8,843
7,128	7,444	7,713	8,031	8,313	8,846
7,130	7,445	7,716	8,032	8,316	8,854
7,132	7,446	7,719	8,033	8,317	8,856
7,134	7,447	7,720	8,034	8,319	8,859
7,135	7,450	7,723	8,035	8,323	8,861
7,146	7,453	7,727	8,036	8,331	8,866
7,151	7,458	7,731	8,046	8,340	8,867
7,163	7,461	7,735	8,048	8,343	8,870
7,166	7,466	7,740	8,049	8,346	8,873
7,170	7,469	7,746	8,053	8,348	8,875
7,182	7,483	7,751	8,054	8,353	8,877
7,186	7,490	7,752	8,055	8,355	8,892
7,197	7,497	7,753	8,056	8,357	8,896
7,202	7,499	7,755	8,064	8,360	8,898
7,203	7,500	7,756	8,082	8,376	8,904
7,204	7,505	7,757	8,098	8,396	8,906
7,205	7,514	7,758	8,104	8,405	8,915
7,210	7,515	7,760	8,114	8,412	8,916
7,215	7,517	7,769	8,118	8,419	8,918
7,220	7,520	7,777	8,121	8,441	8,919
7,221	7,521	7,784	8,124	8,452	8,920
7,224	7,528	7,785	8,132	8,460	8,926
7,225	7,534	7,786	8,136	8,474	8,933
7,230	7,540	7,789	8,139	8,477	8,934
7,246	7,549	7,795	8,145	8,492	8,942
7,249	7,551	7,796	8,148	8,493	8,948
7,251	7,553	7,798	8,153	8,497	8,949
7,253	7,554	7,805	8,158	8,511	8,950
7,254	7,563	7,811	8,162	8,531	8,953
7,255	7,565	7,820	8,166	8,533	8,955
7,257		7,821	8,168	8,534	8,959

8,961	9,257	9,555	9,882	10,172	10,938
8,962	9,259	9,557	9,883	10,173	10,939
8,970	9,260	9,561	9,885	10,177	10,942
8,972	9,262	9,563	9,891	10,185	10,946
8,973	9,265	9,564	9,896	10,198	10,947
8,976	9,269	9,574	9,897	10,218	10,948
8,978	9,271	9,575	9,898	10,286	10,949
8,982	9,276	9,580	9,902	10,301	10,952
8,983	9,280	9,585	9,911	10,316	10,955
8,987	9,286	9,586	9,917	10,318	10,980
8,993	9,287	9,591	9,924	10,339	10,985
8,998	9,288	9,592	9,926	10,344	10,987
9,001	9,292	9,595	9,928	10,362	10,990
9,005	9,297	9,597	9,930	10,382	10,994
9,008	9,298	9,600	9,935	10,386	11,015
9,012	9,299	9,606	9,936	10,418	11,038
9,015	9,301	9,609	9,938	10,422	11,043
9,019	9,302	9,610	9,940	10,423	11,047
9,022	9,303	9,611	9,945	10,426	11,052
9,024	9,304	9,612	9,947	10,430	11,068
9,025	9,305	9,614	9,948	10,434	11,075
9,026	9,308	9,615	9,949	10,436	11,076
9,032	9,309	9,617	9,955	10,472	11,079
9,034	9,323	9,618	9,958	10,483	11,085
9,037	9,335	9,620	9,961	10,509	11,094
9,039	9,340	9,621	9,962	10,530	11,096
9,041	9,342	9,624	9,967	10,532	11,097
9,046	9,349	9,628	9,971	10,533	11,100
9,060	9,354	9,632	9,972	10,535	11,121
9,062	9,355	9,648	9,973	10,549	11,127
9,067	9,361	9,656	9,974	10,570	11,129
9,088	9,369	9,657	9,979	10,573	11,133
9,094	9,372	9,658	9,980	10,575	11,135
9,096	9,373	9,672	9,987	10,580	11,136
9,102	9,374	9,673	9,989	10,590	11,137
9,109	9,376	9,677	9,992	10,594	11,164
9,113	9,377	9,686	9,998	10,599	11,165
9,114	9,378	9,691	10,001	10,600	11,180
9,117	9,384	9,695	10,006	10,610	11,186
9,122	9,391	9,705	10,017	10,622	11,191
9,128	9,394	9,706	10,018	10,626	11,194
9,134	9,406	9,707	10,019	10,633	11,206
9,139	9,410	9,710	10,027	10,634	11,208
9,142	9,412	9,718	10,030	10,636	11,211
9,146	9,413	9,726	10,031	10,646	11,221
9,147	9,419	9,733	10,034	10,675	11,245
9,148	9,436	9,740	10,038	10,683	11,246
9,150	9,443	9,769	10,040	10,689	11,249
9,152	9,449	9,773	10,043	10,702	11,250
9,165	9,453	9,774	10,047	10,704	11,254
9,167	9,456	9,781	10,048	10,724	11,273
9,168	9,459	9,788	10,057	10,734	11,280
9,172	9,460	9,796	10,059	10,736	11,282
9,173	9,462	9,799	10,074	10,738	11,287
9,174	9,464	9,801	10,080	10,753	11,288
9,179	9,471	9,810	10,083	10,756	11,290
9,181	9,472	9,811	10,087	10,768	11,291
9,183	9,476	9,817	10,088	10,771	11,294
9,189	9,477	9,820	10,089	10,775	11,296
9,190	9,492	9,821	10,091	10,785	11,301
9,191	9,494	9,822	10,095	10,788	11,306
9,197	9,499	9,826	10,097	10,798	11,332
9,201	9,512	9,827	10,099	10,805	11,333
9,202	9,524	9,844	10,104	10,811	11,350
9,203	9,525	9,846	10,112	10,843	11,358
9,208	9,530	9,847	10,120	10,882	11,359
9,214	9,532	9,849	10,122	10,883	11,364
9,216	9,533	9,853	10,154	10,891	11,397
9,219	9,534	9,855	10,157	10,921	11,425
9,230	9,538	9,870	10,161	10,922	11,483
9,233	9,549	9,873	10,169	10,926	11,485
9,238	9,550	9,875	10,171	10,931	11,503

11,510	11,790	11,993	12,180	12,281	12,409
11,520	11,820	11,995	12,182	12,287	12,412
11,522	11,823	11,997	12,193	12,288	12,414
11,527	11,831	11,999	12,202	12,289	12,417
11,540	11,850	12,001	12,203	12,296	12,424
11,542	11,852	12,003	12,208	12,297	12,426
11,549	11,853	12,004	12,209	12,317	12,430
11,578	11,854	12,010	12,210	12,320	12,432
11,583	11,857	12,011	12,214	12,321	12,434
11,591	11,858	12,023	12,221	12,332	12,436
11,594	11,868	12,026	12,223	12,333	12,438
11,596	11,870	12,035	12,224	12,334	12,439
11,614	11,872	12,043	12,226	12,335	12,440
11,621	11,882	12,048	12,234	12,336	12,441
11,636	11,883	12,051	12,241	12,341	12,443
11,681	11,888	12,053	12,242	12,342	12,446
11,685	11,911	12,054	12,246	12,344	12,447
11,691	11,918	12,067	12,250	12,345	12,452
11,692	11,922	12,076	12,255	12,346	12,482
11,694	11,927	12,082	12,256	12,360	12,485
11,715	11,936	12,098	12,258	12,366	12,603
11,723	11,937	12,101	12,266	12,367	12,605
11,730	11,939	12,107	12,272	12,380	12,606
11,731	11,942	12,123	12,274	12,383	12,609
11,737	11,949	12,137	12,275	12,387	12,614
11,750	11,959	12,139	12,277	12,398	12,683
11,761	11,960	12,144	12,278	12,401	12,688
11,782	11,967	12,145	12,279	12,404	12,706
11,786	11,977	12,158		12,406	
				12,408	

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

PHYSICAL FACTORS

Fractionation or Protraction of Dose

1	546	1,032	1,487	1,818	2,183
3	552	1,038	1,489	1,820	2,189
21	589	1,048	1,490	1,843	2,195
32	591	1,049	1,495	1,847	2,196
44	594	1,065	1,507	1,850	2,197
82	623	1,073	1,517	1,867	2,208
97	654	1,075	1,537	1,873	2,213
115	683	1,101	1,543	1,884	2,214
126	695	1,136	1,556	1,889	2,217
131	706	1,149	1,580	1,905	2,220
159	707	1,169	1,581	1,924	2,223
170	739	1,170	1,582	1,930	2,228
260	753	1,192	1,583	1,973	2,229
261	794	1,196	1,585	1,997	2,267
262	795	1,205	1,594	1,998	2,268
286	811	1,217	1,607	1,999	2,274
316	814	1,251	1,608	2,007	2,276
320	832	1,298	1,611	2,026	2,301
351	833	1,305	1,650	2,046	2,302
352	844	1,320	1,655	2,055	2,307
374	882	1,331	1,670	2,087	2,310
413	895	1,347	1,671	2,121	2,314
415	931	1,359	1,674	2,122	2,321
419	948	1,373	1,725	2,129	2,328
450	949	1,383	1,752	2,132	2,333
469	960	1,412	1,758	2,149	2,337
514	966	1,421	1,768	2,154	2,351
524	978	1,426	1,770	2,155	2,353
528	985	1,440	1,786	2,163	2,360
540	1,007	1,472	1,788	2,164	2,363
543	1,022	1,474	1,815	2,169	2,378

2,379	3,565	4,324	5,364	6,379	7,274
2,393	3,576	4,327	5,376	6,382	7,292
2,424	3,583	4,333	5,403	6,388	7,300
2,445	3,587	4,341	5,414	6,415	7,315
2,447	3,599	4,350	5,458	6,426	7,317
2,448	3,604	4,373	5,476	6,429	7,355
2,460	3,608	4,376	5,485	6,431	7,418
2,478	3,609	4,381	5,499	6,432	7,424
2,497	3,610	4,385	5,506	6,433	7,427
2,498	3,625	4,398	5,513	6,434	7,432
2,505	3,641	4,402	5,517	6,440	7,445
2,519	3,642	4,403	5,527	6,447	7,452
2,538	3,660	4,433	5,535	6,459	7,453
2,552	3,673	4,456	5,544	6,537	7,456
2,556	3,678	4,476	5,562	6,540	7,462
2,563	3,684	4,500	5,564	6,541	7,466
2,586	3,686	4,509	5,577	6,542	7,479
2,588	3,692	4,518	5,612	6,543	7,499
2,600	3,702	4,529	5,616	6,560	7,517
2,620	3,728	4,566	5,646	6,572	7,519
2,623	3,741	4,574	5,663	6,574	7,521
2,626	3,752	4,579	5,671	6,604	7,523
2,629	3,754	4,582	5,682	6,612	7,541
2,645	3,777	4,592	5,717	6,616	7,565
2,674	3,779	4,616	5,751	6,623	7,572
2,683	3,788	4,647	5,777	6,625	7,581
2,726	3,791	4,705	5,801	6,627	7,583
2,751	3,828	4,716	5,819	6,644	7,586
2,761	3,830	4,723	5,845	6,653	7,595
2,768	3,835	4,729	5,868	6,657	7,607
2,781	3,839	4,737	5,875	6,666	7,624
2,782	3,868	4,811	5,884	6,671	7,634
2,806	3,899	4,818	5,938	6,716	7,652
2,823	3,907	4,834	5,940	6,743	7,658
2,835	3,908	4,837	5,990	6,769	7,659
2,909	3,910	4,845	5,994	6,774	7,661
2,945	3,933	4,855	6,099	6,783	7,664
2,948	3,957	4,857	6,108	6,788	7,665
2,949	3,976	4,861	6,116	6,791	7,668
2,987	3,978	4,870	6,118	6,820	7,671
3,011	3,987	4,875	6,119	6,829	7,713
3,018	3,988	4,890	6,125	6,835	7,716
3,050	4,011	4,898	6,168	6,842	7,760
3,053	4,020	4,904	6,178	6,858	7,781
3,056	4,022	4,920	6,202	6,877	7,789
3,115	4,026	4,931	6,203	6,892	7,820
3,130	4,040	4,942	6,210	6,918	7,859
3,133	4,061	4,990	6,212	6,931	7,877
3,136	4,064	5,056	6,220	6,939	7,878
3,151	4,080	5,057	6,242	6,949	7,889
3,157	4,097	5,059	6,243	6,981	7,898
3,161	4,105	5,080	6,260	6,982	7,921
3,165	4,116	5,105	6,265	6,994	7,935
3,179	4,131	5,111	6,274	6,999	7,970
3,187	4,144	5,116	6,284	7,013	7,971
3,198	4,157	5,121	6,287	7,053	7,989
3,205	4,160	5,122	6,288	7,071	8,004
3,209	4,170	5,156	6,290	7,100	8,016
3,237	4,179	5,157	6,292	7,119	8,017
3,257	4,191	5,188	6,294	7,125	8,032
3,287	4,205	5,214	6,305	7,128	8,048
3,297	4,223	5,225	6,306	7,130	8,053
3,340	4,224	5,243	6,310	7,132	8,054
3,374	4,238	5,258	6,313	7,134	8,056
3,389	4,248	5,260	6,322	7,162	8,061
3,398	4,251	5,280	6,328	7,184	8,064
3,401	4,255	5,316	6,331	7,200	8,067
3,446	4,268	5,327	6,342	7,202	8,103
3,460	4,273	5,331	6,350	7,210	8,116
3,511	4,283	5,351	6,357	7,225	8,172
3,534	4,285	5,353	6,360	7,256	8,173
3,537	4,313	5,357	6,363	7,267	8,177
3,554					

8,225	9,187	9,992	10,878	11,149	11,594
8,231	9,201	10,065	10,879	11,160	11,605
8,237	9,202	10,127	10,880	11,162	11,630
8,238	9,203	10,135	10,881	11,163	11,634
8,255	9,208	10,145	10,882	11,165	11,636
8,259	9,213	10,160	10,883	11,169	11,649
8,263	9,214	10,169	10,891	11,170	11,681
8,279	9,219	10,171	10,894	11,172	11,704
8,304	9,230	10,172	10,901	11,174	11,768
8,305	9,243	10,182	10,902	11,175	11,790
8,310	9,244	10,202	10,903	11,191	11,831
8,327	9,247	10,270	10,904	11,196	11,836
8,332	9,262	10,286	10,905	11,198	11,852
8,345	9,292	10,301	10,906	11,211	11,853
8,355	9,296	10,308	10,907	11,233	11,868
8,356	9,299	10,311	10,908	11,241	11,878
8,359	9,311	10,316	10,909	11,245	11,918
8,418	9,318	10,317	10,920	11,246	11,926
8,426	9,355	10,318	10,927	11,248	11,927
8,487	9,361	10,343	10,931	11,249	11,932
8,495	9,369	10,347	10,938	11,250	11,933
8,517	9,370	10,349	10,942	11,251	11,936
8,534	9,380	10,355	10,947	11,254	11,937
8,568	9,381	10,358	10,949	11,261	11,939
8,639	9,407	10,362	10,950	11,266	11,943
8,657	9,457	10,371	10,952	11,270	11,946
8,669	9,464	10,374	10,955	11,273	11,949
8,707	9,471	10,386	10,967	11,282	11,953
8,709	9,488	10,399	10,980	11,287	11,955
8,778	9,489	10,408	10,984	11,291	11,958
8,782	9,530	10,409	10,986	11,292	11,959
8,788	9,532	10,470	10,987	11,294	11,960
8,795	9,534	10,472	10,988	11,296	11,964
8,854	9,535	10,480	10,989	11,297	11,966
8,866	9,536	10,483	10,994	11,301	11,992
8,867	9,537	10,505	10,995	11,305	11,997
8,877	9,541	10,515	10,996	11,306	12,048
8,885	9,543	10,518	11,004	11,307	12,052
8,894	9,553	10,527	11,018	11,334	12,069
8,904	9,555	10,528	11,020	11,335	12,073
8,907	9,561	10,535	11,022	11,340	12,082
8,912	9,563	10,565	11,023	11,345	12,094
8,916	9,575	10,590	11,029	11,347	12,112
8,918	9,579	10,603	11,033	11,356	12,137
8,920	9,585	10,628	11,035	11,360	12,149
8,937	9,586	10,632	11,040	11,373	12,202
8,945	9,606	10,660	11,042	11,382	12,209
8,946	9,610	10,662	11,044	11,384	12,210
8,949	9,615	10,683	11,045	11,397	12,214
8,950	9,616	10,699	11,047	11,408	12,241
8,954	9,706	10,708	11,051	11,419	12,252
8,959	9,707	10,713	11,056	11,466	12,256
8,985	9,709	10,715	11,060	11,468	12,266
8,991	9,710	10,716	11,062	11,472	12,277
9,001	9,714	10,717	11,064	11,502	12,306
9,022	9,720	10,722	11,065	11,507	12,319
9,026	9,743	10,724	11,066	11,512	12,328
9,034	9,776	10,727	11,076	11,527	12,329
9,059	9,798	10,735	11,079	11,530	12,334
9,061	9,800	10,738	11,085	11,534	12,336
9,073	9,802	10,753	11,088	11,543	12,341
9,081	9,804	10,756	11,092	11,545	12,360
9,091	9,806	10,765	11,094	11,547	12,426
9,102	9,808	10,771	11,103	11,549	12,434
9,108	9,811	10,785	11,111	11,550	12,445
9,122	9,815	10,797	11,121	11,551	12,448
9,128	9,817	10,811	11,128	11,552	12,468
9,134	9,842	10,812	11,135	11,553	12,471
9,164	9,891	10,814	11,136	11,562	12,472
9,168	9,940	10,838	11,142	11,583	12,474
9,181	9,955	10,846	11,143	11,587	12,475
9,182	9,971	10,847		11,590	12,485
9,183	9,973	10,859		11,592	12,688
					12,691

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

PHYSICAL FACTORS

Magnetic Field

4,092
4,910
5,202

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

PHYSICAL FACTORS

Environmental Temperature

7	2,457	4,227	5,480	6,882	9,188
33	2,565	4,246	5,500	6,969	9,233
196	2,599	4,247	5,543	6,975	9,288
199	2,774	4,262	5,559	7,004	9,369
311	2,794	4,263	5,565	7,026	9,370
445	2,800	4,285	5,579	7,070	9,414
468	2,808	4,297	5,610	7,148	9,438
505	2,865	4,326	5,686	7,181	9,490
535	2,926	4,418	5,706	7,267	9,494
621	2,960	4,452	5,710	7,270	9,602
638	3,105	4,522	5,715	7,302	9,859
677	3,108	4,540	5,749	7,337	9,948
683	3,126	4,552	5,877	7,343	9,963
713	3,148	4,575	5,884	7,381	9,966
724	3,175	4,596	5,904	7,397	9,969
736	3,244	4,628	5,935	7,411	10,004
877	3,263	4,629	6,059	7,417	10,033
906	3,295	4,681	6,149	7,436	10,081
907	3,439	4,687	6,157	7,450	10,173
910	3,443	4,690	6,239	7,606	10,373
997	3,513	4,698	6,250	7,625	11,003
1,018	3,585	4,751	6,253	7,644	11,045
1,062	3,590	4,838	6,272	7,862	11,284
1,118	3,778	4,904	6,355	7,869	11,286
1,247	3,813	4,935	6,404	7,911	11,914
1,449	3,831	4,937	6,459	8,082	11,939
1,475	3,833	4,939	6,554	8,093	12,005
1,509	3,925	4,967	6,563	8,247	12,057
1,591	3,927	4,975	6,642	8,358	12,060
1,605	3,944	4,979	6,646	8,417	12,192
1,681	3,977	5,022	6,669	8,549	12,225
1,789	4,047	5,071	6,673	8,655	12,242
1,894	4,050	5,090	6,674	8,676	12,266
1,942	4,110	5,097	6,700	8,755	12,320
2,072	4,124	5,127	6,701	8,825	12,353
2,081	4,142	5,303	6,746	8,946	12,419
2,134	4,147	5,307	6,790	8,964	12,425
2,203	4,150	5,336	6,809	9,062	12,432
2,328	4,151	5,358	6,827	9,150	12,434
2,356	4,216	5,369	6,837	9,163	12,490
	4,218				

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

PHYSICAL FACTORS

Pressure

997	5,478	6,961	7,148
5,421	6,116	7,070	7,267

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

PHYSICAL FACTORS

Comparison of radiation applied over a continuous
vs. a discontinuous area (grid shielding etc.)

2,220	3,111	5,685	6,066	7,068	10,626
2,377	3,366	5,720	6,443	7,172	12,199
2,743	5,679	5,879	6,636	7,458	12,322

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

PHYSICAL FACTORS

Effect of exposure to non-ionizing radiation on
response to ionizing radiation exposure

3	2,066	4,036	5,005	6,642	9,310
52	2,114	4,690	5,183	6,672	9,442
490	2,253	4,795	5,236	6,699	9,478
622	2,565	4,903	5,283	6,725	9,486
772	2,643	4,912	5,501	7,009	9,490
1,055	2,646	4,924	5,982	7,260	9,863
1,557	2,976	4,974	6,157	7,341	9,981
1,637	3,060	4,977	6,250	8,354	12,058
1,693	3,263	4,978	6,362	8,517	12,242
1,745	3,485	4,979	6,554	8,528	12,286
1,794	3,773	4,980	6,641	8,805	12,320
					12,349
					12,406

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

PHYSICAL FACTORS

Gravitational force

5,410	8,646	9,062
7,943	8,792	12,320

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

PHYSICAL FACTORS

Electric Current

3,104	6,672
4,089	11,476

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

PHYSICAL FACTORS

Sonic energy

3,017	6,554	12,320
5,305	8,358	

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

BIOL. and PHYSIOL.

Chemical and Pharmaceutical, etc.

Effect of time of administration (relative to irradiation) on exposure

420	1,253	2,850	5,639	7,475	9,188
644	1,282	2,894	5,650	7,491	9,204
645	1,312	2,897	5,678	7,620	9,226
680	1,335	2,926	5,779	7,633	9,231
685	1,383	2,947	5,817	7,678	9,253
697	1,390	2,956	5,867	7,709	9,262
698	1,393	2,971	6,093	7,726	9,280
711	1,394	3,263	6,103	7,755	9,294
729	1,518	3,455	6,128	7,909	9,296
766	1,726	3,539	6,208	7,972	9,560
780	1,789	3,550	6,256	8,092	9,767
788	1,861	3,773	6,358	8,107	9,843
805	1,983	3,785	6,486	8,108	10,329
827	2,066	3,810	6,548	8,249	10,746
837	2,068	3,935	6,573	8,296	11,686
862	2,114	3,982	6,618	8,693	12,198
892	2,132	4,575	6,628	8,792	12,218
962	2,165	4,698	6,655	8,866	12,226
963	2,213	4,711	6,669	8,870	12,270
1,016	2,247	4,903	6,710	8,926	12,272
1,035	2,262	4,912	6,870	8,932	12,353
1,087	2,297	5,365	7,030	8,980	12,372
1,107	2,356	5,366	7,036	8,989	12,378
1,109	2,459	5,410	7,048	8,998	12,422
1,130	2,583	5,463	7,073	9,008	12,438
1,137	2,643	5,501	7,253	9,023	12,478
1,144	2,671	5,570	7,267	9,027	12,495
1,163	2,700	5,599	7,326	9,115	12,496
1,206	2,752	5,600	7,385	9,172	12,499
1,252	2,774	5,601	7,405	9,181	12,500

QUANTITATIVE ASPECTS OF FACTORS INFLUENCING THE RESPONSE TO IRRADIATION

CHEMICAL, PHARMACEUTICAL AND MISCELLANEOUS THERAPEUTIC AGENTS INFLUENCING RESPONSE IN VITRO OR IN VIVO

substances isolated from urine

928
6,653

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

CHEMICAL, PHARMACEUTICAL AND MISCELLANEOUS AGENTS IN VITRO OR IN VIVO

SH and closely related compounds

643	709	766	842	993	1,144
645	739	778	861	1,050	1,159
647	751	780	892	1,054	1,179
691	764	820	914	1,092	1,222
698	765	823	943	1,094	1,244

1,253	2,196	5,754	7,389	8,709	10,752
1,277	2,197	5,794	7,390	8,796	11,096
1,304	2,202	5,817	7,404	8,822	11,166
1,319	2,216	5,850	7,435	8,832	11,197
1,328	2,263	5,865	7,440	8,866	11,262
1,329	2,291	5,962	7,441	8,871	11,352
1,333	2,293	6,090	7,566	8,883	11,353
1,349	2,349	6,101	7,603	8,989	11,502
1,350	2,438	6,105	7,604	9,043	11,649
1,386	2,459	6,106	7,605	9,114	11,650
1,393	2,477	6,225	7,619	9,124	11,657
1,413	2,479	6,273	7,681	9,155	11,684
1,427	2,522	6,413	7,709	9,172	11,686
1,459	2,530	6,538	7,726	9,250	11,688
1,460	2,647	6,569	7,734	9,262	12,225
1,532	2,671	6,573	7,739	9,284	12,226
1,546	2,700	6,598	7,833	9,294	12,231
1,559	2,701	6,816	7,835	9,317	12,232
1,563	2,807	6,849	7,857	9,320	12,233
1,576	2,901	6,850	7,862	9,481	12,269
1,602	2,971	6,853	7,863	9,488	12,270
1,672	3,465	6,879	7,951	9,565	12,271
1,673	5,340	6,900	7,971	9,624	12,272
1,677	5,448	6,928	7,972	9,629	12,292
1,678	5,504	6,961	7,973	9,731	12,304
1,703	5,540	6,971	8,024	9,740	12,305
1,718	5,545	6,993	8,035	9,840	12,333
1,729	5,552	7,004	8,036	9,905	12,371
1,747	5,553	7,030	8,073	9,953	12,372
1,894	5,578	7,038	8,109	10,181	12,375
1,982	5,580	7,039	8,159	10,477	12,388
1,983	5,594	7,069	8,192	10,501	12,420
1,985	5,623	7,072	8,213	10,524	12,422
2,012	5,639	7,093	8,246	10,537	12,423
2,052	5,641	7,189	8,250	10,541	12,424
2,097	5,652	7,205	8,261	10,606	12,477
2,119	5,654	7,253	8,266	10,649	12,478
2,157	5,665	7,269	8,686	10,663	
2,160	5,684	7,379	8,707	10,706	
2,189	5,710	7,387	8,708	10,720	
	5,735				

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

CHEMICAL, PHARMACEUTICAL AND MISCELLANEOUS AGENTS

substances influencing uptake or removal of
radioactive isotopes

51	1,895	5,868	7,130	7,720	8,245
548	2,181	5,881	7,131	7,724	8,246
596	2,228	6,091	7,145	7,816	8,256
915	2,330	6,163	7,202	7,825	8,272
967	2,488	6,396	7,271	7,841	8,273
1,065	2,737	6,422	7,292	7,898	8,296
1,080	2,796	6,424	7,310	7,907	8,355
1,164	2,821	6,444	7,384	8,002	8,385
1,171	2,888	6,626	7,445	8,059	8,439
1,204	3,000	6,696	7,446	8,098	8,477
1,335	3,030	6,698	7,448	8,099	8,478
1,336	3,053	6,767	7,462	8,100	8,505
1,382	3,687	6,959	7,530	8,115	8,540
1,422	4,068	7,051	7,563	8,116	8,577
1,465	4,837	7,055	7,666	8,136	8,589
1,582	4,951	7,058	7,668	8,137	8,795
1,610	5,010	7,120	7,672	8,150	8,867
1,622	5,510	7,122	7,686	8,151	8,868
1,844	5,541	7,128	7,712	8,181	

8,879	9,685	10,263	10,540	10,996	11,440
8,891	9,687	10,270	10,545	11,004	11,441
8,901	9,688	10,284	10,548	11,012	11,442
8,907	9,692	10,286	10,555	11,023	11,443
8,911	9,699	10,288	10,558	11,026	11,448
8,913	9,700	10,289	10,566	11,028	11,453
8,920	9,703	10,300	10,577	11,057	11,456
8,923	9,708	10,319	10,578	11,067	11,467
8,925	9,722	10,321	10,584	11,069	11,469
8,929	9,723	10,324	10,589	11,070	11,476
8,930	9,724	10,326	10,593	11,072	11,499
8,931	9,735	10,342	10,598	11,090	11,502
8,936	9,738	10,345	10,604	11,108	11,526
8,938	9,743	10,347	10,606	11,116	11,543
8,959	9,744	10,350	10,618	11,119	11,557
8,960	9,745	10,352	10,623	11,122	11,560
8,991	9,747	10,358	10,625	11,123	11,564
9,029	9,748	10,361	10,628	11,138	11,565
9,035	9,751	10,364	10,635	11,141	11,568
9,041	9,753	10,365	10,639	11,144	11,569
9,082	9,755	10,368	10,641	11,148	11,579
9,084	9,762	10,370	10,645	11,149	11,599
9,106	9,764	10,371	10,651	11,152	11,603
9,110	9,765	10,376	10,679	11,154	11,619
9,111	9,767	10,377	10,684	11,156	11,624
9,130	9,768	10,378	10,693	11,157	11,649
9,164	9,770	10,383	10,712	11,158	11,664
9,170	9,771	10,386	10,716	11,161	11,670
9,204	9,772	10,396	10,719	11,168	11,683
9,245	9,773	10,404	10,722	11,169	11,716
9,305	9,775	10,407	10,728	11,177	11,748
9,324	9,776	10,410	10,729	11,179	11,769
9,333	9,778	10,420	10,735	11,181	11,803
9,338	9,986	10,425	10,744	11,183	11,808
9,347	10,060	10,427	10,783	11,195	11,817
9,355	10,113	10,430	10,789	11,199	11,822
9,457	10,121	10,435	10,810	11,203	11,830
9,458	10,133	10,437	10,812	11,209	11,833
9,500	10,145	10,439	10,840	11,216	11,841
9,535	10,150	10,440	10,841	11,218	11,893
9,536	10,151	10,442	10,843	11,228	11,928
9,605	10,152	10,443	10,845	11,256	11,935
9,621	10,154	10,444	10,850	11,261	11,943
9,638	10,155	10,449	10,858	11,274	11,947
9,639	10,157	10,462	10,871	11,304	11,948
9,647	10,158	10,465	10,872	11,338	11,954
9,650	10,161	10,466	10,877	11,345	11,956
9,659	10,164	10,468	10,882	11,347	11,965
9,662	10,169	10,470	10,888	11,367	12,204
9,663	10,171	10,476	10,889	11,369	12,206
9,664	10,172	10,484	10,890	11,372	12,215
9,665	10,176	10,487	10,892	11,383	12,265
9,666	10,179	10,492	10,893	11,407	12,454
9,667	10,188	10,493	10,934	11,418	12,455
9,668	10,189	10,497	10,936	11,422	12,456
9,669	10,193	10,500	10,943	11,423	12,457
9,670	10,194	10,511	10,946	11,426	12,458
9,671	10,196	10,514	10,954	11,427	12,459
9,678	10,199	10,520	10,959	11,429	12,460
9,680	10,223	10,521	10,960	11,431	12,468
9,681	10,242	10,522	10,961	11,433	12,475
9,682	10,243	10,523	10,962	11,434	12,615
9,684	10,255	10,529	10,970	11,437	12,618
			10,971	11,438	12,619
				11,439	12,620
					12,621
					12,622
					12,691

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

CHEMICAL, PHARMACEUTICAL AND MISCELLANEOUS AGENTS

irritants and local stimulants

235	1,802	5,260	6,784	9,275	11,339
420	3,386	5,451	7,062	9,536	11,538
465	4,665	6,672	7,627	10,807	11,636
1,296	4,843	6,684	8,998	11,179	12,443

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

CHEMICAL, PHARMACEUTICAL AND MISCELLANEOUS AGENTS

miscellaneous topical agents

829	1,163	2,740	4,574	6,672	10,248
871	1,186	2,754	5,093	6,759	10,304
937	1,280	2,969	5,272	9,100	10,514
976	1,364	3,386	5,779	9,782	10,595
1,020	1,413	3,421	6,151	9,966	11,688
1,109	2,396	4,521	6,209		

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

CHEMICAL, PHARMACEUTICAL AND MISCELLANEOUS AGENTS

anesthetics

725	1,345	5,366	6,771	8,827	12,516
727	1,855	5,678	6,822	9,278	12,353
769	5,338	5,715	8,138	10,850	12,584

fluorescent substances (see also "other agents, etc." in this section)

550	3,079	3,431	3,485	5,083	
2,831	3,191	3,455	3,809	6,838	

heavier
elements

vitamins (cont'd)

	963	1,938	2,925	5,640	6,695
342	1,013	2,068	2,970	5,712	6,710
413	1,020	2,089	3,003	5,766	6,755
440	1,050	2,101	3,025	5,866	6,851
610	1,313	2,125	4,203	5,958	7,227
586	1,464	2,126	4,718	5,972	7,320
2,526	1,702	2,455	4,732	6,216	7,834
3,738	1,713	2,533	4,933	6,223	7,976
4,236	1,809	2,595	4,934	6,325	10,368
12,044	1,861	2,600	4,985	6,369	11,446
	1,897	2,678	5,031	6,458	11,641
	1,899	2,752	5,036	6,479	
vitamins	1,918	2,753	5,204	6,511	
171	1,919	2,887	5,312	6,517	
679	1,920	2,911	5,408	6,621	
695	1,932	2,924	5,562	6,628	
828					

amines, including histamine (see also "SH compounds" in this section)	natural or synthetic endocrine preparations (cont'd)	antibiotics and antibacterial agents
530	1,027	644
697	1,207	658
1,015	1,245	672
2,219	1,282	768
5,123	1,428	815
7,731	1,457	1,033
	1,462	1,076
	1,512	1,181
	1,678	1,182
antihistamines	1,698	1,183
840	1,704	1,283
1,910	1,764	1,343
2,043	1,994	1,374
2,380	2,044	1,399
2,716	2,127	1,426
2,754	2,197	1,438
2,769	2,207	1,497
2,843	2,225	1,759
2,920	2,289	1,911
5,923	2,290	2,062
6,094	2,311	2,063
6,204	2,345	2,064
6,597	2,375	2,065
7,583	2,532	2,088
	2,579	2,090
	2,583	2,187
	2,660	2,430
cobalt	2,660	2,464
813	2,788	2,536
1,405	2,871	2,649
5,709	2,897	2,872
7,326	2,918	3,354
10,329	2,939	4,321
	2,940	5,467
	2,947	5,530
	2,956	5,599
	2,957	5,650
	3,029	5,796
drugs affecting the	3,148	6,512
autonomic nervous system	3,362	6,573
	3,421	7,429
685	3,489	7,805
1,014	3,759	7,924
1,079	3,886	8,113
2,842	4,361	8,205
4,237	4,389	8,961
4,932	4,517	9,027
6,041	4,665	9,253
7,385	4,711	9,496
7,399	4,907	10,649
7,778	4,931	11,187
8,571	5,046	11,939
9,547	5,093	
	5,407	
	5,576	
	5,651	
natural or synthetic	5,697	
endocrine preparations	5,713	
509	5,764	
650	5,816	
660	5,974	
729	6,039	
817	6,081	
862	6,166	
908	6,361	
928	6,506	
976	6,618	
1,017	6,807	
		plasma
		substitutes
		711
		1,394
		6,933
		7,299
		7,633
		Colchicine
		631
		5,192
		2,296
		5,193
		2,403
		5,304
		2,456
		6,607
		4,160
		6,655
		4,300
		9,947
		4,792
		4,804
		4,836
		4,987

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

CHEMICAL, PHARMACEUTICAL AND MISCELLANEOUS AGENTS

other agents (miscellaneous) or more than one
of the agents included in various sub-
classifications of this section

391	1,460	2,899	5,815	7,597	9,649
618	1,479	2,903	5,847	7,617	9,821
633	1,518	2,910	5,850	7,623	9,822
640	1,545	2,929	5,854	7,627	9,843
642	1,549	2,934	5,855	7,679	9,875
643	1,550	3,390	5,873	7,681	9,905
645	1,559	3,443	6,105	7,694	9,913
647	1,572	3,457	6,128	7,734	9,919
680	1,602	3,539	6,167	7,755	9,993
698	1,619	3,560	6,168	7,768	10,022
726	1,622	3,618	6,320	7,806	10,023
730	1,651	3,657	6,357	7,807	10,039
760	1,661	3,770	6,391	7,835	10,072
762	1,666	3,804	6,406	7,899	10,122
764	1,672	3,946	6,413	7,911	10,182
808	1,676	4,149	6,486	7,968	10,354
823	1,707	4,299	6,548	7,975	10,443
827	1,739	4,304	6,554	7,977	10,508
829	1,801	4,408	6,558	8,007	10,529
837	1,810	4,452	6,564	8,030	10,536
859	1,894	4,510	6,635	8,037	10,543
861	1,934	4,613	6,672	8,038	10,561
891	1,983	4,645	6,700	8,197	10,648
902	2,012	4,679	6,759	8,204	10,688
912	2,029	4,820	6,811	8,216	10,706
920	2,096	4,841	6,817	8,217	11,195
925	2,097	4,864	6,837	8,248	11,262
934	2,164	4,875	6,844	8,249	11,354
943	2,165	4,967	6,916	8,250	11,356
946	2,189	5,019	6,926	8,287	11,637
962	2,195	5,049	6,961	8,293	11,650
1,016	2,202	5,260	6,966	8,294	11,671
1,040	2,214	5,290	6,971	8,295	11,674
1,041	2,216	5,365	6,975	8,296	11,675
1,054	2,232	5,375	7,037	8,347	11,678
1,081	2,235	5,433	7,046	8,686	11,686
1,085	2,259	5,434	7,048	8,709	11,689
1,122	2,263	5,440	7,070	8,734	11,690
1,128	2,333	5,461	7,084	8,866	11,696
1,131	2,349	5,464	7,085	8,883	11,896
1,133	2,358	5,468	7,148	8,891	12,166
1,206	2,395	5,488	7,194	8,917	12,183
1,209	2,416	5,491	7,267	8,992	12,201
1,242	2,444	5,504	7,302	9,040	12,218
1,279	2,450	5,540	7,306	9,062	12,225
1,292	2,459	5,555	7,378	9,155	12,226
1,312	2,509	5,560	7,398	9,158	12,230
1,333	2,547	5,581	7,408	9,218	12,238
1,344	2,560	5,623	7,421	9,226	12,242
1,349	2,589	5,641	7,441	9,250	12,245
1,363	2,626	5,656	7,442	9,262	12,246
1,382	2,659	5,682	7,450	9,294	12,290
1,386	2,671	5,684	7,491	9,315	12,331
1,406	2,690	5,699	7,504	9,317	12,333
1,412	2,699	5,708	7,539	9,321	12,371
1,421	2,700	5,714	7,566	9,490	12,407
1,439	2,728	5,779	7,582	9,536	
1,452	2,770	5,780			
1,459	2,826				

QUANTITATIVE ASPECTS INFLUENCING RESPONSE

CHEMICAL, PHARMACEUTICAL AND MISCELLANEOUS AGENTS

injected bacteria, vaccines, antisera (see also "other agents" in this section)

	<u>Replacement Therapy</u>		<u>Replacement Therapy</u>	
	Blood Transfusion		Cell and Tissue Extracts	
760				
1,322				
2,275				
2,703	658	2,349	1,107	6,882
3,755	660	5,331	1,137	7,208
4,469	817	5,657	1,141	7,498
4,519	862	5,818	1,281	7,899
4,852	1,033	6,722	1,345	7,903
5,710	1,041	6,813	1,414	7,972
5,897	1,076	6,956	2,232	7,974
6,973	1,173	7,049	2,692	8,084
7,075	1,209	7,153	3,540	8,294
7,566	1,296	7,263	4,312	8,726
7,678	1,343	7,304	5,289	8,907
8,107	1,363	7,600	5,361	10,019
8,108	1,375	7,694	5,511	10,182
9,008	1,379	7,697	5,542	11,372
9,115	1,480	7,706	5,651	12,183
9,181	1,549	7,864	5,698	12,198
9,280	1,660	9,176	6,042	12,200
10,913	1,661	10,882	6,337	12,268
12,201	1,763	11,167	6,361	12,364
	2,098	11,675	6,811	12,509
	2,294			

Replacement therapy

	<u>Lymphoid Tissue and Bone Marrow</u>			
339	1,611	6,256	7,573	8,956
649	1,732	6,338	7,626	8,961
659	2,132	6,358	7,696	8,990
660	2,189	6,810	7,749	8,993
710	2,200	6,812	7,762	9,004
764	2,247	6,815	7,782	9,023
788	2,251	6,871	7,790	9,112
859	2,641	6,992	7,838	9,114
862	5,185	7,036	7,856	9,123
908	5,289	7,046	7,892	9,138
914	5,343	7,057	7,974	9,147
927	5,362	7,084	7,983	9,152
990	5,375	7,186	8,025	9,154
1,037	5,406	7,208	8,026	9,159
1,089	5,409	7,228	8,091	9,161
1,130	5,426	7,260	8,092	9,178
1,172	5,511	7,263	8,134	9,226
1,208	5,530	7,328	8,138	9,246
1,254	5,547	7,398	8,206	9,281
1,277	5,624	7,406	8,250	9,285
1,278	5,651	7,427	8,281	9,337
1,332	5,707	7,437	8,290	9,430
1,438	5,771	7,494	8,541	9,813
1,461	5,798	7,496	8,880	10,019
1,479	6,086	7,498	8,907	10,670
1,560				

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
(see also the sections on QUANTITATIVE ASPECTS OF FACTORS
INFLUENCING RESPONSE --- etc. for agents influencing
genetic effects)

Comparison of Effects of Ionizing Radiation with
Effects Produced by Exposure to Chemical or Physical
Agents or Non-Ionizing Radiation (see also section on
THEORETICAL CONSIDERATIONS)

19	3,844	4,805	5,278	7,602	9,636
516	3,895	4,813	5,333	8,082	9,637
354	3,939	4,824	5,354	8,237	9,857
720	3,952	4,899	5,446	8,368	9,859
997	3,969	4,924	5,501	8,651	9,863
1,227	4,049	4,980	5,502	8,693	9,951
1,773	4,086	4,983	5,692	8,696	9,960
1,819	4,103	4,999	6,159	8,753	9,962
2,077	4,105	5,006	6,186	8,770	9,964
2,636	4,202	5,054	6,249	8,806	9,983
2,637	4,295	5,069	6,353	8,813	9,990
2,643	4,491	5,075	6,508	8,818	10,002
2,792	4,503	5,101	6,563	8,848	10,020
2,829	4,525	5,129	6,596	8,853	10,104
2,923	4,567	5,130	6,669	8,917	10,148
3,017	4,702	5,171	6,676	8,922	12,245
3,058	4,707	5,183	6,713	9,145	12,247
3,201	4,708	5,192	6,993	9,198	12,284
3,214	4,743	5,198	7,012	9,364	12,310
3,316	4,759	5,218	7,077	9,409	12,405
3,518	4,773	5,237	7,097	9,440	12,418
3,522	4,794	5,249	7,438	9,523	12,432
3,820		5,264			

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
(See also the sections on QUANTITATIVE ASPECTS OF FACTORS
INFLUENCING RESPONSE --- etc. for agents influencing
genetic effects)

Genetic Effects on Microorganisms (see also the
section on unicellular plants and unicellular animals)
viruses, bacteriophages (see also main section on effects
on unicellular plants)

521	2,719	3,507	6,330	8,276	10,557
602	2,791	4,021	6,596	8,366	10,564
668	2,862	4,961	7,161	9,032	11,409
877	2,881	5,605	7,581	10,531	11,457
2,040	2,882	6,030	7,984		

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
(see also the sections on QUANTITATIVE ASPECTS OF FACTORS
INFLUENCING RESPONSE --- etc. for agents influencing
genetic effects)

Genetic Effects on Microorganisms (see also the
section on unicellular plants and unicellular
animals)
bacteria (see also main section on effects on unicellular
plants)

398	1,266	2,029	2,298	2,722	3,772
706	1,291	2,040	2,355	2,780	4,061
900	1,448	2,077	2,431	3,091	4,062
1,249	1,470	2,142	2,432	3,507	4,171
	1,577	2,150	2,494	3,579	4,192
			2,569		4,319
					4,324

4,412	4,794	5,238	6,159	7,641	12,225
4,436	4,813	5,286	6,295	7,721	12,242
4,439	4,905	5,354	6,414	7,726	12,276
4,488	4,936	5,456	6,596	7,818	12,288
4,491	4,997	5,481	6,676	7,984	12,306
4,545	5,028	5,746	6,709	8,090	12,307
4,630	5,040	5,803	6,721	8,253	12,695
4,741	5,051	5,922	6,826	8,366	12,700
4,750	5,065	5,924	6,827	8,750	
4,770	5,164	5,985	7,106	8,967	
	5,179	6,030	7,205	9,285	
	5,237	6,137	7,482	9,953	

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION

(see also the sections on QUANTITATIVE ASPECTS OF FACTORS INFLUENCING RESPONSE --- etc. for agents influencing genetic effects)

Genetic Effects on Microorganisms (see also the section on unicellular animals and unicellular plants)

fungi; algae; other unicellular plants other than bacteria

617	2,636	4,941	5,812	7,900	9,872
683	2,643	4,980	5,915	8,082	9,873
714	2,644	5,006	5,924	8,655	9,895
902	2,713	5,024	5,928	8,658	9,898
939	2,792	5,025	6,030	8,724	9,909
997	2,923	5,075	6,064	8,746	9,983
1,115	3,214	5,083	6,079	8,801	9,994
1,132	3,423	5,119	6,085	8,816	10,002
1,227	3,673	5,171	6,116	8,844	10,020
1,528	3,716	5,172	6,156	9,162	10,028
1,557	3,940	5,190	6,158	9,234	10,034
1,654	4,447	5,195	6,186	9,364	10,038
1,787	4,491	5,196	6,218	9,389	10,040
1,794	4,503	5,197	6,414	9,425	10,046
1,878	4,660	5,232	6,489	9,450	10,148
2,006	4,709	5,249	6,555	9,452	10,805
2,008	4,721	5,264	6,580	9,453	11,833
2,059	4,752	5,265	6,626	9,493	11,923
2,141	4,759	5,278	6,898	9,513	12,251
2,432	4,771	5,370	7,255	9,603	12,289
2,510	4,773	5,396	7,441	9,637	12,426
2,564	4,802	5,481	7,817		12,700
	4,923	5,628			
		5,730			

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION

(see also the sections on QUANTITATIVE ASPECTS OF FACTORS INFLUENCING RESPONSE --- etc. for agents influencing genetic effects)

Genetic Effects on Microorganisms (see also the section on unicellular plants and unicellular animals)

protozoa

640	1,415	4,541	6,000	6,802	7,918
642	1,793	4,758	6,030	7,003	9,036
651	2,198	4,926	6,080	7,077	9,253
874	2,385	5,310	6,125	7,150	10,592
1,157	3,007	5,692	6,263	7,438	11,939
1,299	3,015	5,936	6,644	7,441	12,279
	3,686		6,800		
	4,132				

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
(see also the sections on QUANTITATIVE ASPECTS OF FACTORS
INFLUENCING RESPONSE --- etc. for agents influencing
genetic effects)

Genetic Effects in Multicellular Plants Listed
According to Type of Effect

chromosome or chromatid aberrations;
ploidy

133	2,354	3,980	4,904	6,238	8,690
298	2,393	3,982	4,912	6,239	8,693
305	2,433	3,983	4,921	6,240	8,695
494	2,435	3,999	4,922	6,249	8,696
515	2,436	4,057	4,937	6,253	8,697
532	2,441	4,070	4,968	6,320	8,698
616	2,467	4,086	4,973	6,362	8,700
619	2,470	4,087	4,974	6,378	8,701
621	2,480	4,151	4,981	6,379	8,702
622	3,518	4,152	5,003	6,421	8,705
712	2,544	4,173	5,004	6,563	8,706
715	2,565	4,176	5,027	6,655	8,707
739	2,587	4,186	5,052	6,669	8,708
784	2,590	4,210	5,053	6,673	8,709
873	2,602	4,212	5,067	6,674	8,710
881	2,657	4,232	5,076	6,707	8,712
1,046	2,682	4,234	5,101	6,724	8,713
1,069	2,706	4,285	5,110	6,746	8,714
1,106	2,865	4,294	5,161	6,809	8,715
1,114	2,880	4,295	5,162	6,890	8,716
1,117	2,894	4,326	5,163	6,913	8,717
1,162	2,916	4,327	5,169	6,966	8,719
1,191	3,017	4,332	5,182	6,991	8,731
1,200	3,093	4,334	5,218	7,008	8,742
1,240	3,174	4,353	5,303	7,032	8,745
1,274	3,201	4,356	5,304	7,067	8,749
1,360	3,202	4,406	5,305	7,097	8,750
1,361	3,276	4,459	5,307	7,195	8,751
1,390	3,329	4,486	5,323	7,239	8,756
1,486	3,365	4,499	5,371	7,297	8,758
1,522	3,424	4,501	5,393	7,435	8,759
1,528	3,426	4,502	5,404	7,441	8,765
1,531	3,451	4,504	5,410	7,451	8,770
1,603	3,452	4,505	5,412	7,463	8,785
1,692	3,497	4,535	5,432	7,582	8,789
1,694	3,518	4,555	5,445	7,602	8,790
1,717	3,519	4,556	5,458	7,644	8,791
1,775	3,542	4,557	5,460	7,728	8,792
1,789	3,606	4,560	5,501	7,846	8,796
1,791	3,613	4,568	5,502	7,868	8,799
1,794	3,614	4,570	5,506	7,875	8,800
1,817	3,672	4,587	5,535	8,086	8,802
1,819	3,713	4,601	5,604	8,226	8,803
1,841	3,731	4,625	5,621	8,231	8,805
1,842	3,732	4,662	5,674	8,236	8,812
1,936	3,743	4,669	5,676	8,242	8,813
1,957	3,762	4,683	5,677	8,346	8,818
1,963	3,763	4,689	5,681	8,347	8,819
2,000	3,764	4,698	5,735	8,531	8,822
2,048	3,765	4,708	5,737	8,645	8,823
2,066	3,840	4,710	5,786	8,646	8,829
2,096	3,861	4,742	5,904	8,651	8,831
2,100	3,868	4,798	5,954	8,657	8,832
2,110	3,891	4,805	5,986	8,660	8,841
2,114	3,911	4,822	6,030	8,662	8,847
2,151	3,923	4,824	6,059	8,668	8,848
2,201	3,929	4,825	6,060	8,669	8,849
2,232	3,937	4,854	6,077	8,676	8,859
2,277	3,939	4,895	6,110	8,678	8,860
2,321	3,941	4,872	6,121	8,682	8,903
2,331	3,951	4,899	6,138	8,683	8,917
2,353	3,952	4,903	6,157	8,689	8,968

8,969	9,395	9,449	9,850	9,951	10,763
9,052	9,396	9,491	9,851	9,956	10,764
9,057	9,399	9,529	9,852	9,960	10,766
9,062	9,400	9,568	9,853	9,962	10,767
9,104	9,401	9,604	9,856	9,963	10,777
9,145	9,402	9,623	9,857	9,964	10,833
9,155	9,404	9,627	9,858	9,990	11,003
9,188	9,405	9,630	9,859	9,992	11,150
9,191	9,406	9,632	9,860	10,013	11,293
9,192	9,407	9,715	9,899	10,045	11,296
9,193	9,409	9,795	9,901	10,048	11,341
9,194	9,412	9,796	9,902	10,074	11,409
9,195	9,416	9,809	9,905	10,076	11,458
9,196	9,424	9,823	9,906	10,077	11,691
9,198	9,426	9,828	9,908	10,078	11,912
9,360	9,429	9,830	9,907	10,079	11,920
9,365	9,436	9,831	9,918	10,082	11,921
9,366	9,437	9,834	9,923	10,088	11,924
9,367	9,438	9,838	9,925	10,092	12,282
9,368	9,440	9,841	9,927	10,099	12,284
9,369	9,441	9,842	9,938	10,100	12,406
9,370	9,442	9,848	9,940	10,149	12,417
9,390	9,444	9,849	9,948	10,748	12,432

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
(see also the sections on QUANTITATIVE ASPECTS OF FACTORS
INFLUENCING RESPONSE --- etc. for agents influencing
genetic effects)

Genetic Effects in Multicellular Plants Listed
According to Type of Effect

gene mutations

2	2,163	3,715	4,697	5,531	7,946
25	2,232	3,730	4,702	5,621	7,947
258	2,255	3,744	4,774	5,676	8,021
283	2,264	3,801	4,775	5,736	8,051
297	2,273	3,859	4,798	5,822	8,083
302	2,296	3,860	4,799	5,853	8,139
354	2,353	3,939	4,899	5,899	8,172
532	2,393	3,941	4,904	5,926	8,207
533	2,409	4,048	4,918	5,927	8,231
545	2,512	4,049	4,921	6,030	8,234
617	2,562	4,058	4,982	6,083	8,237
627	2,590	4,059	4,991	6,084	8,531
636	2,607	4,086	5,015	6,122	8,641
701	2,706	4,104	5,026	6,147	8,643
745	2,714	4,108	5,027	6,232	8,651
880	2,829	4,123	5,043	6,298	8,652
955	2,891	4,187	5,069	6,379	8,654
1,011	3,058	4,202	5,102	6,603	8,655
1,046	3,092	4,235	5,134	6,724	8,656
1,069	3,174	4,286	5,153	6,873	8,664
1,117	3,175	4,305	5,160	6,991	8,665
1,258	3,255	4,332	5,173	7,034	8,671
1,290	3,329	4,344	5,186	7,053	8,672
1,360	3,383	4,352	5,233	7,076	8,675
1,361	3,424	4,387	5,234	7,221	8,677
1,454	2,426	4,392	5,239	7,239	8,679
1,528	3,449	4,525	5,240	7,441	8,680
1,694	3,518	4,538	5,306	7,489	8,681
1,817	3,522	4,559	5,307	7,497	8,682
1,819	3,541	4,587	5,323	7,634	8,684
1,878	3,553	4,644	5,353	7,711	8,685
1,929	3,579	4,648	5,383	7,728	8,687
2,021	3,656	4,678	5,415	7,875	8,688
2,048	3,664	4,681	5,454	7,944	8,689
2,154	3,672	4,682	5,501	7,945	8,690
	3,714				

8,691	8,755	8,842	9,402	9,831	10,761
8,692	8,757	8,848	9,408	9,837	10,762
8,693	8,758	8,850	9,412	9,846	10,764
8,694	8,760	8,851	9,414	9,848	10,766
8,703	8,761	8,853	9,417	9,858	10,777
8,704	8,762	8,887	9,421	9,861	10,782
8,710	8,764	8,892	9,422	9,874	10,785
8,718	8,766	8,903	9,424	9,881	10,795
8,719	8,767	8,968	9,427	9,896	10,832
8,720	8,781	9,052	9,440	9,906	10,833
8,721	8,786	9,054	9,446	9,922	11,296
8,723	8,788	9,104	9,448	9,923	11,342
8,735	8,800	9,188	9,491	9,951	11,362
8,738	8,807	9,198	9,521	9,957	11,409
8,739	8,809	9,221	9,523	10,013	11,912
8,744	8,810	9,252	9,529	10,077	11,920
8,747	8,814	9,289	9,569	10,078	12,282
8,748	8,819	9,359	9,604	10,085	12,405
8,750	8,821	9,360	9,623	10,095	12,406
8,752	8,836	9,361	9,796	10,096	12,418
8,753	8,838	9,371	9,809	10,099	12,419
8,754	8,840	9,397	9,824	10,147	

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
(see also the sections on QUANTITATIVE ASPECTS OF
FACTORS INFLUENCING RESPONSE --- etc. for agents
influencing genetic effects)

Genetic Effects in Multicellular Plants Listed
According to Type of Effect

plant breeding; role of radiation in evolution,
etc. (see also section on effects of internally
deposited isotopes under QUANTITATIVE ASPECTS
OF FACTORS INFLUENCING RESPONSE---)

202	4,525	5,899	8,207	8,684	9,404
474	4,798	6,083	8,226	8,693	9,405
1,360	4,899	6,084	8,231	8,701	9,417
1,929	4,904	6,121	8,531	8,703	9,424
2,714	4,921	6,603	8,642	8,735	9,429
2,895	4,982	6,873	8,652	8,747	9,809
3,201	4,991	7,034	8,653	8,748	9,837
3,303	5,043	7,489	8,654	8,752	10,086
3,329	5,102	7,497	8,661	8,761	10,147
3,426	5,233	7,711	8,664	8,786	10,763
3,703	5,234	7,728	8,666	8,807	10,764
3,939	5,239	7,875	8,671	8,811	10,766
4,049	5,240	7,944	8,672	8,821	10,776
4,202	5,323	7,946	8,673	9,252	10,782
4,305	5,383	7,947	8,674	9,371	10,832
4,332	5,531	8,083	8,679	9,396	12,308
4,352	5,853	8,139			

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION

(see also the sections on QUANTITATIVE ASPECTS OF FACTORS
INFLUENCING RESPONSE --- etc. for agents influencing
genetic effects)

**Genetic Effects on Multicellular Animals Listed
According to Type of Effect**

chromosome or chromatid aberrations; ploidy

29	1789	2682	3747	4332	4754
30	1791	2730	3748	4334	4762
125	1794	2793	3764	4336	4768
264	1804	2794	3765	4342	4776
265	1805	2829	3768	4343	4798
293	1817	2865	3800	4345	4805
305	1841	2877	3818	4353	4822
355	1842	2880	3819	4356	4823
363	1870	2894	3820	4405	4840
367	1904	2916	3821	4406	4854
384	1936	2976	3840	4409	4868
404	1957	3069	3841	4413	4895
473	1959	3072	3842	4446	4903
494	1963	3093	3861	4448	4912
516	2007	3094	3869	4459	4913
517	2029	3149	3891	4460	4914
532	2048	3176	3895	4461	4915
581	2066	3201	3923	4486	4919
616	2079	3202	3924	4489	4922
619	2096	3212	3937	4490	4924
621	2100	3213	3939	4499	4925
622	2110	3231	3968	4501	4927
634	2111	3276	3970	4502	4939
662	2114	3277	3971	4506	4940
665	2134	3278	3981	4507	4950
712	2151	3291	3982	4509	4962
715	2198	3311	3983	4524	4963
734	2201	3313	3984	4525	4964
739	2232	3314	3999	4535	4968
784	2257	3316	4031	4539	4973
847	2259	3328	4034	4548	4974
881	2267	3349	4048	4555	4975
943	2277	3350	4057	4556	4977
1028	2297	3351	4071	4557	4978
1046	2306	3352	4087	4558	4979
1069	2321	3382	4124	4560	4999
1095	2331	3407	4141	4562	5000
1114	2353	3408	4151	4567	5003
1162	2354	3425	4152	4568	5004
1191	2378	3426	4173	4569	5005
1195	2384	3430	4176	4570	5007
1200	2393	3439	4177	4587	5022
1240	2433	3451	4178	4591	5023
1258	2435	3452	4179	4594	5052
1273	2436	3477	4180	4601	5053
1274	2441	3478	4197	4625	5076
1361	2467	3518	4201	4646	5090
1390	2469	3519	4210	4656	5091
1408	2470	3520	4211	4669	5101
1424	2480	3521	4212	4675	5103
1486	2505	3524	4232	4683	5104
1522	2544	3542	4234	4689	5110
1531	2545	3613	4236	4698	5120
1570	2565	3614	4240	4700	5127
1588	2576	3665	4242	4706	5128
1608	2584	3667	4295	4707	5154
1609	2587	3672	4296	4708	5161
1692	2602	3674	4297	4710	5162
1694	2605	3699	4306	4717	5163
1717	2637	3712	4307	4730	5169
1752	2638	3731	4308	4742	5182
1775	2646	3732	4326	4743	5198

5199	6266	7576	8770	9438	10,764
5200	6281	7582	8785	9440	10,767
5236	6297	7593	8789	9441	10,833
5250	6310	7594	8791	9442	11,003
5303	6320	7602	8792	9444	11,043
5304	6321	7611	8796	9449	11,150
5305	6342	7644	8800	9488	11,194
5307	6362	7679	8802	9489	11,293
5324	6378	7735	8803	9490	11,341
5371	6380	7757	8805	9559	11,461
5393	6385	7846	8812	9564	11,644
5394	6386	7848	8813	9568	11,691
5404	6412	7875	8818	9604	11,723
5410	6421	7919	8822	9622	11,823
5412	6431	8011	8823	9626	11,855
5432	6452	8086	8829	9627	11,856
5445	6475	8201	8831	9630	11,862
5458	6476	8226	8832	9632	11,872
5459	6477	8227	8841	9715	11,888
5460	6487	8228	8847	9795	11,915
5490	6563	8236	8849	9823	11,916
5501	6581	8242	8859	9828	11,921
5502	6602	8326	8893	9830	11,924
5506	6640	8336	8894	9832	12,027
5514	6641	8346	8902	9834	12,246
5535	6642	8347	8917	9838	12,247
5565	6647	8354	8922	9841	12,249
5580	6655	8358	8943	9842	12,263
5604	6666	8368	8969	9848	12,274
5614	6669	8457	9049	9849	12,284
5674	6673	8458	9050	9850	12,310
5676	6674	8526	9053	9851	12,320
5677	6694	8531	9056	9852	12,321
5681	6706	8535	9057	9853	12,332
5693	6713	8641	9062	9856	12,349
5735	6716	8645	9143	9858	12,387
5750	6746	8646	9145	9859	12,406
5774	6751	8651	9148	9863	12,415
5777	6808	8657	9155	9864	12,417
5785	6809	8660	9165	9901	12,424
5786	6855	8662	9168	9902	12,432
5884	6861	8669	9188	9905	12,433
5904	6885	8676	9191	9906	
5937	6890	8678	9192	9907	
5939	6913	8683	9193	9908	
5954	6966	8689	9194	9918	
5982	6991	8690	9195	9925	
5986	7008	8693	9198	9938	
5987	7009	8695	9360	9940	
6030	7011	8700	9365	9948	
6046	7012	8702	9366	9951	
6059	7024	8705	9367	9956	
6060	7032	8706	9368	9959	
6077	7033	8707	9369	9960	
6105	7067	8708	9370	9962	
6110	7079	8709	9375	9963	
6121	7080	8710	9381	9964	
6123	7096	8712	9390	9988	
6124	7097	8713	9399	9990	
6138	7160	8714	9400	9992	
6139	7181	8715	9401	10,024	
6146	7195	8716	9402	10,045	
6157	7281	8717	9404	10,047	
6187	7297	8719	9405	10,048	
6208	7362	8731	9406	10,076	
6222	7409	8742	9407	10,077	
6238	7435	8745	9409	10,078	
6239	7441	8750	9412	10,079	
6240	7451	8751	9423	10,082	
6249	7463	8756	9424	10,088	
6250	7489	8759	9426	10,092	
6253	7561	8765	9437	10,100	

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
(see also the sections on QUANTITATIVE ASPECTS OF FACTORS
INFLUENCING RESPONSE --- etc. for agents influencing
genetic effects)

Genetic Effects on Multicellular Animals Listed
According to Type of Effect

gene mutations

19	1710	3304	4105	4928	6439
28	1754	3313	4118	4940	6459
37	1773	3315	4142	4962	6472
40	1796	3317	4153	4964	6473
46	1797	3350	4194	4975	6474
179	1820	3351	4197	4983	6475
180	1913	3352	4237	5000	6476
187	1924	3353	4243	5005	6534
193	1929	3384	4263	5054	6565
204	1931	3409	4276	5068	6595
263	1943	3410	4289	5089	6596
274	1962	3426	4290	5090	6602
281	1975	3441	4332	5103	6650
300	2158	3442	4348	5104	6627
303	2198	3453	4354	5120	6646
362	2271	3477	4357	5129	6647
385	2297	3478	4388	5130	6661
390	2299	3518	4393	5131	6662
403	2306	3523	4408	5134	6671
404	2332	3538	4410	5154	6675
475	2363	3545	4413	5174	6681
476	2378	3576	4446	5200	6716
497	2387	3579	4449	5252	6751
504	2425	3588	4463	5309	6808
518	2458	3630	4489	5311	6855
532	2462	3674	4507	5333	6861
534	2484	3745	4508	5355	6907
603	2496	3746	4549	5394	6938
617	2501	3748	4561	5395	6963
639	2549	3751	4571	5446	6993
662	2570	3800	4593	5455	7010
663	2586	3821	4594	5492	7011
720	2605	3822	4599	5501	7012
759	2637	3842	4609	5514	7013
888	2638	3843	4620	5566	7024
938	2685	3844	4621	5567	7027
1051	2693	3846	4636	5642	7033
1070	2697	3851	4637	5676	7079
1095	2708	3863	4652	5701	7082
1097	2715	3870	4656	5729	7137
1103	2781	3892	4700	5739	7138
1113	2795	3894	4722	5740	7139
1146	2824	3922	4726	5743	7207
1161	2877	3938	4730	5893	7213
1381	2978	3942	4738	5935	7222
1402	3070	3943	4739	5939	7281
1424	3073	3944	4754	5981	7325
1450	3074	3945	4762	5987	7329
1455	3075	3954	4764	6009	7389
1481	3076	3969	4768	6030	7409
1489	3095	3970	4777	6035	7441
1496	3096	3984	4798	6046	7453
1507	3109	3992	4828	6055	7486
1511	3116	4000	4840	6172	7504
1517	3124	4001	4844	6173	7512
1528	3125	4013	4850	6207	7562
1581	3173	4014	4855	6233	7634
1589	3205	4050	4915	6283	7679
1598	3231	4060	4917	6286	7735
1601	3290	4069	4919	6310	7843
1652	3291	4076	4924	6342	7870
1709	3303		4925	6353	

7888	8651	9217	11,044	11,981	12,273
7919	8655	9309	11,194	11,982	12,310
8011	8750	9318	11,210	11,983	12,311
8065	8839	9533	11,265	11,985	12,314
8079	8858	9803	11,570	11,986	12,315
8164	8972	9837	11,644	12,033	12,321
8166	9006	9928	11,746	12,091	12,324
8201	9051	10,055	11,747	12,245	12,332
8217	9053	10,075	11,823	12,247	12,405
8326	9055	10,104	11,854	12,249	12,433
8336	9058	10,136	11,855	12,250	12,518
8355	9143	10,663	11,856	12,251	12,519
8612	9182	10,708	11,859	12,263	
			11,915		

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
(see also the sections on QUANTITATIVE ASPECTS OF FACTORS
INFLUENCING RESPONSE --- etc. for agents influencing
genetic effects.)

Genetic Effects on Multicellular Animals Listed
According to Type of Effect

role of radiation in evolution;
breeding studies; etc.

19	1095	2563	4105	6474	9928
281	1496	3303	4332	6566	10,056
403	1929	3426	5383	6595	11,521
532	2158	3441	5566	7486	11,747
720	2462	3892	6472	9837	11,870
938					

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
(see also the sections on QUANTITATIVE ASPECTS OF FACTORS
INFLUENCING RESPONSE --- etc. for agents influencing
genetic effects)

Genetic Effects on Multicellular Animals Listed
According to Type of Organism (see also sections
on congenital defects and altered fertility under
LATE AND LATENT EFFECTS)

human genetics

19	1754	3545	5893	7870	10,055
37	1913	3969	6009	7888	10,104
40	1931	4118	6055	8079	10,136
504	1943	4548	6283	9000	10,659
720	1975	4706	6299	9006	10,708
938	2277	4726	6310	9055	11,644
1095	2425	4764	6472	9058	11,854
1097	2484	4855	6627	9089	11,856
1113	2501	5054	6650	9091	11,859
1146	2563	5068	6907	9126	12,250
1161	2570	5101	6963	9149	12,262
1450	2586	5130	7013	9215	12,263
1496	2697	5131	7131	9217	12,264
1507	2708	5701	7207	9309	12,345
1581	2715	5739	7409	9375	12,669
1710	3109	5743	7750	9482	12,672
					12,673
					12,688
					12,692

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
(see also sections on QUANTITATIVE ASPECTS OF FACTORS
INFLUENCING RESPONSE --- etc. for agents influencing
genetic effects)

Genetic Effects on Multicellular Animals Listed
According to Type of Organism (see also sections
on congenital defects and altered fertility under
LATE AND LATENT EFFECTS)

vertebrates other than man: fish

1752	12,726
6566	
7843	

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
(see also the sections on QUANTITATIVE ASPECTS OF FACTORS
INFLUENCING RESPONSE --- etc. for agents influencing
genetic effects)

Genetic Effects on Multicellular Animals Listed
According to Type of Organism (see also sections
on congenital defects and altered fertility under
LATE AND LATENT EFFECTS)

vertebrates other than man: amphibia and reptiles

19	4730	5693	11,855	11,986
2877	5200	8457	11,985	

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
(see also the sections on QUANTITATIVE ASPECTS OF FACTORS
INFLUENCING RESPONSE --- etc. for agents influencing
genetic effects)

Genetic Effects on Multicellular Animals Listed
According to Type of Organism (see also sections
on congenital defects and altered fertility under
LATE AND LATENT EFFECTS)

vertebrates other than man: birds

4448	4730
4507	5089

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
(see also the sections on QUANTITATIVE ASPECTS OF FACTORS
INFLUENCING RESPONSE --- etc. for agents influencing
genetic effects)

Genetic Effects on Multicellular Animals Listed
According to Type of Organism (see also sections
on congenital defects and altered fertility under
LATE AND LATENT EFFECTS)

vertebrates other than man: mammals

19	187	390	1095	1589	2378
28	263	475	1113	1598	2484
46	265	639	1381	1601	2781
125	274	888	1489	1929	2877
180	362	938	1517	2029	3109
				2271	

3116	4410	5743	7453	9182	11,856
3290	4446	6222	7512	9318	11,862
3353	4548	6281	7594	9533	11,870
3520	4636	6310	7611	9546	11,872
3523	4637	6385	8164	10,056	11,981
3538	4730	6386	8166	10,659	11,982
3630	4850	6412	8167	10,663	11,983
3843	4868	6431	8227	11,044	12,033
3984	5101	6595	8355	11,210	12,091
4076	5311	6650	8612	11,265	12,263
4197	5395	6671	8972	11,521	12,324
4240	5490	6716	9058	11,570	12,332
4289	5580	6861	9165	11,723	12,345
4354	5739	7222	9168	11,747	
		7325			
		7441			

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
 (see also the sections QUANTITATIVE ASPECTS OF FACTORS
 INFLUENCING RESPONSE --- etc. for agents influencing
 genetic effects)

Genetic Effects on Multicellular Animals Listed
 According to Type of Organism (see also sections
 on congenital defects and altered fertility under
 LATE AND LATENT EFFECTS)

invertebrates

drosophila

29	1609	3075	3747	4178	4594
30	1709	3076	3751	4179	4599
179	1773	3094	3821	4180	4609
193	1796	3095	3822	4194	4620
204	1804	3096	3841	4236	4621
264	1805	3124	3842	4237	4625
281	1820	3125	3844	4242	4646
300	1924	3173	3846	4243	4652
303	2007	3176	3851	4263	4675
355	2271	3205	3863	4276	4700
384	2297	3212	3869	4290	4738
385	2299	3213	3870	4296	4742
403	2306	3231	3892	4297	4762
404	2363	3277	3893	4306	4777
476	2378	3278	3894	4307	4823
516	2387	3291	3895	4308	4828
517	2458	3304	3922	4336	4840
518	2462	3313	3938	4345	4844
534	2469	3315	3942	4357	4913
603	2496	3316	3943	4393	4917
617	2549	3349	3944	4408	4924
663	2570	3350	3945	4409	4939
665	2584	3352	3968	4413	4950
720	2605	3384	3969	4449	4962
759	2685	3408	3970	4460	4963
938	2693	3409	3971	4461	4964
1070	2794	3425	3981	4463	4975
1095	2795	3439	3992	4489	4977
1103	2824	3441	4001	4490	4978
1113	2877	3442	4013	4508	4979
1146	2928	3453	4034	4524	4983
1195	2976	3477	4050	4549	4999
1273	2978	3478	4060	4558	5000
1455	3069	3521	4069	4561	5005
1481	3070	3576	4071	4562	5007
1489	3072	3579	4124	4568	5090
1511	3073	3588	4142	4571	5101
1528	3074	3665	4153	4593	5103
		3746			

5104	5750	6439	7009	8166	10,075
5120	5774	6459	7010	8201	11,043
5127	5935	6473	7011	8217	11,194
5128	5937	6475	7024	8326	11,409
5154	5939	6476	7033	8354	11,461
5198	5981	6477	7079	8655	11,746
5199	5982	6565	7096	8750	11,855
5250	5987	6581	7137	8805	11,856
5333	6030	6596	7138	8831	11,859
5355	6035	6602	7139	8832	11,924
5394	6046	6640	7281	8839	12,245
5446	6123	6641	7441	8858	12,247
5501	6124	6642	7486	8943	12,249
5514	6139	6646	7504	9051	12,251
5565	6172	6647	7561	9053	12,273
5566	6173	6650	7562	9056	12,282
5567	6187	6661	7602	9062	12,310
5614	6207	6662	7634	9143	12,311
5642	6233	6675	7679	9803	12,314
5676	6266	6713	7735	9837	12,315
5729	6286	6751	7848	9863	12,405
5739	6342	6855	7919	9928	12,406
5740	6353	6885	8011	9959	12,433
5743		6993			12,519

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
(see also sections on QUANTITATIVE ASPECTS OF FACTORS
INFLUENCING RESPONSE --- etc. for agents influencing
genetic effects)

Genetic Effects on Multicellular Animals Listed
According to Type of Organism (see also sections
on congenital defects and altered fertility under
LATE AND LATENT EFFECTS)

invertebrates

insects other than drosophila

734	3311	3819	4717	5091	7012
1028	3314	3954	4722	5174	7027
1402	3317	4000	4743	5252	7082
1608	3328	4014	4754	5309	7329
1652	3351	4031	4768	5455	7441
1904	3410	4177	4776	6140	7576
1962	3524	4211	4915	6146	7593
2198	3674	4342	4919	6297	8336
2332	3712	4343	4925	6321	8526
2730	3748	4348	4927	6534	9837
2877	3800	4506	4928	6681	11,855
	3818	4509	4940	6808	12,518
		4539	5022	6938	12,519
		4591	5023		

GENETIC EFFECTS OF EXPOSURE TO IONIZING RADIATION
(see also the sections on QUANTITATIVE ASPECTS OF FACTORS
INFLUENCING RESPONSE --- etc. for agents influencing
genetic effects)

Genetic Effects on Multicellular Animals Listed
According to Type of Organism (see also sections on
congenital defects and altered fertility under
LATE AND LATENT EFFECTS)

invertebrates

invertebrates other than insects

106	3745	4388	7389	8535	9049
1051	3820	4914	8458	8893	9050
1424	4141				

LATE AND LATENT EFFECTS (EXCLUSIVE OF GENETICS)

LATE AND LATENT EFFECTS LISTED ACCORDING TO TYPE
OF EFFECT

Comparison of Effects of Ionizing Radiation With
Effects Produced by Exposure to Chemical or Physical
Agents or Non-Ionizing Radiation.

465	4,039	4,865	5,975	7,473	10,590
605	4,385	4,866	6,012	7,775	11,538
770	4,516	5,016	6,275	9,069	12,212
2,214	4,598	5,037	6,304	9,183	12,282
2,345	4,664	5,056	6,784	9,820	12,443
2,428	4,815	5,260	7,427	10,386	12,448
2,448	4,843	5,479	7,240		
3,934					

LATE AND LATENT EFFECTS (EXCLUSIVE OF GENETICS)

LATE AND LATENT EFFECTS LISTED ACCORDING TO TYPE
OF EFFECT

Tumor Induction and Effects Related to
Carcinogenesis.

21	444	895	1,383	1,837	2,213
44	465	909	1,414	1,843	2,214
69	469	914	1,444	1,873	2,220
117	570	948	1,463	1,922	2,228
143	667	949	1,489	1,923	2,233
145	678	959	1,506	1,976	2,236
161	694	960	1,510	1,980	2,246
187	707	966	1,543	2,018	2,254
191	766	1,022	1,567	2,055	2,266
250	768	1,048	1,574	2,108	2,269
260	768	1,097	1,604	2,167	2,276
286	770	1,102	1,614	2,170	2,313
293	787	1,141	1,626	2,171	2,322
296	809	1,148	1,655	2,183	2,323
322	811	1,186	1,669	2,189	2,329
325	826	1,244	1,741	2,195	2,333
386	832	1,263	1,785	2,199	2,345
392	833	1,290	1,788	2,207	2,359
405	862	1,346	1,802	2,208	2,373
427	882	1,347	1,833	2,212	

2,378	4,131	5,414	7,117	8,869	10,927
2,379	4,139	5,431	7,124	8,887	10,931
2,397	4,224	5,451	7,130	8,907	10,938
2,419	4,272	5,454	7,143	8,947	10,980
2,448	4,273	5,479	7,212	8,954	11,004
2,450	4,299	5,560	7,213	8,963	11,023
2,482	4,313	5,573	7,224	8,985	11,040
2,497	4,376	5,576	7,240	8,998	11,051
2,498	4,384	5,583	7,315	9,022	11,056
2,501	4,385	5,619	7,328	9,026	11,064
2,560	4,457	5,662	7,410	9,061	11,097
2,596	4,500	5,663	7,411	9,080	11,103
2,621	4,516	5,746	7,418	9,081	11,111
2,624	4,517	5,775	7,424	9,142	11,135
2,645	4,565	5,795	7,427	9,171	11,202
2,659	4,579	5,811	7,433	9,203	11,205
2,662	4,580	5,842	7,442	9,232	11,211
2,666	4,592	5,853	7,445	9,234	11,245
2,674	4,598	5,974	7,453	9,235	11,266
2,741	4,633	5,975	7,462	9,244	11,285
2,747	4,664	5,984	7,479	9,275	11,290
2,765	4,673	5,993	7,517	9,276	11,291
2,768	4,680	6,076	7,627	9,299	11,292
2,770	4,701	6,108	7,634	9,319	11,296
2,793	4,712	6,203	7,642	9,344	11,300
2,809	4,716	6,242	7,650	9,354	11,303
2,863	4,723	6,275	7,655	9,352	11,306
2,917	4,730	6,304	7,667	9,534	11,323
2,945	4,815	6,306	7,695	9,536	11,334
2,948	4,816	6,310	7,758	9,553	11,339
2,949	4,826	6,360	7,760	9,561	11,344
2,950	4,834	6,372	7,775	9,563	11,384
2,962	4,837	6,426	7,863	9,569	11,472
2,967	4,842	6,430	7,874	9,575	11,492
3,011	4,843	6,431	7,889	9,710	11,538
3,026	4,847	6,433	7,898	9,720	11,570
3,037	4,855	6,447	7,920	9,733	11,631
3,052	4,857	6,462	7,970	9,802	11,634
3,056	4,861	6,467	7,983	9,806	11,635
3,151	4,865	6,514	7,989	9,808	11,636
3,157	4,866	6,540	7,995	9,811	11,645
3,237	4,875	6,542	8,001	9,815	11,836
3,251	4,900	6,543	8,035	9,817	11,878
3,287	4,920	6,544	8,043	9,820	11,907
3,297	4,945	6,546	8,101	9,831	11,932
3,330	4,990	6,574	8,116	10,115	11,933
3,344	5,016	6,623	8,119	10,182	11,936
3,345	5,037	6,639	8,179	10,186	11,937
3,361	5,047	6,664	8,180	10,351	11,943
3,386	5,056	6,668	8,191	10,386	11,970
3,391	5,059	6,684	8,199	10,438	11,972
3,497	5,063	6,728	8,230	10,483	12,039
3,514	5,080	6,739	8,232	10,590	12,082
3,534	5,156	6,778	8,233	10,603	12,241
3,565	5,177	6,780	8,234	10,632	12,252
3,572	5,212	6,783	8,238	10,660	12,253
3,586	5,223	6,784	8,241	10,662	12,272
3,599	5,224	6,804	8,259	10,709	12,288
3,600	5,246	6,812	8,277	10,757	12,324
3,660	5,258	6,845	8,279	10,787	12,338
3,678	5,260	6,847	8,294	10,794	12,341
3,752	5,315	6,848	8,298	10,837	12,375
3,839	5,317	6,892	8,303	10,839	12,400
3,934	5,319	6,954	8,305	10,846	12,405
3,961	5,327	6,983	8,355	10,847	12,428
3,963	5,342	7,007	8,356	10,878	12,439
3,995	5,343	7,040	8,487	10,879	12,440
4,028	5,346	7,054	8,513	10,879	12,443
4,039	5,357	7,062	8,778	10,880	12,445
4,040	5,364	7,089	8,795	10,882	12,446
4,041	5,397	7,112	8,851	10,885	12,448
4,078				10,891	12,450
				10,892	12,608
				10,920	12,640

LATE AND LATENT EFFECTS (EXCLUSIVE OF GENETICS)

LATE AND LATENT EFFECTS LISTED ACCORDING TO TYPE OF EFFECT

Production of Cataracts (see also: eyes, in the following section of Late Effects Listed According to Tissue or Organ)

55	1,202	2,282	5,670	7,016	8,140
289	1,237	2,308	5,690	7,017	8,148
653	1,261	2,310	5,871	7,018	8,288
654	1,262	2,424	5,872	7,144	8,304
718	1,356	2,443	5,907	7,170	9,078
751	1,414	2,623	5,957	7,213	9,539
752	1,483	3,280	6,195	7,275	10,146
764	1,818	3,323	6,196	7,279	11,533
866	1,837	5,331	6,339	7,377	12,122
984	2,117	5,345	6,686	7,627	12,324
1,037	2,167	5,346	6,831	8,033	12,338
1,078	2,189	5,386	6,869	8,084	12,389
1,097	2,199	5,560	7,015	8,124	12,392
1,155	2,244				

LATE AND LATENT EFFECTS (EXCLUSIVE OF GENETICS)

LATE AND LATENT EFFECTS LISTED ACCORDING TO TYPE OF EFFECT

Observations Pertinent to Maximum Permissible Exposure and Maximum Permissible Dose. (see also sections on differences inherent in cells and in tissues under Quantitative Aspects, etc.)

32	926	1,450	1,788	2,236	2,840
53	932	1,458	1,796	2,242	2,961
117	948	1,487	1,818	2,310	3,001
129	949	1,490	1,827	2,333	3,011
170	966	1,493	1,828	2,341	3,056
262	967	1,495	1,843	2,378	3,109
286	1,012	1,496	1,847	2,379	3,115
374	1,022	1,498	1,913	2,389	3,534
382	1,099	1,517	1,926	2,397	3,545
444	1,112	1,521	1,931	2,417	3,554
450	1,113	1,525	1,943	2,484	3,571
469	1,145	1,529	1,944	2,498	3,599
495	1,147	1,530	1,977	2,563	3,600
548	1,161	1,534	1,998	2,570	3,619
652	1,167	1,551	1,999	2,577	3,625
670	1,169	1,556	2,013	2,586	3,687
671	1,170	1,580	2,016	2,588	3,692
686	1,205	1,607	2,019	2,617	3,728
688	1,224	1,615	2,026	2,620	3,731
702	1,251	1,616	2,038	2,623	3,741
751	1,309	1,659	2,041	2,629	3,777
753	1,347	1,665	2,082	2,652	3,791
787	1,351	1,710	2,086	2,672	3,830
814	1,357	1,712	2,087	2,674	3,835
832	1,384	1,725	2,122	2,697	3,865
833	1,407	1,752	2,139	2,708	3,917
836	1,409	1,753	2,147	2,710	3,933
844	1,415	1,755	2,167	2,715	3,969
856	1,417	1,756	2,177	2,723	3,988
862	1,421	1,758	2,179	2,726	4,022
878	1,422	1,770	2,223	2,741	4,040
882	1,437	1,777	2,229	2,781	4,043
915	1,444	1,779	2,233	2,782	4,046

4,064	5,359	6,474	7,663	8,910	10,104
4,116	5,360	6,537	7,664	8,911	10,105
4,131	5,364	6,594	7,665	8,912	10,107
4,157	5,368	6,608	7,675	8,920	10,108
4,168	5,414	6,611	7,676	8,949	10,111
4,188	5,438	6,623	7,685	8,973	10,112
4,205	5,466	6,627	7,689	8,981	10,114
4,209	5,477	6,650	7,705	9,000	10,125
4,213	5,489	6,657	7,710	9,001	10,127
4,280	5,492	6,659	7,712	9,006	10,128
4,292	5,499	6,677	7,713	9,007	10,129
4,333	5,527	6,697	7,746	9,058	10,130
4,362	5,529	6,704	7,747	9,064	10,131
4,375	5,541	6,729	7,750	9,065	10,132
4,385	5,544	6,743	7,771	9,073	10,133
4,403	5,575	6,772	7,789	9,077	10,134
4,515	5,583	6,773	7,803	9,081	10,135
4,582	5,596	6,819	7,816	9,082	10,136
4,592	5,608	6,820	7,825	9,091	10,142
4,647	5,619	6,842	7,839	9,093	10,144
4,712	5,649	6,881	7,840	9,106	10,145
4,716	5,653	6,889	7,841	9,107	10,154
4,723	5,655	6,891	7,842	9,108	10,157
4,726	5,662	6,892	7,870	9,118	10,193
4,729	5,727	6,907	7,877	9,121	10,202
4,737	5,743	6,918	7,879	9,126	10,214
4,749	5,813	6,931	7,888	9,143	10,215
4,764	5,831	6,952	7,889	9,149	10,216
4,811	5,868	6,958	7,898	9,153	10,217
4,837	5,875	6,959	7,954	9,164	10,219
4,855	5,896	6,963	7,957	9,182	10,220
4,857	5,901	6,984	7,964	9,189	10,221
4,875	5,918	6,994	7,979	9,200	10,222
4,884	5,925	7,013	7,989	9,201	10,223
4,886	5,934	7,019	7,990	9,202	10,225
4,898	5,938	7,055	7,991	9,215	10,228
4,962	5,963	7,056	8,004	9,217	10,230
4,963	5,970	7,107	8,020	9,217	10,232
4,964	5,975	7,119	8,064	9,223	10,235
5,000	5,984	7,121	8,067	9,230	10,236
5,010	6,007	7,131	8,069	9,249	10,237
5,011	6,009	7,221	8,071	9,276	10,238
5,012	6,054	7,242	8,074	9,293	10,241
5,030	6,099	7,256	8,075	9,299	10,242
5,054	6,118	7,292	8,076	9,305	10,243
5,057	6,134	7,313	8,077	9,311	10,247
5,059	6,142	7,315	8,097	9,355	10,256
5,060	6,176	7,317	8,098	9,530	10,258
5,064	6,199	7,355	8,099	9,535	10,260
5,105	6,200	7,370	8,100	9,536	10,264
5,113	6,201	7,373	8,115	9,543	10,267
5,116	6,284	7,384	8,272	9,553	10,272
5,130	6,287	7,418	8,279	9,561	10,275
5,144	6,290	7,430	8,327	9,579	10,282
5,156	6,305	7,432	8,335	9,674	10,283
5,178	6,307	7,447	8,369	9,675	10,285
5,210	6,310	7,448	8,370	9,697	10,286
5,211	6,313	7,495	8,568	9,707	10,288
5,244	6,333	7,501	8,639	9,708	10,293
5,253	6,354	7,503	8,743	9,710	10,294
5,256	6,388	7,558	8,778	9,724	10,300
5,261	6,389	7,559	8,782	9,729	10,301
5,273	6,396	7,584	8,795	9,741	10,303
5,277	6,400	7,585	8,867	9,743	10,308
5,295	6,429	7,586	8,868	9,746	10,310
5,296	6,430	7,588	8,884	9,764	10,311
5,297	6,447	7,599	8,885	9,771	10,312
5,309	6,465	7,601	8,897	9,776	10,314
5,316	6,466	7,607	8,904	9,891	10,315
5,337	6,467	7,652	8,907	10,055	10,316
5,357	6,472	7,658	8,909	10,060	10,317
		7,659			10,318

10,319	10,521	10,727	10,906	11,162	11,471
10,320	10,522	10,730	10,907	11,163	11,473
10,322	10,523	10,732	10,908	11,169	11,474
10,323	10,525	10,735	10,909	11,170	11,477
10,324	10,527	10,738	10,916	11,172	11,478
10,336	10,528	10,739	10,924	11,174	11,481
10,339	10,529	10,741	10,928	11,175	11,482
10,342	10,532	10,744	10,934	11,181	11,496
10,343	10,534	10,751	10,936	11,182	11,498
10,345	10,535	10,757	10,939	11,196	11,507
10,350	10,539	10,758	10,942	11,202	11,529
10,352	10,540	10,759	10,943	11,204	11,534
10,353	10,550	10,771	10,946	11,209	11,540
10,355	10,555	10,774	10,948	11,219	11,543
10,356	10,565	10,789	10,949	11,229	11,547
10,358	10,575	10,792	10,950	11,230	11,549
10,360	10,579	10,797	10,955	11,237	11,550
10,361	10,594	10,801	10,958	11,241	11,551
10,362	10,597	10,810	10,961	11,248	11,552
10,363	10,601	10,811	10,967	11,254	11,553
10,364	10,607	10,812	10,968	11,257	11,564
10,369	10,608	10,814	10,970	11,261	11,568
10,370	10,609	10,815	10,971	11,267	11,569
10,371	10,611	10,816	10,976	11,268	11,572
10,374	10,613	10,817	10,977	11,274	11,579
10,376	10,614	10,818	10,978	11,277	11,581
10,377	10,615	10,819	10,980	11,279	11,582
10,379	10,619	10,820	10,984	11,290	11,583
10,384	10,620	10,825	10,986	11,291	11,584
10,387	10,621	10,826	10,988	11,300	11,587
10,394	10,623	10,830	10,989	11,301	11,590
10,399	10,625	10,835	10,995	11,303	11,592
10,401	10,627	10,836	10,996	11,304	11,594
10,404	10,628	10,838	11,000	11,305	11,603
10,405	10,629	10,840	11,004	11,306	11,604
10,406	10,635	10,841	11,005	11,307	11,605
10,408	10,638	10,842	11,008	11,312	11,606
10,409	10,639	10,845	11,011	11,316	11,607
10,410	10,641	10,846	11,020	11,317	11,608
10,411	10,644	10,847	11,023	11,327	11,611
10,412	10,645	10,849	11,024	11,335	11,615
10,424	10,650	10,852	11,025	11,360	11,616
10,426	10,651	10,857	11,046	11,369	11,619
10,432	10,656	10,858	11,054	11,371	11,624
10,433	10,658	10,859	11,056	11,372	11,628
10,435	10,659	10,864	11,062	11,374	11,630
10,444	10,660	10,873	11,064	11,382	11,634
10,446	10,662	10,878	11,065	11,384	11,640
10,447	10,665	10,879	11,066	11,386	11,642
10,449	10,667	10,880	11,067	11,388	11,655
10,454	10,668	10,881	11,075	11,392	11,660
10,460	10,671	10,882	11,076	11,393	11,664
10,463	10,672	10,883	11,079	11,395	11,668
10,465	10,673	10,885	11,088	11,397	11,670
10,466	10,674	10,886	11,103	11,399	11,681
10,468	10,676	10,887	11,107	11,402	11,695
10,469	10,681	10,888	11,111	11,404	11,697
10,472	10,684	10,889	11,112	11,405	11,698
10,479	10,687	10,890	11,115	11,408	11,701
10,480	10,690	10,891	11,117	11,413	11,702
10,483	10,691	10,892	11,118	11,414	11,704
10,486	10,693	10,894	11,119	11,416	11,705
10,490	10,699	10,895	11,142	11,419	11,706
10,498	10,701	10,897	11,143	11,422	11,707
10,505	10,707	10,898	11,144	11,426	11,716
10,506	10,709	10,899	11,148	11,432	11,717
10,507	10,710	10,900	11,149	11,437	11,718
10,508	10,711	10,901	11,155	11,459	11,720
10,512	10,716	10,902	11,158	11,466	11,721
10,514	10,717	10,903	11,160	11,468	11,722
10,515	10,718	10,904	11,161	11,470	11,739
10,518	10,722	10,905			
	10,724				

11,741	11,797	11,839	11,940	12,094	12,454	12,620
11,742	11,799	11,840	11,943	12,206	12,456	12,622
11,745	11,800	11,841	11,944	12,241	12,457	12,626
11,751	11,801	11,842	11,946	12,250	12,458	12,629
11,752	11,803	11,843	11,947	12,252	12,459	12,637
11,753	11,804	11,844	11,949	12,256	12,460	12,646
11,754	11,805	11,845	11,951	12,261	12,461	12,669
11,755	11,806	11,846	11,952	12,262	12,462	12,670
11,758	11,807	11,852	11,954	12,263	12,464	12,672
11,769	11,808	11,853	11,957	12,264	12,466	12,673
11,771	11,809	11,868	11,958	12,324	12,467	12,676
11,772	11,810	11,883	11,960	12,328	12,468	12,680
11,774	11,811	11,893	11,961	12,329	12,469	12,686
11,778	11,815	11,894	11,962	12,332	12,470	12,688
11,782	11,820	11,908	11,963	12,338	12,471	12,691
11,783	11,824	11,910	11,964	12,341	12,472	12,692
11,784	11,831	11,928	11,965	12,344	12,473	12,694
11,785	11,832	11,929	11,966	12,345	12,474	12,696
11,787	11,834	11,930	11,972	12,405	12,475	12,701
11,788	11,835	11,931	11,976	12,406	12,483	12,703
11,792	11,836	11,934	11,977	12,427	12,581	12,706
11,793	11,837	11,935	11,992	12,445	12,589	12,708
11,795	11,838	11,937	12,004	12,446	12,598	12,711
				12,448	12,605	12,721
				12,449	12,606	12,723
					12,615	12,725
					12,619	12,726

LATE AND LATENT EFFECTS (EXCLUSIVE OF GENETICS)

LATE AND LATENT EFFECTS LISTED ACCORDING TO TYPE OF EFFECT

Decreased Fertility and Altered Sex Ratio (See also the section on genetics)

43	1,353	2,694	3,659	4,124	4,775
58	1,381	2,706	3,674	4,165	4,810
61	1,418	2,744	3,676	4,211	4,816
193	1,421	2,806	3,694	4,212	4,828
264	1,489	2,808	3,748	4,240	4,855
265	1,507	2,824	3,749	4,260	4,869
269	1,517	2,877	3,750	4,268	4,891
274	1,581	2,912	3,751	4,275	4,915
297	1,597	3,039	3,771	4,284	4,919
316	1,598	3,069	3,828	4,289	4,924
327	1,601	3,070	3,851	4,298	4,925
407	1,704	3,072	3,859	4,342	4,928
463	1,709	3,073	3,860	4,354	4,940
491	1,742	3,074	3,863	4,355	4,962
494	1,819	3,077	3,873	4,408	4,976
497	1,854	3,116	3,891	4,410	4,979
502	1,904	3,132	3,894	4,413	4,984
504	1,913	3,203	3,932	4,426	4,993
528	1,927	3,230	3,939	4,446	5,005
545	1,930	3,255	3,941	4,449	5,027
569	1,975	3,265	3,944	4,462	5,030
591	2,027	3,279	3,953	4,472	5,047
605	2,209	3,316	3,954	4,508	5,059
606	2,297	3,352	3,970	4,547	5,081
639	2,299	3,353	3,984	4,608	5,104
787	2,353	3,409	3,988	4,616	5,120
926	2,425	3,410	4,008	4,619	5,130
987	2,426	3,427	4,010	4,621	5,144
1,070	2,462	3,449	4,011	4,634	5,145
1,108	2,484	3,468	4,014	4,636	5,154
1,192	2,505	3,545	4,051	4,637	5,155
1,217	2,508	3,622	4,076	4,644	5,174
1,307	2,516	3,645	4,085	4,681	5,197
1,308	2,545	3,653	4,122	4,682	5,199
1,325	2,570	3,658	4,123	4,702	5,201
1,345	2,685				

5,212	6,266	7,431	8,847	9,846	11,730
5,214	6,281	7,453	8,860	9,857	11,731
5,233	6,310	7,466	8,892	9,859	11,780
5,251	6,321	7,486	8,893	9,899	11,830
5,252	6,354	7,489	8,918	9,902	11,854
5,271	6,385	7,522	8,941	9,926	11,859
5,298	6,386	7,535	8,942	9,928	11,862
5,321	6,431	7,538	8,943	9,935	11,868
5,323	6,475	7,593	9,037	9,936	11,870
5,344	6,494	7,701	9,041	9,951	11,872
5,355	6,534	7,735	9,051	9,957	11,874
5,395	6,566	7,760	9,060	9,982	11,953
5,415	6,591	7,796	9,164	10,045	11,981
5,455	6,646	7,845	9,165	10,056	11,982
5,460	6,647	7,871	9,169	10,057	11,983
5,486	6,648	8,079	9,182	10,094	11,984
5,490	6,650	8,159	9,221	10,096	11,985
5,514	6,661	8,165	9,234	10,100	11,986
5,548	6,666	8,167	9,303	10,123	11,987
5,560	6,671	8,201	9,309	10,277	11,988
5,567	6,716	8,209	9,328	10,292	11,989
5,577	6,739	8,222	9,361	10,305	12,004
5,583	6,740	8,280	9,397	10,313	12,024
5,621	6,751	8,336	9,402	10,338	12,035
5,629	6,778	8,355	9,404	10,399	12,040
5,642	6,799	8,356	9,405	10,457	12,091
5,676	6,808	8,456	9,413	10,509	12,107
5,725	6,855	8,457	9,422	10,575	12,124
5,729	6,861	8,459	9,423	10,667	12,209
5,751	6,882	8,523	9,426	10,759	12,214
5,757	6,893	8,579	9,427	10,760	12,241
5,792	6,899	8,594	9,428	10,823	12,243
5,848	6,906	8,641	9,429	10,835	12,247
5,893	6,938	8,643	9,437	11,261	12,248
5,910	6,983	8,649	9,438	11,265	12,249
5,935	6,991	8,698	9,440	11,331	12,261
5,950	7,013	8,718	9,446	11,364	12,272
5,951	7,027	8,719	9,491	11,521	12,273
5,953	7,033	8,720	9,525	11,522	12,277
5,982	7,034	8,738	9,529	11,542	12,311
5,991	7,076	8,739	9,530	11,570	12,314
6,024	7,079	8,751	9,531	11,578	12,315
6,045	7,142	8,756	9,533	11,599	12,324
6,046	7,281	8,764	9,539	11,614	12,332
6,055	7,290	8,800	9,546	11,723	12,338
6,057	7,300	8,809	9,552	11,725	12,405
6,118	7,325	8,812	9,802	11,727	12,427
6,139	7,327	8,839	9,804	11,728	12,483
6,140	7,419	8,842	9,823	11,729	
6,207	7,427				

LATE AND LATENT EFFECTS (EXCLUSIVE OF GENETICS)

LATE AND LATENT EFFECTS LISTED ACCORDING TO TYPE OF EFFECT

Premature aging, life span shortening or prolongation
(see also specific tissues listed in this main section
on LATE EFFECT) (see also references on mathematical
interpretation of mortality and morbidity under the
main heading THEORETICAL CONSIDERATIONS, etc.)

50	949	1,417	1,788	2,276	2,948
316	1,053	1,418	1,818	2,306	2,953
508	1,263	1,501	1,946	2,556	3,151
654	1,275	1,634	2,099	2,640	3,401
787	1,412	1,670	2,132	2,745	3,565
895	1,415	1,737	2,199	2,909	3,586
					3,609

3,749	6,207	6,961	7,445	8,327	9,530
3,945	6,306	6,973	7,453	8,355	9,531
3,988	6,426	6,982	7,486	8,356	9,534
4,084	6,430	6,983	7,540	8,594	9,541
4,268	6,433	7,040	7,563	8,885	9,706
4,519	6,480	7,117	7,581	8,907	10,054
4,783	6,540	7,122	7,666	8,918	10,182
4,855	6,541	7,123	7,667	8,945	10,189
4,861	6,543	7,213	7,845	8,949	10,483
5,056	6,544	7,247	7,863	8,959	10,508
5,059	6,627	7,253	7,877	9,001	10,692
5,342	6,728	7,275	7,970	9,069	11,345
5,346	6,783	7,292	8,034	9,183	11,937
5,517	6,784	7,294	8,035	9,202	12,211
5,659	6,788	7,302	8,053	9,219	12,241
5,662	6,829	7,337	8,054	9,227	12,272
5,663	6,906	7,366	8,079	9,243	12,276
5,792	6,939	7,427	8,116	9,232	12,324
6,108	6,949	7,433	8,167	9,262	12,332
6,134	6,950	7,442	8,298	9,433	12,334
					12,336
					12,367

LATE AND LATENT EFFECTS (EXCLUSIVE OF GENETICS)

LATE AND LATENT EFFECTS LISTED ACCORDING TO TYPE OF EFFECT

Congenital Defects

4	1,598	4,354	6,318	8,523	11,364
18	1,601	4,634	6,319	8,579	11,521
19	1,695	4,636	6,494	8,583	11,546
28	1,975	4,637	6,648	8,897	11,570
35	2,112	4,726	6,650	8,972	11,580
37	2,209	4,730	6,762	9,037	11,890
39	2,390	5,039	6,799	9,165	11,727
40	2,437	5,047	6,922	9,169	11,747
140	2,486	5,081	7,013	9,309	11,775
230	2,889	5,130	7,124	9,531	11,776
243	2,912	5,144	7,131	9,535	11,777
263	3,116	5,212	7,325	9,541	11,854
373	3,123	5,285	7,465	9,705	11,859
457	3,302	5,311	7,477	9,802	11,874
463	3,347	5,378	7,512	9,804	11,981
504	3,474	5,490	7,538	9,978	11,982
605	3,538	5,738	7,581	10,056	11,983
771	3,622	5,739	7,595	10,123	11,984
787	3,661	5,741	7,992	10,166	11,985
936	3,709	5,744	8,043	10,277	11,986
1,121	3,817	5,752	8,079	10,313	11,987
1,150	3,855	5,753	8,147	10,422	11,988
1,187	3,856	5,754	8,159	10,579	11,989
1,259	3,857	5,757	8,239	10,600	11,997
1,314	3,879	5,767	8,280	10,630	12,033
1,381	3,950	5,841	8,356	10,663	12,040
1,419	3,953	5,950	8,384	10,894	12,091
1,466	4,118	5,951	8,391	10,975	12,099
1,484	4,165	6,055	8,457	11,035	12,344
1,517	4,240	6,299	8,461	11,210	12,491
1,597	4,284	6,303			

LATE AND LATENT EFFECTS

LATE AND LATENT CHANGES LISTED ACCORDING TO TISSUES SHOWING THE MORPHOLOGICAL OR PHYSIOLOGICAL CHANGE

Hematopoietic Tissues and Blood (see also: observations
pertinent to MPE etc. in this section on Late and Latent
Effects)

115	2,932	5,659	7,274	9,021	9,714
832	2,933	5,661	7,317	9,022	9,800
833	2,935	5,921	7,424	9,061	9,802
882	3,115	5,944	7,433	9,081	9,806
909	3,251	5,983	7,445	9,201	9,811
942	3,572	6,193	7,664	9,214	9,820
949	3,625	6,260	7,665	9,243	10,349
966	3,741	6,313	7,693	9,354	10,351
1,205	3,791	6,322	7,705	9,380	10,423
1,489	3,934	6,360	7,707	9,530	10,753
1,607	4,064	6,372	7,781	9,531	11,245
1,670	4,168	6,447	7,880	9,532	11,254
1,682	4,224	6,543	7,989	9,535	11,868
2,167	4,664	6,544	8,035	9,537	12,112
2,199	4,855	6,804	8,043	9,538	12,241
2,397	4,857	7,007	8,191	9,539	12,252
2,428	4,898	7,054	8,238	9,541	12,253
2,497	5,056	7,119	8,279	9,553	12,338
2,620	5,059	7,122	8,305	9,563	12,428
2,741	5,080	7,124	8,332	9,612	12,440
2,830	5,212	7,213	8,345	9,616	12,445
2,861	5,345	7,224	8,356	9,710	12,446
	5,346				12,448
	5,576				12,608
					12,640

LATE AND LATENT EFFECTS

LATE AND LATENT CHANGES LISTED ACCORDING TO TISSUES SHOWING THE MORPHOLOGICAL OR PHYSIOLOGICAL CHANGE

Skin and Appendages

9	1,510	2,666	4,580	6,317	9,344
28	1,520	2,741	4,597	6,429	9,539
316	1,567	2,750	4,740	6,567	9,541
416	1,607	2,809	4,847	6,612	9,553
502	1,682	2,841	4,855	6,615	9,561
567	1,705	2,868	5,009	6,678	9,575
612	1,783	2,875	5,056	6,684	9,733
685	1,847	2,905	5,212	6,784	9,817
696	1,853	2,931	5,346	7,123	9,944
770	1,873	2,943	5,414	7,211	10,386
783	1,874	3,026	5,441	7,315	10,630
853	1,881	3,157	5,498	7,345	10,787
949	1,914	3,257	5,499	7,410	11,626
1,049	1,921	3,386	5,550	7,473	11,631
1,186	1,981	3,514	5,659	7,521	11,868
1,205	2,018	3,599	5,976	7,695	11,878
1,270	2,199	3,684	5,977	7,705	12,039
1,280	2,234	3,914	6,006	7,707	12,082
1,302	2,306	4,018	6,011	7,760	12,189
1,346	2,320	4,056	6,074	7,781	12,199
1,364	2,478	4,238	6,197	8,001	12,218
1,418	2,498	4,241	6,242	8,259	12,266
1,444	2,500	4,360	6,292	8,569	12,443
1,447	2,616	4,375	6,294	8,778	12,444
1,484	2,618	4,407	6,306	8,985	
1,502	2,619	4,480		9,275	

LATE AND LATENT EFFECTS

LATE AND LATENT CHANGES LISTED ACCORDING TO TISSUES SHOWING THE MORPHOLOGICAL OR PHYSIOLOGICAL CHANGE

Bone and Cartilage; Joints

21	2,073	3,600	6,011	8,954	10,879
28	2,143	3,660	6,012	9,022	10,880
97	2,229	3,791	6,013	9,061	10,882
286	2,233	3,827	6,065	9,244	10,892
325	2,359	4,131	6,108	9,541	10,894
415	2,397	4,375	6,135	9,563	10,980
430	2,527	4,403	6,360	9,569	11,042
623	2,593	4,480	6,514	9,710	11,146
765	2,619	4,500	6,648	9,733	11,191
783	2,621	4,694	6,820	9,808	11,211
799	2,640	4,705	6,823	9,811	11,292
862	2,645	4,834	6,892	9,815	11,301
949	2,768	5,176	7,117	10,422	11,306
966	2,904	5,212	7,124	10,452	11,634
1,346	2,905	5,317	7,274	10,549	11,757
1,383	3,115	5,662	7,316	10,597	12,063
1,485	3,151	5,795	7,345	10,600	12,202
1,655	3,251	5,808	7,433	10,662	12,439
1,881	3,534	5,921	7,693	10,846	12,440
1,885	3,565	5,956	7,828	10,847	12,445
1,888	3,567	5,975	8,116	10,878	12,606
		6,006	8,183		

LATE AND LATENT EFFECTS

LATE AND LATENT CHANGES LISTED ACCORDING TO TISSUES SHOWING THE MORPHOLOGICAL OR PHYSIOLOGICAL CHANGE

Exocrine Glands (most references to pancreas are listed with endocrine glands)

949	1,888	9,151	10,168
1,682	3,398	9,541	11,245

LATE AND LATENT EFFECTS

LATE AND LATENT CHANGES LISTED ACCORDING TO TISSUES SHOWING THE MORPHOLOGICAL OR PHYSIOLOGICAL CHANGE

Eyes

569	2,244	4,328	6,234	7,213	9,539
653	2,310	5,056	6,625	7,618	10,116
751	2,424	5,346	6,686	7,707	10,146
752	2,348	5,386	7,015	8,033	11,869
1,026	2,443	5,414	7,016	8,124	12,122
1,078	2,623	5,670	7,017	8,288	12,324
1,202	2,741	5,871	7,018	8,304	12,338
1,483	2,892	5,907	7,060	8,400	12,389
1,818	3,323	6,195	7,144	9,078	12,392
1,881	3,582	6,196			12,683
					12,689

LATE AND LATENT EFFECTS

LATE AND LATENT CHANGES LISTED ACCORDING TO TISSUES SHOWING THE MORPHOLOGICAL OR PHYSIOLOGICAL CHANGE

Respiratory System

570	2,394	3,604	4,837	7,462	9,804
696	2,595	3,741	4,875	7,702	10,135
832	2,674	3,933	6,397	8,795	10,349
949	2,732	4,040	6,769	9,346	10,927
960	2,765	4,292	7,274	9,530	11,518
1,682	2,945	4,385	7,345	9,536	11,636
1,881	3,051	4,500	7,424	9,541	11,851
2,359	3,198				

LATE AND LATENT EFFECTS

LATE AND LATENT CHANGES LISTED ACCORDING TO TISSUES SHOWING THE MORPHOLOGICAL OR PHYSIOLOGICAL CHANGE

Endocrine Glands

24	1,102	2,667	6,248	8,982	10,572
221	1,217	2,684	6,677	9,541	10,590
378	1,501	3,590	6,736	9,707	11,100
741	1,682	3,653	7,155	9,742	11,205
826	2,108	4,586	7,432	9,777	11,679
949	2,276	5,346	7,970	10,127	11,868
1,034	2,419	5,423	7,995	10,381	12,400

LATE AND LATENT EFFECTS

LATE AND LATENT CHANGES LISTED ACCORDING TO TISSUES SHOWING THE MORPHOLOGICAL OR PHYSIOLOGICAL CHANGE

Reproductive System

809	1,474	2,618	5,030	7,274	9,533
941	1,489	2,619	5,059	7,327	9,539
949	1,682	3,116	5,096	8,116	9,541
987	1,783	3,828	5,346	8,356	9,552
1,026	1,852	4,547	5,577	8,918	9,577
1,108	1,854	4,565	5,751	9,151	9,804
1,217	1,923	4,900	5,993	9,202	11,725
1,307	2,322	4,946	6,716	9,530	12,241
1,308	2,373	4,984	6,778	9,531	12,324
1,385					

LATE AND LATENT EFFECT

LATE AND LATENT CHANGES LISTED ACCORDING TO TISSUES SHOWING THE MORPHOLOGICAL OR PHYSIOLOGICAL CHANGE

Liver

832	2,288	3,830	6,787	8,116	9,806
949	3,151	5,398	6,954	8,985	10,757
1,426	3,297	5,810	7,117	9,151	10,920
1,682	3,360	6,514	7,119	9,243	11,245
1,833	3,374	6,566	7,214	9,541	11,254
1,881	3,741	6,780	7,820	9,714	11,334
2,183					11,384

LATE AND LATENT EFFECTS

LATE AND LATENT CHANGES LISTED ACCORDING TO TISSUES SHOWING THE MORPHOLOGICAL OR PHYSIOLOGICAL CHANGE

Connective Tissue

832	1,981	3,609	5,929	8,116	9,818
949	2,018	3,830	7,414	8,569	9,944
1,184	2,765	4,807	7,695	9,243	10,549
1,575	2,809	5,225	7,970	9,541	11,626
1,881		5,414			

LATE AND LATENT EFFECTS

LATE AND LATENT CHANGES LISTED ACCORDING TO TISSUES SHOWING THE MORPHOLOGICAL OR PHYSIOLOGICAL CHANGE

Circulatory System (Blood and Lymph)

94	2,018	3,604	5,346	7,695	9,714
159	2,199	3,609	5,550	7,760	9,733
804	2,443	3,808	5,659	7,970	9,742
949	2,666	4,056	6,317	8,290	9,800
1,154	2,809	4,597	7,274	8,308	10,549
1,187	2,870	4,654	7,345	9,075	11,063
1,444	2,943	4,769	7,351	9,151	11,790
1,575	2,975	4,807	7,359	9,342	12,189
1,874	3,297	4,873	7,363	9,541	12,218
1,881		4,877	7,473		
1,923					

LATE AND LATENT EFFECTS

LATE AND LATENT CHANGES LISTED ACCORDING TO TISSUES SHOWING THE MORPHOLOGICAL OR PHYSIOLOGICAL CHANGE

Gastrointestinal System

16	1,851	2,611	4,890	7,130	8,985
464	1,865	2,618	4,946	7,212	9,271
783	1,881	2,619	5,282	7,274	9,553
949	1,979	3,026	5,983	8,308	9,563
1,682	2,400	4,809	6,053	8,963	12,351
1,783	2,500				

LATE AND LATENT EFFECTS

LATE AND LATENT CHANGES LISTED ACCORDING TO TISSUES SHOWING THE MORPHOLOGICAL OR PHYSIOLOGICAL CHANGE

Nervous System

316	2,347	4,705	6,345	6,568	9,335
637	2,732	4,748	6,346	6,614	9,541
810	2,975	4,902	6,393	6,615	9,575
1,097	3,685	5,332	6,435	6,764	9,816
1,187	3,701	6,183	6,455	7,136	11,389
1,900	3,914	6,219	6,488	7,759	11,869
1,922	4,091	6,231			12,088

LATE AND LATENT EFFECTS

LATE AND LATENT CHANGES LISTED ACCORDING TO TISSUES SHOWING THE MORPHOLOGICAL OR PHYSIOLOGICAL CHANGE

Urinary Tract

94	1,315	3,047	5,808	8,116	9,433
118	1,783	3,209	5,832	8,427	9,541
159	1,881	3,808	7,274	8,522	9,553
576	2,199	3,609	7,328	9,075	9,733
804	2,301	4,381	7,359	9,151	9,806
949	2,618	4,382	7,666	9,243	10,163
1,111	2,619	5,346	7,863	9,342	10,504
1,154	2,870	5,662	7,970		

LATE AND LATENT EFFECTS

LATE AND LATENT CHANGES LISTED ACCORDING TO TISSUES SHOWING THE MORPHOLOGICAL OR PHYSIOLOGICAL CHANGE

Reticulo-Endothelial System

2,183	4,224	8,116	9,714	11,233
3,741	7,424	8,279	10,920	

RADIATION EFFECTS ON VIRUSES AND BACTERIOPHAGES

Comparison of Effects of Ionizing Radiation with Effects of Non-Ionizing Radiation or Other Chemical or Physical Agents

1122	3211	4714	6101	7260	10,770
2040	4162	5166	6330	8366	12,384
2791	4427	5411	7226	10,564	

Activation

1249	2881	4756	8276	10,564	12,208
2040	4082	4991	10,354	10,702	12,288
2791	4083				

Inactivation, Altered Latent Period and Lethal Effects

744	2791	4428	5384	6756	8366
877	2862	4434	5411	6789	8869
910	2881	4442	5416	6989	9032
911	2882	4498	5443	7028	9869
912	3045	4533	5480	7063	10,075
995	3211	4554	5605	7116	10,531
1036	3505	4639	5669	7161	10,557
1062	3507	4653	5714	7226	10,564
1122	3705	4663	5745	7260	10,582
1491	3997	4714	5979	7295	10,723
1504	4029	4720	5999	7597	10,770
1653	4170	4778	6101	7654	11,006
1681	4175	4960	6137	7660	11,457
1800	4200	4961	6154	7745	11,802
1864	4258	5084	6267	7748	12,372
1948	4281	5124	6330	7890	12,384
2339	4282	5159	6413	7980	12,486
2548	4351	5166	6420	7984	12,489
2551	4427				12,490

Change in Growth Rate; Infectivity

521	3045	4128	5166	8600	11,457
1243	3377	4842	5572	9032	12,307
2339	4021	5084	7226		
2882					

Change in Antigenic or Toxic Properties; Pathogenicity

521	2882	4128	4434	5084	7161
602	3377	4170	4598	5411	7581
1504	3866	4258	4842	5572	7748
2339	3997	4281	4960	5605	10,564
2719	4021	4429	4961	7116	12,384
2862					
2881					

RADIATION EFFECTS ON BACTERIA AND UNICELLULAR PLANTS

BACTERIA

Comparison of Effects of Ionizing Radiation with Effects of Non-Ionizing Radiation or Other Chemical or Physical Agents

1243	3243	5040	6863	8125	8519
1635	3438	5051	7546	8133	8724
2040	4319	5097	7625	8143	8771
2077	4746	5237	7721	8144	9141
2355	4813	5238	7853	8366	10,770
2472	4910	6049	7904	8484	12,159
2722	4959	6295	7911		

Effects on Cell or Colony Morphology

84	3740	4412	5286	6742	7904
1324	3772	4488	5456	6962	7929
1577	4062	4630	5968	7092	7984
2680	4171	4813	6137	7551	7986
3091	4192	4997	6295	7680	8219
3507	4319	5179	6480	7738	8521
					12,221

Effects on Cell Division and Growth lethal effects

6	1100	2746	4734	5749	7468
22	1122	2779	4746	5761	7546
64	1159	2898	4751	5776	7551
65	1166	3036	4791	5803	7564
66	1249	3046	4801	5804	7579
103	1266	3091	4910	5821	7603
146	1276	3112	4959	5869	7612
181	1317	3158	4997	5898	7629
245	1324	3240	4998	5922	7680
249	1358	3274	5040	5932	7715
254	1392	3470	5065	5943	7717
336	1401	3494	5097	5962	7718
342	1403	3505	5146	5979	7763
349	1467	3506	5164	5985	7769
387	1470	3551	5180	5995	7772
388	1475	3611	5288	6032	7804
394	1528	3668	5335	6049	7812
401	1557	3669	5336	6137	7818
413	1570	3705	5349	6235	7819
432	1588	3740	5358	6375	7853
449	1593	3756	5369	6480	7865
472	1642	3816	5436	6509	7866
477	1723	3833	5444	6545	7867
505	1766	3852	5461	6585	7894
513	1774	3853	5495	6742	7895
555	1953	3866	5500	6782	7897
577	2028	4146	5515	6820	7904
582	2040	4149	5524	6827	7911
641	2077	4171	5526	6843	7912
673	2120	4228	5559	6863	7932
706	2142	4313	5562	6879	7955
713	2211	4321	5593	6886	7962
806	2263	4331	5645	6900	7963
872	2285	4412	5667	6935	7984
877	2401	4430	5671	7046	7985
889	2432	4431	5683	7092	7986
925	2472	4437	5685	7160	7996
943	2491	4439	5686	7174	8005
953	2576	4443	5704	7196	8012
1036	2580	4488	5710	7378	8015
1081	2653	4491	5742	7441	8044
1082	2680	4630	5748	7443	8045

8048	8270	8546	9141	9910	11,802
8089	8282	8568	9197	9953	11,836
8118	8290	8590	9250	10,043	11,841
8122	8324	8601	9288	10,067	11,919
8125	8339	8608	9447	10,533	11,975
8129	8344	8632	9509	10,543	12,032
8130	8349	8837	9542	10,546	12,096
8131	8350	8857	9569	10,596	12,133
8133	8351	8871	9807	10,747	12,154
8142	8365	8878	9822	10,844	12,155
8143	8366	8888	9862	11,058	12,221
8144	8373	9009	9869	11,258	12,242
8157	8401	9013	9870	11,296	12,381
8184	8484	9014	9897	11,693	12,647
8219	8489	9017	9903	11,713	12,700
8247	8519				

non-lethal effects

1233	4171	6782	7967	8365	9890
1324	4259	7223	7984	8463	10,663
2077	4734	7443	7986	8608	12,221
2253	4793	7551	8089	8935	12,225
2285	5051	7575	8131	9358	12,243
2291	5671	7629	8219	9435	12,381
2431	5710	7640	8270	9870	12,452
2832	6137	7680	8324		
	6480	7895			
		7929			

RADIATION EFFECTS ON BACTERIA AND UNICELLULAR PLANTS

BACTERIA

Effects on Cellular Respiration and Cellular Metabolism
in General (see also section on Biochemical Effects)

423	1941	4192	5349	6850	9569
677	2196	4259	5481	8365	9910
1171	2680	4793	5932	8590	11,058
1219	2722	5286	6491	8771	12,452
1635					

Effect on Antigenic and Toxic Properties; Pathogenicity

27	2558	3852	4630	5776	8475
398	2559	4061	4997	5869	10,844
531	2569	4081	5051	5924	11,975
1082	2722	4319	5369	5979	12,108
1448	2832	4324	5456	7482	12,109
1577	3495	4412	5542	7641	12,181
2431	3496	4436	5704	7967	12,190
2432	3649	4485	5746	8324	12,276
2494					

Biochemical Effects
change in metabolites or growth factors required

102	2298	2780	5065	5985	8253
900	2355	4750	5164	6709	8878
1243	2432	4905	5179	6721	9953
1448	2569	4936	5237	7106	12,242
2077	2722	5028	5286	7721	12,276

change in nucleic acids or amino acids

1291	2680	5803	7625	8090	12,207
2150	4936	6826	7726	8366	12,225
2232	5663	7205	7862	8967	

effects on enzymes or synthetic processes (see also: effects on luminescence)

423	4192	6826	8365	9862	10,683
624	5369	6850	8590	9889	11,295
1221	5515	7904	8771	9993	12,452
1249	6721	8219	8878	10,031	

change in ability to support virus or phage growth

1243	4770	5084	10,704	12,208	
1249	5040	7721	10,723	12,288	

effects on permeability or cell surface chemistry

3240	3757	8401	12,117		
3740	7996	12,032			

nitrogen fixation

102	336	4259	8219	8587	10,031
181	3921	4998	8472	10,010	

RADIATION EFFECTS ON BACTERIA AND UNICELLULAR PLANTS

UNICELLULAR PLANTS OTHER THAN BACTERIA

Comparison of Effects of Ionizing Radiation with Effects of Non-Ionizing Radiation or Other Chemical or Physical Agents

84	3182	4835	7777	11,830	luminescence
87	3191	4971	8082	12,159	
348	3214	4980	8133	12,279	423
359	3331	5006	8741		2820
772	3397	5075	8801		5515
900	3526	5147	9352		5789
902	3527	5195	9364		8521
1132	3716	5249	9511		10,683
1396	3862	5264	9637		
2004	3940	5626	9791		
2040	3973	5870	9947		
2636	4017	6158	9983		
2643	4458	6510	10,016		
2792	4629	6555	10,020		
2923	4704	6580	10,039		
3138	4759	7721	10,148		

Effects on Cell Division and Growth
lethal effects

177	5481	9946
321	5539	9947
359	5562	10,003
673	5610	10,030
683	5671	10,040
714	5683	10,770
772	5719	10,796
774	5812	10,844
869	5821	11,280
947	5838	11,841
1036	5858	11,923
1151	5870	12,119
1324	5885	12,159
1352	5928	12,167
1396	6052	12,179
1467	6085	12,279
1528	6480	12,289
1557	6545	12,348
1657	6555	12,426
2011	6585	12,614
2040	6727	12,647
2162	6898	12,700
2283	6971	
2303	6978	
2324	6986	
2680	7093	
2683	7099	
2713	7148	
2790	7255	
2792	7354	
2923	7380	
3036	7657	
3159	7812	
3182	7813	
3191	7900	
3256	7931	
3294	8082	
3318	8100	
3331	8256	
3397	8297	
3431	8337	
3500	8650	
3527	8699	
3635	8724	
3717	8730	
3775	8844	
3940	8857	
4037	8871	
4128	8878	
4193	8947	
4303	9241	
4450	9447	
4491	9450	
4704	9461	
4751	9484	
4763	9487	
4835	9513	
4836	9514	
4929	9525	
4971	9602	
5087	9620	
5107	9791	
5119	9822	
5147	9845	
5322	9872	
5349	9897	
5370	9898	
5396	9941	
5421	9945	

non-lethal
effects

177	4185	8590
321	4193	8616
337	4303	8699
359	4715	8730
449	4751	8741
472	4763	8805
564	4771	8844
674	4835	8947
762	4971	9352
772	5083	9452
947	5349	9483
1036	5370	9486
1324	5396	9511
1422	5481	9603
1429	5539	9637
1528	5584	9873
1941	5626	9885
2004	5628	9890
2040	5671	9897
2166	5734	9898
2683	5838	9941
2790	5864	9947
3036	5885	9991
3099	5915	10,006
3182	6036	10,039
3191	6085	10,043
3214	6545	10,044
3318	6580	10,066
3331	6727	10,173
3393	6978	10,643
3397	7148	10,844
3500	7223	11,923
3527	7255	12,289
3575	7549	12,348
3635	7657	12,426
3655	7692	12,452
3720	7900	12,513
3734	8049	
3775	8314	
4017	8316	
4128		

Effects on Cell Respiration
(see also: Biochemical Effects)

87	8049
2680	8316
3396	8616
3973	8640
4017	8771
5349	9876
5424	9910
6156	10,030
6480	10,072
6491	10,093
6731	12,167
6850	12,280
7372	12,289
7777	12,452

Effects on Reproduction

137	3734	9898
160	3940	9947
176	3973	9994
177	4193	10,006
353	4629	10,020
449	4721	10,039
674	5119	10,041
683	5671	10,044
1036	5915	10,093
1115	6036	11,923
1411	7817	12,279
1429	8616	12,289
3099	9784	
3294	9885	
3397	9895	

Effects on Antigenic and

Toxic Properties; Pathogenicity

337	3575	5915
1654	3949	6024
1872	4721	6036
2790	4802	7805
2792	4803	8724
3393		

Effects on Cell or Colony Morphology

47	3575	7817
131	3655	8520
353	3673	8658
674	3716	8730
714	3720	8797
977	3734	9258
1218	3862	9450
1227	3920	9493
1324	3940	9637
1396	4193	9885
1557	4629	9898
1654	4715	9909
1872	4752	9947
1878	4771	9994
2008	5024	10,002
2059	5075	10,020
2166	5119	10,030
2510	5172	10,034
2644	5197	10,038
2680	5232	10,041
2683	5247	10,044
2792	5249	10,046
2923	5264	11,594
3035	5838	12,064
3214	6036	12,167
3243	6085	12,279
3294	6158	12,289
3397	6480	12,380
3423	6555	12,426
3526	7777	

Biochemical Effects

change in metabolites or growth factors required

939	5006	8907
1528	5028	9364
1787	5119	9389
2006	5396	9425
2141	5730	9493
2564	5870	9603
2636	6064	9791
4447	6079	9872
4460	6186	10,028
4660	6489	10,038
4709	6580	10,148
4752	6626	10,643
4759	7718	12,251
4923	7777	12,289
4941		

change in nucleic acids

3397	6112	9947
4835	6428	12,289
5421	7979	

change in chemical composition, including vitamin content, lipids, etc.

177	5626	8520
772	5663	8593
2141	6112	9455
3138	6866	12,289
3920	7777	12,623
5424		

effect on enzymes and synthetic processes, including antibiotic production (see next section also)

160	5083	8771
353	5190	8801
423	5196	9133
656	5247	9162
917	5265	9455
939	5278	9456
1115	5734	9624
1654	5902	9791
1941	5915	9810
2004	6112	9993
2318	6156	10,002
2644	6186	10,030
2792	6489	10,034
3035	6731	10,040
3397	6850	10,093
4721	6866	10,805
4802	7738	12,217
4803	7777	12,289
4941	7817	
5014	8590	
5075	8746	

effects on metabolic activity generally

423	5396	9389
656	5424	9425
939	5730	9493
1528	5769	9603
1787	5870	9791
1941	6064	9872
2006	6079	10,000
2564	6112	10,016
2636	6186	10,028
3396	6480	10,038
3498	6489	10,039
3920	6580	10,046
4447	6626	10,093
4660	6731	10,148
4709	7202	10,173
4752	7718	10,643
4759	7777	12,167
4771	8049	12,251
4923	8316	12,280
4941	8590	12,289
5006	8816	12,348
5028	8907	12,383
5119	9364	

effects on fermentation

131	4693	9889
148	5424	9947
2318	5481	9993
2644	5882	9994
3035	7777	10,035
3367	8468	10,039
3397	8485	10,844
3862	8590	12,280
3920	8664	12,289
3940	9637	12,452
4092	9814	12,514
4692	9876	

effects on cell permeability; cell membrane

348	5147	10,063
353	5734	10,064
656	6471	10,093
2510	9241	12,280
3397	9345	12,289
4185	9885	12,383

effects on cell viscosity

3823	4715
4172	6471
4458	12,148
4536	

RADIATION EFFECTS ON MULTICELLULAR PLANTS

MORPHOLOGICAL CHANGES IN MULTICELLULAR PLANTS

Comparison of Effects of Ionizing Radiation with Effects of
Non-Ionizing Radiation or Other Physical or Chemical Agents

365	4295	5459	8733	9353	10,024
1038	4302	6208	8770	9634	10,079
2354	4525	6249	8772	9831	10,086
3149	4708	6255	8785	9833	10,773
3177	4805	6276	8804	9859	11,003
3201	5069	6320	8808	9863	11,920
3292	5101	6563	8818	9867	12,013
3577	5218	6694	8848	9960	12,284
3631	5236	6699	8853	9962	12,387
3939	5269	7097	8917	9964	12,417
4033	5324	8644	8966	10,016	12,432
4201	5432	8682	9145		

Changes in Cells Generally
chromosome aberrations (see also section on genetics)

293	2384	4326	5604	8086	8902
305	2393	4334	5674	8226	8917
363	2433	4353	5676	8228	8969
367	2435	4356	5677	8236	9057
494	2436	4405	5681	8242	9062
581	2441	4406	5735	8265	9145
616	2467	4459	5777	8346	9155
619	2470	4486	5785	8347	9168
621	2480	4499	5786	8358	9188
622	2505	4501	5884	8368	9191
634	2544	4502	5904	8531	9192
712	2545	4525	5954	8641	9193
715	2565	4535	5986	8645	9194
739	2576	4555	6059	8646	9195
784	2587	4556	6060	8657	9198
847	2602	4557	6077	8660	9360
881	2646	4560	6105	8662	9365
943	2682	4569	6110	8669	9366
1046	2829	4570	6121	8676	9367
1069	2865	4587	6138	8678	9368
1114	2880	4601	6157	8689	9369
1162	2894	4625	6208	8690	9370
1191	2916	4669	6238	8693	9381
1200	3093	4683	6239	8695	9390
1240	3149	4689	6240	8696	9399
1258	3201	4698	6249	8700	9400
1274	3202	4707	6250	8702	9401
1361	3276	4708	6253	8705	9402
1390	3382	4710	6320	8706	9404
1408	3407	4730	6362	8707	9405
1486	3430	4742	6378	8708	9406
1522	3451	4805	6380	8709	9407
1531	3452	4822	6421	8710	9409
1570	3519	4824	6452	8712	9412
1588	3542	4854	6487	8713	9423
1692	3613	4895	6563	8714	9424
1694	3614	4903	6655	8715	9426
1717	3667	4912	6666	8716	9437
1775	3672	4922	6669	8717	9438
1789	3699	4968	6673	8719	9440
1791	3731	4973	6674	8731	9441
1794	3732	4974	6694	8742	9442
1817	3764	5003	6706	8745	9444
1841	3765	5004	6746	8751	9449
1842	3768	5053	6809	8756	9488
1870	3800	5076	6890	8759	9489
1936	3840	5101	6913	8765	9490
1957	3861	5110	6966	8770	9559
1959	3891	5161	6991	8785	9564
1963	3923	5169	7008	8789	9568
2048	3924	5182	7032	8791	9604
2066	3937	5236	7067	8792	9622
2079	3939	5303	7080	8796	9626
2096	3982	5304	7097	8800	9627
2100	3983	5305	7160	8802	9630
2110	3999	5307	7181	8803	9632
2111	4048	5324	7195	8805	9715
2114	4057	5371	7297	8812	9795
2134	4087	5393	7362	8813	9823
2151	4151	5404	7435	8818	9828
2201	4152	5410	7441	8822	9830
2232	4173	5412	7451	8823	9832
2257	4176	5432	7463	8829	9834
2259	4201	5445	7489	8831	9838
2267	4210	5458	7582	8841	9841
2321	4212	5459	7644	8847	9842
2331	4232	5460	7757	8849	9848
2353	4234	5506	7846	8859	9849
2354	4295	5535	7875		9850

9851	9907	9964	10,082	11,293	12,320
9852	9908	9988	10,088	11,341	12,321
9853	9918	9990	10,092	11,691	12,349
9856	9925	9992	10,100	11,888	12,387
9858	9938	10,024	10,764	11,921	12,406
9859	9940	10,045	10,767	12,027	12,415
9863	9948	10,047	10,833	12,246	12,417
9864	9951	10,048	11,003	12,274	12,424
9901	9956	10,076	11,150	12,284	12,432
9902	9960	10,077			
9905	9962	10,078			
9906	9963	10,079			

Changes in Cells Generally
nucleus (including ploidy) and nucleolus (other than
chromosomes per se)

5	3365	3936	5218	9395	9850
365	3440	4176	8242	9402	9859
519	3497	4201	8668	9404	9860
715	3606	4210	8715	9416	9925
1657	3711	4230	8716	9424	10,024
1992	3732	4334	8719	9436	10,074
2259	3762	4406	9198	9451	10,748
2264	3768	4867	9323	9478	11,691
2545	3923	4981	9366	9848	12,121
2587	3924	4987			

cytoplasm

5	8716
405	9323
846	9626
1322	9988
1657	10,024
1769	10,042
3606	10,049
3803	11,691
4230	12,104
4797	12,121
8644	12,148

Changes in Reproductive Cells and Tissues

2	3743	4682
1011	3762	5371
1117	3802	5549
1360	4016	5920
1769	4295	6308
3501	4311	8765
3542	4344	10,085
3613	4560	10,087
3618	4644	11,888
3715	4681	12,274
3730		

Changes in Seeds

25	4130	5960
563	4212	6603
779	4822	8171
1068	5015	8765
1117	5186	8903
1177	5233	9041
1361	5377	10,018
3180	5445	10,087
3295		

Changes in Seedlings

105	2706	3873	4702	6969	9190
178	3097	3874	4800	6991	9240
322	3178	3923	4804	7080	9397
356	3179	3926	5004	7381	9414
357	3180	3927	5194	7449	9421
363	3181	3937	5334	7519	9478
386	3193	3964	5445	7868	9510
425	3242	4092	5535	8185	9565
523	3332	4100	5536	8490	9569
563	3383	4229	5602	8510	9604
579	3394	4302	5675	8663	9621
638	3395	4317	5682	8725	9826
701	3411	4320	5802	8734	9868
779	3525	4331	6023	8796	9884
796	3577	4340	6122	8804	9930
845	3605	4462	6255	8809	10,018
847	3606	4465	6298	8828	10,091
1045	3614	4501	6308	8835	11,548
1068	3615	4587	6387	8842	11,904
1069	3656	4601	6484	8870	11,920
1993	3657	4643	6547	8892	12,104
2306	3667	4669	6669	8966	12,121
2321	3711	4679	6730	9039	12,387
2687	3872	4696	6890		

Changes in Mature Plants

83	3541	4587	7053	8685	9359
147	3542	4648	7140	8687	9402
202	3656	4657	7684	8691	9403
297	3664	4678	7711	8710	9416
350	3711	4775	7958	8711	9417
395	3714	4799	8021	8719	9419
405	3719	4832	8120	8723	9422
494	3731	4904	8174	8725	9423
519	3758	4981	8230	8735	9446
701	3840	4982	8233	8737	9447
796	3859	4998	8234	8747	9521
846	3873	5015	8236	8748	9523
898	3875	5027	8237	8752	9529
998	3891	5069	8241	8753	9569
1045	3897	5086	8382	8754	9628
1454	3926	5235	8490	8757	9780
1492	3941	5248	8502	8762	9860
1817	4016	5269	8531	8766	9881
1878	4033	5304	8585	8767	9922
1993	4059	5306	8586	8768	9935
2051	4104	5460	8607	8772	9937
2257	4108	5543	8619	8781	9957
2267	4121	5899	8643	8788	9989
2447	4123	5927	8652	8808	10,012
2512	4163	5952	8653	8810	10,029
2538	4187	5960	8654	8814	10,073
2545	4210	6002	8661	8819	10,078
2714	4229	6021	8662	8821	10,085
2874	4260	6121	8665	8826	10,087
2895	4261	6143	8667	8836	10,089
2997	4262	6145	8671	8842	10,094
3058	4275	6478	8673	8850	10,098
3174	4305	6603	8674	8853	10,773
3255	4316	6629	8675	8854	11,548
3292	4318	6699	8679	8855	11,920
3411	4344	6864	8680	9048	12,418
3412	4394	6865	8681	9199	12,639
3429	4440	6873	8684	9289	

RADIATION EFFECTS ON MULTICELLULAR PLANTS

PHYSIOLOGICAL CHANGES IN MULTICELLULAR PLANTS

Comparison of Effects of Ionizing Radiation with Effects
of Non-Ionizing Radiation or Other Physical or Chemical Agents.

1693	4086	5352	6725	9379	10,004
1819	4099	5459	7885	9394	10,016
2802	4183	6022	8443	9440	10,026
2829	4202	6023	8510	9523	10,032
3242	4708	6034	8538	9625	10,071
3496	4908	6058	8820	9833	10,248
3577	5049	6255	9190	9867	10,773
3769	5050	6699	9377	9919	11,086
					12,387

Effects on Cells Generally

5	3382	4331	6571	8773	9883
100	3407	4340	6600	8824	9931
356	3497	4445	6694	8856	9984
367	3613	4797	7140	8859	9988
405	3699	4867	7435	8902	10,013
847	3847	4904	7684	9372	10,017
1059	3858	5085	7770	9622	10,049
1442	3861	5170	7786	9633	10,073
1443	3896	5300	7951	9799	10,080
1657	3924	5301	7958	9803	10,099
1775	3941	5324	8221	9805	10,541
1817	4120	5459	8226	9851	11,625
2134	4212	5954	8372	9855	12,148
2201	4274	6138	8557	9861	12,180
2837	4275	6308	8619	9882	12,523
3098	4288	6553			

Effects on Reproduction and Fertility (see also; section on genetics)

2	2562	3860	5323	8764	10,049
297	3255	3868	5415	8809	10,059
364	3292	4016	5460	9361	10,080
520	3385	4344	5920	9373	10,095
701	3394	4392	6308	9413	10,096
880	3440	4587	7076	9426	10,097
955	3715	4644	8139	9427	10,100
1806	3730	4683	8643	9846	11,362
1819	3731	4686	8698	9859	11,888
2155	3743	4867	8738	9926	12,274
2232	3775	5269	8756	9936	12,321
2505	3847	5300			

Effects on Seeds

174	1740	2850	3529	4184	5153
197	1819	2883	3616	4227	5186
199	1936	2946	3666	4275	5239
200	2003	3078	3692	4404	5287
349	2191	3097	3715	4441	5302
482	2296	3136	3731	4462	5307
520	2331	3174	3805	4522	5436
779	2352	3192	3831	4534	5481
847	2388	3242	3898	4537	5584
1046	2401	3244	3924	4560	5602
1069	2434	3256	3925	4587	5621
1177	2453	3295	3941	4669	5899
1361	2555	3305	4015	4772	6023
1443	2576	3306	4086	4904	6130
1693	2657	3330	4090	4952	6387
1721	2687	3417	4130	5050	6571
1723	2776	3499	4156	5122	6603

6725	7885	8557	8903	9569	10,027
6809	7951	8585	9039	9625	10,032
6864	8087	8588	9041	9867	10,036
6865	8139	8606	9188	9882	10,058
6945	8177	8607	9190	9884	10,071
6965	8316	8663	9323	9893	10,090
6968	8374	8676	9374	9904	10,091
6991	8441	8722	9394	9914	10,101
7076	8443	8729	9411	9917	10,777
7080	8516	8736	9423	9924	10,844
7348	8537	8809	9431	9989	11,691
7464	8538	8825	9435	10,018	11,920
7556	8539	8846	9437	10,023	12,274
7557	8549	8856	9510	10,026	12,321
7811					

Effects on Seedlings

89	2210	3657	5302	8374	9565
178	2255	3667	5758	8406	9621
197	2281	3699	5785	8441	9805
320	2306	3769	6022	8510	9826
351	2321	3773	6050	8659	9855
358	2330	3804	6380	8697	9868
366	2555	3805	6600	8722	9875
380	2776	3873	6730	8726	9930
523	2896	3898	6801	8751	10,004
545	3097	3925	6969	8779	10,018
563	3192	3928	7034	8786	10,036
604	3356	4119	7188	8793	10,541
638	3366	4159	7282	8804	11,350
767	3394	4316	7318	8815	11,353
779	3434	4317	7436	8846	11,904
845	3499	4349	7516	9095	12,180
1443	3525	4642	7519	9240	12,281
1678	3528	4643	7534	9377	12,287
1694	3577	4987	7868	9414	12,294
1771	3590	5049	8078	9459	12,319
1956	3615	5085	8183	9462	12,434
1993	3616	5191	8185	9510	

Effects on Growth, Development, Regeneration and Repair

31	395	1443	2198	2896	3366
83	425	1514	2210	2983	3383
89	520	1570	2257	2993	3385
104	523	1588	2267	2997	3394
105	545	1613	2281	3022	3395
147	556	1678	2306	3059	3411
174	563	1694	2321	3079	3434
198	579	1721	2330	3097	3497
199	604	1723	2353	3133	3501
200	634	1740	2434	3136	3525
201	638	1771	2453	3178	3528
268	701	1806	2531	3179	3529
282	721	1846	2538	3181	3541
283	779	1936	2545	3192	3577
320	863	1956	2555	3242	3590
349	883	1967	2576	3244	3605
350	898	2029	2609	3245	3615
357	931	2051	2683	3255	3631
358	955	2057	2724	3293	3667
363	1046	2096	2776	3330	3699
364	1082	2110	2777	3332	3713
366	1101	2111	2802	3355	3718
380	1171	2149	2874	3356	3733
386	1239	2191	2883	3365	3769

3775	5004	6699	8441	9140	9930
3805	5049	6730	8490	9144	9935
3831	5086	6801	8502	9188	9942
3861	5122	6825	8510	9190	9965
3868	5126	6864	8511	9233	9986
3871	5191	6865	8512	9240	9987
3873	5193	6923	8516	9287	9989
3875	5235	6965	8539	9323	9998
3876	5239	6969	8573	9351	10,004
3897	5248	6970	8585	9361	10,009
3898	5268	6979	8586	9372	10,011
3927	5269	6991	8607	9373	10,012
3928	5302	7026	8613	9377	10,018
3964	5306	7034	8659	9379	10,026
3978	5334	7115	8662	9385	10,029
4015	5352	7188	8663	9394	10,032
4016	5415	7273	8667	9399	10,059
4119	5436	7318	8685	9417	10,065
4138	5481	7381	8694	9423	10,068
4159	5535	7427	8697	9431	10,069
4184	5536	7436	8711	9432	10,070
4201	5543	7449	8734	9435	10,083
4229	5549	7516	8748	9437	10,087
4262	5602	7519	8768	9438	10,089
4274	5623	7534	8776	9439	10,090
4275	5675	7545	8777	9446	10,097
4302	5785	7634	8779	9457	10,541
4305	5786	7811	8780	9459	10,773
4316	5801	8078	8781	9462	10,777
4317	5802	8101	8793	9478	11,362
4318	5837	8174	8794	9550	11,548
4320	5952	8182	8802	9628	11,691
4349	5960	8185	8804	9631	11,920
4350	5961	8221	8808	9634	12,013
4404	5969	8223	8809	9793	12,027
4462	6002	8229	8815	9826	12,166
4464	6021	8230	8820	9831	12,180
4584	6022	8231	8824	9855	12,274
4642	6024	8232	8826	9867	12,281
4643	6034	8233	8828	9868	12,294
4644	6050	8234	8834	9871	12,319
4679	6077	8240	8836	9877	12,380
4695	6130	8241	8843	9884	12,387
4772	6145	8323	8846	9886	12,417
4795	6208	8358	8850	9887	12,419
4796	6210	8371	8852	9888	12,434
4804	6285	8374	8854	9893	12,639
4818	6308	8382	8855	9903	
4832	6387	8392	8856	9904	
4904	6478	8406	8902	9917	
4987	6484	8431	8932	9920	
4998	6669	8432	9039	9924	

Effects Observed on Mature Plants or Their Tissues

161	3715	7634	8626	8754	9429
198	3758	7944	8671	8760	9432
202	3859	7946	8672	8786	9457
1059	3871	7958	8673	8807	9780
1082	4808	8221	8674	8860	9930
1290	5269	8233	8684	8892	9965
1993	5531	8234	8688	8940	9989
2149	5755	8241	8721	9011	10,094
2353	5802	8316	8723	9199	10,098
2512	5853	8512	8737	9289	11,912
3385	6024	8528	8739	9410	12,281
3412	6571	8613	8748	9417	

85	578	4351	7552	8851	9844
88	1082	4657	7715	9403	9919
90	2683	5481	8189	9419	10,037
161	3146	5900	8490	9432	10,248
282	3495	6024	8491	9780	11,296
405	3496	6724			

Comparison of Effects of Ionizing Radiation with Effects of Non-Ionizing Radiation or Other Physical or Chemical Agents.

1693	4908	9864	10,004	11,086
3952	6023	9933	10,773	

5	3499	5899	9274	9446	9930
257	3896	8317	9287	9490	9933
898	4797	8854	9374	9920	9935

203	2232	6603	8626	9287
1101	3366	6884	8733	9986
2155	3499	7786	8856	

338	6348	8317	12,287
1992	6923	9933	

562		767	6327	701
1743		863	7273	715
3528		917	7885	1657
7115		1038	8367	1723
8023		1082	8843	1992
8317		1678	9459	2232
8835		3773	9799	2436
8889		3871	9801	5169
9391		4695	11,350	7239
9937		5482	12,281	7282
		6326		7362
	Enzymes			8347
				8728
83	4534	9801		8749
203	6023	9812		9864
767	6327	9989		12,287
779	6380	10,036		12,319
999	6731	10,074		12,387
2589	9274	11,350		
3429	9490	12,281		
3499	9799	12,287		

Respiration and Transpiration

203	3366	4099	8183	8773	9410
349	3525	4908	8317	8856	9882
356	3615	6731	8451	8898	10,004
999	3876				

Photosynthesis and Chlorophyll

1993	4305	5240	8773	9633	10,074
3541	4678	6143	9422	9903	11,086
3801	4774	6731	9423	10,049	12,064
4123	5160	8451	9446		

RADIATION EFFECTS ON UNICELLULAR ANIMALS

Comparison of Effects of Ionizing Radiation with Effects of
Non-Ionizing Radiation or Other Chemical or Physical Agents.

218	1123	1733	4150	6607	7539
651	1134	2040	5071	7301	7797
767	1222	3509	5691	7438	12,279

Effects on Cell Division and Reproduction

lethal effects

1	1299	4330	5936	7003	11,147
17	1319	4422	6106	7301	11,159
38	1415	4541	6125	7307	11,269
99	1467	4631	6263	7539	11,836
275	1790	4645	6264	7581	12,044
343	1793	4758	6337	7756	12,057
352	2104	5071	6481	7930	12,081
432	2198	5310	6607	8434	12,110
459	2243	5440	6708	8527	12,149
571	3390	5462	6734	8907	12,183
640	3560	5488	6802	9253	12,279
642	3955	5543	6820	9968	12,364
767	3967	5780	6838	10,542	
874	4132	5855	6882	10,574	

non-lethal effects on cell division and growth rate

1	1137	3321	5167	7460	11,159
458	1170	3509	5181	7756	11,269
640	1299	3686	5462	7797	11,401
642	1345	3788	5691	7918	11,836
651	1415	3904	5936	8394	12,044
760	1500	3967	6125	8395	12,110
767	1954	4150	6337	8463	12,163
863	2189	4231	6802	9036	12,165
874	2243	4532	7003	9253	12,279
1089	2370	4541	7278	10,182	12,364
1123	3015	5151	7307		

Effects on Reproduction (Other than Effects on Division Rate)

767	1134	1790	3509	6131	11,147
863	1636	2385	3788	7581	11,401
917	1637	3007	4379	10,592	12,081
1040	1680	3015	6000	10,663	12,279

Cell Vigor and Cell Function (General)

651	3232	4391	6545	7150	11,559
1134	3634	5821	6644	8395	11,744
1733	3648	6080	7077		

Infectivity, Antigenic and Toxic Properties; Pathogenicity

1500	3648	4758	5167	8396	11,401
1790	3967	4972	5181	9376	12,044
1990	4231	5111	7539	10,188	12,081
2370	4532	5112	7756	11,159	12,110
3494	4757	5151			

Morphological Effects

352
1157
3509
3648
3686
3904
3936
4391
4926
6802
7003
7539
9376
12,044
12,163
12,165

Biochemical Effects

1222
1319
1633
3232
3880
3904
4972
7150
8527
9376
11,559
11,744

AUTHOR INDEX

A number of conventions have been employed in this computer-prepared index in an attempt to collect all papers under the names of the proper authors.

Author variants have been minimized by key-punching only the initials of all names other than surnames. This has undoubtedly caused some excessive merging, but this should not result in a serious problem for the user.

Transliteration of surnames has been reconciled using the best available authority.

Surnames that appear without initials reflect the fact that many early papers were published in which the authors were only identified by their last names.

AALDERS LE
 8662
 AARONIS P
 592
 ABASOV IT
 8921
 ABATT JD
 12414
 ABBATT JB
 12394
 ABBATT JD
 6946 7001 7006 7560
 8864 10451 12205 12445
 ABBATUCCI J
 10839
 ABDERHALDEN R
 4009 4337 6531
 ABE K
 12107
 ABEL G
 9150
 ABELE A
 6530
 ABELS JC
 2870 4564
 ABELSON F
 9700
 ABELSON PH
 1483 2310
 ABERG B
 10512
 ABERG E
 4187
 ABRAHAMSON S
 5355 7561 7562 7848
 8942 8943
 ABRAHAMSON L
 10927
 ABRAHAMSON ML
 10927
 ABRAMOWITSCH T
 6301
 ABRAMS HL
 2078 6529
 ABRAMS R
 1701 6397 6495 6528
 7563 10873 10929 11033
 ACKERMAN GA
 11645
 ACKERMAN H
 4485 10358
 ACKERMAN LV
 8190
 ACKERMANN IB
 805 940
 ACKERMANN PG
 10930
 ACCSTA A
 7946
 ACQUA C
 8371 8372
 ACQUA VD
 7564
 ADAM R
 2982
 ADAMANTIADIS B
 3280
 ADAMS GD
 12285
 ADAMS JD
 7080
 ADAMS LJ
 3609
 ADAMS M
 920 932
 ADAMS MA
 10205
 ADAMS RR
 9871
 ADAMS SN
 10089
 ADAMS W
 6527
 ADAMS WE
 11145
 ADAMS WR
 5416 5480
 ADAMS WS
 1897 6526 6888
 ADAMSON DM
 1569 1591 1605 1732
 5508 11133

ADATI T
 4037
 ADES HW
 9214
 ADLER C
 6500
 ADLER FL
 1035 1133
 ADLER K
 260 428 6004 6126
 12105
 ADLER M
 6004 6126
 ADOLF MS
 11541
 ADUNTS GT
 10454
 AEBERSOLD PC
 2179 3928 4370 4380
 4492 4550 6386 6525
 7319
 AEBI H
 5773
 AFANASSIEVA AS
 3711 10087
 AFANASSJEVA AS
 3923
 AGERSBORG HPK JR
 11183
 AGGELER PM
 1439 2489
 AGNOLI R
 426 1286 3359
 AGOL IJ
 3350
 AGOSTINI A
 1964
 AGULHON H
 8373 8374 9889
 AHLSTROM L
 4835 4836 4956 5206
 9947
 AHLSTROM LH
 6524
 AHMED IARS
 4646
 AHNLUND K
 11705
 AHRENS R
 9950
 AHUMADA JC
 4809
 AICHINGER F
 1223
 AJISAKA S
 7567
 AKAGI H
 11163 11615 11616 12621
 AKAIWA H
 3120
 AKE G
 2296
 AKERBERG E
 8643
 AKERMAN A
 8642 10763 10764
 AKIN PV
 7568
 AKITA K
 12357
 ALBANESE AA
 4231
 ALBANESE G
 11381
 ALBANO V
 7039
 ALBAUM HG
 2280 8039 8040 8333
 ALBERS-SCHONBERG HC
 11614
 ALBERS-SCHONBERG
 10760
 ALBERT A
 10380 10383
 ALBERT R
 6994
 ALBERT RE
 6959
 ALBERTI W
 8375 12103
 ALBUT G
 3374

ALBRITTON EC
 12577
 ALBUQUERQUE DD
 10484
 ALDERMAN FM
 1441
 ALDERMAN I
 5363
 ALDERMAN IM
 940 1183 687C 6871
 7398
 ALDERMAN JO
 9312
 ALDOUS JG
 5902
 ALEKSANDROV SN
 7218 7291 7479 7570
 7571
 ALEKSANDROVA MF
 7569 8906
 ALEKSEEVA VM
 6863 12647
 ALESHKINA YA
 9100
 ALEXANDER AS
 2818
 ALEXANDER GL
 11134
 ALEXANDER GV
 7448 10179 11095
 ALEXANDER JA
 5483
 ALEXANDER LT
 1967 2555
 ALEXANDER ML
 5740 8326
 ALEXANDER P
 1054 5504 6718 6828
 6879 6914 7067 7183
 8775 10740 10768 11895
 12216 12407 12408 12409
 12410 12411 12412 12413
 12414 12415 12416 12417
 12418 12419 1242C 12421
 12422 12423 12424 12425
 12426 12427 12428 12451
 12452 12453 12477 12478
 12479 12480 12481 12482
 12483 12484 12485 12486
 12487 12488 12489 12490
 ALEXANDER PH
 12317
 ALICATA JE
 2808
 ALIKHANYAN SI
 9162
 ALLAN HC JR
 10544
 ALLEE WC
 5925
 ALLEN A
 3838
 ALLEN AC
 2811
 ALLEN AJ
 1261
 ALLEN B
 1158
 ALLEN BM
 631 974 1129 1267
 1509 2356 2456 2457
 5429 6977 7572 8919
 ALLEN BR
 2022 7573
 ALLEN CM
 6263
 ALLEN FM
 2599
 ALLEN H
 9701
 ALLEN JG
 1480 1661 1666 1683
 1684 1685 1686 1687
 1688 1689 1903 2535
 2622 2951 5008 5222
 6522 7356 10998 12240
 ALLEN R
 6222 9753 10346 10348
 10481
 ALLEN RE
 12578
 ALLEN ROBERT E

11253
 ALLEN RP
 10358
 ALLEN RR
 10350
 ALLEN SW
 17
 ALLEN WM
 10588
 ALLES GA
 4066
 ALLSOPP CB
 1840 5029 9206
 ALLWEISS-ALVET P
 1499
 ALLY MS
 6786 6787
 ALMAND JR
 5633
 ALMEIDA AB
 12229
 ALPEN EL
 1404 5483 5484 5826
 7201 7574 8877 8948
 9096 9226
 ALPEN EP
 12260
 ALPER T
 1122 1864 5627 5745
 6101 7063 7575 9250
 12221 12486
 ALPERS BJ
 6521 6568
 ALPERS JB
 9346
 ALPERT S
 5791
 ALT HL
 769 5765 5782 5783
 9122
 ALTER AJ
 1237
 ALTER NM
 3650
 ALTLAND PD
 982
 ALTMAN K
 2172
 ALTMAN KI
 1220 1226 1786 2113
 2250 5348 5379 5759
 6241 6797 10008
 ALTMAN KL
 6163
 ALTMANN V
 7534
 ALTNOW H
 159
 ALTSCHUL W
 11866
 ALTSHULER CH
 7623
 ALVERDES F
 8376
 AMANC WS
 7576
 AMANIERA G
 6519
 AMANO K
 12579 12580
 AMARASINGHAM C
 5866
 AMATO A
 74
 AMBROSI F
 6518
 AMERIO G
 8644
 AMES FB
 4076
 AMES SR
 6517
 AMLER MH
 11037
 AMCROSO EC
 4810 5145
 AMORY HE
 10931
 AMCRY HI
 1650
 AMCSS HL
 8377

AMPRIND R
 7577 10341 10932 10933
 AMY RL
 1590 7203
 ANAGNOSTU JL
 8542
 ANCEL P
 196 261 8378 8379
 8380 8381 9847 12099
 12100 12101 12102
 ANCEL S
 25 31 104 199
 200 201 320 351
 380 395
 ANCELIN R
 8729
 ANDEM MR
 705 1765
 ANDERSEN
 12097
 ANDERSEN AC
 7578
 ANDERSEN EK
 1905 1906
 ANDERSEN HC
 12098
 ANDERSEN RS
 6214
 ANDERSEN SR
 1988
 ANDERSON CT
 2127
 ANDERSON DR
 8915 9298
 ANDERSON DT
 6114
 ANDERSON E
 2847 7407
 ANDERSON EB
 10330 10942 11145 11607
 11643 11719
 ANDERSON EC
 5516 8221 8283 9462
 10353 10934 10936 11248
 12581
 ANDERSON EE
 1493 1777 1780 12354
 ANDERSON EG
 1531 2706 3313 3911
 5323 8645 10748 11921
 ANDERSON EH
 943 2142 6827
 ANDERSON H JR
 7708
 ANDERSON LC
 673 5436 5683 5821
 ANDERSON LF
 8646
 ANDERSON NG
 9281 9559
 ANDERSON RE
 8308
 ANDERSON RG
 5848
 ANDERSON RM
 12582
 ANDERSON RS
 4428 4450 4554 4842
 12583
 ANDERSON SR
 5966
 ANDERSON W JR
 5362
 ANDERSON WAD
 1382 1383 10938 10939
 ANDERSSON G
 5758 5899 6083 10761
 ANDERVONT HB
 2482 4313
 ANDO
 11456
 ANDO Y
 6971
 ANDOUARD P
 8382
 ANDREIS N
 3080
 ANDREQNI O
 6032
 ANDREW GA
 11089
 ANDREWS GA

613 1142 1256 1377
 2105 2625 5423 5689
 9072 9216 10330 10375
 10390 10942 10947 11060
 11071 11155 11643
 ANDREWS GC
 3555
 ANDREWS HL
 5422 5806 6515 6771
 6819 7085 9003 9378
 10265 11669
 ANDREWS JR
 7580 9347
 ANDREWS JS
 8050
 ANDREWS PS
 8175
 ANDRIYASHEVA NM
 9046
 ANDRUS MB
 4127
 ANE JN
 1500 4526
 ANGEL S
 3295 6484 6523
 ANGELL MAK
 8245
 ANGELO L
 3342
 ANGER H
 1830
 ANGER HO
 5762 6869 7249
 ANGEVINE M
 4520
 ANONYMOUS
 9391
 ANSLOW GA
 6525
 ANSON BJ
 589 12078
 ANTHONY D
 7113 7114 10948 10949
 ANTHONY DS
 5583 5663 6383 6514
 7112 7418 7716 10218
 10433 10483 1095C 10952
 11164 11951
 ANTHONY E
 5203 5204
 ANTONIOLI G
 12563
 APOSTOLOS Y
 8323
 APPEL W
 1519
 APPELYARD RK
 12307
 ARAI Y
 3176
 ARAPOFF A
 3083
 ARARATIAN A
 3201
 ARARATIAN AC
 3614
 ARCHDEACON JW
 10954
 ARCHER VE
 7313 11300 11304
 ARCHER VW
 7585
 ARD WB
 8410
 ARDRAN GM
 7586 9118
 ARGYRIS TS
 5772 7587
 ARIEL I
 10813 10853 10956
 ARIEL IM
 1767 4079
 ARKIN A
 1885
 ARKIN AM
 2446
 ARKINS WHB
 11530
 ARKUSSKY JJ
 3623
 ARKUSSY I
 2913

ARLASHCHENKO NI
7478
ARLEY N
8648 9107
ARMSTRONG C
11966
ARMSTRONG WB
625
ARMSTRONG WD
158 165 6390 6424
6513 6894 7670 7671
10525 10957 10959 10961
ARNASON TJ
1011 1717 1791 2549
2883 2928 5777 9564
10082
ARNESON AN
858
ARNETT LC
6959
ARNOLD A
5400 5401 5402 5568
6098
ARNOLD AC
6573
ARNOLD ED
7588 10363
ARNOLD HL JR
6016
ARNOLD J
6262
ARNOLD JS
2143 7272 10619 10965
10966 10968 10970 10971
10977 11947 11948
ARNOW LE
12558
ARNTZEN L
7519
ARONS I
828 5408 5640 6511
6512
ARONS P
3089
ARONSON I
12431
ARONSON DL
10064 11351
ARPIARIAN N
5409
ARRILLAGA FC
7589
ARRINGTON LR
10974
ARTAMONOVA VA
8362
ARTEMOVA AG
7596
ARTOM C
679 2125 5766
ARVY L
2206 2688 10106
ARZT L
8434
ASCHER O
33
ASCHKINASS E
12096
ASDELL SA
9546
ASHIKAWA JK
10331
ASHLER FM
2731
ASHTON M
12438
ASHWELL G
51 1140 5362 5852
ASIMOV I
10978
ASKANAZY M
3420
ASLING CW
2364 7590 8891 10444
10825 10827 10830 10979
10981 11385
ASTAUROV BL
3745 7591
ASTON BC
10009
ASTON MJ
2415

ASTRACHAN GD
4312
ASTWOOD E
10284
ATABEKOVA AI
8777
ATABEKOVA AJ
3858
ATABEKOWA AJ
3924
ATCHISON AA
9449
ATKINSON GF
1993 9199
ATLAND PD
684
ATTA GJ
8201
ATWOOD KC
1470 5396 5735 6509
6510 7593 8650 9514
9872 9873
AUB JC
966 4020 4667 4765
4834 11347
AUBERTIN C
9386 9387 9504 9554
11849 11873 11892
AUBERTIN CH
11527
AUE H
464
AUERBACH C
1773 5501 6508 7501
7594 8651
AUERBACH CA
4446
AUERBACH R
7595
AUERBACH SH
1178 11114 11129 11130
AUERBACH SI
7715 12582
AUERBACK C
5446
AULAMO R
3101
AURAND K
1275 5623 10135 12206
12210 12449
AUSKAPS AA
635
AUSTIN IG
6881
AUSTIN MK
7469
AUSTING ME
626
AUSTONI ME
11168 11171
AUVERGNAT R
6507
AUXIER JA
7162
AVAKYAN T
10454
AVANZINI S
10982
AVATA G
10983
AVELLONE L
429
AVERSEN Q
257
AVERSENG M
147
AVERY AG
8841 9412 9874 10092
AVERY AV
9918
AVERY P
3276 3553 9860 9957
AVETIKYAN BG
7596
AVRUNINA GA
9267
AXELROD D
4550 6400 11439 11441
AXELROD DJ
6072 6697 10164 11437
11440
AXFORD SJ

9089
AYER HE
1407
AYRES WW
11254
AYYANGAR FNR
3715
AYYANGAR GNR
4648
AYYANGAR R
4212
AYYANGAR, GNR
4440
AZZARITI M
5228
BAARLI J
5776 12312
BABARCZY M
8383
BABCOCK EB
403 9928
BABERO BB
901
BABERS FN
12644
BACHEM A
8 10 378 3987
BACHINCKAIA AA
3920
BACHMAN AL
2300 4586
BACHMAN BL
6977
BACHOFER CS
910 911 912 1062
1681 5714 6790 7412
7597 7598 12347
BACIGALUPI M
3548
BACK A
4528 4541 4631 4758
4987 5001 6607 7736
BACKER OG
12448
BACLESSE F
5715 6506
BACQ ZM
645 697 1015 1222
1333 1350 1545 1559
1602 2202 2357 2358
2395 2671 2826 5578
6548 6828 6879 6914
7067 7183 7209 7579
7599 8726 9294 9314
9565 9875 10537 10720
10740 10768 11352 12197
12270 12380 12407 12408
12409 12410 12411 12412
12413 12414 12415 12416
12417 12418 12419 12420
12420 12421 12422 12423
12424 12425 12426 12427
12428 12451 12452 12453
12477 12478 12479 12480
12481 12482 12483 12484
12485 12486 12487 12488
12489 12490
BACTERN G
44
BACTEU G
69
BADE H
4338
BADELL M
2716 2843
BADENHUIZEN NP
4560 9395
BAER KA
12531
BAER M
1514 2776 5248 6050
8828
BAER RL
2234
BAERMANN G
9515
BAETGE HH
6021
BAETJER FH
11990 12009
BAGDASAROV AA
7600

BAGG HJ
390 580 3257 3259
4080 4354 6505 7512
7538 8384 8385 8433
8598 10987 11981 11982
11983 11984 12033 12088

BAGLIONI T
5326 10993

BAIDINS A
2660 5046

BAIETTI AL
2102

BAILEY H
7538 11984

BAILEY JC
7601 10133

BAILEY NTJ
1739

BAILEY OT
7066 7083

BAILEY P
5400 5401 5568 6098
6504

BAILLIF RN
10812 10995

BAIR WJ
5734 9082 9111 9222
9876 10039 12280

BAISOGOLOV GD
7815

BAKAY L
6503

BAKER BL
6770 6915 7086 7623

BAKER K
11043

BAKER LE
9939

BAKER SL
3705

BAKER VH
9790

BAKER WK
943 1195 1273 2387
2794 5676 5935 7602
8201 9056

BAKIN EI
4527

BALAKHOUSKY SD
12584

BALASHOVA AN
9538

BALASUBRAHMANYAN R
8652 9422

BALBER D
2179

BALDER RB JR
10182

BALDINI G
7603 7604 7605

BALDINI M
6502

BALDWIN RR
11311

BALDWIN WF
7606

BALDWIN WM
7539 8386 11985 11986
11987

BALE WF
929 1494 4779 5314
6444 9282 9663 9687
10365 10956 11606 11817
12474

BALESTRA G
3391

BALFOUR W
9663

BALFOUR WM
9687 11822

BALI T
2967 5397

BALL COT
5398

BALL E
9439 9887 9888

BALLANTYNE RM
1516

BALLENGEE GO
1013

BALLI H
6501

BALLI R
3629

BALLIN JC
1354 2185 5338 7021

BALLOU JD
7607

BALLOU JE
9771 10193 10322 10608
10609 11174 11611

BALMUTH M
1090

BALSKE RJ
1324 5671

BAMBACIONI-MEZETTI V
8815

BANCI-BUONAMICI C
590

BANCROFT GH
6499

BANDLOW G
6084 8653 8654

BANFIELD FH
9383

BANGHAM AD
11179

BANGSON JS
4587

BANKS TE
10323

BARABADZE EM
11245

BARANOV VI
9886

BARBASHOVA ZI
7608

BARBER A
2422

BARBER DA
12383

BARBER FW
4813

BARBER M
5924

BARBERA R
10179

BARBERA RC
10361 11093

BARCLAY A
9891

BARCLAY RK
11000 11002

BARDEEN CR
11546 11988 11989 11990

BARDEN RP
4444

BARFOOT SW
5030

BARES J
6731

BARHORST RR
10791

BARKER HA
5286

BARKER HH
262 11004

BARKER P
12493 12500

BARLOW G
11183

BARLOW JC
6833 6953

BARLOW JCD
1096

BARNARD RD
6498

BARNES BF
3052

BARNES CM
7658 11868 12585

BARNES DE
10245

BARNES DW
6810

BARNES DWH
5289 7762 10211 10336
12234 12236 12267 12299
12481

BARNES EA
6516

BARNES KK
1288 4847

BARNES MN

3397

BARNES SW
1525 2723

BARNES WA
4814 6497

BARNETT HL
2173 2174 2175 2176
2178 6880

BARNETT JC
2360

BARNETT TB
1260 1644 2785 3050
10412 10489

BARNUM CP
7470

BARON LS
5870 9791

BARONDES RD
2770

BARR JS
4588 5045

BARR TA
9729

BARRATT RW
2636

BARRETT R
10263

BARRON ESB
11325

BARRON ESC
9993

BARRON ESG
682 868 893 1131
1189 1635 1734 2858
2938 2979 6490 6491
6492 6495 6496 7118
8062 9624 10062 10382
10385 11058 11161 11328
12237 12238 12348 12348

BARROW J
2920 2927

BARROWS L
11239

BARTELSTONE HJ
11005

BARTH EE
3504

BARTH G
7609 9247

BARTH H
5973

BARTH LG
407

BARTHELEMY
11589

BARTHELMESS A
4344

BARTON DW
5432

BARTSCH O
12131

BASIC M
7465

BASINGER CE
1480

BASS A
10865

BASSAGET J
3654

BASSETT RC
6488

BASSETT RC
2347

BASSETT SH
11277

BASSETT-SMITH PW
10770

BASSI M
2044

BASSIN M
1391

BASSON JK
7610

BASTER CF
7043

BASTISSE EM
11194

BASU RK
8781

BATCH JW
7323

BATE RC

4034
 BATEMAN AJ 2363 7611 12314
 BATES CJ 1392 5742 7174
 BATZER OF 7169
 BAUCH R 5024
 BAUDISCH O 4951
 BAUER 6393
 BAUER ACH 11008
 BAUER AJ 11391
 BAUER FC JR. 10307
 BAUER GCH 11009 11010 11011
 BAUER H 2637 4345 4460 4913
 4914 4915 5162 7612
 BAUER R 7458 9034 9464
 BAUER RE 10309
 BAUGHAN JM 11158
 BAUM SJ 5376 5520 5688 7613
 10765
 BAUMAN EJ 11192
 BAUMANN EJ 11013 11014 11189
 BAUMHOVER AH 11563
 BAUR E 9523
 BAUR H 5447
 BAUTZ E 10030
 BAVRO GV 7614
 BAXENDALE JH 12395
 BAXI AJ 9261 10561
 BAXTER CF 5886 7237
 BAXTER H 2872
 BAXTER JG 6517
 BAXTER RC 6829 7446 7845 9706
 10169 12336
 BAY CE 8185
 BAY RC 6835
 BAYER HV 12132
 BAYER R 8387
 BAYLIN GJ 4780 4782
 BAYRD ED 2856
 BAZERQUE PM 11016
 BAZIN S 2049 5440
 BAZY L 195
 BEACH EP 4342
 BEACH G 6940 7909 7910
 BEADLE GW 2006 4447 4709 4759
 4773 6489 8655 8656
 10148
 BEAK V 7959
 BEAL JM 2255 2447 4567 6487
 8657
 BEAM C

9620
 BEAM CA 5539 6986 7229 7380
 9945
 BEAMAN TC 8084
 BEAMS HW 4543
 BEAN AM 362
 BEAN WB 4203 6486 12574
 BEARD BH 1361
 BEARD C 6533
 BEATH OA 10389
 BEATTY AV 619 621 1191 1200
 2470 4686 5506 9057
 9992 10047 10767
 BEATTY CH 2258
 BEATTY JW 4686 10047 10767
 BEAUJARD E 9386 9387 9504 9554
 11849 11892
 BEAUMARIAGE M 10720
 BEAUMARIAGE ML 9043
 BECAREVIC A 5403 7217
 BECAREVIC AD 6887
 BECK A 172 430
 BECK JSP 4965
 BECK S 4299
 BECKER AF 10133
 BECKER DV 9031
 BECKER J 7399
 BECKER RM 2615
 BECKER SW 3514
 BECKTON H 12020 12029
 BECKWITH TD 602
 BECLERE A 6485 11544
 BECQUEREL P 8388 10090
 BEDFORD CF 2983
 BEDURFTIG G 2372
 BEEBE MR 10130
 BEELER JW 2934
 BEESON PB 7864
 BEFFA AD 1472
 BEGEMANN E 6021
 BEGG RW 7089
 BEGLARYAN AG 7615
 BEHNKEN H 7616
 BEHR DF 8126
 BEHRENS A 212 256
 BEHRENS CF 688 728 2844 5911
 BEILMAN CE 10929
 BEISER WC JR 6924
 BELANGER LF

10306 11025
 BELCHER EA 5886
 BELCHER EH 7043 10804 12212 12297
 12480
 BELEITES I 4153
 BELIAEVA BF 9135
 BELISARIO JC 4737
 BELKNAP EL 11026
 BELL E 11027
 BELL EJ 6967
 BELL GDH 5043
 BELL M 7503
 BELL MJ 1980
 BELL P 7310
 BELL VL 8896
 BELLACK S 962 7146
 BELLAMY AW 2601
 BELLAMY WD 5645 9494 9512 9862
 12242
 BELLER FK JR 2242
 BELLEY G 11776
 BELLI JA 724
 BELLIN J 11028
 BELLIOS NC 11645
 BELLUCI B 4154
 BELLUZZI G 3119
 BELOT J 12134
 BELOUSOV AP 7617 9113
 BELT TH 3198
 BELTZ RE 12502
 BELYAEVA BF 7600
 BENAIGES B 3815
 BENASSI E 9291 10180
 BENDA P 11029
 BENDER AE 5290
 BENDER MA 9148
 BENEDE T 2905
 BENEDEK AL 2699
 BENEDICENTI A 12140
 BENEDICT HM 3499
 BENEDICT SR 215 3595 8593
 BENEDICT WH 5346 7618
 BENEZNY JV 8570
 BENGSTON A 11936
 BENG T 11021
 BENINATO R 3795
 BENJAMIN E 9607 12496
 BENKWITH KB

6482
 BENNER S
 5963
 BENNET LR
 1558
 BENNETT L
 8873
 BENNETT LR
 1571 1858 2106 2193
 2199 2391 2471 2963
 5718 6164 6990 7359
 7970
 BENNETT RL
 2702
 BENNETT VC
 2702 6164
 BENNEYAN RN
 8354
 BENNISON BE
 2690 5167
 BENOIT J
 7535
 BENS AUDE
 8389
 BEASON RE
 7619
 BENTLEY GH
 7581
 BENUA RS
 9031 10427
 BERAUD P
 6156
 BERDJIS CC
 9151 9231
 BEREBUM M
 9829
 BERENSON GS
 11203
 BERERBOM M
 7620
 BERES D
 11694
 BERG HF
 1380 6774 10293 10328
 10616 11031 11032 11034
 11373
 BERG M
 628 1337 10922 11941
 BERGAMA D
 7426
 BERGE BS
 11035
 BERGER E
 10529 11543
 BERGER M
 1435
 BERGMAN B
 3801
 BERGMAN G
 11021
 BERGNER AD
 3451 8841 9412 9918
 10092
 BERGONIL J
 11534 11535 11542 11545
 11635 11874
 BERGONIE JL
 12141
 BERGONIF J
 9384
 BERGQUIST L
 1032
 BERGSMA D
 11706
 BERGSTROM I
 9236 11099 11214 11215
 BERHELL FH
 5857
 BERING EA JR
 7083
 BERING F
 8506
 BERK S
 869 8658 9845 10006
 BERKE HL
 8960
 BERKSON J
 11152
 BERLIN N
 10958
 BERLIN NI
 1663 9219

BERLINER S
 7755
 BERMAN M
 7621 9031 9346
 BERNARD SR
 7624 8920 11564
 BERNARDI OM
 308 331
 BERNER F
 6481
 BERNHARD K
 10279
 BERNHEIM F
 7306
 BERNIER JL
 2317 5318
 BERNSTEIN EK
 7471
 BERNSTEIN LM
 8888 10140
 BERNSTEIN M
 2473
 BERNSTEIN MH
 9864
 BERNSTEIN SE
 6912
 BERRIAN JH
 5909
 BERRILL NJ
 4815
 BERRY GP
 4258
 BERRY JP
 4170
 BERSA E
 178 356 363 8659
 9854
 BERSON SA
 7420 8353
 BERTACCINI G
 575
 BERTANI G
 10564
 BERTIGLIA B
 6519
 BERTIN-SANS
 11763 12244
 BERTRAM VA
 8214
 BERTRAND A
 472
 BEST MM
 2631
 BETHALL FH
 7434
 BETHARD W
 10501
 BETHARD WF
 1623 1668 1697 2575
 2717 2902 10329
 BETHELL FH
 777 983 4589 5521
 6300 6770 6915 7086
 7415 7622 7623 8126
 BETOULIERES P
 2926
 BETTS RM
 11986
 BETZ EH
 7037 12298 12421
 BETZ H
 729 808 837 933
 934 935 1017 1245
 1423 1428 1572 1707
 2032 2202 2567 6166
 6167 6168 6548 9821
 10200
 BEUTEL A
 3557 3899 7410 7462
 BEUTLER E
 775 5710
 BEVELANDER G
 11037
 BEVILOTTI V
 10091
 BEVIS KS
 11476
 BEW E JR
 1340 5525
 BEYL GE
 2072
 BHATIA OS

5948
 BHATIA IS
 10524
 BHATTACHARYA KL
 6100 10471 11038
 BIAGINI C
 1159 6886 12301
 BIANCHI M
 3153
 BIASSONI P
 10877
 BIBBY BG
 10999
 BIBERGALV AV
 9127
 BICH A
 3624
 BIDDULPH C
 1381
 BIDDULPH D
 1148 11707
 BIDDULPH SF
 1148
 BIDWELL KWE
 10216
 BIEBL R
 3803 5301
 BIEGEL AC
 6831
 BIERBAUM OS
 9652 9691
 BIERWALTERS WH
 6483
 BIGELOW RR
 825 1375 2076 5689
 BIGNAMI C
 6170
 BIGNAMI G
 4155
 BILLEN D
 624 641 677 713
 1081 1219 1221 5524
 6827 7625 7626
 BILLINGS M
 7359
 BILLINGS MS
 630 5718 6096 6958
 BILLOWS JA
 976
 BILQUEZ A
 6965 7181
 BILTRIS R
 3237 11040
 BINET L
 3432
 BINGENHEIMER E
 3491
 BINGHAM H
 1592
 BINGHAM HG
 1289
 BINHAMMER R
 5512
 BINHAMMER RT
 5867 7064 7627
 BINK N
 10791 11197
 BINKS W
 5210
 BINNINGTON JP
 12517
 BINUS NM
 9264
 BIRAM MB
 1167
 BIRCH-HIRSCHFELD
 9786
 BIRCH-HIRSCHFELD A
 11533 11869
 BIRD JM
 1418
 BIRD PM
 12313
 BIRGE AC
 5359 9461 9487
 BIRKELAND JM
 4721
 BIRKNER R
 2381 5617 5618 7628
 9008 10757
 BIRNES DW
 10697

BIRNKRANT ML
 11824
 BIRNSTINGL M
 10321
 BISCEGLIE V
 398 12143
 BISCHOFF F
 4816
 BISGARD JD
 4590 4817
 BISHOP CJ
 1603 2079 2441 2837
 8660 8661 8662 8767
 10766
 BISHOP CW
 12501
 BISHOP DW
 4505 4506 4591 5455
 BISHOP FW
 2074 4126 6171 6179
 7355
 BISKIS BO
 10883
 BITO M
 12580
 BITTER BA
 11563
 BITTNER JJ
 7425
 BJCRLING E
 8663
 BJCRM L
 4933
 BJCRNERSTEDT F
 12203
 BJCRNERSTEDT R
 11020 12606
 BLACK A
 7321
 BLACK AL
 10467 10475
 BLACK CE
 4592
 BLACK DAK
 11216 11423
 BLACK LT
 8408
 BLACK MH
 2786
 BLACK R
 12616
 BLACKBERG SN
 11042
 BLACKFORD M
 1673
 BLACKFORD ME
 820 1729 2157 2160
 6273
 BLACKMAN JR
 12077
 BLAGG J
 6734
 BLAIR HA
 82 656 890 971
 1049 1073 1085 1417
 1494 1553 1724 2074
 2187 2464 3050 5644
 6119 6415 6425 6459
 6560 6829 7294 7487
 9201 9202 9203 9706
 11044 11047 11259 11261
 12334 12336
 BLAIR HE
 12521
 BLAKESLEE AF
 880 3451 3522 5736
 5737 6913 7076 8738
 8764 8819 8841 9412
 9413 9874 9906 9918
 9923 10092 10096 10097
 10100
 BLAMOUTIER P
 1916
 BLANC GA
 11708
 BLANC J
 11723 11724
 BLANC R
 4561 4593 4594
 BLANCHARD EW
 593
 BLANCO-SOLER ROS C

11387
 BLANDAU RJ
 1260 1644
 BLANEY LF
 2931
 BLANK IH
 7629
 BLANK L
 7154
 BLANKA H
 467
 BLAND R
 6172 6173
 BLASCHKO H
 2127
 BLATZ H
 2179
 BLAU M
 4595 4951
 BLECHMANN M
 3378 3379
 BLECK H
 1957
 BLEEK H
 5954
 BLESS AA
 1740 2003 4015 4394
 4596 4687 5194 5287
 10029
 BLETCHLY JD
 7630
 BLIFFORD IH
 11695
 BLINKS LR
 10093
 BLINOV VA
 1526
 BLISS CI
 4451 7318
 BLISS JDM
 7211
 BLISS RW
 2944
 BLOCH R
 9793
 BLOCH-FRANKENTHAL L
 5001 5829
 BLOCK M
 10278
 BLOCK MA
 2868
 BLOCK MH
 1903 1918 2315 5032
 11815 12239
 BLOCK P
 10152
 BLOHINA VD
 9270
 BLOKHIN NN
 6175 7631 7632
 BLOM PS
 7007
 BLOMGIE RA
 1060
 BLONDAL H
 7633
 BLOODWORTH JM JR
 8992
 BLOOM MA
 1682 5132 5940 6065
 10980 10994 12342
 BLOOM W
 1682 3018 5070 5132
 5243 5693 6065 6176
 6177 8783 9865 10980
 12342
 BLOOMFIELD JR
 707
 BLOUNT HC
 6837
 BLOUNT HC JR
 2774 3148
 BLUM HF
 1745
 BLUM T
 11051
 BLUME JM
 796 898 1492 12639
 BLUNEL J
 2685
 BLUMENTHAL F
 8390

BLUMENTHAL G
 11310
 BLUMGART HL
 1034
 BLUTHGEN U
 8259
 BLY CG
 5109
 BOAG JW
 1451 1748 5487 5670
 12443
 BOATMAN JB
 7042 10426 10746
 BOCHE RD
 5643 6178 6179 7355
 9202 12586
 BOCHKAREV VV
 6867
 BOCK K
 12351
 BODDY DW
 10505
 BODE HG
 420 12144 12145
 BODEN F
 6180
 BODEN G
 6775
 BODENSTEIN D
 5767
 BODINE JH
 3357 3581 3621 4322
 6181
 BOEHM G
 3358
 BOELL EJ
 6181 11321
 BOERNER F
 3966 4396
 BOFFIL J
 6182
 BOGAYEVSKII AI
 6726
 BOGG HJ
 19
 BOGOMOLETS O
 12198
 BOGUMILL GP
 7184
 BOHLANDER A
 648 695
 BOHLIG H
 9081
 BOHLIN WJG
 1060
 BOHM A
 561
 BOHME A
 6842
 BOHN G
 12118
 BOHNHOFF M
 1087 1088
 BOHR DF
 6770 7434 7623
 BOHRER CW
 5336
 BOICHENKO EA
 12587
 BOICO A
 12198
 BOIFFARD JA
 2206 2688 10106
 BOIRON M
 7439
 BOISSEvain CH
 6
 BOJANOWSKY R
 6184
 BOLAFFI A
 3466
 BOLAFFIO M
 2191
 BOLAND J
 5392
 BOLDYREFF WN
 255
 BOLEN HR
 3094
 BOLIN VS
 1341 5703
 BOLKEN K

4818
 BOLL I
 7636
 BOLLAG W
 5723 6847
 BOLLIGER A
 94 118 207 461
 576 3360 12006 12007
 12018
 BOLLINGER A
 3143 3166
 BOLLMAN JL
 3569
 BOLCMEY RA
 2393
 BOMKE HA
 2773
 BOMANN AM
 3550
 BOND BP
 10915
 BOND JO
 2117
 BOND V
 12517
 BOND VP
 618 788 975 1130
 1410 1508 1690 1727
 1996 2811 5185 5547
 5588 5609 5637 5798
 5888 5916 6338 6821
 6839 6895 6942 7057
 7343 7437 7637 7638
 7639 7687 7704 7705
 8199 8205 8874 8987
 9070 10640 10661 10677
 10714 10736 11882 12260
 12542 12543
 BONDUANT JH
 7873
 BONET-MAURY B
 706
 BONET-MAURY P
 968 1006 2284 2528
 2558 2559 2881 4081
 4793 4960 5051 5124
 5322 6103 6814 7640
 7641 12490 12588
 BONGIOVANI A
 8600
 BONHAM H
 2848
 BONHAM K
 1862 1946 2984 5112
 6566 6937 9525
 BONGNER D
 2636 4923 6186 8746
 10028
 BONGNER G
 10348 10350 10358
 BONGNER JF
 1056 10848
 BONGNER JF JR
 11054
 BONNEY V
 11575
 BONNICHSEN R
 6883
 BONGNIER G
 665 1455 1709 2299
 2795 6187 12248
 BONGMINI B
 3735 3794
 BONTE F
 11941
 BONTE FJ
 2645 10597
 BONZELL V
 1635
 BOOKER DV
 10217 12589
 BOON MC
 4602 4664 4843 5063
 BOONE IU
 6932 7642 7643
 BOOTH A
 2744
 BOOTH C
 10263
 BOOTH J
 2323
 BOOZ G

12298
 BORA KC
 5502 7297 7644 9368
 9369 9370 12274
 BORAK J
 2742 4597 4819 11537
 BORDIER
 10518
 BORDIER H
 12115 12116
 BORENIUS S
 10785
 BORG DC
 10736
 BORG WAJ
 10291
 BORISON HL
 1749
 BORLAUG NE
 7946
 BORMAN MC
 7353
 BORN HJ
 4236 10290 10972
 BORN JL
 7249
 BORNSCHEIN H
 1321
 BORNSTEIN A
 33
 BOROBIEV VN
 9313
 BORDTA A
 2234
 BOROWSKAJA D
 6188
 BORSOOK H
 11057
 BORST LB
 1778
 BORTELS H
 3496
 BORUFF CS
 7680
 BOSAEUS W
 93
 BOSCH H
 6189 11867
 BOSE A
 6100 10471 11038
 BOSMAN LP
 4039
 BOSS WR
 8215
 BOSS WRF
 10198
 BOSTIAN CH
 3279
 BOSTICK WH
 3068
 BOSTROM H
 5548 10516 11019 11272
 BOTHMAN L
 4328
 BOTKIN AL
 626 1420
 BOTSFORD TW
 86
 BOTT PA
 4382
 BOTTCHE H
 6843
 BOTTI G
 2591
 BOUCHARD J
 790
 BOUCHARD M
 3789
 BOUCHER H
 3274
 BOUCHER NE JR
 7425
 BOULD C
 2057
 BOULIN B
 12112
 BOURGIN RC
 7645
 BOURNE G
 3403 3625 3777
 BOURNE GH
 10988

BOURNE HG
 11784
 BOURRET J
 2726
 BOUWER WF
 1043
 BOVIE W
 48
 BOVINGTON MS
 8938 10204
 BOWEN CC
 5604
 BOWEN VT
 12620
 BOWER C
 5923
 BOWER JO
 9527
 BOWERS JZ
 232 758 2107 2675
 3028 5407 5515 6190
 6835 6894 7197 7352
 11505
 BOWING HH
 11539
 BOWMAN MC
 2658
 BOYD ES
 10468
 BOYD GA
 10540 10563 10811 11089
 11319 12590
 BOYD GE
 10955
 BOYD J
 8923 11220
 BOYD MJ
 10213
 BOYER J
 3657
 BOYLAND E
 1452 2596 4598
 BOYLAND H
 770
 BOYLE FP
 7786
 BOYS F
 4820
 BOZEMAN ML
 2730 4599
 BOZHENKO LV
 8978
 BRAASCH NK
 1873
 BRACANTI R
 7240
 BRACE KC
 1156 2510 5422 5806
 9347 9378
 BRACHER GJ
 6151
 BRACK CB
 2301
 BRACKETT FS
 3718
 BRACKIN JT JR
 5509
 BRADBURY JT
 10852
 BRADLEY D
 1917
 BRADLEY M
 5170 5175
 BRADNER WT
 6912 7429
 BRADY FJ
 11524
 BRADY LW
 9212
 BRAESTRUP CB
 3555 6074 8885 11718
 11785
 BRAHMS J
 11991
 BRAILSFORD JF
 4277
 BRAILSFORD RT
 3401
 BRAIN RT
 1882
 BRAMBELL F
 60 61 269

BRAMBELL FWR
58 3468
BRAMS J
536
BRANCOVICI M
12114
BRANDENBURG W
9024
BRANDLY CA
4162
BRANDON FB
7161
BRANDT CL
2004 7307
BRANDT FA
2474
BRANN G
12113
BRANNIGAN FL
1586
BRANSON H
4600
BRASCH A
1247 1909 6191 10067
11802
BRAUDE R
6192
BRAUDO CJ
5211
BRAUER EW
1648 5405 5849
BRAUER RO
2943
BRAUER RW
7213 12534
BRAUM AD
7386
BRAUN R
3215 3415
BRAUN W
4593 6172
BRAUNER R
4137 9592
BRAUSCH CC
10427
BRAWITZ PB
4226
BRAWNER HP
1863
BRAYER FT
6807 6987 11663
BROICZKA G
2302
BREAN H
2604
BRECHER G
839 1296 1343 1546
1747 1863 2119 2144
2256 5594 5818 6703
6722 7030 7153 7304
7442 7694 7706 11650
BREEDIS C
3962
BREFFELH LA
2422
BREIDER H
7409 8664 8665
BREIT DH
5272
BREITLAUDER K
49
BRENNAN JT
864 865 2439
BRENNEKE H
3984 11862
BRENT RL
1150 1250 2170 2266
5492
BRESLAVETS LP
1322 1769 6801
BRESLAVETZ LP
3711 10087
BRETSCHER E
4439
BREWER R
5848
BREWSTER W
3316
BRICK C
8392
BRICK IB
1650

BRICK IV
5279
BRIDGE E
11126
BRIDGES AE
11280
BRIDGFORTH EB
1432
BRIDGMAN J
6802
BRIEN P
5793
BRIGHAM E
1221
BRIGHT EM
8552 8553 8554 8555
8556 8557 12060 12061
BRIN M
7646 8018
BRINK CD
6193
BRINKHOUS KM
1138
BRINKLEY D
9130
BRINNITZER HN
6185
BRINTON C
10723
BRITTINGHAM WH
10094
BRIZZEE KR
7647
BROADFOOT WC
3303
BROCHNER-MORTENSEN K
3900
BROCC
8393
BRODIE M
3610 3679
BROGDEN WJ
3993
BROHULT A
5434
BROKULT A
11356
BRONKS D
9944
BRONNER F
10941
BRONSTEIN K
3190 9985
BRONTE R
606
BROOKS JW
1283 7287
BROOKS M
2180
BROOKS P
2249
BROOKS PM
3229 3632 7264 7369
7467 7648 7649 7785
10001
BROOKS RE
2964 5906
BROOKS SC
11891
BROOKS W
6734
BROSEGHINI A
12582
BROTHERS M
10529
BROTZGE GC
4127
BROWN AL
11992
BROWN BR
10266
BROWN CS
1539
BROWN CWM
2568
BROWN DF
5291
BROWN DV
7650
BROWN DVL
6111 6195 6196 7238
BROWN HM

4305
BROWN JB
2841 6197 7473
BROWN M
2213
BROWN MB
694 795 1105 1463
2207 2208 6812 7856
8277 9430
BROWN MG
3390 3494 4150 4379
BROWN MS
1841 2048 2544 9902
BROWN RF
7651 9231
BROWN RO
11877
BROWN SW
9367 9846 9848 9926
BROWN WH
4864
BROWN WL
9300 9301 9335 9336
BROWN WMC
1144 1176 1812 1910
2628 6026 6946 7001
7006 7703 12414 12446
BROWN-GRANT K
11059
BROWNELL AS
7092
BROWNELL GL
1083 9825
BROWNELL LE
673 1036 1166 1467
5436 5591 5593 5666
5683 5821 5869 6929
7142 7258 7276 7443
9197 9233 11532
BROWNING E
2417 7652
BROWNING JA
8672
BROWNING KM
10572
BROWNING LE
7201
BRU
944
BRU A
5695 11104
BRUCE AK
10063
BRUCE KW
1484 5441 5976
BRUCE WI
11863
BRUCER M
613 1142 5556 5689
8035 9085 10293 10325
10330 10563 10616 10628
11060 11070 11089 11643
11719
BRUCER MV
11071
BRUCK S
11536
BRUCS AM
6493
BRUDA BE
857 3088
BRUDEVOLO F
10848
BRUEGGE CF
2334
BRUES A
5758 6199
BRUES AM
250 654 659 660
766 767 768 844
859 860 861 862
895 914 915 916
917 1037 1038 1169
1170 1171 1180 1414
1415 1632 1638 1641
1721 1730 1866 1877
2188 2189 2195 2196
2197 2198 2212 2228
2248 2351 2438 2612
2817 2948 2949 2950
3151 4580 5697 5728
5896 5984 6198 6200

6201	6202	6203	6242	1998	6659	6660	7118	BURCH G
6243	6263	6288	6326	10288	10315	10316	10345	9647
6327	6360	6368	6434	10360	10382	10385	11076	BURCH GE
6448	6491	6492	6592	11077	11079	11218	11582	4526 10403 11083 11203
6654	6654	6784	6813	BUCHANAN DR				11308 11360 11375 11380
6872	6877	6892	7117	11065				BURCH PRJ
7124	7125	7130	7333	BUCHER OH				10139 12313
7471	7653	9703	9710	3199				BURDICK AB
9733	10182	10182	10264	BUCHHOLZ JT				7464
10268	10280	10283	10285	880 8764	9413	10095		BURDICK KH
10288	10303	10345	10372	10096 10097				1013 5678
10438	10477	10846	10879	BUCHMANN W				BURDON KL
10880	10919	11064	11065	4306 6565	6661	6662		5770 5824
11066	11167	11211	11306	BUCHSBAUM R				BURG C
11323	11400	11933	11937	2952				1426 10740
11942	11954	12328	12343	BUCHTHAL F				BURGENER K
12522	12591			3888				4821
BRUMFIELD RT				BUCHWALD CE				BURGER GN
4501 4601	6238	6655		9898 10044				3158
BRUMMER K				BUCHWALD KW				BURGESS G
12111				3236				9974
BRUMMIT H				BUCKALOO GW				BURGESS GF
5810				690 1278				10391
BRUMMITT M				BUCKLEY HD				BURGESS LE
9749				10406				11084 11377
BRUN I				BUCKY G				BURGHEIM F
9985				9609				389 7408
BRUNCHAUSER W				BUDAI E				BURGVIDZH GK
7130				3065				3920
BRUNER FH				BUDE W				BURK D
3565				9471				4602
BRUNER HD				BUDILOVA EV				BURKE AW JR
10654 10658	11060	11067		5523				685 925
11069 11070	11071	11072		BUDIN E				BURKELL CC
11285 11353	11357	11359		7655				5528
BRUNNBERG M				BUDNITSKAYA YV				BURKHOLDER PR
1694				9274				5237
BRUNNER H				BUDY AM				BURKSER E
6761 6765				1160				3190 9985
BRUNOVSKY B				BUESSELER JA				BURLINGAME L
7635				2424				630
BRUNS KH				BUETTNER RJ				BURLINGAME LM
1956				6332				5718
BRUNSCHWIG A				BUGHER JC				BURN JH
1783 3834	6236	6504		1097 9299 10098 10334				110 803 2127
BRUNST V				12326				BURNAZYAN AI
3825				BUGNARD L				7656
BRUNST VV				4411 6507				BURNETT GW
1031 1434	2410	2463		BUGYI B				8861
2550 2718	2835	2974		5223				BURNETT THJ
3531 3688	5860	6141		BUJARD E				11393
6656 6834	7461			1698 5319				BURNETT WT
BRUSA A				BUKANTZ SC				5461 8303
11073 11074				2023 5442 6663				BURNETT WT JR
BRUSTAD T				BUKHTOYAROVA ZM				643 667 678 685
12312				9811				925 2263 5431 6928
BRUYNOGHE R				BULBRING E				BURNHAM EM
27 6130	7654	8394		803				1688
8395 12110				BULEY HM				BURNS VW
BRUYNOGUE R				11262				5421 7148 7657
8396				BULKLEY GJ				BURNSTONE MS
BRYAN CE				1385 10415 11376				6011
6388 6389				BULL JO				BURR BE
BRYAN FA				7701				6786
6332 6657 11392				BULLARD D				BURR GO
BRYAN HS				7472				2808
988				BULLOCK WH				BURRIS RH
BRYAN L				777				9479 10297
11967				BULMAN HA				BURROWS H
BRYAN R				210 3114 3117				6664
10354				BULMER JJ				BURROWS M
BRYAN WR				7142 7258 7276				50
1504				BULRYAN BJ				BURROWS MT
BRYAN WW				6029				171
4574				BUMHAM CR				BURROWS W
BRYANT FJ				1258				1639 1640 5980
12589				BUMP G				BURSTON SR
BRYANT JR				5155				1757
1380 10328 11373				BUMPUS HCJ				BURSTONE MD
BRYANT MP				9577				11085
9512				BUNCH RF				BURSTONE MS
BUBLITZ H				10931				113 1238 1695 1696
6325				BUNKER JWM				2036 2408 2518 5921
BUCCIANTE L				5156				9705 10168
3680				BUNNING E				BURSTROM D
BUCCIARDI G				3617				3801
12143				BUNTING CH				BURT AS
BUCHANAN CR				853 3436 3850 12052				5573
11758				BUONO PD				BURTON M
BUCHANAN OJ				537				2093 2094 2537
1432 5866				BUONSANTO M				BURTON VL
BUCHANAN DL				11082				12552

BURTON WG
9287
BURYKINA LN
9531
BUSCH E
2970 7433
BUSCH F
3188 3227
BUSCH KA
10483
BUSCHKE W
1816 6043
BUSECK O
8397
BUSH AF
11720
BUSH DL
10188
BUSH F
6665
BUSH JA
10558
BUSH SG
1168 1405
BUSHLAND RC
5629 5792 11563 12518
BUSINCO O
3059
BUSINI PA
7921
BUSSE WF
563
BUSSER E
8618
BUSSY
965
BUSTAD LK
7370 7432 7658 7659
8913 8953 9707 9771
9772 10771 11868 12585
BUTEMENT FDS
2914 11086
BUTLER CL
723 761 2369 10400
BUTLER EE
674 683
BUTLER EG
3254 3319 3404 3473
3516 3708 4603 11890
BUTLER JAV
2040 6416 6666 7232
12350 12350
BUTLER JW
11877
BUTLER L
8766
BUTLER N
2445
BUTT B
10935
BUTTERWORTH A
10294
BUTTERWORTH JS
6668
BUU-HAI NP
5656
BUU-HOFF NP
12451
BUUHOI NP
6811
BUZZATI-TRAVERSO A
5288 6139
BUZZELL A
7161 7660 7980
BYCHKOVSKAYA IB
5478 7661
BYCHOWSKY M
3668
CABASSON F
4049
CABRAL MT
8715
CAFFARATTI E
823 1050 5898
CAHALL HK
8890
CAHAN WG
5317
CAHN JH
11762
CAILLIAU
12134

CAIMS H
3183
CALDECOTT RS
1069 1361 2850 2865
5307 5377 5602 5904
6669 6991 7381 7436
8870 8932 9188 9190
9849 10088 10099 10101
CALDWELL G
9966
CALDWELL JT
9028
CALHOUN A
159
CALHOUN ET
408
CALHOUN JA
11347
CALHOUN WW
5533
CALKINS LL
2424
CALLAN HG
4426
CALLAWAY JL
5030
CALLIHAN AD
10110
CALLIHAN D
7663
CALVET F
11110
CAMARA A
4822 4823 4922 5445
9198 9925
CAMARA A DE S DA
4057
CAMBELL JE
11951
CAMERA R
799
CAMERMAN J
11394
CAMERON G
4510
CAMERON JA
3799 4169 4214 4244
4573 6148
CAMERON OJ
3915
CAMMERMEYER J
6613
CAMP CJ
1530
CAMPANI M
5828
CAMPBELL B
2319 2828 4781
CAMPBELL IG
10317
CAMPBELL IL
710
CAMPBELL JA
11123
CAMPBELL JE
7145 10433
CAMPBELL WL
3036 5035
CAMPI L
10921
CAMPO RD
9070
CANNAVO L
3795
CANNON B
7693
CANNON HL
10773
CANNON RO
9688
CANTER HY
1182
CANTI R
20
CANTI RG
523 544 7336 11993
CANTRIL ST
1534 6670 9230 10480
11361
CAPLAN PE
11752
CAPPELLI E

3558
CAPPELLI L
565
CAPRETTI G
2033
CARBONARO L
10307
CARD LE
2878 4335
CAREY MM
1718
CARLETON R
5626
CARLSON AB
3055
CARLSON JC
5713
CARLSON JG
1320 2386 2801 4031
4140 4177 4343 4605
5021 6794 12346
CARLSON KE
11384
CARLSON LD
4322
CARLSON RI
11114
CARLSSON A
11008 11010 11011 11200
CARMICHAEL EA
3333
CARMONA L
3676
CAROTHERS EE
4101
CAROTHERS EL
5810 7820 7821 9749
9751 9761 10366 10554
11084 11377
CARPENDER JWJ
5832 6417
CARPENTER CM
4485
CARR HS
5942
CARR M
1990
CARR RM
9301
CARRIE C
3455 4301
CARRIERE
944
CARRIGAN KE
3387
CARRITT J
11204
CARROLL HW
7213
CARROLL MJ
4017
CARSON G
759
CARSTEN AL
7662
CARTARR MS
9843
CARTER AC
9762
CARTER CE
2787 6010 10199
CARTER LJ
3184
CARTER RE
864 1126 2383 2439
2970 5588 6839 6895
7433 7664 7665 10640
10677 11277
CARTER TC
5577 6671 7222 9182
10104 12250 12262
CARTER WD
625
CARTLEDGE JL
3522 9412 9923 10100
CARTTAR MS
1193 1453 5672 11136
11137
CARTTER MS
11278
CARTWRIGHT GE
9718 10421 10593 11786

1235	5493	7073	7231
8205	8987		
CHINN HF			
1151			
CHINN HI			
5341	5540	8914	
CHIPPA S			
12362			
CHIRPAZ B			
7394			
CHIZHEVSKII AL			
3723	3724		
CHOCHIA KN			
9308			
CHODAT F			
1832	12119		
CHOME E			
8489			
CHORNEY W			
11362			
CHOUGHAK D			
477			
CHOUDHRI RS			
4100			
CHOUDHURI RD			
10471			
CHOW BE			
11239			
CHOW BF			
11627			
CHCW SK			
10170			
CHRISTENBERRY KW			
1155	5345	5346	5871
5907	7618	8304	
CHRISTENSEN CJ			
9150			
CHRISTENSEN E			
998	1101	2354	2538
2946	5549	5801	5802
9930			
CHRISTENSEN N			
232	7352		
CHRISTENSEN WR			
1201	2183	5794	
CHRISTIAN E			
11094			
CHRISTIAN EJ			
5728	6872	7333	
CHRISTIAN EJB			
1632	1676	1730	2131
5476	5697	6368	10182
11166			
CHRISTIAN T			
159			
CHRISTIANI E			
3298			
CHRISTIANSSEN AM			
6286			
CHRISTIE AC			
696			
CHRISTIE ALM			
4276			
CHRISTIE JH			
628	1741	2539	5775
6650	10594		
CHRISTMAN RP			
1110			
CHRISTOPH P			
7115			
CHRISTOPHERSON WM			
1380	6774	10293	10328
10616	11031	11034	11373
CHRCM SA			
3901			
CHU FCH			
7312			
CHU HJ			
4304			
CHU IT			
3033			
CHUKRU-AKSEL I			
6763			
CHUPP MM			
7723			
CHURCHILL A			
3418			
CHURY J			
5300	10024		
CHURE RN			
10469			
CHZHUN LIN C			

9316			
CIARANFI E			
6679			
CIBIS PA			
6111	7074	7238	
CICCONI M			
5097			
CIECIURA SJ			
12376			
CIOFFI RM			
3035			
CIPALLARO AC			
6441			
CIPOLLARO AC			
6443			
CIPRIANI AJ			
11149	12471		
CIRIO L			
3391			
CLAASSEN V			
11251			
CLAESSON L			
2660	5046		
CLAIBORNE HA			
10499			
CLAPPER WE			
5570	7678		
CLARK AM			
1961	2153	4743	5606
5622	5836	6681	6924
7679			
CLARK CM			
5370	8844		
CLARK DE			
9276	12400		
CLARK FE			
2285			
CLARK GL			
2878	3387	3579	6680
7680	7738		
CLARK GM			
10592			
CLARK H			
432			
CLARK JG			
11996			
CLARK JH			
6682	9527	11885	12593
CLARK JW			
1169	5598	5599	5817
7296	7681	8318	8319
9496	10649	10791	11297
11937	12333		
CLARK L			
6534			
CLARK LB			
1078	5155	7082	
CLARK LH			
3114	10749	12572	
CLARK RJ			
1			
CLARK RK			
4789			
CLARK SH			
1409			
CLARK W			
786			
CLARK WA			
11708			
CLARK WG			
1861	2745		
CLARKE G			
1893			
CLARKE GE			
7790			
CLARKE RW			
11378	12594	12595	12596
CLARKE TH			
10287			
CLARKSON JR			
4400			
CLARKSON P			
2413	2414		
CLAUS PE			
4160			
CLAUS WD			
3470			
CLAY HL			
2631			
CLAY M			
7573			
CLAYTON FE			

5565			
CLAYTON R			
10386			
CLAYTON RS			
6784			
CLEMEDSON CH			
7682			
CLEMEDSON CJ			
7254	9139	11020	12213
12606			
CLEMENTE CD			
6683	8873		
CLEMMESSEN J			
1905	1906	3963	4272
4384			
CLIFCORN LE			
7149			
CLINE JF			
9106	9457	9458	9931
9933	9935	9936	
CLOKEY IW			
3911			
CLOSON J			
6717	10735		
CLOSUIT M			
10208			
CLOUD RW			
4765			
CLOUDMAN AM			
6684	6784	10386	11339
CLOUET DH			
5398			
CLOUTIER R			
8868			
CLUGSTON H			
5639	6876	7044	7414
CLUZET J			
122	5115	6725	84 4
12568			
COATNEY GR			
2690	5167		
COBB JP			
7683			
COCCHI U			
5106	5953		
COCHRAN KW			
1023	2115	6685	11075
COCKCROFT J			
6889	11396		
COCKCROFT JD			
4038			
COCKERELL TDA			
474			
COCKRELL WF			
10251			
CODMAN EA			
9575			
COE WS			
2631			
COGAN DG			
653	752	2244	2308
2348	4765		
COGAN GD			
6686			
COHEN A			
1020	1456	2269	5630
5631			
COHEN BS			
9295			
COHEN G			
9789			
COHEN I			
4117	4493		
COHEN J			
8002			
COHEN JA			
5503	8670	12226	12271
COHEN L			
1020	1456	2145	2269
2337	5031	5630	5631
10270	11641		
COHEN SG			
1699	2603		
COHN A			
254			
COHN C			
370			
COHN DV			
10733			
COHN P			
12350	12350		
COHN SH			

623	1080	1216	1335
2053	5044	5510	7685
7686	7687	7712	8929
11256	11955	12541	
CCHN WE			
1834			
COIC CR			
9249	9724		
COLANERI LL			
478			
COLE AM			
11926			
CCLE JW			
1949			
CCLE LJ			
618	788	827	1130
1349	4448	4507	4760
5089	5426	5547	5771
5798	6086	6338	6815
6992	7057	7212	7262
7268	7328	7494	7496
7688	7698	8091	8092
8206	8961	8963	8990
9123	9177		
COLE RD			
7042	10746		
CCLEBROOK L			
8405			
COLEBY B			
7827			
COLEMAN RD			
11397			
COLEMAN S			
10513			
COLEY BL			
5317			
COLGAN J			
921			
COLIEZ R			
11696			
CCLLIER JG			
5118			
COLLIER V			
1858			
COLLING M			
1087	1088		
COLLINS CJ			
2912			
COLLINS GN			
8846			
COLLINS JG			
5350			
COLLINS JL			
403	9928		
COLLINS VP			
1365	8135	9012	11224
COLLINSUN E			
10786			
COLODZIN M			
11300	11304	11305	
COLCVOS GC			
9494			
COLWELL CA			
4129	4427		
COLWELL H			
107	10772		
COLWELL HA			
3682	3998	6687	6688
11997			
COLWELL HE			
34			
COLWELL HJ			
18			
COLWELL HW			
6689			
COMAR CL			
1185	1271	5529	5551
6690	6691	6692	6693
7689	8034	9136	9245
9765	10183	10324	10326
10327	10376	10943	10992
11257	11266	11268	11312
11314	11316	11319	11504
11956			
CCMAR RD			
11333			
COMBA EG			
7748			
COMBESCOT C			
10655			
COMER R			
1592			

COMSA J			
1277	5366		
COMSOCK CR JR			
11716			
COMSTOCK M			
12597			
CONARD RA			
2075	5594	5613	7201
7637	7690	7691	7693
7694	7695	12444	
CONDON EU			
108			
CONE G			
1464			
CONGOON C			
1208	11577		
CONGDOON CC			
187	1461	5511	6783
6787	6980	7696	7697
7863	8134	8956	9004
9114	9147	9158	9159
9161	9433	9813	12503
12506	12538	12546	
CONGDOON ED			
8406	11998		
CONGER AD			
616	1274	2384	2682
3017	5067	5305	5393
5674	5862	6060	6138
7413	7463	8818	9004
9318			
CONGER D			
6110			
CONIGLIO JG			
1236	6967	7332	7568
7699			
CONLON P			
8795			
CONNEL HC			
4957			
CONNER H			
12582			
CONNOR CL			
9665			
CONRAD RA			
989	1342	6041	
CONROY L			
1462			
CONSTANS J			
11029			
CONSTANT MA			
5612	5709		
CONTE FP			
7220	7700	8032	8305
9015	10675		
CONTROULIS J			
5869			
CONVERSE JM			
11647			
CONZELMAN GM JR			
5522			
COOK EB			
6113	7257		
COOK ES			
5607	9460	10689	
COOK EV			
4110			
COOK GB			
10336			
COOK MB			
11039			
COOK SF			
6221	9700		
COOK TJ			
783			
COOK WA			
11405			
COOKE AR			
9937			
COOKE J			
10232			
COOKE R			
10500			
COOL HT			
6786			
COOL WS			
982			
COOLEY MA			
5471			
COOLIDGE WD			
8837	10052		
COON JM			

1985	6695	7347	7740
11446			
COONAN L			
932			
COONEY JP			
1761	2015		
COOPER AR			
11406			
COOPER BJ			
10447			
COOPER DB			
5597	5598	5599	7102
7392			
COOPER FS			
4315	4424	4477	9898
COOPER G JR			
7585			
COOPER JA			
1385			
COOPER JAD			
769	5765	5782	5783
9122	10415	10416	11376
COOPER ZK			
3690	4383		
COPE D			
4765			
COPELAND MM			
3260	6365		
COPLEY AL			
192	2890		
COPP DH			
1521	6091	6696	6697
9723	10164	10413	10629
10645	10981	11330	11385
11439			
COPP HD			
2095	9722		
CORBERI E			
2644			
CORBETT BD			
7224			
CORDIER EJ			
11784			
CORDINER GRM			
3508			
COREY RB			
9939			
CORI CF			
7518	9958		
CORI GT			
9913			
CORI K			
8407			
CORK JM			
9227			
CORMIA FE			
4574			
CORNATZFR WE			
679	2125	5417	5807
6698			
CORNER GW			
2995			
CORNFIELD J			
2822	5363	5624	11957
CORNFORD CE			
9144			
CORNIL L			
812			
CORNILLOT M			
6406			
CORNWELL PB			
7701			
CORP MJ			
10141			
CORPER HJ			
8408	8454	8455	11999
CORPS MJ			
10697			
CORRADI C			
9317			
CORREA LM			
8564			
CORRIGAN KE			
1872			
CORSBIE RL			
10404			
CORSI H			
11398			
CORWIN AH			
10524			
CORY R			
11707			

DA CAMARA A
6707
DA SILVA MELLO A
7544
DACK GM
8324
DACOSTA E
1000
DAELS F
44 69 143 296
3237 7517
DAGGS VM
1168
DAHL A
1494
DAHL B
3827 4356 9612
DAHL LK
1315 11561
DAHN PA
5799
DAIGNEAULT E
1167G
CAILEY M
10873 11033
CAILEY ME
5636 5846 7104 10436
11134
CAINTON FS
12429 12599
DALAL MS
4891
DALE PP
2867 5977
DALE T
9495 9497
DALE WM
5931 6718 11860 12352
12403 12600 12601
DALLA NG
8644
DALLEMAGNE MJ
10589
CALLENBACH F
7100
DALLYN SL
7026
DALY JM
1878
DAMBLON I
12380
DAMGAARD E
5399 7406
DAMMIN GJ
5442 6663
DANFORD MB
7942 7943
DANIEL G
2651
DANIEL GE
5365 6106
DANIEL O
11036
DANIELIAN AC
309
DANIELLI JF
6337
DANIELS DS
9191 9630
DANIELS EW
1137 2243 10574 11401
12364
DANIELS F
452 563
DANILENKO AI
9268
CANNEEL R
4289 4360 4407
DANTCHADOFF V
3759
DANTCHAKOFF V
3760
DARBY WJ
1236 1432 5866 7332
8260 9680 11035
DARDEN EB
5681
DARDEN EB JR
733 734 5625 8201
DARENSKAYA NG
9267
DARIER

11589
DARLINGTON CD
9196 9399 9400 9401
9409 9938
DARNBACHER L
536 11991
DARROW JB
7919
DAS GUPTA NN
5187 10471 11038
DAS NN
4827
DASAIVE P
12209
DAUDEL P
10871
DAUER M
11446
DAUPHIN J
2874 10066
DAVAL R
11511
DAVENPORT E
12014
DAVENPORT V
7352
DAVENPORT VD
232
DAVEY PW
1154
DAVEY WP
3240 3757 7540
DAVID LR
5687 10450
DAVID M
11029
DAVID O
253 8412 11324
DAVID PW
6786 6787
DAVIDOFF LM
4091
DAVIDOVA SA
9030
DAVIDS JA
8541
DAVIDS JAG
12377
DAVIDSON HO JR
7713
DAVIDSON JM
8413
DAVIDSON JN
2597 12501
DAVIDSON JP
5417
DAVIDSON RS
5915
DAVIDSON S
1392
DAVIES BP
7164
DAVIES DV
11041
DAVIES HEF
11216 11423
DAVIES HP
8186
DAVIES JV
5931
DAVIES R
11379
DAVIS AK
5483 5484 5826 7574
8877 8948 9226
DAVIS BD
6709
DAVIS DSH
4624
DAVIS GK
6690 6691 6692 6693
10183 10874 10875 10937
10974 11448
DAVIS JJ
12458
DAVIS KS
10053
DAVIS M
953 5495 5669 6789
7714 10051
DAVIS ME
3658

DAVIS MI
12224
DAVIS RJ
7715
DAVIS RK
7716 10483 10950 11927
11945 11946
DAVIS RW
5516 6037
DAVIS WM
5483 5484 5826
DAVISON B
1515
DAVISON C
4470 4615
DAVISON JP
5807
DAVISON RA
3027
DAVISON S
5742 7174
DAVY L
12002
DAVYDOFF S
7717 7718
DAWBARN MC
3401
DAWSON AB
68 421 7314
DAWSON K
10439
DAY KM
2500
DAY PL
2509 5381 7103 7216
9028
DAZI A
12003
DE AMICIS E
670
DE ANGELIS G
311 393
DE BERNARDI E
5352
DE BOER B
4425
DE BRION G
5763
DE BROGLIE D
8787
DE BRUYN PPH
2342 2879 7719
DE CARAMAN M
3872
DE CARVAJAL-FORERO J
5157
DE CARVALHO S
4994
DE CASTRO D
5445
DE COURMELLES F
3361
DE COURSEY E
2056
DE DILVEIRIA M
9712
DE DIOS LEAL LUNA J
5383
DE FOREST DM
12035
DE HEVESY GC
8864
DE LA CAMP O
9952
DE LA HOZ FABRA J
11387
DE LANDTSCHER L
6760
DE LEEUW NKM
9995
DE MOL WE
3365 4982 4991
DE NABIAS
3753
DE NICOLA M
5883
DE NOBELE J
230
DE OME KB
9151
DE OYA JC
10395

DE PK
 10471 12450
 DE PLAEN P
 822
 DE PUY SAHLER O
 4269
 DE RENYI GS
 12091
 DE RENYI M
 457 12091
 DE SAUSA DA CAMARA A
 4406
 DE SCHRYVER A
 9172 9263 9266 9284
 9320
 DE SERRES FJ
 5506 9493 9992
 DE SILVERIA M
 9713
 DE SOMER P
 5075
 DE VASCONCELLOS S
 4823
 DE VERA JA
 9432
 DE WAARD DJ
 8446
 DE WAARD RH
 11402
 DE WITTE J
 9172 9263
 DE YAKIMACH A
 1832
 DEAMICIS E
 1309 11721 11799
 DEAN ACR
 2077
 DEAN AH
 2870
 DEAN LA
 10050
 DEANESLY R
 422
 DEANTONI V
 7564
 DEARBORN EH
 11383
 DEBLEY V
 1014 5561 5733 6933
 7421
 DEBOTTIS DJ
 8038
 DEBRUYN PPH
 681
 DECARLOS R
 6710
 DECHAMPS G
 1350
 DECHAUME JC
 6012
 DECHAUME M
 6135
 DECKER AB
 2106 2471 2540
 DECKER CF
 11940
 DECOURMELLES F
 8414
 DECCOURSEY E
 1799 2418 2942 5892
 OEDEN C
 7252
 DEDERER PH
 4329
 DEFCE E
 2043
 DEGARA PF
 5098
 DEGIULI G
 11657
 DEGROOT J
 12305
 DEHEVESY G
 6718
 DEHLER H
 252
 DEHM JE
 8780
 DEHO GG
 6711
 DEL BUONO G
 2442

DEL BUONO P
 4119 10496
 DEL ROSARIO C
 571
 DELACIO AM
 10426
 DELAMORE A
 11873
 DELARIO AJ
 3005 5435
 DELAS R
 177
 DELAVAL H
 8472 10010
 DELBRUCK M
 2158 4332
 DELFEL NE
 6779
 DELIT M
 5374
 DELL ACQUA G
 6712
 DELLA ROSA RJ
 7058 7720 8059 10430
 11144
 DELLEPIANE G
 538 3480
 DELONE LN
 3329
 DELONG CW
 10319 10320 10625 11722
 DELTOUR GH
 10398
 DELUCA HA
 11309
 DEMEESTER G
 9265 9266
 DEMEIO RH
 11046
 DEMEL R
 6762 6764
 DEMEREC M
 3069 3442 3981 4013
 4178 4296 4345 4393
 4413 4508 4770 4828
 5040 5172 5195 5197
 5265 6713 6751 7721
 9398
 DEMIRCHOGLYAN GG
 10454
 DEMMLER R
 8999
 DEMOL WE
 5460
 DEMPSTER ER
 4194 4307 4380
 DEMPSTER WJ
 1451 1748
 DEN AJ
 4878
 DEN HOED D
 4056 4992 9617 12560
 DEN LE
 4062
 DENEGRÉ M
 8788
 DENHAM SW
 1152
 DENHAM W
 9676
 DENIS W
 11864
 DENISOVA EA
 8904 11468
 DENISOVA ZV
 8971
 DENKO J
 12200
 DENNIER A
 5351
 DENNIS RH
 2424
 DENNISTON RH II
 4608
 DENNY CB
 5336
 DENSEN PM
 11039
 DENSIN JR
 1125
 DENSON J
 772

DENSTAD T
 4942 10775
 DENT JN
 678 2343 5309 5431
 6714
 DENT JW
 1590
 DEPLAEN P
 5615
 DEPP RK
 6715
 DERICK RA
 3983
 DERINGER M
 4926 6433
 DERINGER MK
 4990 5059 6716 6778
 6983
 DERNIERVILLE E
 9892
 DERDIN J
 1023
 DESAIVE P
 3828 4829 5280 5991
 6717 12427
 DESCHNER E
 1114 5412
 DESCHNER EE
 5371
 DESCHNER ER
 2467
 DESERRES FJ
 9940
 DESJARDINS AU
 2873 3102 3103 735
 DESSAUER F
 427 479 6719 9635
 10102 10249 10491 10494
 10495 12004
 DETRICK LE
 711 1014 5561 5733
 6933
 DEUEL HJ JR
 1032
 DEUPREE NG
 1639 1640
 DEUTSCH E
 35
 DEUTSCH L
 3533
 DEVI P
 6721
 DEVICK MH
 7572
 DEVICK R
 11088
 DEVIK F
 749 1460 2017 2031
 2254 5580 6317 7269
 7379 8950 9769 1062
 12199
 DEVINE RL
 7194 11212 11232
 DEVINS JD
 12602
 DEVIRTS AP
 3582
 DEVIS R
 10676
 DEVISSCHER M
 11428
 DEVLAMINK F
 10232
 DEVRIESE R
 2895
 DEYSACH LJ
 11049
 DEYSINE A
 716
 DEYSSON G
 8917
 DI LUZIO NR
 6844 9321
 DIADIUCHA G
 12198
 DIAMOND HD
 2451 7722
 DIAZ CJ
 10395
 DICHIE A
 5064
 DICHTER IS

EDHCLM OG					6994	9066	10215	12475		2340	5794	5830	7002
2598					EISENMAN AJ					12255	12300		
EDICK M					11463					ELTZHOLTZ D			
10475					EISENSTARK A					1928			
EDINGTON CW					7738					ELTZHOLTZ DC			
1195	7735	8201	8247		EISLER M					1576	1932	2748	5312
EDINGTON GM					445					6027			
7166	11015	12605			EKAMN L					ELWARD JF			
EDLUND T					10512					4455			
5433					EKLUND L					ELY CA			
EDMCNDSON CH					1607					7741			
3779					EKSTEIN DM					ELY JO			
EDSCN EF					10681	10686				1908	1950	2058	2326
11741					ELDJARN L					2327	3050	11427	
EDUARD DE MOL W					7739	12269	12303	12388		ELY RE			
3542					ELDRED E					6690			
EDWARDS DJ					6107					EMELYANOV KH			
12088					ELDREDGE JH					802			
EDWARDS G					2042	2251				EMERSON GA			
11077					ELFTMAN AG					1984			
EDWARDS JE					11018					EMERSON RJ			
7992					ELFTMAN H					11604			
EDWARDS JL					11018					EMERY ES			
875					ELGHAMMER RM					7346	9974		
EDWARDS RR					2535					EMERY ES JR			
11131					ELIAS C					3161			
EDWARDS VM					2473					EMERY EW			
10387					ELIAS OE					11216	11423		
EFEIKIN AK					8435					EMMERICH E			
9416					ELIASOPH J					7407			
EFNER JA					11111					EMMERLING MH			
1432	7332				ELIASSON R					7997			
EFRATI E					2120					EMMETT J			
7736					ELKELES A					2370			
EFRICIMSON WP					9499					EMMONS CW			
3441					ELKIND MM					6555			
EFSKIND L					6986	9945	9946			EMSLIE ARG			
4494	4806	4807			ELLER JJ					10368			
EGELHAAF H					2742					ENASSI E			
2832					ELLER MH					12136			
EGLOFF WC					1814					ENDICOTT KM			
3609					ELLER WD					1863			
EGNER W					2742					ENERSON D			
2535					ELLINGER F					1480			
EGGROV AP					945	1128	1163	1457		ENERSON DM			
6867					1469	1479	1808	2360		1661	1683	1684	1685
EHLERS OC					2532	2871	3029	3044		1689			
3165					3776	4111	4215	4416		ENGBERG CJ			
EHRENBERG L					4470	4495	4496	4614		1057			
1045	1046	1177	1694		4615	4931	5019	5121		ENGEL A			
2331	2512	5758	6884		5378	5607	6113	6732		3919			
7034	7684	9423	9429		6733	6734	6997	7227		ENGEL D			
9437	9438	10023	10777		7228	7257	7305	8965		172	4072		
10779	10785	12321	12419		9138	9460	10689	12524		ENGEL OS			
EHRENSBERGER R					ELLINGER FP					1771	5960	9373	
8668					5184	5188				ENGELHARD H			
EHRET CF					ELLINGER P					2472			
1062	1134	1636	1637		582	8420	8421	9792		ENGELMANN MD			
1680	1681	1733	6263		ELLINWOOD LE					12582			
12279					1252	5516	5662	7147		ENGELMANN W			
EHRHARDT K					7347	7740				8422			
3299					ELLIOTT AM					ENGELS A			
EHRMANOVA-FRIEDLANDER R					10592					7120	10503	11115	
5077					ELLIOTT FC					ENGELSTAD D			
EICHBAUM F					9397	10048				5807			
4019					ELLIOTT RR					ENGELSTAD OD			
EICHEL B					10502					5417			
7074					ELLIOTT SB					ENGELSTAD RB			
EICHEL HJ					11788					3677	3780	4362	6735
1319	7031	7171	7737		ELLIS F					6736			
EICHMULTZ F					730	1797	2339	2379		ENGER R			
3286	4361				5313	8894	8970	9672		3209			
EICHORN KB					9673	9677	10778	12373		ENGFELOD B			
10824					12411	12447				10516	11019	11020	11021
EIDENOW A					ELLIS G					11467			
8405					9078					ENGLE ET			
EIDINOW A					ELLIS K					2789			
11850					8204					ENGLERT ME			
EIDUS LK					ELLIS M					6428			
6923					7496	8206				ENGLESTAD RB			
EILERMANN G					ELLIS ME					3051			
1720					788	827	1349	5771		ENGLISH JA			
EILERS T					6086	6815	6992	7212		738	5378	5705	7330
6848					7262	7328	7688	7698		7505	7742	7828	10507
EINSET J					8963	8990	9177			11444			
9289					ELLIS WW					ENGLMANN			
EISENBERG M					763					9615			
3668					ELLSWORTH LD					ENGSTROM A			
EISENBERG MF					4412	5456				10516	11019	11020	12203
3109					ELSBERG CA					12606			
EISENBUD M					4091					ENGSTROM RM			
1147	1615	2177	2179		ELSON LA					5259			

ENGUS M					3801	4956	4966	5206	FABRICUS-MOLLER J				
579					6023	6524	6741	9947	9465				
ENLGE CF					10071	10072	10074		FADEEVA ZN				
2866					EUNUS AM				7749				
ENTENMAN C					9323				FAERST CR				
699	700	2050	2118		EVANS AP				12381				
5137	5254	5428	5589		3104				FAHLSTROM S				
5590	6860	6919	7094		EVANS B				2771				
7095	7792	7902	8862		8090				FAHMY M				
8974	11209				EVANS BH				12310				
ENZMANN EV					4245				FAHMY MJ				
3844	3942	4041	4050		EVANS EA JR				12247				
4259	4395	6155	6239		4972				FAHMY OG				
EPHARATI E					EVANS EI				12247	12310			
6413					7287				FAILLA G				
EPHRATI E					EVANS HB				1094	1386	2167	2179	
6737					11222				3011	3115	3262	3434	
EPHRUSSI B					EVANS HJ				4339	4617	4618	5560	
2713					8078				6747	6748	6749	8594	
EPHRUSSI-TAYLOR H					EVANS HM				9001	11408	11880	11969	
12489					10548	10567			11996				
EPSSTEIN YA					EVANS J				FAIR DRR				
7743	7744	11828			6979				12461				
EPSTEIN HT					EVANS RD				FAIRBANKS AJ				
7745	10704				966	1943	2697	2995	11693				
EPSTEIN S					3056	3571	4020	4834	FAIRBROTHER F				
4497					4837	5011	5156	6743	4839				
ERDELY D					6744	7747	11023	11284	FAIRBROTHER JAV				
8998					11286	11287			3126				
ERDMANN K					EVANS RS				FAIRCHILD LM				
1242	12513				4986				616	8818			
ERF LA					EVANS RW				FAIRES RA				
4542	7319	9646	9667		2854				7014				
9668	9669	9670	9681		EVANS T				FAIRHALL LT				
9682	9702	11814	11900		3357				10870				
ERICHSEN MC					EVANS TC				FAIRLEY NH				
4793					1487	1770	1811	1818	3508				
ERICKSON CA					1893	3067	3581	3585	FAIRWEATHER MJ				
2906	5426				3620	3621	3726	3845	6028				
ERIEKSOVA EV					4216	4246	4247	4390	FAJBISOWICZ S				
9534					4452	4453	4512	4543	11688				
ERINA EV					4575	4617	4618	4783	FAJERMAN H				
11468					4838	5079	5201	7144	10871				
ERLEKSCVA EV					8148	10852	10854		FALCONER E				
11022					EVANS WA				9961				
ERMALA P					12089				FALEEVA ZN				
2676					EVANS WW				9048				
ERNST E					7829	9827			FALK F				
50	171				EVERETT HS				7416				
ERNST EC					2301				FALK R				
524					EVERETT NB				7033				
ERNST H					4619	11454			FALKENHEIM M				
4087					EVERHARDY WH				6750	10465	10872		
ERNST J					9087				FALLON M				
3657					EVERSOLE WJ				216				
ERRARA M					1535	10504			FAND U				
12380					EVLAKHOVA VF				581	1498	4178	4620	
ERRERA L					6051				4621	4828	4840	5103	
2324					EVRAO E				6751	8669			
ERRERA M					10537				FARABEE LB				
6738	10075	12484	12607		EWART AJ JR				2001				
ERTAUD A					10070				FARAGHAN WG				
968	1006				EWING J				9430	10619	10621		
ESCHENBRENNER A					79	7316	9528	11699	FARAGO A				
6068					11968	12090			3706	3902	4363		
ESCHENBRENNER AB					EWING PI				FARBER GJ				
1565	1627	1628	1669		1984				2301				
1930	2276	4944	4990		EXNER F				FARDON JC				
5059	5214	6433	6739		4165				4017	4127			
6740	10393	10754			EXNER FM				FARKAS				
ESCHER GC					4200	4533			266				
4565					EY W				FARKAS G				
ESHENBRENNER AB					10138				151	7157			
4920					EYSTER HC				FARMER FR				
ESMARCH O					2607				7750	12464			
5451					EZMIRLIAN F				FARMER FT				
ESNCUF MP					2552	10179	10361	10377	9819				
12236					10379	11093	11095		FARMHAM NG				
ESSENBERG JM					EZQUERRA GC				9776				
1854	3347	3798	4085		5384				FARNER G				
4616					FABER K				8566				
ESSEX HE					9616				FARNSWORTH PC				
11121					FABER M				6233				
ESTERBROOK EG					6931	12252			FARR LE				
11253					FABERG AC				1019	6588	6752	6753	
ET BERTIN-SANS R					1789				6754	10696			
6252					FABERGE AC				FARR RF				
EUGSTER J					4186	4285	5303	6059	804				
1378	2915	4156	5180		6746	8789	9221	9948	FARR RS				
EUGSTER JAG					FABRE G				681	12543			
7746					2453	5235	5269	12108	FARRAN HEA				
EULER HV					12109				7793	10451	12205		

FARRAR JT					981	1086	5756			10880	10881	10882	10883
7472					FENYES J					11211	11290	11472	11583
FARRELL JI					7111					11664	11932	11933	11937
141	12045	12046			FERGUSON JH					11938	11942	11949	11960
FARRIS EJ					613	1142	12507			FINKELSTEIN P			
3039					FERKEL RL					1189			
FARROW JG					2731					FINKLE MF			
3069					FERMI E					5047			
FARROW JH					4052					FINKLE R			
2732					FERNANDES A					7113	10884	10948	10949
FASS H					3762					FINKLE RD			
2691	5955				FERNAU A					6383	6495	6758	7122
FASSULIOTIS G					318	12147	12555			7123	10271		
7219					FERRARI AC					FINKLER RS			
FATEEVA MN					132					2449	4399		
11468					FERREBEE JW					FINLEY HE			
FAURE-BEAULIEN M					8993					4448	4507		
8418					FERRELL CB					FINNEGAN C			
FAUST H					3106					793	1091	1268	1731
7751					FERRETTI R					2092	8925	10842	10843
FAUVET J					10480					11748			
1934					FERRETTI RJ					FINOCCHIARO F			
FAY JWJ					32					4623			
1311					FERRI L					FINOCCHIARO M			
FAYTEMBERG-BLANK VR					2678	7603	7604	7605		4841			
9170					FERRINI O					FINZI NS			
FEASTER JP					10876	10877				6617	6759		
10874	10875				FERROUX R					FIORENTINI S			
FEDDER L					98	126	164	528		3885			
446	12106				4010	4011	8425			FIORINI E			
FEDOROV II					FERSHING JL					3540			
10340					4113					FIORINI M			
FEDOROV NA					FERTIG JW					12117			
12296					8204					FIRKET J			
FEDCROVA TA					FESZENKO TF					3781	12298		
7752					3849					FISCH S			
FEDOROVA ZP					FETNER RH					10635	10679		
10340					7757					FISCHEL E			
FEENSTRA TP					FETZER H					5283			
209	3090	9185	9286		2380					FISCHEL EE			
FEHER D					FIDLAR E					2804			
4989	10069				1096					FISCHER A			
FEHR A					FIELD EO					3105	12142		
3864	7110				10439					FISCHER AW			
FEICHTINGER N					FIELD JB					7759			
845	12104	12148			2753	3025	5036	6755		FISCHER B			
FEINBERG EL					FIEVEZ C					11857			
11698					12423					FISCHER M			
FEINE U					FIGGE FH					12098			
7753	10135				2333	2463				FISCHER MA			

3956

FOUASSIER				
8601				
FOULDS L				
4273				
FOULKES J				
1147				
FOURNIER G				
12160	12162			
FOWLE AC				
5932				
FOWLER FD				
7083				
FOWLER JF				
8436				
FOX BW				
1398	1400			
FOX H				
80				
FOX M				
1054	5504	6914		
FOX SW				
7764				
FRADKIN GE				
7765				
FRAENKEL J				
3668				
FRAENKEL M				
7967	8845	11570	11922	
FRAJOLA WJ				
11645				
FRAM H				
2491	3036	5444	8131	
FRANCE HD				
6202	8126			
FRANCE O				
1850	7623			
FRANCHI M				
1216				
FRANCIS DS				
3258	3525	3785	3925	
3929	4074	4320	8825	
FRANCIS E				
8888				
FRANCIS HC				
9688				
FRANCK J				
12402				
FRANK A				
2727	3883	3912		
FRANK EJ				
7397				
FRANK GM				
3135	8362	9076		
FRANK P				
5925				
FRANKEL E				
9471	12137	12138	12139	
FRANKEL S				
8428				
FRANKENTHAL L				
7321				
FRANKS WR				
2658	3770			
FRANTZ CH				
1485				
FRANTZ ID JR				
5942				
FRANTZ VK				
9142	9142			
FRANZ H				
6567				
FRANZEN LF				
10236				
FRASER AW				
4388				
FRASER MJ				
10064				
FRASER R				
3963	10492			
FRAZIER CH				
6568				
FRAZIER CN				
4547				
FRAZIER WC				
4813				
FREDELL H				
6570				
FREDERIC J				
2411	2807	6569		
FREDERICK WG				
11742				
FREDRICKSON DS				

10520
 FREE AA
 6705 11366
 FREED JH
 3039
 FREEDEBERG AS
 10583 10914 11205 11410
 11525
 FREEGLANDER SD
 7988
 FREEMAN J
 5408 5640
 FREEMAN JW
 6512
 FREEMAN PJ
 2004
 FREERKSEN E
 10896
 FREERKSON E
 10895
 FREID JR
 4161 7345
 FREIDELL HL
 12548
 FREISLEBEN R
 5239 5240 10782
 FRENCH AB
 7197 7766
 FRENCH CB
 1806
 FRENKEL SR
 11773 12086
 FRESCO J
 6994
 FREUD J
 1925 1970
 FREUND E
 539 8429
 FREUND F
 611
 FREY E
 748
 FREY H
 480 12135
 FREY J
 7628
 FREY KJ
 8671 8672 9417
 FREY S
 498
 FREYDBERG LV
 10916
 FREYMANN JG
 7767
 FREYTAG FC
 3052
 FRIBERG U
 11272 11479
 FRICKE H
 251 3127 3128 3131
 3580 4013 11826 12093
 12611
 FRICKEY P
 8256
 FRIDELL HL
 871 5343
 FRIED C
 4513 10257 12133
 FRIED JF
 11928
 FRIEDBERG W
 7768
 FRIEDBERGER E
 8430
 FRIEDEL HL
 628 690 691 762
 891 918 1278 1337
 2146 2164 2539 2645
 5546 5552 5707 7069
 7071 7072 7225 7440
 10538 10597 10922 10923
 11483 11485 11935
 FRIEDEMANN U
 5979 9499 11802
 FRIEDEN J
 2903
 FRIEDENSTEIN AJ
 12201
 FRIEDENWALD JS
 1816
 FRIEDENWALD WF
 4428 4554 4842

FRIEDKIN M
 9449
 FRIEDLAND M
 7769
 FRIEDMAN IA
 8178
 FRIEDMAN J
 1303 9686 11597
 FRIEDMAN L
 10304
 FRIEDMAN M
 1574 2275 4399 4566
 5411 6572
 FRIEDMAN NB
 4467 4481 5092 6845
 10197 11700
 FRIEDMAN OM
 10378
 FRIEDMANN E
 1739
 FRIEDRICH W
 9574
 FRIEDRICH-FRESKA H
 2648
 FRIES M
 9358
 FRIES N
 2636 4752 4941 5232
 6064 6079 9425
 FRIESEN BS
 5747
 FRIESEN H
 3425 3869 3892 3893
 FRIK K
 7403
 FRILLEY M
 2361 2362 4929 5039
 5951 12588
 FRISCH RE
 5165
 FRITZ-NIGGLI H
 747 748 986 5722
 5752 7770 7771 8086
 8902 9038 9044 10122
 12273 12363
 FRIZEN G
 3747
 FROBLICH A
 4084
 FROIER K
 4184 4537 4772 4774
 8673 8674
 FROLA G
 553 4287
 FROLIK EF
 2 1069 2281 2590
 2657 5785 9190
 FROLOVA EG
 12702
 FROMME G
 11571
 FRONTALI N
 5284
 FRUCHTER JM
 11536
 FRUHLING L
 1707 6168
 FRY M
 12243
 FRY WE
 1202
 FRYER HC
 4463 4571
 FRYER MP
 2841 6197 7473
 FRYXELL R
 11116 11204
 FUA C
 5114
 FUCHS G
 1055
 FUERST CR
 6989 10546
 FUGE K
 3878
 FUGII S
 4308
 FUJIHARA MP
 9941
 FUJII S
 3408
 FUJII T

8083 8701 8703 8705
 FUKAHORI K
 332
 FUKASE M
 2935
 FUKASE S
 433 434 541 583
 12130
 FUKU T
 540
 FUKUSHIMA N
 6956
 FULD GJ
 7772
 FULFORD M
 5126
 FULLER FW
 1500
 FULLER JB
 7100 7401 8056
 FULLER RK
 7685 7712
 FULTON GP
 3139 5382 7367
 FULTON JD
 1025 6573
 FULTON JF
 3183
 FUNK C
 9260
 FUNSHTEIN LV
 7773
 FUQUA PA
 5541
 FURCHNER J
 1326 6996 8255 12545
 FURCHNER JE
 876 928 5649 5662
 7147 7774 8254
 FURER E
 8428
 FUREY WW
 2771
 FURST W
 568
 FURTH F
 2430
 FURTH FW
 658 815 1033 1076
 1759 1763 2062 2063
 2068 2069 2070 2088
 5467
 FURTH J
 620 667 678 703
 809 816 825 1155
 1375 2076 2105 2322
 2747 2893 2967 3344
 3586 3602 3962 4602
 4664 4843 5063 5098
 5345 5346 5397 5431
 5576 5811 5842 5871
 5907 6574 6575 6780
 7054 7775 8303 8304
 8305 9760 9820 12341
 FURTH OB
 4814 6574
 FUSKA J
 10226
 GABBIANELLI L
 4996
 GABE M
 2206 2688 10106
 GABRIEL F
 6562
 GABRIEL G
 499 595 7776 11324
 12182
 GABRIELI ER
 222 635 7235 11487
 GABRIELSEN Z
 10569
 GADEN EL JR
 11713
 GADSDEN E
 678
 GADSDEN EL
 5431
 GAERTNER K
 5989
 GAERTNER O
 38 249 394 7930
 GAESSLER EC

3167
 GAETJER JE
 12703
 GAFFNEY GW
 5759
 GAGER CS
 2109 8431 8432 8819
 8820 8836 8856 8859
 11920 12013
 GAHLEN W
 6840
 GAILEY FB
 4802
 GAINES JA
 4565
 GAITHER N
 642 874 1123 1299
 5692 7918 9253 11269
 11939
 GALBRAITH TW
 11604
 GALE EF
 12207
 GALIMARD J
 12116
 GALKOVSKAYA KF
 824 1298 7479
 GALL EA
 4217 4310 4417 4588
 5045
 GALLAGHER RG
 11528
 GALLARDO E
 3935 4544
 GALLAVRESIK L
 4191
 GALLI A
 3782
 GALLIARD H
 5266
 GALLICO E
 1452 5897
 GALLIMORE JC
 994 10540 11564
 GALLIMORE JC JR
 11089
 GALLUZZI NJ
 1685 1688
 GALTON GA
 12300
 GALTSOVA RD
 5424 6863 6866 7777
 12647
 GAMALEYA AN
 7778 9176
 GAMBAROV G
 3172
 GAMBLE FN
 1375
 GAMERTSFELDER CC
 8882
 GAMMILL JC
 10554
 GANONG WF
 10520
 GANS O
 8421 9759
 GARAVAGLIA C
 10993 11087
 GARBER ED
 10045
 GARCIA J
 6943 7164 7283 7284
 7779
 GARCIA JF
 1668 2575
 GARCIA-CALDERON J
 2394
 GARDE A
 2587 6707
 GARDELLA JW
 7105
 GARDINER D
 1674
 GARDNER CO
 1361
 GARDNER DE
 10163
 GARDNER HC
 8435
 GARDNER WU
 4711 5246 5974

GARLAND LH
 4112
 GARNER JL
 7397
 GARRISON WM
 2364 3052 10825 10827
 GARSCHIN WG
 3890
 GARTNER H
 1052 7005 7780 9086
 GARY-BOBO J
 12266
 GASKELL JF
 12008
 GASPER GW
 10751
 GASSMAN WA
 10787
 GASSOUL RI
 867 12385
 GASSUL R
 247 248 280 3870
 9754
 GAST JH
 11141
 GASTALDI C
 1953 5898
 GASTALDI G
 2707
 GASTEIGER EL
 5877
 GASTEIGER EL JR
 961
 GASTEIGER H
 605
 GASTON E
 1903 2786 12239
 GASTON EO
 1623 1667 1839 2042
 2810 2902 5032 7208
 11661 12482
 GASVODA B
 1635 2938 2979 6492
 7118
 GASVODA J
 2025 6360 11058
 GATENBY J
 606
 GATENBY JB
 292
 GATES AA
 2086 5477 6142 10891
 GATES E
 921
 GATES O
 111 8328 11092
 GATTANI ML
 1115 1878
 GAUDE G
 8934 12275
 GAUDIN P
 1698 5319
 GAUL LE
 1888
 GAULDEN ME
 733 734 1320 1372
 1596 5022 7460
 GAUNT WE
 9685 11717
 GAUPP O
 9619
 GAUTSCHI ML
 2092 10842
 GAUWERKY F
 2618
 GAVAZZENI S
 7781
 GAVETT E
 10855
 GAVIATI A
 9752
 GAVOILLE MT
 4746
 GAY DM
 2806
 GAY EH
 3315
 GAY H
 4977 5005 9863
 GAYET R
 98
 GAYLORD HR

9556
 GAZAY P
 2039
 GEAR J
 4624
 GEARY JR JR
 957
 GEBAUER A
 7424
 GECKLER RP
 651 1123 1157
 GEE M
 10463
 GEFFERTH C
 6017
 GEFTER OW
 3669
 GEHLEN W
 7499
 GEHRELS PE
 7383
 GEIGER EL
 9110
 GEINISMAN YL
 1044
 GEISSELSODER JL
 8088
 GEIST SH
 4565
 GELBER LJ
 6597
 GELIN O
 8677
 GELIN OEV
 4535 8675 8676 8821
 GELLER
 11903
 GELLER FC
 3481
 GEMMELL AR
 5196
 GEMMILL CL
 10572
 GENAUD P
 11529
 GENAUD PE
 1312 2813 2929
 GENDREAU JE
 7344
 GENGOZIAN N
 7696 9004
 GENOUD P
 12498
 GENTER CF
 4305
 GENTHER IT
 3064 3622
 GENTIL F
 3362
 GENTRY G
 5374 5587 7162
 GEORGE EP
 2323
 GEORGE HC
 4919
 GEORGE LA
 9771 9772 11868
 GEORGE LA JR
 7658 7659 8913 8953
 GEORGE M
 2323
 GEORGE P
 5505
 GEORGE RS
 7042 10426 10746
 GEORGE TJ
 6349
 GERASAIMOVA H
 4555
 GERASSIMOVA H
 4556
 GERBER G
 6905 7753 12228
 GEREBTZOFF MA
 2834 5578 12420
 GERECZE G
 10989
 GERHARTZ
 10007
 GERHARTZ H
 12181
 GERICKE S

8768
 GERMAN E
 4049
 GERNCW I
 6023
 GEROL AY
 11602
 GERDNE A
 9608
 GERSCH M
 693
 GERSCHMAN R
 5694 5768 6925
 GERSHBEIN LL
 7783 9645
 GERSHCN-COHN J
 781 2261 4248 4398
 5668
 GERSHOW-COHN J
 7655
 GERSTEN J
 11488
 GERSTNER HB
 1024 1254 1327 2249
 3229 3632 5657 5732
 5778 5781 6578 6579
 6806 7026 7264 7467
 7784 7785 9067 9094
 10001
 GESCHICKTER CF
 10627
 GESCHWIND II
 10548 10567
 GESSERT CF
 7234
 GESSNER F
 3769 4099
 GEST H
 1653
 GETTLER AO
 415 3534 12069
 GETZENDANER ME
 10625
 GEYER BS
 10469
 GEYER JH
 1838
 GEYER RP
 1439
 GEYER SV
 10425
 GEZCN HM
 775
 GHELDERE CHD
 26
 GHELELCVITCH S
 4192
 GHENT WR
 1955 2010 2295
 GHEORGHIO I
 578
 GHGLICITTI GM
 10877
 GHILAIN A
 1043
 GIABICANI R
 4746
 GIBB FR
 8868
 GIBBS JE
 10439
 GIBBS WH
 7311
 GIBLER J
 7946
 GIBRIDIZACII V
 11342
 GIBSON A
 2527
 GIBSON JG
 10337 10652 11059
 GIBSON JG 2ND
 2314
 GIBSON JR
 9129
 GIERLACH ZS
 1657 2589
 GIESE AC
 5041 5071 7307
 GIFFEE JW JR
 7727
 GIFFORD MP

1010
 GIFFORD SR
 3504
 GILBERT CW
 5931 8103 12257 12536
 GILBERT DL
 5694 5768 6925
 GILBERT IGF
 10804 11491
 GILES AM
 2694
 GILES DL
 6580
 GILES N
 4294 6452
 GILES NH
 621 1842 4502 5404
 5506 5986 8678 9493
 9795 9940 9992 11003
 11341
 GILES NH JR
 619 939 1191 1200
 1787 2384 2393 2470
 2480 2682 2894 2916
 4625 5006 5237 6580
 12320
 GILL DC
 2931
 GILLERN CV
 5969
 GILLMAN T
 9944
 GILMAN A
 11407
 GILMAN PK
 12009
 GILMORE RF
 1687
 GINGOLD N
 6637
 GINORI SS
 10585
 GINOZA W
 7116
 GINSBURG JM
 11412
 GINTSBURG MB
 9264
 GINZBURY IS
 11492
 GIORDANA G
 6561
 GIORDANO G
 5356
 GIRAUD G
 9949
 GIRAUD M
 9949
 GIRDEN E
 3387 3587 3783
 GIRRIAN JM
 11187
 GIRVIN EC
 5939
 GIUSTI M
 3612
 GIVENS E
 1658
 GJESSING EC
 1972
 GLADSTONE RJ
 3682 3998 6687 11997
 GLASS B
 4844 5982 7009 7011
 9006 9149
 GLASS D
 10326
 GLASSER O
 170 481 3200 3369
 3636 6199 6582 9555
 11791 12010 12011 12012
 12058
 GLASSER SM
 3029
 GLASSER SR
 7285 11663
 GLASSTONE S
 6583 10790
 GLATTFELD JW
 11362
 GLAUBERMANN J
 9976

GLAZKO AJ
 4044
 GLEASON GI
 107C7 11270 11501 11624
 GLEGG RE
 7786
 GLEICHGEWICHT E
 7534 11691
 GLEISER CA
 1300 1301 3267
 GLENN JC
 4932
 GLENN JC JR
 4761 6584
 GLENN JL
 10198
 GLENN WG
 9327
 GLICK C
 1340 5525
 GLOBUS JH
 2465
 GLOCKER R
 246 482 604 1551
 1756 2725 3535 3784
 6585 6586 8080 10796
 12179 12180 12323
 GLOOR W
 9599
 GLOTZ HL
 4197
 GLOTZER DJ
 707 1685
 GLUCKSMANN A
 732 1883 2378 3556
 3837 3879 3958 4255
 4323 4800 5391 5479
 6149 6587 7787 10784
 12443
 GLUSHCHENKO IE
 9987
 GOBBATO F
 11139
 GOBBEL WG JR
 4780 4782
 GODDARD D
 3500
 GODFREY EW
 5189
 GODWARD MBE
 9406
 GODWIN JT
 1384 2452 6588 8200
 10150 10195
 GODWIN LD
 1138
 GOEKE RH
 11531
 GOFF JL
 653
 GOFMAN J
 9698 11865
 GOFMAN JW
 633
 GOJMERAC WL
 8093
 GOLDBERG AF
 3946
 GOLDBERG ED
 12456
 GOLDBERG H
 7345
 GOLDBERG RC
 741 2108 2656 2667
 11097
 GOLDBERG SA
 3610 3679
 GOLDBLITH SA
 657 737 779 872
 1392 1403 1774 2783
 3032 5444 5526 5559
 5685 5686 5742 5804
 6031 6143 6900 7174
 7378 7772 9272 9494
 GOLDBLITH SE
 2846
 GOLDBLOOM AA
 279 511
 GOLDEN A
 6954
 GOLDEN R
 10634

GCLDFARB AR
 1186
 GOLCFEDER A
 1939 2034 2304 2665
 4113 4134 4626 4744
 4845 5020 5031 5094
 5632 6589 7790 8055
 12291
 GOLDHABER F
 6590
 GOLDHABER G
 4528 4610 4627 4756
 4830 4831 4846 4851
 4894 12616
 GOLDIE H
 755 1306 2262 2288
 7788 10562 10580 10953
 GOLDIS B
 4940
 GOLDMAN A
 11228
 GOLDMAN D
 4848
 GOLDMAN M
 7285 9277 10505
 GOLDMAN MC
 2316
 GOLDMAN ML
 1110
 GOLDMAN MO
 1625
 GOLDMANN H
 3323
 GOLDRING IP
 7791
 GCLCSCHIEDER G
 6591
 GOLDSCHMIDT B
 9660
 GOLDSCHMIDT L
 1690 1982 2578 7343
 GOLDSSTEIN LM
 8863
 GOLDSMITH HH
 2739
 GCLDSMITH RE
 10568
 GCLDSMITH Y
 11798
 GOLDSTEIN B
 6726
 GOLDSTEIN I
 3406
 GOLDSTEIN L
 569 6913
 GOLDSTEIN MJ
 510 9717
 GOLDSTON P
 1072 5342
 GCLDWASSER E
 12268
 GOLDWATER WH
 6919 7792
 GOLSTEIN I
 3302
 GOLTZ HL
 5764
 GOLUBITSKAYA MB
 7789
 GOLUBTSOVA AV
 9326
 GCMBERG HJ
 673 983 5436 5521
 5591 5666 5683 5821
 6097 6929 7415 7623
 8126 11532
 GOMES DA COSTA FS
 3421
 GOMES DA COSTA SF
 3362
 GOMEZ ET
 3886
 GONG JK
 1080 1216 1335 5510
 7685 7686 7687 7712
 8929 11256
 GONSHERY L
 1181 1183 5363 7398
 GONZALES EL
 12348 12348
 GONZALEZ TA
 2366 2734

GOOCH A
 1297
 GOOD DJ
 8562
 GOODELL JPB
 9688 11821
 GOODFELLOW DR
 3728 3917 4364
 GOODING SEF
 3335
 GOODMAN E
 1072
 GOODMAN L
 3056
 GOODMAN RD
 632 1175
 GOODNER CJ
 6894 7352
 GOODRICH JP
 4216 4246 4452 4575
 4628
 GOODRICH ME
 3809
 GOODSELL SF
 9796
 GOODSPEED TH
 283 302 494 515
 533 1132 3097 3276
 3519 3553 3768 4353
 4629 8842 9485 9860
 9881 9953 9957 11924
 GOOLDEN AWG
 7793 9235
 GOPAL-AYENGAR AR
 12284
 GORBARENKO NI
 11468
 GORBMAN A
 826 1102 1141 1501
 2765 2803 5062 11105
 GORDON AS
 2156 8137 10440
 GORDON B
 3161 7346
 GORDON E
 10501
 GORDON EL
 707
 GORDON EP
 10192
 GORDON ES
 5314 11190
 GORDON HA
 6973
 GORDON LE
 1093 1292 7396
 GORDON LL
 7102
 GORDON MA
 9755
 GORDON MB
 3082
 GORDON SA
 1678 5482 6326 6327
 7273 8975 9799 9801
 11350 12281
 GORDON SH
 2542
 GORDY W
 8410
 GORE WA
 10237
 GORING CAI
 2285
 GORIZONTOV PD
 7794 9030
 GORMAN AE
 1547 11792 12467
 GORODINSKY SM
 9098
 GORODYSKII VI
 10124
 GORSHELEVA LS
 7481
 GOSS DM
 10213
 GOSSET A
 7552
 GOSTEVA EA
 10340
 GOTHIE S
 11106

GOTO H
 11163 11615 11616
 GOTT CL
 1436
 GOTTLIEB F
 4137
 GOTTLIEB D
 7817 9483
 GOTTLIEF F
 9592
 GOTTSCHALK RG
 10544
 GOTTSCHALK W
 10076 10079
 GOUCHER CR
 806 1401 10596
 GOUDAERT M
 6012
 GOULD AP
 8436
 GOULD BS
 3877
 GOULD RG
 8896 11107
 GOULD SE
 5521 5591 5666 6097
 6929 7415 7623 8126
 11532
 GOULD TC
 10585 11495
 GOULDING FS
 1224
 GOULSTON D
 3388
 GOUNARIS I
 6593
 GOVAERTS J
 6594 9451 10589 11335
 GOWEN JW
 717 1448 3315 3453
 4073 4282 4449 4488
 4571 4753 4975 5308
 5941 6595 6596 7082
 8031 11925 12276 12332
 12367
 GOWEN MS
 4975
 GRABLEY I
 10418
 GRACE EJ
 3791
 GRACHUS T
 2702
 GRAD B
 2606 10551
 GRAEVSKAIA BM
 11103
 GRAEVSKAYA BM
 2367 5712 6175 7176
 7795
 GRAEVSKII EY
 1475 6824 7084 7796
 7797 8988
 GRAFF WS
 4784
 GRAFFEO AJ
 2897
 GRAHAM AB
 11597
 GRAHAM AJ
 11563
 GRAHAM ER
 12582
 GRAHAM I
 11378
 GRAHAM JB
 2583 2897 6128 12378
 12508
 GRAHAM R
 4162
 GRAHAM RM
 130 2085 2583 2897
 6128 12378
 GRAHN D
 7798 9243 9329 12398
 GRAIKOSKI JT
 1036 1166 1467 5761
 9197
 GRAINGER TH JR
 4997
 GRANATOWICZ J
 4114

GRANCINI P
 3973
 GRAND CG
 3994 4135
 GRANHALL I
 1045 2714 8679 8680
 8681 8682 8753 10785
 GRANICK S
 5014 5247 10046
 GRANKE RC
 7829 9827
 GRANT BM
 5885
 GRANT WM
 4690
 GRASSELLINO V
 3676
 GRATTAROLA R
 2044
 GRATZEK FR
 5176
 GRAUER J
 8081
 GRAUL EH
 3048 5620 6599 7277
 7385 9093 10227
 GRAVES A
 7233
 GRAVES E
 653
 GRAY CH
 5164
 GRAY EJ
 1125
 GRAY H
 4924
 GRAY I
 5809
 GRAY J
 10654 10658 11070
 GRAY JL
 1109 1125 1764
 GRAY LH
 1792 1868 2040 2110
 2111 2210 2321 2876
 2896 4340 4584 4735
 4849 5003 5085 5673
 5856 5862 6377 6470
 6545 6600 6601 6701
 7799 7800 9567 9622
 9803 9805 9964 10073
 10174 12283 12544
 GRAYBEAL A
 9111
 GREB RJ
 3748
 GREEN DE
 7801
 GREEN M
 12014
 GREEN MM
 6233
 GREENBERG D
 7563
 GREENBERG DM
 4044 10645 11108 11168
 11330 11415
 GREENBERG J
 7035 7802 11565 11603
 11633
 GREENBERG R
 4727
 GREENFIELD MA
 2047 6096 6958 10237
 11788
 GREENFIELD MM
 1900
 GREENING JR
 5295
 GREENING SG
 7896 12437
 GREENLEAF CA
 7803
 GREENLEY PW
 1914
 GREENMAN V
 1235 7496 8205 8206
 8987
 GREENSTEIN JP
 6355 12557 12559
 GREENSTEIN JP ET AL
 12612

GREENWOOD DD
 7444
 GREGERSEN MI
 8986
 GREGG J
 5532
 GREGOIRE C
 3552 3960
 GREGORI A
 9467
 GREGORY J
 1204
 GREGORY WC
 6873 9054
 GREIFF D
 7804 7805
 GREIS H
 5025
 GREITE W
 4546
 GREMME A
 3336
 GRENAN MM
 1182 2203 5474 5874
 7085
 GRESKY AT
 7588 10363
 GREUEL H
 833
 GREULICH RC
 11109
 GREVIOR JJ
 10843
 GREVIOR JS
 793 1091 1731 2092
 10842
 GRICOUROFF G
 276 850 7965 9507
 12178
 GRICOUROFF H
 12161
 GRIEF RL
 11494
 GRIFFEN AB
 4562 6602
 GRIFFIN D
 7707
 GRIFFIN HZ
 9690
 GRIFFIN PL
 5347
 GRIFFITH HD
 3588 4055 5499 11790
 GRIFFITH HG
 3992
 GRIFFITH HL
 9685
 GRIFFITH IO JR
 781
 GRIFFITH JQ
 2126 4514 5082
 GRIFFITH JQ JR
 2261 3637 4769 5203
 5204 6517
 GRIFFITH PC
 8946
 GRIFFITH WH
 8050
 GRIGOREV YG
 7806 7807 7808 9267
 GRIMALDI AJ
 1027
 GRIMM MR
 2494
 GRIMMET LG
 3269
 GRIMMET LG
 1969 3696
 GRINBERG NA
 3669
 GRINEFF D
 9501
 GRISEWOOD EN
 3607
 GRODEL FM
 7809
 GRODZINSKII DM
 8316
 GROFF RA
 6270
 GROMAKOVSKAIA MM
 9350

GRONCHI V
 3367
 GROOT JT
 8
 GROOVER TA
 696
 GROS C
 1304 1578 2328 6161
 11497 12410
 GROS CM
 1277 5366
 GROSCH DS
 1153 5725 6906 7466
 9328
 GROSS E
 4516
 GROSS J
 11284 11286 11287 11572
 GROSS R
 4215 4496
 GROSS RE
 1766
 GROSS WJ
 5489 10565
 GROSSE AV
 5113
 GROSSI V
 1159
 GROSSMAN BJ
 1684 1688 2535 9075
 GROSSMAN MI
 1400
 GROSSMANN A
 6846
 GROTTIS JH
 1563
 GROVER CA
 319
 GROVER JK
 1703
 GRUBBS RC
 8029
 GRUBIN AF
 5072
 GRUCCI T
 6769 7310
 GRUCCI TB
 7672 7673 10295
 GRUHN E
 582
 GRUNDHAUSER W
 6259
 GRUNE WN
 2120
 GRUNEBERG H
 4850
 GRUNER J
 11368
 GRUNTSCHOW J
 2888
 GRUSCHETZKAJA MA
 601
 GRUSSNER G
 2372 9296
 GUALDI A
 3739
 GUARDABASSI A
 2492
 GUBERMAN E
 5083
 GUBLER CJ
 9718 10421 10593 11786
 GUDDEN B
 259
 GUDE WD
 5385 10485
 GUDZENT
 8437
 GUDZENT E
 8438
 GUDZENT F
 8439
 GUERIN
 2973
 GUERIN M
 3678 3752 10839
 GUEST GH
 11793
 GUGGENHEIMER H
 9609
 GUILBERT RP
 8440

GUILD W
8002
GUILD WR
995 5443
GUILLEMINOT H
5122 5186 8441 8442
8443
GUIMARAES JP
7810
GUIREL G
8468
GUL AP
3749
GULLEND GL
10434
GULYAKIN IV
8936
GUMINSKAYA MA
12698
GUMP H
1863 9347
GUMPERTZ F
12139
GUNCKEL JE
998 1101 1239 8230
8231 8232 8233 8234
8966
GUND K
2576 2725
GUNN SA
10585 11495
GUNNAR
11021
GUNSEL E
2669 5701 8994
GUNSETT A
370 6523 7811 9550
GUNTER SE
7223 7468 7812 7813
7931 7932 9807 9822
GUNTARDT HM
7080 8087
GUNTHER G
3130
GUNTHER RL
11701
GUNZ FW
2338 2639
GUNZBURG I
371
GUREVICH RG
3168
GUREVICH RI
3639
GUREWITSCH R
3930
GURIAN J
672 1665 5473 10611
10620 11503
GURIAN JM
6877 7814 10182
GURNANI SU
8989 9224
GUSEV NG
9065
GUSKOVA AK
7815
GUSTAFSON A
4187
GUSTAFSON G
1072
GUSTAFSON GE
644 1071 1120 1362
1374 5342
GUSTAFSON PF
5868 7816 9709 10318
10470 11490 11704 11930
11943 11964
GUSTAFSSON A
1177 1694 1819 2331
2512 2714 4088 4184
4538 4772 4775 5026
6603 8748 8754 9424
9429 9437 9438 9529
9809 10017 12418
GUTHMANN H
245 7334
GUTHRIE RK
5770
GUTMANN A
7552
GUTTADAURO M

1987
GUYENOT E
4798
GUYER MF
452 3603 4160
GUYOT R
423
GUYTON JS
1935
GUZMAN BARRON ES
819
GWATKIN RB
7817
GWYTHER MM
10439
GYI KK
424 7725
GYORGY P
10577
GYORGYI E
7157
GYORGYI G
151
GYURDZHIAN AA
7778 9176
GYURKO P
10068
HAAS F
7818 8253
HAAS FL
5565 8967
HAAS LL
6098 7836 12613
HAASE J
9734
HABERLAND GL
10008
HABERLAND HFD
10788
HABERLAND HFO
7819
HABERLANDT L
185 704
HABERMAN RT
6980
HABERMAN S
4412 4436 4630 5456
HABERMEYER JG
7057 7268 7494 8091
8092
HACCIUS B
9394
HACCKER V
8444
HACKETT PL
8953 10810
HADDAD F
11036
HADDOW A
6718 12282
HADZIC L
7217
HAECKER V
10281
HAEGE L
6291
HAEGGSTROM CE
3919
HAGA T
8683 9365
HAGBERG A
1692
HAGE TJ
8209
HAGEN C
6605
HAGEN CE
796 1492 12639
HAGEN CW JR
1523 2237 3413 6259
6604
HAGEN G
8233
HAGEN GL
8234
HAGEN U
6850 7390 7974 7976
7977 8771 12231 12292
12304
HAGUE A
9841 9842
HAHN L

1803
HAHN PF
755 1178 1306 1954
2241 2262 2288 5244
5398 5810 6875 7820
7821 9663 9680 9687
9688 9711 9749 9751
10366 10554 10562 10587
10584 10719 11039 11084
11114 11129 11130 11377
11749 11817 11821
HAHNE HJ
1292 7396
HAIGH MV
7822 8103 12257
HAIGLER ML
2226
HAIK GM
9078
HAINES RB
4430 4439 7985 7986
HAINES SF
11152
HAIR WW
9728
HAJDUKOVIC S
5579 7081 7270 7823
HAJOS K
8445
HALBERSTAEDTER I
3042
HALBERSTAEDTER L
244 287 3159 3967
4631 4758 4831 4846
4851 5133 5205 616
6606 6607 7551 7736
7756 12176 12177
HALD AM
7429
HALDANE JBS
5052 5102 5131 6963
7207 9058 11856
HALE AR
10812
HALE DB
1364 1367 1369 1371
7357 8013 11313
HALE DH
2838
HALE WM
1068 1139 1294 1323
1332 6093 6094 7485
7824
HALEY TJ
705 711 963 1014
1079 1391 1765 1994
2097 2392 2481 2758
2769 5361 5561 5646
5650 5717 5733 5815
5816 6933 6939 7036
7048 7421 9027 9208
11354 12278
HALEY TK
1445
HALIK GM
2422
HALIN PA
9761
HALKIN H
11513
HALL
9512
HALL BE
2856 9689 9690
HALL BV
709 1677 2216 5464
10182 11349
HALL CC
3490
HALL D
297
HALL JJ
5006
HALL JW
1574 3961 4566
HALL RH
7127 10701 11047
HALL T
2604
HALL VE
10695
HALLAUER C

3272
 HALLHEIMER S
 773
 HALNAN KE
 9256
 HALPERN B
 782 1708
 HALPERN BN
 1016
 HALPERT B
 11141
 HALTER CR
 580 3257 3259
 HALVORSEN H
 9882
 HAM WT
 10146
 HAM WT JR
 7287
 HAMANN A
 5245
 HAMAWAKI T
 5949
 HAMBURGER HJ
 8446
 HAMERTON JL
 7762 12234
 HAMILTON FE
 5282
 HAMILTON HB
 985
 HAMILTON JD
 1154
 HAMILTON JG
 1521 2182 2364 2849
 2990 3034 4045 4066
 4632 5055 5635 6C72
 6400 6608 6609 6696
 6697 6704 7590 7710
 8891 9166 9778 10162
 10164 10384 10444 10463
 10497 10605 10637 10638
 10639 10641 10644 10645
 10722 10815 10817 10818
 10819 10820 10822 10824
 10825 10827 10828 10830
 10831 10836 10897 10898
 10899 10900 10901 10902
 10903 10904 10905 10906
 10907 10908 10909 10979
 10981 11237 11385 11418
 11437 11439 11440 11441
 11499 11526 11598 11599
 11600 11673 11796 11813
 HAMILTON K
 2188 6684 11339
 HAMILTON KA
 6784 10182
 HAMILTON KR
 12398
 HAMILTON L
 5971
 HAMMEL R
 6003
 HAMMER JM
 1872
 HAMMERLE QA
 7174
 HAMMETT FS
 3543 12014
 HAMMOND CW
 672 1058 1087 1088
 1716 2065 2536 2649
 2650 3354 5530 5597
 5598 5599 5724 6061
 7192 7392 8042 10423
 11475
 HAMMOND EC
 2173 2174 2175 2176
 2178 6880
 HAMORI A
 7763
 HAMPTON JK JR
 11601
 HAMPTON MM
 10022
 HAMWI GJ
 8992
 HANCE RI
 9
 HANCE RT
 1 180 3880 4102

7141
 HANDA DT
 1229
 HANDFORD SW
 6610
 HANDLER P
 10733
 HANDLOSER JS
 2019
 HANDOVSKY H
 6133
 HANEL HK
 8951 9257
 HANEY WJ
 8788
 HANKINS RM
 1397
 HANLE W
 7178
 HANNAFORD NC
 6921
 HANNAN RS
 7826 7827 9101 9109
 9287 9420 12365
 HANNOCH J
 1529
 HANS-JOACHIN H
 7383
 HANSARD SL
 10874 10875
 HANSEL H
 8684
 HANSEN LS
 7828
 HANSEN PB
 1712
 HANSEN RA
 2193 2199
 HANSEN RJ
 5368
 HANSLIAN R
 2014
 HANSON FB
 179 193 385 534
 3124 3426 3521 3576
 7137 7138
 HANSON HJ
 4721 5190 9885
 HANSON WC
 12454
 HARASZTI A
 1C989
 HARBER A
 2275
 HARBERS E
 10713 10838 11649
 HARDENBERGH E
 1539
 HARDIN CA
 8784 9242
 HARDING RS
 8888
 HARDUNG V
 5146
 HARDY EP JR
 10215
 HARDY WB
 12015
 HARE HF
 7829 9827
 HAREL J
 10839
 HARGAN LA
 5633
 HARGREAVES MH
 9690
 HARIG A
 3385
 HARKER G
 3320
 HARLAND WA
 9142
 HARLEY J
 6994
 HARLEY JH
 1147 9066 10215
 HARLOW HF
 7184
 HARM W
 10531
 HARMAN D
 7247

HARMON JH
 11719
 HARPER PV
 11145 11602 11653
 HARRELL GT JR
 679 2125
 HARRELL JR GT
 6698
 HARRIMAN H
 7727
 HARRINGTON H
 2194 2238 5465 6115
 7331 7830 7831 7832
 HARRINGTON HL
 10789
 HARRINGTON NG
 1320 6794
 HARRINGTON NJ
 1772
 HARRINGTON RV
 11311
 HARRIS BB
 3070
 HARRIS DC
 7094
 HARRIS DH
 2758 2769
 HARRIS ID
 4820
 HARRIS JB
 4388
 HARRIS M
 12016
 HARRIS P
 866
 HARRIS PF
 9997
 HARRIS PS
 864 865 1127 2439
 5516 5665 6932 7978
 8254 10404 11277 12545
 HARRIS RS
 4834 5156 1C50C 10941
 HARRIS SJ
 11771
 HARRIS W
 2300 6994
 HARRISON B
 12583
 HARRISON BJ
 439
 HARRISON GE
 10336
 HARRISON HC
 10841 10845
 HARRISON HE
 10841 10845
 HARRISON RW
 11145
 HARRISS EB
 5830 5886 7C43 10451
 11271 12215 12297
 HARSH GR III
 7066
 HART EJ
 3127
 HART H
 10728
 HART HE
 10121 10529 11603 11633
 12204
 HARTIG JJ
 10108
 HARTLEY P
 8447
 HARTMAIR V
 3805
 HARTMAN A
 11609
 HARTMAN CG
 4346
 HARTMAN F
 118
 HARTMAN FW
 94 182 207 461
 12006 12007
 HARTMANN FL
 4852
 HARTMANN M
 12018
 HARTECK W
 10344

HARTUNG EW JR
4633 4976
HARTWEG H
7387 7492 7833 7834
7835 9178
HARTWIG QL
9102 9302
HARTZEL J
11934
HARVARD RE
3129 12614
HARVEY
9982
HARVEY RA
4170 4264 5401 6098
6429 6611 6612 7100
7401 7836 8056
HARVEY WF
4747
HASAMA B
4002
HASAMA BI
4222
HASHIMOTO K
6956
HASIMOTO H
8893
HASKINS CP
3411 3656 3714 3771
3775 3942 4041 4050
4059 4092 4259 4357
4395 6155 9898
HASLAM RNH
1194
HASS VH
1954
HASSETT CC
6073 10246
HASTERLIK RJ
838 1169 6785 6892
8106 9710 10750 10846
10847 11306 11883
HASTERLIK RS
7837
HASTINGS AB
11107
HASTINGS S
12020
HASTINGS SO
12019
HASZLER K
3706
HATCH MH
981 1086 7838
HATCH TF
6769 7310 10295
HATHAWAY EA
1169 7816 12265 12526
HAUENSTEIN J
8448
HAUPTMANN W
4156
HAUROWITZ F
10731
HAUSCHILDT JD
2118 2775 5137
HAUSCHKA T
4853
HAUSMANN W
8449 12174 12175
HAUSSER KW
483 500
HAVEN FL
10387
HAVENS WP
6150
HAWKINS JA
3263
HAWKINS JW
4857
HAYAKAMA T
11389
HAYBITTLE JL
9130
HAYDEN B
1936 5307
HAYDEN HS
1872
HAYDEN JW
10558
HAYDON H
1990 8246

HAYER E
604 3810 3832 9598
9618 12173
HAYES DF
10222 11411
HAYES RA
3118
HAYES RL
11067 11069
HAYES T
5427
HAYES TL
633 6998 7244
HAYMAKER W
6515 6613 6614
HAZAMA F
8450
HAZARD JB
3118
HAZEN HH
76
HEALD AH
6533
HEALEY R
12211
HEALY JW
7840 7841 7842 10142
10145
HEARMON RFS
8940
HEARON JZ
5692 7438
HEATH HD
5071
HEATH JC
10721
HEBERT A
7542
HECHT O
4851
HECHTER HH
6895 10677 12543
HEDIN RF
2506
HEEPER WC
6623
HEEREN IG
1889
HEEREN J
493 3216 3300 10276
HEFFNER MC
5973
HEFT BB
3947
HEGLIN J
1391 5646 5815 7036
HEGSTED DM
11557
HEIDELBERGER C
10458
HEIDENHAIN L
10257
HEIDENTHAL G
1402 5174 6534 7082
HEIFAKH AA
7843
HEILBRUNN LV
6535 7844
HEIM K
243 9516
HEIMAN J
4517
HEIN JW
10848
HEINCKER R
7424
HEINECKE H
6536
HEINEKE
8452
HEINEKE H
9472 9473 9474 9475
9476
HEINRICH HL
1957 2201
HEISLER C
690
HEISLER CR
1278
HEITE HJ
2852
HEITMAN H JR

11475
HEITZ E
4854 4921 9838
HEKTOEN L
8453 8454 8455 11999
12021 12495
HELBER E
6282 9470
HELD A
848 4365
HELD EE
2601 9068 10219
HELDE M
5564 5845 6537 9877
12256
HELDER RJ
8928
HELPER RG
4336 4409
HELIGASON S
7391
HELL P
9117
HELLER DA
2364 10456 10827 10981
11385
HELLNER H
446 12106
HELLRIEGEL W
6901
HELLSTROM H
3801
HELM J
8685
HELMICK M
8002
HELMKE R
956 2592 2655
HELWIG ER
3311 3524 3712
HELWIG HL
10331
HEMEON WCL
10849
HEMPEL C
242
HEMPELMANN LH
754 791 841 966
1118 1220 1376 1437
1784 2860 2931 3147
5042 5064 5348 5379
5759 5844 6797 9691
9711 10008 10192
HEMPLEMAN L
5942
HENDERSON BJ
7845
HENDERSON SG
3966 4396
HENDERSON WJ
7100 8056
HENDLEY DD
2369 10396 10400
HENDRICKS SB
10050
HENLEY C
1599
HENN O
5575 8639
HENNESSY TG
1703 2406 6538
HENNY GC
11709
HENRI V
12172
HENRIQUES FC JR
11046
HENRIQUES FW JR
922 923
HENRY GC
4764
HENRY GH
2581
HENRY HF
7611 9071 10133
HENRY JA
1855 9331
HENRY KE
10300 10311 10312
HENSCHER AF
4475 4703
HENSCHKE U

2637				2788	2826	2833	2834	5561	5733	6933
HENSCHKE UK				5579	6040	6548	6618	HIGHMAN B		
7847 8176				6914	8866	9331	9565	684		
HENSEN J				9821	9875	10735	12380	HIGHMAN BJ		
626				12408	12422			2774		
HENSHAW CT				HERXHEIMER K				HIGINBOTHAM N		
3258 3456 12022				542				1059		
HENSHAW PE				HERZFELD E				HIGINBOTHAM NL		
4309				290				4484 5317 6553		
HENSHAW PS				HERZGER R				HILCKEN JA		
1555 3217 3258 3434				241				4217 4310 4417 12604		
3446 3456 3638 3785				HESLIN J				HILD W		
3925 3929 4074 4128				7621				6217		
4228 4320 4418 4523				HESS F				HILDEBRANDT F		
4549 4634 4635 4764				7277				4466		
4855 4856 4857 4858				HESS P				HILDRETH PE		
4859 4860 4861 5056				240				6855		
5080 5095 5327 6539				HESS VF				HILFINGER MF JR		
6540 6541 6542 6543				2915				12507		
6544 6546 8825 11344				HESTON WB				HILGER LN		
11824 12022 12591				6716				3177		
HENSON M				HESTON WE				HILL E		
4636 4637				2276 4920 4990 6431				9498		
HENSTELL HM				6433				HILL EC		
2286				HESTON WL				8501		
HENSTELL IS				5059				HILL EL		
2286				HETTIG RA				6781		
HENZI H				4589 11817				HILL L		
7454				HEUB K				8405		
HEPTNER MA				7849				HILL M		
3746				HEUSE O				12516		
HERBERT A				1275				HILL R		
8451				HEUSGHEM C				7855 10195 11056		
HERBERT FJ				2833				HILLIARD GW		
1125				HEUSTIS AE				9761		
HERBST W				7850				HILLS TH		
8886				HEUWLESER H				11413		
HERCIK F				11710				HILSCHER W		
4120 4230 5968 6052				HEVESY G				2620		
6547				1395 2454 2729 3515				HILSNITZ O		
HERCIK T				5147 5206 5257 6551				330		
3833				6883 7851 8321 9732				HINDS DB		
HERDE KE				10233 10850 11794 12479				1436		
2122 2487 11868				HEVESY GV				HINE CH		
HERDE KF				4956 4966 6524 6741				5466		
7658				7852				HINE GH		
HERITIER PL				HEVESY H				6453		
2548				10851				HINE GJ		
HERMANN M				HEWER EE				5316 9825		
8064				8460				HINEZ NO		
HERMANNE J				HEWITT HB				5901		
6183				2551				HINKEL CL		
HERMEL MB				HEWITT JE				4576 4862 4863		
781 2261 5668				633 5427 6998 7244				HINSHAW HC		
HERNAMAN A				HEYDE W				343		
8436				12351				HINSHELWOOD C		
HERNAMAN-JOHNSON F				HEYDERDAHL SA				2077		
3689				9836				HINTON CW		
HERNE A				HEYDERN K				1511		
5850				11753				HINZ W		
HEROE A				HEYROTH FF				959		
1785				7853				HIRAI K		
HERR EB JR				HEYS F				181		
5622				385 534 3124 3521				HIRAO M		
HERRON JW				3576 7137 7138				5929		
10243 10684				HEYS FM				HIRES LE		
HERRON RG				179				11518		
10224				HICKEY PM				HIROWO N		
HERSCH GM				12023				9899		
2766				HICKMAN J				HIRSCH		
HERSHEY AD				51 1140 5852				6812		
1653				HICKS SP				HIRSCH A		
HERSKOWITZ IH				810 818 969 1187				8412		
662 5104 5355 5774				1232 1419 1466 2889				HIRSCH BB		
7561 7848 8897 8942				5741 6552 7854 8899				7856 8277 9430		
8943 9143				HIDANO K				HIRSCH CF		
HERTWIG G				605				10307		
8456 10296 10305 12169				HIEMSCH W				HIRSCH EF		
12170 12171				2219				8462		
HERTWIG O				HIFFEL EV				HIRSCH EZ		
8457 11515 12168				8461				10427		
HERTWIG P				HIGGINBOTHAM RD				HIRSCH FG		
607 3953 3984 4240				5515				10247		
8458 8459 9837 10313				HIGGINBOTTAM C				HIRSCH G		
10338 11265 11364 11855				6721				6426		
HERTZ CS				HIGGINS E				HIRSCH GM		
7415				1752 5438				10528 10535 10881 11583		
HERVE A				HIGGINS GM				HIRSCH H		
645 697 842 1015				3218 3704				9779		
1222 1333 1350 1545				HIGGINS WA				HIRSCH JD		
1559 1572 2202 2357				3598				6940 7909 7910		
2358 2395 2421 2671				HIGHBY D				HIRSCHFELD H		

8463
 HIRSCHFELDER JO
 10790
 HIRSH G
 1674
 HIRSH GM
 7125
 HIRSHFELD JW
 4300
 HIRT G
 4281
 HISTAMOTO J
 7159
 HITCH SF
 5504
 HITIER H
 8690
 HITTLE I
 11934
 HIWATASHI Y
 12711
 HIYAMA Y
 12457
 HJERTQUIST O
 11467
 HJCRT G
 8951 9257
 HLASIVEK Z
 1225
 HO TJ
 11414
 HOANGER HO
 6352
 HOARD AG
 9010 9066
 HOASE J
 10590
 HOBBS AA JR
 2664
 HOCH-LIGETI C
 2659 4223
 HOCH L
 54
 HOCHMAN A
 5829 12616
 HOCHSTETLER SK
 9430
 HOCHWALD LB
 1509 2356
 HOCKENDORF P
 8464
 HOCKMAN NJ
 5915
 HODES PJ
 4514 5082 6270 9683
 HODGE H
 10412 10679
 HODGE HC
 3021 6750 8923 10163
 10358 10365 10399 10401
 10405 10408 10409 10411
 10457 10465 10468 10489
 10635 10664 10665 10668
 10848 10853 10855 10872
 10956 11220 11606
 HODGES FJ
 776 1468 4638 4869
 9077
 HODGES GRV
 2479
 HODGES PC
 3834
 HODGES RE
 10852
 HODGES RM
 10856
 HODGKINSON CP
 10990
 HOECKER FE
 1655 2768 6251 7133
 10550 10656 10857 10858
 10859 11605
 HOEHNE G
 5955
 HOEHNE H
 849
 HOFBAUER
 11901
 HOFER O
 960
 HOFFBAUER FW
 5297

HOFFMAN H
 7988
 HOFFMAN J
 9743
 HOFFMAN JG
 754 5042 5764 5844
 HOFFMAN RS
 2642
 HOFFMAN V
 10277
 HOFFMAN W
 5027
 HOFFMANN C
 3232
 HOFFMANN J
 9087 10860
 HOFFMANN W
 239 3281 8687 9396
 HOFHAUSER S
 8445
 HOFMANN D
 5890 6816 7857 7858
 7859
 HOFMANN-LYDTIN E
 4366
 HOGBERG B
 4835 4836 9947
 HOGGLER F
 467
 HOGNESS JR
 2931
 HOHL K
 2829 2910 5324
 HOHN A
 7236
 HOHNE G
 2691 5750 11355 12318
 12372 12435
 HOHNSTON ME
 10830
 HOKIN LE
 7860
 HOKIN MR
 7860
 HOLADAY DA
 1407 3554 11397 12472
 HOLDEN FR
 2102 5466
 HOLDEN WD
 1949
 HOLFELDER H
 7759
 HOLFORD JM
 1581
 HOLLAEENDER A
 641 643 677 713
 714 899 925 943
 1081 1219 1557 2011
 2263 2643 2801 4401
 4912 4974 4977 4978
 4980 5021 5171 5172
 5183 5195 5197 5461
 5500 5943 6355 6554
 6555 6718 6826 6879
 7152 7861 7862 8832
 9953 10543 10706 12225
 12320 12343 12344 12345
 12346 12402 12403 12404
 12405 12406 12557 12559
 HOLLICROFT J
 1564 1629 6556 7863
 10393 12538
 HOLLICROFT JW
 680 708 913 2821
 6783 9433 10755 11768
 HOLLE F
 6557
 HOLLINGSWORTH JW
 1541 7864
 HOLLIS OL
 10193 10194 11337
 HOLLOWAY BJ
 11223 11950
 HOLLOWAY RJ
 6807
 HOLM B
 5159
 HOLMES AV
 11134
 HOLMES BE
 924 1053 1614 1744
 1788 2966 3207 3282

3482 3786 4147 5013
 6558 6559 6718 8047
 8165 8180 8230 8347
 8359 9045 12197 12198
 12199 12200 12201 12202
 12203 12204 12205 12206
 12208 12209 12210 12211
 12212 12214 12215 12216
 12218 12219 12220 12221
 12222 12223 12224 12226
 12227 12228 12229 12230
 12231 12232 12233 12234
 12235 12236 12245 12246
 12247 12248 12249 12250
 12251 12252 12253 12254
 12255 12256 12257 12258
 12259 12293 12294 12295
 12296 12297 12298 12299
 12300 12301 12302 12303
 12305 12306 12307 12308
 12309 12310 12311 12312
 12313 12314 12315 12316
 12317 12318 12319 12321
 12379 12412 12429 12430
 12431 12432 12433 12434
 12435 12436 12437 12438
 12439 12440 12441 12442
 12443 12444 12445 12446
 12447 12448 12449 12450
 HOLMES E
 12225
 HOLMES EE
 11084
 HOLMES R
 11423
 HOLMSTROM EG
 5176
 HOLMSTROM V
 1648 2181 5405 5849
 HOLST EA
 6683
 HOLSTROM V
 10514
 HOLT AP
 8986
 HOLT JF
 9077
 HOLT MW
 736 1293 2205 10737
 10861
 HOLT RL
 3211
 HOLTERMAN C
 10191
 HOLTHUSEN H
 237 238 401 2638
 3337 3415 9091 9969
 9981 10081 10459 11358
 12617
 HOLWECK F
 387 3318 3331 4639
 6727 6978 7099 7278
 7865 7866 7867
 HOLWECK L
 11258
 HOLZ AM
 4609
 HOLZKNECHT
 10509
 HOLZL H
 4156
 HOMANN W
 5890
 HONESS RF
 4293
 HONG MS
 8812
 HONJO S
 3338
 HOOD SL
 1185 5529 11504
 HOOKER DR
 12024
 HOOKER J
 4769
 HOOVER RL
 10132
 HOPF H
 8202
 HOPKINS CG
 8855
 HOPKINS DC

3860
 IMBERT R
 10065
 IMIRIE G
 10736
 IMIRIE GW JR
 10302
 IMLER AE
 6628
 IMSHENETSKII AA
 3431
 INABA C
 95
 INAMA K
 964
 INDA FA
 2169 3050
 INDOVINA I
 10617
 INGBER E
 564 3394 3395 3428
 3804
 INGELFINGER FJ
 7472
 INGLIS K
 3360
 INGRAHAM FD
 7066 7083
 INGRAHAM LP
 4816
 INGRAHAM SC
 1161
 INGRAM M
 821 920 932 1524
 1525 1537 2037 2723
 7880 9201 11332
 INGRAM ML
 1494 7056
 INOUYE K
 4046 4047
 IRVINE DH
 5505
 IRVINE JW JR
 4803
 IRVINE VC
 4033 4302
 IRVING A
 11606
 IRVING CC
 3241
 IRVING JL
 9685
 IRVING JT
 4055
 IRWIN DA
 3835
 IRWIN RL
 2928
 IRWIN RLB
 2883
 ISAACS AM
 1380
 ISAACS JD
 12456
 ISAACS R
 309 3210
 ISACHENKO VB
 7881
 ISHIBACHI K
 1210
 ISHIBASHI K
 2830 5658 5659 5660
 5661
 ISHIGAMI R
 2935
 ISHIMARA SJ
 2090
 ISHIZAWA M
 5329 5991
 ISRAELESKI M
 10344
 ISTOCK JT
 10302
 ITO R
 9517 12561
 ITO T
 9053 10805
 ITTNER WB
 6836 10682
 IUGENBURG A
 3639
 IVANITSKAIA EA

9279
 IVANITSKAYA AF
 7882 7883
 IVANOV AE
 7884 8979
 IVANOV II
 6856
 IVANOV KP
 1750
 IVANOV VI
 7482
 IVANOVA GF
 6825 6968 6970 9621
 IVANOVA TA
 9535
 IVEN H
 3978
 IVERSEN K
 10930
 IVY AC
 141 589 1398 1400
 12026 12045 12046 12078
 IVY C
 8467
 IZADIAN H
 9020
 IZARD C
 7885 8689 8690
 IZEKOVA AV
 8286
 IZUMI C
 11389
 IZZO MJ
 6037
 JAARMA M
 6884
 JACOTTET A
 10208
 JACKSON AH
 6875 7820 7821 9711
 JACKSON DP
 728 782 1708 2756
 JACKSON E
 2522
 JACKSON EM
 1092 2024 6897 9557
 10913
 JACKSON H JR
 3574
 JACKSON JH
 1617
 JACKSON K
 7902
 JACKSON KL
 8974
 JACKSON MA
 2241 2288 7820 7821
 JACKSON WD
 9047
 JACOB KT
 9989
 JACOB P
 4746
 JACOBI W
 10135 12206
 JACOBS E
 333
 JACOBS GJ
 728 839 980 6985
 11882
 JACOBS GS
 11494
 JACOBSEN A
 9150
 JACOBSEN EM
 5376 5688 8877 10765
 JACOBSEN LO
 856
 JACOBSEN VC
 3107 3604
 JACOBSSOHN K
 9712 9713
 JACOBSON BS
 11045
 JACOBSON HG
 10816 11810
 JACOBSON HP
 8830
 JACOBSON L
 5268 6280 6629 6670
 9716 11237
 JACOBSON LE

9097 9714
 JACOBSON LO
 53 908 1248 1527
 1623 1625 1626 1667
 1668 1669 1670 1671
 1697 1815 1839 1845
 1890 1903 1918 2042
 2251 2315 2316 2575
 2622 2717 2786 2810
 2857 2902 2959 2987
 3020 3413 5008 5032
 5057 5111 5222 5243
 5542 5641 5710 5903
 6369 6391 6433 6456
 6522 6630 6631 6632
 6633 7049 7108 7126
 7128 7134 7208 7563
 7901 7903 8084 10278
 10329 10477 10501 10753
 11186 11238 11340 11661
 11666 11667 11815 12200
 12239 12240 12482 12494
 JACOBSON VC
 91 317
 JACOBY A
 8467
 JACOBY D
 10474
 JACOE PW
 11772
 JACOX HW
 1915 1923 9077
 JACQUARD P
 10086
 JACQUEMIN G
 8468
 JACQUES JA
 2485
 JADASSOHN W
 1698 5319
 JAEGER R
 11404
 JAEGER RF
 8005
 JAEGER RG
 10240
 JAGER L
 4156
 JAGGER J
 7177 7295 9812
 JAGIC N
 9380
 JAHIEL R
 5083
 JAKLITSCH JJ JR
 2574
 JAKOB A
 9174
 JAKOWSKA S
 1573
 JALLER C
 12128
 JALLOUSTRE
 257
 JALLOUSTRE M
 147
 JAMES AO
 7900
 JAMES AP
 9089
 JAMMET H
 12463 12476
 JAMPOL ML
 2611
 JANDA V
 3787 3811
 JANEWAY CA
 2604
 JANITZKY A
 4403
 JANSEN BCP
 4225
 JANSEN H
 8469
 JANSSEN EF
 687
 JANSSEN G
 7338
 JANSSEN G
 3264
 JANZEN AH
 6634

[illegible]

242

KIRKMAN LW
2396
KIRMAN BH
11307
KIRRMANN JM
9160
KIRSCHBAUM A
2345 2962 4865 4866
5037 5259 5260 7920
KIRSCHNER L
10195
KIRSCHNER LB
2922
KIRSCHON A
5008 12240
KIRSLIS M
2124
KIRSNER JB
1851
KIRSSANOW BA
3439
KIRWAN DP
2923
KISELEV PN
7921 7922 7923 9103
11180
KISELEY PN
5711
KISHI S
5267
KISIEBESKI W
10280
KISIELESKI W
11803 11965
KISIELESKI WE
2955 6383 6758 10182
10528 10578 10619 10621
11338 11520 11963
KISTLER K
1387
KITAEVA ON
6861 8941
KITAMURA S
5848
KITTLE CF
10628
KIVEL B
2003
KIVMAN G
7924
KIYASU J
7855
KJORVEN C
9392
KLAFTEN E
9595
KLAUBER WA
6014
KLAUBER WA JR
5978
KLAUDER JV
11
KLAUGER WA JR
6015
KLAUNBERG HJ
2715
KLAUS K
7340
KLECHKOVSKY VM
12622
KLECKI CV
8610
KLEESATTEL H
7549
KLEIBER M
10467 10475 11181 11182
KLEIN E
11184
KLEIN G
6667 10688
KLEIN HV
12124
KLEIN J
12126
KLEIN JR
5413 6798 6910 7925
KLEIN K
7819
KLEIN O
3557
KLEIN PD
1229

KLEIN RM
10248
KLEINE HD
7926
KLEINEBERGER C
9593
KLEINSCHMIDT J
11204
KLEINSCHMIDT R
11204
KLEMPARSKAYA NN
7927 7928 9115
KLEPIKOVA FS
9162
KLERCKI C
8475
KLEVIN P
6994
KLEWITZ F
152
KLIGERMAN MM
2640 8204 9077 9142
9142
KLIMECKY V
2695
KLIMOV VS
11468
KLIMOVA E
9530
KLIMOVITSKAYA ZM
8317
KLINE BE
7129 8271
KLING A
7542 8451
KLINGER Q
9150
KLIPFEL FJ
8274
KLOVEKORN GH
249 7930
KLOVEKORN H
7929
KLOVENKORN GH
38
KLUGE L
3286 4361 6127 7342
KLUMPAR J
6071
KLUPFEL W
3220
KMIETOWICZ F
8476
KNAFFL-LENZ E
10478
KNAFFL-LENZ EV
8611
KNAPP E
3743 3802 5027 5153
6078 9623
KNAUSS HJ
5838 6112 8730 9455
KNEF JP
8795
KNIPPING HW
7550
KNISELEY RM
1256 1377 5423 5689
9216 10375 10390 10947
11155 11643
KNOBF VI
2147
KNOCKE FJ
3961
KNOTT FA
409
KNOUF RA
11645
KNOWLES ZD
8954
KNOWLES ZELDA D
11292
KNOWLTON NP JR
1556 2767 2782 2800
2931 3147 5042 7664
KNUDSON A
12566 12623
KNUDSON D
10052
KNUDSON L
3501 4644 10042
KO MH

293
KOCH E
7500
KOCH HJ JR
2473
KOCH L
381
KOCH R
530 648 695 5554
5581 5651 5652 5698
6850 7390 7972 7973
7974 7975 7976 7977
8883 9629 9740 11671
12292 12304 12371
KOCH W
6648
KOCHOLATY W
763 772 806
KOCHOLATY WF
1401
KOCIS JJ
10598
KODANI M
4938 5848
KOEHRIG V
4645
KOELLING RA
6943 7283
KOERNICKE M
9893
KOESTER ML
2155
KOETS P
3027
KOFMAN
6725
KOFMAN J
12568
KOFMAN T
122
KOFMANN T
8404
KOFROID CA
413 12044
KOGEL G
3975
KOH WY
10533
KOHBRAUSCH FL
8477
KOHLE DA
9896
KOHLE GD
10634
KOHLMANN
12097
KOHN H
2875
KOHN HI
830 879 2124 2165
2440 2557 2635 2733
2887 5468 6878 6981
7041 7101 7204 7223
7468 7812 7813 7931
7932 7933 7934 7935
7936 7937 7938 7939
9151 9348 9758 9807
9822 10734 12285 12499
KOIDSUMI K
615
KOIDUMI R
6649
KOIKE H
6971
KOISTENEU H
11653
KOJAN S
8235 8238 8239
KOJIMA K
8814
KOJO K
8478 10685
KOK F
9954
KOKUMODR KL
7400
KOLETSKY S
644 1071 1072 1120
1374 1497 1741 2645
5342 5775 6650 10594
10595 10597 11185 11936
12549

KOLLER PC
 2307 2571 4446 4646
 4867 4868 8750 8774
 8831 9409 9636 9695
 9832 9850 10186 10794
 KOLCMIETZ MI
 4369
 KOLCMIETZ MJ
 512 12196
 KOLTA E
 339 4607
 KOLTER PC
 9168
 KOGMAI T
 4180 4524
 KOMAROVA OI
 7940
 KOMMEDAHL T
 5915
 KOMURO H
 322 365 386 405
 519 3497 7140 12027
 12121
 KONDOGURI W
 3190
 KONDRATEVA TM
 802 7941
 KONECCI EB
 1327 5706 5781 7163
 7326 7369 7942 7943
 KONEFF AA
 5762
 KONGIG W
 3487
 KONNERTH A
 8038
 KCAO T
 11163 11615 11616 12621
 KONZAK CF
 5531 6945 7221 7944
 7945 7946 7947 8207
 8697 8870 8932 8968
 9826 9828
 KOCCLMAN MTD
 290
 KOCNTZ RL
 8912
 KOPPE M
 7636
 KORBBLER J
 2980
 KORCHAK LI
 6824 8988
 KORDECKI R
 1651
 KORDIK P
 110 803
 KGREN K
 10228
 KORMAN S
 10121
 KORNBERG HA
 5819 7370 7658 9707
 9771 9941 10320 10651
 10771 11587 11590 11592
 11722 11868 12094 12454
 KORNBLUM K
 3966 4125 4278 4356
 6463
 KORNFIELD L
 9167
 KCRNICKE M
 12120
 KCRNMAN S
 11228
 KCRGGODIN VI
 9258
 KORROZA GS
 9175
 KORSON R
 1420
 KORTZAREFF A
 315
 KORY RC
 1178 11129 11130
 KOSAKA SH
 373
 KOSEL G
 10348
 KOSEL GE
 10350
 KOSHTOYANTS KS

12624
 KOSIKOV KV
 3851 3894
 KOSIN IL
 5081
 KOSLOWSKI L
 6841
 KOSMATH W
 3805
 KOSMATII ES
 8317
 KOSNOVA LB
 7950
 KOSTENKO MS
 9278
 KOSTIUK VI
 7948
 KOSTOFF D
 1963 4981 5101
 KOSTOV D
 8751
 KOSTROMSKAYA VA
 8220
 KOSZALKA JM
 8038
 KOTLYAREVSKII LI
 7481
 KOTSCHNEFF N
 3083
 KOTVAL JP
 5003
 KOTZ J
 4455 6651
 KOTZAREFF A
 11188 11191 12119
 KOVACS J
 11617
 KOVACS K
 436 12183 12184 12187
 KOVALEV IF
 7949
 KOVALSKII VV
 8315
 KOWALEWSKI K
 11235
 KOWITZ G
 1267
 KOWITZ HL
 7550
 KOWLESSAR OD
 1220 5348 6797
 KOYAMA Y
 6951 6955 6957
 KOYENUMA N
 5134 11712
 KOZIOL J
 10161
 KRABENHOFT KL
 7250
 KRACKE RR
 11453
 KRAEMER EO
 4077
 KRAEVOI SJ
 11342
 KRAEVSKII NA
 7388 9022
 KRAFT LM
 7028
 KRAHE M
 7951
 KRAINTZ FW
 11317
 KRAINTZ L
 11193 11317
 KRAMER HH
 10748
 KRAMER HP
 1642 1643 2614 2680
 KRAMISH A
 10790
 KRANTZ JC JR
 103 12645
 KRASILNIKOV NA
 4437
 KRASSO I
 484
 KRATSCHELL U
 3438
 KRAUS O
 9104
 KRAUSE AC

2117
 KRAUSE FT
 6927
 KRAUSE P
 6652
 KRAUTH C
 12582
 KRAYBILL HF
 8890
 KRAYEVSKII NA
 10660
 KRAYEVSKII NN
 9061
 KREBS A
 1179 2397 4046 4403
 4647 5532 5938 7299
 9999 11196 11198 11795
 KREBS AT
 813 962 1251 1405
 1612 1657 2589 5649
 5679 7052 8916 9213
 KREBS C
 3188 3227 3283 3377
 7519
 KREBS HA
 12370
 KREBS JS
 7213 12534
 KREINER W
 857
 KREINER WM
 3088
 KREJCI LE
 4077
 KRENZ FH
 5894 12625
 KRESAGE M
 1858
 KRESGE M
 2963
 KRESLING EK
 9637 10000
 KRESS H
 10795
 KRESTINSKAYA TV
 7175 10116
 KRETCHMAR AL
 983 5857 10569
 KRETZSCHMAR CH
 5313
 KREYBERG L
 2017 2254 4012 8950
 10602
 KRICKA J
 336
 KRIEG F
 8479
 KRIJANOVSKY A
 3812
 KRISE GM
 8915 9298
 KRISHNASWAMI N
 4212 4440 4648 8698
 KRISS JP
 10586
 KRITTER H
 2359
 KRIUKOV PG
 11619
 KRIVKOV PG
 11199
 KRIZEK H
 6653
 KROETZ C
 277 278 8480 8481
 8482 12185 12186
 KROHMER JS
 7C71 7225 8938 10204
 10923 12548
 KROHN LH
 6858 7090 7091
 KROLL H
 10121
 KROLL JG
 7585
 KROLUMITSKY GA
 8483
 KROMEKE F
 887 9548
 KRONING F
 8195 9734 10590 12360
 KRONTOWSKI AA

903 6410 7952	7955 7956	5017 5656 5700 6156
KRCTKOV FG	KURABAYASHI M	6402 6403 6404 6405
9798	9963	6811 7099 7278 7531
KROTOSZYNSKI BK	KURAKAMI H	7531 7553 7865 7962
7783	9404 9405	7963 7964 7965 7966
KRUCHAKOVA FA	KURASAKI H	7969 8699 9507 9597
11201	942	9839 10005 10417 11206
KRUGER PG	KURDYUMOV GV	11267 11279 11517 11521
2310 10657	9076	11522 11523 11740 11823
KRUMHOLTZ LA	KURLAND GS	12028 12160 12161 12167
10797	1034 10583 11205	12451
KRUMHOLZ LA	KURZ ME	LACASSAGNE AMB
11202	9129	850
KRUMINS R	KUSANO N	LACASSAGNE MA
7645	7047	11630
KRUPSKI AI	KUSHNEVA VS	LACHANCE L
3109	9536	7027
KRUSE E	KUSIN AM	LACHANCE LE
11460	9334	7466 9328
KRYDER GK	KUSMIEREK B	LACHMANN E
1032	7174	10482
KRYZHANOVSKII GN	KUSNETZ HL	LACKEY JB
7475	7957	9083 12582
KRZYWICKI HJ	KUSTER A	LACKNER J
8888 8890	7958	1313
KUBANYI E	KUTSCHER CF	LACOUR LF
468	4947	8700 9852
KUBITSCHKE HE	KUTZ ER	LACROIX P
1171	7042 10746	10676
KUBO H	KUTZIM H	LACY WJ
5066	9333	8005
KUCK KD	KUZELL WC	LADO P
2162	3027	10993
KUDOKOTSEV VP	KUZIN AM	LADOW CS
2831	5523 6923 7243 7248	2593
KUDRYASHOV YB	9279 9332 11217	LAFARGUE J
7953	KUZMA JF	3253
KUEHNER C	10938 10939	LAFFARGUE P
5915	KUZMIN AI	11778 11779
KUGLER GA	11698	LAFRANCE LJ
3784	KUZNETSOV SI	10680
KUHL OA	7959	LAGEN JB
1613	KUZNETSOVA IV	1439
KUHN USG	12584	LAGUNOV LL
10992	KUZNETZ HL	10059
KUHN USG III	11397	LAHM
4930 6939	KUZNITZKY E	11902
KULAGIN VK	8484	LAHM W
8110	KYANDARYAN KA	402 8486
KULIKOVA VG	7615 7960	LAHR MS
8008	KYKER GC	11270
KULLANDER S	7156 10293 10616 10631	LAHR TN
5123	10942 11145 11155 11607	10707
KULLY BM	11624 11670	LAIDLEY JWS
10271	L HEUREUX MV	3143
KULP JL	6422	LAIRD D
7954 11371 12703	LA BELLE CH	12353
KULWIN MH	10189	LAIRD M
11262	LA BORDE S	9961
KUMAR LSS	3754	LAIRD RD
4275	LA COUR LF	7968
KUMER L	2134 9399 9400 9401	LAJTHA LG
453	9834 9851 9960	7000 12373 12411 12447
KUMTA US	LA VIA MF	LAKHOVSKY G
8989 9224	9023	444 3066 3100 7552
KUN H	LA VIOLETTE D	LALLEMAND S
3063	10406	261 3133 3192 3244
KUNASHEVA KG	LABARRE I	7557
10061	41	LAMARQUE P
KUNASHEVA S	LABARRE J	1196 2328 2460 2926
7635	71 101 156 9524	6161 12266
KUNDU BC	LABAW LW	LAMBERT G
5086	1243	979 1042 1253 1328
KUNG HC	LABBE H	1427 2064 2526 5873
11713	315	LAMBERT J
KUNIN AS	LABEDINSKY N	3616 4130 6730 7348
11383	10281	7516
KUNKEL AM	LABELLE C	LAMBERT O
10659	10263	6406
KUNKEL HA	LABELLE CW	LAMBERTINI G
1021 7951 8179 8180	1725 10158 10176 10969	3121 3284 3445 3472
8944 11355 11622 12318	LABORDE J	3512
12372	8485	LAMBERTON LF
KUNKLER PB	LABROSSE EH	2340
804	7961	LAMBOU MG
KUNTZ H	LACASSAGNE	779
4148	6727 6978	LAMBRANZI M
KUPALOV PS	LACASSAGNE A	3589
3701	307 388 1207 1543	LAMDIN E
KUPER JBH	1974 2459 2502 3041	5942
2139 2179	3318 3331 3345 3864	LAMERTON LF
KUPRIANOFF J	4175 4434 4720 4945	5794 5830 5886 7043

7237	9445	10451	10461
10804	11271	12212	12297
12300	12480		
LAMPE I			
776	2498	3964	4548
5808			
LAMPE J			
4869			
LAMPEN JO			
2298	4936		
LAMPERT H			
3807			
LAMPERT J			
630			
LAMS			
39			
LAMS H			
230			
LAMSON BG			
740	5538	7359	7970
9357			
LANDAU HG			
661			
LANDAU P			
1199			
LANDESBERG J			
11714			
LANDING BH			
5573			
LANDMAN W			
10014			
LANDMANN HR			
1579			
LANDMANN W			
11826			
LANDSBERGER M			
9792			
LANDY JJ			
1480			
LANE CW			
78			
LANE GR			
5458	9853	12417	
LANE JF			
9187			
LANE JJ			
1359	5760	6791	6939
6950			
LANE LA			
55			
LANE TJO			
3047			
LANE WB			
7685	7686	7712	8929
LANG CA			
11627			
LANG DA			
1392			
LANG FR			
10678			
LANG G			
6777			
LANG K			
12626			
LANGE L			
7967			
LANGE RD			
909	942	12640	
LANGE S			
11918			
LANGENDORF M			
585			
LANGENDORFF			
3784			
LANGENDORFF H			
530	585	647	1276
1965	2511	2517	2637
2725	3098	3110	3664
3683	3976	4036	4107
4204	4219	5554	5581
5651	5652	5698	6850
7390	7971	7972	7973
7974	7975	7976	7977
8883	8886	9209	9740
10134	10472	10646	10796
11671	12159	12179	12214
LANGENDORFF M			
1276	3110	3683	4036
5751	8883	10796	12159
12214			
LANGENFORFF H			
5751			

LANGENSKIOLD A			
5956			
LANGER H			
6407			
LANGHAM W			
5486	5662	6408	7433
7978	8221	8910	9462
10936	11204	11275	11276
11628	12545	12581	
LANGHAM WH			
864	1252	1437	5665
7275	8115	8254	8283
10404	10662	11116	11273
11274	11277	11466	
LANGOHR JL			
4765			
LANGRIDGE J			
9446			
LANIER ML			
1731			
LANTZ HC JR			
6400			
LANZ H			
7710			
LANZ HC			
6409			
LANZ R			
6454			
LANZL EF			
1482	1645		
LAPENNA M			
3140	4159		
LAPIN BA			
8933			
LAPP RE			
6070	7979	8981	10265
11669	12537	12627	
LAPTEVA-POPOVA			
9532			
LARINA MA			
7752			
LARIVIERE PD			
10105			
LARK-HOROVITZ K			
348			
LARKIN AJ			
525			
LARKIN JC			
2842	4239	4649	4706
6411			
LARKS SD			
671			
LARSON E			
378			
LARSON FC			
11190			
LARSON RE			
2609			
LARSON RF			
10467			
LARSSON LE			
1607			
LARSSON LG			
1981			
LARTIGUE O			
835	886	1416	2005
2582	5763	6047	6436
LARUE HC			
10310			
LASCH C			
49			
LASER H			
287	851	5349	6718
8365	12452		
LASKIN S			
10176	10189	10969	
LASNITSKI I			
4871			
LASNITZKI I			
4419	4420	4870	5148
5293	5648	6412	12425
LASSAGNE A			
276			
LASSALLE H			
177			
LASSER EC			
5582			
LASSEUR P			
4746			
LASZLO D			
7035	7802	10121	10529
10681	10686	10728	11028

11228	11543	11603	11633
12204			
LATARJET R			
2253	2713	3045	4751
4778	4929	4959	4971
5040	5242	6413	6414
6718	8366	9890	12208
12489	12628	12636	
LATCHFORD WB			
3226			
LATHROP K			
2951	7113	7114	10948
10949	10998		
LATHROP KA			
1687	1688	1689	6514
9733			
LATTA JS			
3165	5611		
LATTEN W			
3307			
LATTES J			
307	7530	7531	9839
10005	12160	12162	
LATTES JS			
11279	11630		
LAUFFER MA			
7161	7660	7980	
LAUG EP			
6088			
LAUGHLIN JS			
1302	5568	6098	7401
7813	7836	8939	10238
10708	10725		
LAURENS H			
3414			
LAURIN JG			
7623			
LAURITSEN CC			
609			
LAUTSCH EV			
11063			
LAVEDAN J			
4954	7351	7981	7982
9597	10005	11576	
LAVIA M			
12500			
LAVIK PS			
690	1278	2194	2238
5465	6115	6995	7245
7331	7830	7831	7832
LAVIOLETTE D			
8136			
LAVRICK V			
12198			
LAVRITSEN CC			
4271			
LAW LW			
7983			
LAWEN A			
12158			
LAWRASON FD			
5983	9028		
LAWRENCE CA			
1036	1467	5869	
LAWRENCE EA			
4136	4519	4672	
LAWRENCE EO			
3903	4370		
LAWRENCE GC			
4764			
LAWRENCE GH			
2921			
LAWRENCE JH			
652	746	1668	1886
2148	2529	2575	2849
2972	2981	3034	3903
3986	4265	4370	4492
4515	4550	4650	4651
4659	4711	4784	5887
5946	6352	6417	6418
6937	7249	8983	9646
9665	9682	9699	10666
11632	11673	11673	11796
11813	11816		
LAWRENCE JN			
9669	9670	11814	
LAWRENCE JNP			
9293			
LAWRENCE JS			
194	1829	1897	1947
2046	2762	2861	3008
4948	6526	6888	9596

LEITNER J	3062			
LEITNER SJ	9594			
LELIEVRE P	10200			
LELY JW	8638			
LEMAY M	2252	2804	844C	
LEMAY MJ	1811			
LEMBERG VK	9811			
LENGEMAN FW	11316			
LENNOX B	1451	1748		
LENOIR A	5450			
LENOIR M	10342	11148		
LENSER P	8488			
LENTZ EA	897	1297		
LENZ M	520	1811	9358	11264
	12030			
LENZL EF	24C4			
LEONARD AB	1066	1067	1397	
LEONARDS JR	690	1278		
LEONE CA	1066	1067	1397	7371
	7374	10014	11826	
LEONG GF	6807			
LEOPOLD AC	5755			
LEOPOLD RS	1002	1064		
LEPAPE A	9628	10060		
LEPSKAJA MW	3946			
LEQUEUX P	8489			
LERCHE W	4915			
LERNER SR	5590	8862		
LERDY GV	782	1552	1708	2173
	2174	2175	2176	2178
	2272	2756	6880	10287
LESCHI J	1199			
LESHCHINSKII AF	9774			
LESHCHINSKII AF	11430			
LESHER S	9134	9243		
LESKOWITZ S	12508			
LESLEY JW	7489	8809		
LESLEY MM	7489	8809		
LESSA ZT	6479			
LESSLER MA	8029			
LESTINA J	10882	10883	11937	
LEUCUTIA T	1822	5273	11631	12089
LEULIER M	8485			
LEUSEN I	9172	9263	9265	9266
LEVACHEVA VM	12702			
LEVADITI C	4961			
LEVAN A	2331	4108	9627	
LEVCHENKO MA	11289			

LEVENE MB
 5423
 LEVENSON S
 1000
 LEVENSON SM
 10205
 LEVENT R
 2814
 LEVIE B
 4056 9617
 LEVIN AJ
 4453
 LEVIN BS
 3560 3866
 LEVIN EM
 5245
 LEVIN GS
 9137
 LEVIN I
 8490 8491 8595 9403
 9545 9780 9781 9844
 LEVIN S
 11751
 LEVINE B
 7988
 LEVINE DI
 2770
 LEVINE M
 4657 4804 5192 5193
 5304 7325 8490 8491
 9403 9419 9626
 LEVINE MD
 10308
 LEVINE NO
 4162
 LEVINE WT
 3402 3510 3597 12031
 LEVINSON LB
 9255
 LEVINSON SA
 5325
 LEVITSKII GA
 3614 3763 4334
 LEVITSKY G
 4356
 LEVITT WM
 3808 11672
 LEVITCHOUK G
 12198
 LEVY B
 978 1330 1368
 LEVY BM
 6011
 LEVY LM
 8888 10140
 LEVY M
 8492 8493
 LEVY U
 12157
 LEVY-DORN
 9785
 LEVY-DORN M
 254 389
 LEWALLEN CG
 9346
 LEWIN ML
 2478
 LEWIN R
 10681 10686 11603 11633
 12204
 LEWIS AE
 632 711 2195 6096
 LEWIS D
 2021 2264 2562 3449
 3730 5926 8758 8860
 9371 9408 9448
 LEWIS EB
 7989
 LEWIS GN
 2022
 LEWIS L
 5466 7215 11752
 LEWIS MR
 2542
 LEWIS R
 1500
 LEWIS RB
 5778 5784
 LEWIS TH
 2273
 LEWIS YS
 1061 5647 12394

LEWITSKY GA
 4210
 LEWITZSKY G
 3201
 LEYPUNSKIY DI
 9171
 LHEUREUX MV
 10618
 LI CH
 1817 2706 10548 10567
 LI MH
 5246
 LIBBY WF
 5113 7990 7991 12629
 LICHKO EI
 3289
 LICHSTEIN HC
 624
 LICHTLER EJ
 7105
 LICK L
 2962
 LIEBELT AG
 7920
 LIEBER GD
 410 10647 10694 12156
 LIEBER H
 10799
 LIEBER VGD
 3896
 LIEBERSOHN J
 96
 LIEBERSOHN JG
 11764
 LIEBOW AA
 2173 2174 2175 2176
 2178 2942 6423 6880
 LIECHTI A
 56 112 4053 4658
 7414 12154 12155
 LIEDTKE KH
 8994
 LIENKE RI
 6424 10961
 LIGHT I
 12630 12631 12632 12633
 LILJEGREN EG
 6771
 LILJEGREN EJ
 9189
 LILJESTRAND A
 7992
 LILLEHEI CW
 5713 7154
 LILLY EH
 8896
 LIMA-DE-FARIA A
 4808
 LIMPEROS G
 1459 1600 2245 2530
 2901
 LINCOLN RE
 4488
 LINDEGREN CC
 1396 1411 4503
 LINDEGREN G
 4503
 LINDELL B
 7033 7993 12401
 LINDEMANN B
 669 6425 7994
 LINDENBAUM A
 10959
 LINDENBAUM B
 1968
 LINDERGEN CC
 1227
 LINDERGEN G
 1227
 LINDHARD J
 3888
 LINDNER K
 8473
 LINDQUIST B
 11010 11011
 LINDSAY S
 2667 5636 5846 7104
 7995
 LINDSLEY BF
 10311
 LINDSLEY DL
 1560

LINDSLEY DR
 5534
 LINDSTROM EW
 3255 8021
 LINEMAN JW
 8126
 LING CT
 11239
 LINGLEY JR
 4217 4310 4417 4588
 5045
 LINK AM
 1022
 LINMAN JW
 6300 7623
 LINN JG JR
 1261
 LINQUIST B
 11008
 LINSER H
 883
 LINSER KF
 411
 LINSER P
 6282 9470 9515
 LINTZ DO
 11470
 LION G
 5615
 LIPETZ LE
 1234 6896
 LIPPERT J
 11753
 LIPPINCOTT SW
 8199 8946
 LIPPINCOTT SW JR
 7829 9827
 LIPPMANN H
 12153
 LIPSCOMB A
 11655
 LIQUIER-MILWARD J
 10721
 LIRA JL
 306
 LISCHI G
 798
 LISCO H
 754 1169 1186 1827
 2351 2438 2945 2950
 5058 6165 6200 6203
 6263 6360 6426 6434
 6448 6492 6493 6592
 6654 7124 7125 7130
 7563 9733 10260 10879
 11064 11211 11290 11933
 11937 11942
 LISSE MW
 3240 3757 7996 12032
 LISSITZKY S
 11105
 LITOVITZ TA
 10627
 LITTLE CC
 3290 5016 7512 11983
 12033
 LITTLE EP
 4617 4618
 LITTLE RE
 9738
 LITTMAN A
 1398 1400
 LITVINOV NH
 11294
 LITVINOV NN
 8954 9022 9061 9244
 9808 10660 11291 11292
 LITZNER S
 136
 LIU CK
 6129
 LIU JH
 9016
 LIVANOV MN
 7997
 LIVERANI E
 6643 7998
 LIVSHITS NN
 10705
 LOBERING J
 3979
 LOCHER GL

3905 4001
 LOCHTE HL JR
 8993
 LOCKE BD
 2282
 LOCKHART-MUMMERY JB
 5149
 LOCKSLEY HB
 6427 6752 6753 10696
 10698
 LOEB L
 7533 8494
 LOEBEL R
 539
 LOEBERING J
 4035
 LOEFFLER MK
 4127
 LOEFFLER RK
 1366 7999 10242 10243
 10684 10691 10693 11224
 LOEMKER K
 734
 LOEVINGER R
 1648 5405 5849 10626
 LOEWENTHAL K
 1218
 LOEWENTHAL LA
 1575
 LOEWENTHAL LJA
 2740
 LOEWENTHAL S
 8000
 LOEWENTHAL W
 9376
 LOEWY A
 8496
 LOFSTROM JE
 9303 11674
 LOGOTHETOPoulos J
 11298
 LOGOTHETOPoulos JH
 7560 9789
 LOHE H
 8497
 LOHMANN
 9310
 LOHMANN A
 12540 12562
 LOHR W
 6528
 LOISEAU AN
 11696
 LOISELEUR
 9506
 LOISELEUR J
 1406 2444 2477 2547
 2579 3881 5242 6506
 11024 12634 12635 12636
 LONGDON ES
 9480 12152
 LONGDON J
 3418
 LONG DA
 5742
 LONG JA
 3224
 LONG TP
 3897 3926
 LONG WG
 5334
 LONGABAUGH GM
 10429
 LONGLEY AE
 1817 2100 2602 2706
 10748
 LONGUET D
 1279
 LONTIE P
 11299
 LOGFBOUROW IR
 7853
 LOGFBOUROW JR
 6428 12565
 LOCNEY WB
 1849 2233 5364 6892
 7313 8001 8002 9710
 10178 10846 11300 11301
 11303 11304 11305 11306
 11634
 LOCS GM
 1745

LOPEZ V
 3141
 LORBEER G
 3868 4392 9491
 LORENZ E
 187 649 680 708
 856 913 1208 1461
 1504 1564 1626 1629
 1630 1669 1670 1671
 1815 1930 2268 2276
 2443 2821 4875 4920
 4990 5059 5214 5215
 5511 6430 6431 6432
 6433 6434 6448 6556
 6716 6778 6783 6980
 6983 7863 9433 9502
 9767 9813 10354 10753
 10755 11302 11340 11577
 11636 11768 11959 12241
 12341 12538 12546
 LORENZ KP
 4228
 LORENZ W
 993 6853 6917 7457
 LOREY A
 6435
 LORICK PC
 9338 10356
 LORING HS
 10703
 LORTET L
 12498
 LOSSL HJ
 9174 10225
 LOTHE F
 7269 7379
 LOTSCH A
 2403
 LOTT JR
 8003
 LOTZ V
 1326 5664 10353 11248
 LOTZ WE
 11319
 LOURAU M
 835 1203 2005 2582
 6047 6436
 LOURAU-PITRES M
 12413
 LOUREAU-PITRES M
 12359
 LOUIT F
 12234
 LOUIT JF
 2012 5289 5406 6773
 6810 7762 10211 10334
 10336 10697 11307 11675
 12253 12267 12299 12324
 12460 12481 12505 12535
 LOUVIERE LJ
 10301
 LOVE RA
 2001 2019 2236
 LOVE RM
 3983
 LOVE WD
 11308
 LOVE WH
 2668 3312 3643 3671
 3906 4371
 LOVEGROVE TD
 11309
 LOVELESS LE
 5671
 LOVELL BK
 4890
 LOVELL FW
 6933
 LOW RJ
 1494
 LOW-BEER A
 3433 12151
 LOW-BEER BVA
 2489 3006 4195 4659
 6417 6437 6438 7249
 8214 10798
 LOWDER WM
 8004
 LOWE EC
 3376
 LOWE HN JR
 8005

LOWENBERG K
 6488
 LOWENBERG-SCHARENBERG K
 2347
 LOWENSTADT H
 231
 LOWENTHAL
 8495
 LOWERY A
 7693
 LOWMAN FG
 1946 10219 12637
 LOWRY JR
 11311
 LOWRY PH
 2082
 LOWY H
 4876
 LU CS
 5259
 LU WC
 8993
 LUBNOW E
 4241 4289 4360
 LUCARELLI G
 8006
 LUCAS HF JR
 9764 11386 11551 11552
 LUCAS J
 7339
 LUCE WM
 1482 1795 2824 6439
 LUCHETTA B
 4003 4198 4468
 LUCHETTI G
 10031
 LUCHNIK NV
 8007 8008 9218 9306
 LUCK JM
 3494 10703
 LUCKE WH
 1352 8805
 LUDEN G
 8498
 LUDEWIG S
 897 1297 1562 1566
 2239 2240 5469 6062
 LUDIN M
 570 5447 12150
 LUDDIG F
 5595 8009 8202 9625
 10026
 LUESSENHOP AJ
 8010 11564
 LUETH HC
 3031
 LUGANOVA IS
 7631
 LUICK JR
 10467
 LUIPPOLD HE
 7451
 LUIPPOLD H
 9381 9407
 LUIPPOLD HE
 6966 8346 8347 9490
 LUIPPOLD HJ
 9318
 LUKENS RM
 1859
 LUKIN L
 8986
 LULL GF
 2466
 LUMB G
 2030
 LUMB GO
 5975
 LUNDIE A
 1978 2484
 LUNDIN J
 9139
 LUNDQUIST V
 9438
 LUNDQVIST V
 9437
 LUNING KG
 665 1709 2299 2795
 7033 8011 12249 12433
 LUNPIE RT
 2756
 LUNTZ A

3159 12149	5049 5944 8501	4242 5306
LUPU M	MACHT DJ	MAISIN F
5908 6032	4266	1614
LURIA S	MACHT DL	MAISIN H
4639 8012	103	1328 1427 1614 7189
LURIA SE	MACHT SH	8024 9331 10547 11365
2791 4200 4533 5166	2365 2595 5944 7013	11685 12259 12375 12423
12509	MACINTYRE JW	12477
LUSHBAUGH CC	8938	MAISIN J
876 987 1209 1364	MACINTYRE WJ	586 1042 1253 1427
1367 1369 1370 1371	1337	2064 2526 2741 5873
1679 2161 3882 5665	MACK HP	6130 7189 7525 9478
7357 7978 8865 9739	725	10547 11365 11685 12259
10109 11313	MACK JF	12272 12375 12477
LUSHBAUGH CE	11098	MAISIN JH
8013	MACKEE G	1328
LUSSIER JP	6441	MAISKY IN
11050	MACKEE GM	8924
LUSZTIG A	4312 6443 10367 11917	MAISSEN L
399 3189	MACKAY J	5135
LUTHER W	636 955 1819 2512	MAJOR MH
2637 3977 4181 4341	4086 4968 9436	676 8164
5532 8014 8252	MACKIE RW	MAKARYCHEVA RI
LUTWAK-MANN C	796 1492 12639	9815
2639	MACKINNEY G	MAKHJANI JK
LUTZ BR	10703	5090 5120
3139	MACKINNON J	MAKINO S
LUXENBURGER H	2473	6146
11854	MACLENNAN WD	MAKINODAN T
LUXTON RW	11759	7696 8025 8026 9004
804 9342	MACMILLAN JC	9112 9114 9281 9337
LUYET B	1513 2507	12503
2166	MACNIDER W	MALBEC EF
LUYET BJ	8499	11677
3182 3294	MACPHERSON DG	MALCZYNSKI S
LUZANOVA IS	11720	6442
7632	MACVICAR R	MALDAGUE P
LUZZIO AJ	4172	7189 10547 11365 11685
9241	MADDEN EE	12259
LVITSINA GM	2771	MALDAWER M
9115	MADDEN SC	1522
LYMAN RS	5538 9357	MALETSKOS CJ
3701 4367	MADDOX GE	8002
LYNAM WC	10310 10314	MALHEIROS N
11934	MADHAVAMENON P	5445
LYNCH FX	8698	MALHOTRA RC
6988 11882	MADISON M	3242
LYCN GM	1592	MALIDNEY J
11676	MADSEN CB	2352
LYCN HW	1712	MALLARD JR
7505	MAEYENS E	7793
LYCN MF	5629	MALLERY OT JR
5577 7222	MAGATH M	4589
LYONS WR	183 12034	MALLET L
5177 6533	MAGATH MA	1875 2738 3789 8022
LYREE EB	454 512 1318 12194	11812
10335	12196	MALLOCH WS
MA WA	MAGEE JL	1132 4660 4662 9953
4433	8225	10041
MA WC	MAGEE MZ	MALM M
4253	5702	10809
MAAB H	MAGEE PN	MALOFF F
8944	11179	9742
MAAS JM	MAGEL JL	MALONEY MA
1865	10802	10913
MAASS AR	MAGILL RJ	MALONEY WC
11190	10129	12640
MAASS H	MAGIN ML	MALOOF F
9005 11355 12318 12372	147	7165 10381 11100
MACARTHUR JW	MAGNUSSON G	MALPEAUX L
3541 8021	11099 11214 11215	8502
MACCIOTTA E	MAGROU J	MANCIC D
5352	7552	7217
MACCOMB WS	MAHLER RF	MANCIC DD
6440	2568 2628 7703	5403 6887
MACDONALD D	MAHLING W	MANCINI RE
3634	3086	11101 11102
MACDONALD NS	MAHNERT A	MANDART M
2552 7448 9338 10179	7527	979 1253 1328 1427
10356 10361 10377 10379	MAIBACH HI	2064 2526 5873
10856 11090 11091 11093	2465	MANDEL HG
11095	MAIN ER	5430 5522
MACDOUGALL JT	3000 3030	MANDEL J
2527	MAIN JM	3742
MACCOWELL EE	9246 10019	MANDEL L
1303	MAIN RK	3607
MACDUFFEE RC	5426 5547 9177	MANDEL P
2965	MAINOLDI P	1304 1578 7394 8027
MACFARLAND ML	3121	11497 12410
1516	MAINS MP	MANERY JF
MACHT DI	2754	6444 6445
2735 3959 4404 4728	MAINX F	MANJUNATH RK

11715
MANN S 963 1994 2097 2392
2481
MANN W 2888 10365 10853 10956
11606
MANNELL T 6626 9983
MANCLOV SE 6446 8028 11103
MANOUKHINE II 12036 12497
MANOUKHINE J 2851
MANOV GG 11470
MANOWITZ B 972 1100 1613 9896
MANOYLOV SE 5712
MARABLE IW 9327
MARCEUSE W 11263
MARCH HC 2497 6447
MARCHBANK DF 2162
MARCKWALD W 8438
MARCOVICH H 5084 7964 10702 12208
12233 12306
MARCOVICH MH 12288
MARCUS PI 10599 12376
MARCUS S 391 424 1119 1355
7724 7725 8107 8108
9181 9280
MARDENSTEIG K 6450
MARGER SN 2213 6448
MARDERSTEIG K 4063 4064
MARDJANISHVIL J 3201
MAREI AN 10220 11471
MARETTI E 11928
MAREY AN 10111
MARGRETH G 377
MARGUERITE L 886
MARIASIN RS 4611
MARIN A 472
MARINELLI L 4504
MARINELLI LD 2684 4471 4564 5316
5868 6449 6451 6452
6453 7816 8665 9660
9671 9709 10318 10846
11455 11490 11704 11883
11929 11931 11964
MARINONI U 789 11001
MARINUS CJ 8500
MARIOS M 5715
MARKAKIS PC 657
MARKEES S 6454
MARKERT CL 2141 9364 10038
MARKHAM R 2882 5159
MARKIEWICZ T 6455
MARKOVITS J 275
MARKOWITS E

12163
MARKOWITZ HA 11061
MARKS EK 53 856 1527 1623
1624 1667 1815 1839
1845 1903 2042 2251
2316 2717 2786 2902
2959 5032 5057 6350
6456 6631 6632 7208
8084 11661 11815 12239
12482
MARKS EL 2810
MARKS S 7370 7432 7658 7659
11868 12585
MARLEY WG 8020 11473 12469
MARMUR J 7106
MAROIS M 10398
MARQUARDT H 1959 3951 4445 5076
5163 5621 5878 6121
8759 8785
MARQUES 944
MARQUES P 5695 6728 11104
MARRER HH 10289
MARSHAK A 3841 3952 3982 4405
4442 4490 4531 4557
4661 4662 4663 5170
5175 6120 9192 9193
9418 9662 9830 9856
10388 11110
MARSHAK AG 3764
MARSHAK RH 11111
MARSHALL C 11556
MARSHALL SP 10183
MARSILI 834
MARSTON RQ 1181 1183 1438 5624
7398
MARTELL EA 11112
MARTENS HH 7206
MARTI N 2098
MARTI NF 1660
MARTIN A 1598
MARTIN A JR 1652 5309
MARTIN AE 1494
MARTIN C 9966 9967
MARTIN CI 11970
MARTIN CL 221 5274 9573 11971
12037 12038
MARTIN FL 899 2011 5928 5943
MARTIN HE 3908
MARTIN I 6902
MARTIN JH 2709 11797 12641
MARTIN JJ 673 5436 5683 5821
MARTIN JL 11
MARTIN JM 11971
MARTIN JR 2710
MARTIN L 8640

MARTIN P 12460
MARTIN RP 2993 9363 10089 12683
MARTIN SF 2308
MARTIN WR 10428 10431
MARTIN WS 8029
MARTIN-ALDRICH CL 11864
MARTINENGHI C 1112
MARTINOVIC P 12197
MARTINOVITCH MM 8726
MARTINOVITCH P 9314
MARTIUS 11904
MARTIUS H 274
MARTLAND HS 115 286 966 3251
7131 7317 8795 10351
MARTLAND HS JR 7131
MARUCCI HD 10425 11638
MARVIN JF 7065 8149
MARX E 8503
MASAMI K 870
MASCHERPA P 485 3119 3375 7288
12193
MASINI V 6457
MASON BT 6532
MASON EM 4055
MASON GD 5814
MASON HC 6532
MASON KE 1738 2429
MASON ML 1705 1921 2666
MASON WB 821 1524 1537 5791
9201 11332
MASOUREDIS SP 11113
MASSA J 3334
MASTERS R 5942
MASTURZO A 2129 7132 10374
MASUMOTO K 6401
MASY S 9478
MATAS R 12039
MATEYKO GM 2156 5586 5634 5823
MATHER K 3452 3765 4152 9400
MATHESON J 8256
MATHEWS J 12536
MATHEWS M 12538
MATHEWSON JB 11678
MATHIESON DR 1971
MATRAS A 383
MATSUDA H 12357
MATSUDA T 486
MATSUKI T

11163 11165					10408 10409 10411 10412		5646 5815		
MATSUMURA A					10457 10489 10665		MCCULLOH EF		
8531					MAYNARD EH		5361 5650 5717 5816		
MATSUMURA S					8873		7036 7048 9208		
7846 7875 8083 8701					MAYNARD FW		MCCUTCHEON M		
8702 8703 8704 8705					3139		11370		
8706 10805					MAYNARD LS		MCDONALD DJ		
MATSUNAGE H					10420		5848		
942					MAYNARD RM		MCDONALD E		
MATSUOKA K					1706 2009		5315 6560 8016 8017		
3492					MAYNE RY		MCDONALD JE		
MATSUOKE S					779		5654 7170		
942					MAYNEORD WV		MCDONALD MR		
MATSUURA H					1284 1662 2709 3644		9864		
9365 9366					3934 4400 6664 9655		MCDONALD RE		
MATTHEWS H					9656 9657 9658 9661		1341 5703 7179		
169					10015 10461 11474		MCDONNEL GM		
MATTHEWS JJ					MAYTUM CK		2399		
698					5453		MCDOWELL AA		
MATTHEWS M					MAZER C		9335 9336		
680 9433					4727		MCDOWELL F		
MATTICK WL					MAZIA D		2841 6197		
547 4372 7363 9894					7844 11310		MCELROY W		
12073					MAZUR M		10326		
MATTIS PA					6685 11075		MCELROY WD		
10157 10371 11426 11934					MAZZANRI L		617 997		
MATTISON RW					1206		MCENDY DP		
11466					MAZZOLA V		4664		
MATUSKA RA					169		MCFALL R		
11114					MCADAMS GB		8873		
MAUBERT A					11428		MCFARLANE AS		
437					MCANENY JB		10254		
MAUDAL S					4890		MCGARY VE		
10228					MCARDLE B		8888 10140		
MAURER E					11117		MCGEORGE M		
11580					MCARTHUR C		4640 5965		
MAURER HJ					2552 10379		MCGINTY DA		
6904 6916 8030 9024					MCARTHUR LL		10188 10443		
MAURER PH					11972		MCGINTY JD		
735 1213					MCBRIDE AF		7086		
MAURER W					4388		MCGIRR EM		
7120 10503 11115					MCCALL JT		11122		
MAURIN					10874 10875		MCGRATH J		
257					MCCANCE RA		1340 5525		
MAURIN E					10962 10963 10964 11118		MCGRATH JJ		
338					MCCARTHY JE		8147		
MAURIN M					12026		MCGRAW CT		
147					MCCARTHY RE		10237		
MAURIN R					6912		MCGREGOR JF		
1875					MCCLELLAN WS		5354		
MAUTZ FR					11716		MCGREGOR JH		
481 3636					MCCLEMENT P		12040		
MAVOR JW					9001		MCGUIRE TJ		
190 264 8504 9599					MCCCLINTOCK B		10250		
12035					1162 3672 10077 10078		MCHENRY EW		
MAXFIELD JR JR					MCCLINTON LT		1516		
6458					5256		MCINALLY M		
MAXIMOW					MCCLURE CC JR		11123		
10807					10366		MCISAAC R		
MAXIMOW AA					MCCOLLUM EV		11126		
9125					11178		MCISAAC RJ		
MAXWELL E					MCCOMBS R		11124 11125		
11116					7249		MCKAY HAC		
MAXWELL J					MCCOMBS RK		6007 12465		
3954					6930		MCKAY JW		
MAXWELL LR					MCCONAHEY WM		533		
4193 4227 4262 4522					10414		MCKEE RW		
8846 9855					MCCONCHIE JE		7646 8018		
MAXWELL RD					2755		MCKEEN CL		
5889					MCCONNELL ER		2535		
MAY JP					7803		MCKENDRY JBR		
1016 2982					MCCONNELL KP		894 6460		
MAY RM					2524 10446 10447 10945		MCKENNA JM		
5409					11119		8019		
MAYER A					MCCORD C		MCKIBBEN WB		
12172					8500		11088		
MAYER C					MCCORMICK DB		MCKINLEY TW JR		
4464					7699		7697		
MAYER EG					MCCORMICK JA		MCLAMPY RM		
4291					12638		8031		
MAYER J					MCCORMICK JB		MCLAUGHLIN VD		
10944					11120		2837		
MAYER LD					MCCORMICK WG		MCLAURIN RL		
1699 2603					5361 5650 5717 5816		7066		
MAYER S					7048 9208		MCLEAN AS		
1681					MCCRACKEN EC		8020 10294 12461		
MAYER SD					11121		MCLEAN FC		
1062 6263					MCCRADY E JR		1160 6177		
MAYER SH					3132		MCLEAN R		
1092					MCCULLOCH EC		11347		
MAYNARD EA					8015		MCLEISH J		
10358 10399 10401 10405					MCCULLOH E		6890		

253

160
367
099

11702					MILLER LS					1614	1744	1788	8165
MIDDLETON LJ					9067					8180	8230	8347	8359
9249					MILLER M					MITCHELL FS			
MIDDLETON WS					7469					1053			
11680					MILLER DB					MITCHELL HH			
MIEGE E					10435					9324	11406		
10012					MILLER P					MITCHELL JH			
MIESCHER G					11113					2052			
3684	4018	4065	5550		MILLER PC					MITCHELL JR			
MIESCHER O					1087					2774			
455					MILLER RG					MITCHELL JS			
MIGEON CJ					11683					3043	4879	4880	4881
7197					MILLER RW					4882	6461	6462	6718
MIGICOVSKY BB					787	919	1033	1076		8047	9674	9675	10432
10368					1379	5796	8043	10422		12197	12198	12199	12200
MIGLIAVACCA A					MILLER SE					12201	12202	12203	12204
3653					12472					12205	12206	12208	12209
MIGOSI H					MILLER TR					12210	12211	12212	12214
12642					7243					12215	12216	12218	12219
MIKA ES					MILLER WB JR					12220	12221	12222	12223
1059	2986	6553	10083		10437					12224	12225	12226	12227
MIKAELSEN K					MILLER WC JR					12228	12229	12230	12231
739	6105	8707	8708		7378					12232	12233	12234	12235
8709	9882	12424			MILLER WR					12236	12245	12246	12247
MIKHAILOVICH SM					2506	10251				12248	12249	12250	12251
9806					MILLET JAP					12252	12253	12254	12255
MIKI K					7548					12256	12257	12258	12259
2932					MILLET RJ					12293	12294	12295	12296
MIKULICZ-RADECKI FV					7014	12643				12297	12298	12299	12300
12164	12195				MILLIGAN RRD					12301	12302	12303	12305
MIKUTA ET					374	4188				12306	12307	12308	12309
1171	5496	5571			MILLOT J					12310	12311	12312	12313
MILANICH V					3225					12314	12315	12316	12317
1072	5342	11936			MILLS CA					12318	12319	12321	12407
MILCH LJ					120					12429	12430	12431	12432
5350	5533	7422	8039		MILLS P					12433	12434	12435	12436
8040	8333				8507					12437	12438	12439	12440
MILCHENER R					MILLS WA					12441	12442	12443	12444
9466					7220	10675				12445	12446	12447	12448
MILES BJ					MILLWEE RH					12449	12450		
11743					10084					MITCHELL JW			
MILETZKY O					MILNE J					3366			
4411	6182	6728			2311					MITCHELL RB			
MILGEWSKA W					MILNE WL					1025	6114	6573	
3190					5044	5510	5798	7685		MITCHELL TG			
MILHAILOVSKII BG					7686	7687	7712	8929		7729	11061		
3273					MILOVIDOV PF					MITCHISON NA			
MILHAM M					3193	6694				10670			
5008	12240				MILSTEAD LC					MITERSTEIN B			
MILLARD MJ					76					6018			
974	1129				MINAEV PF					MITLIN N			
MILLER C					6806	6862				12644			
5031	7505	11475			MINAMI					MITRA BN			
MILLER CE					8508					6213			
10318	11929	11930	11931		MINCK F					MITRA S			
MILLER CL					8044	8045				350	456	3437	6100
7498					MINDER W					12450			
MILLER CP					832	1823	1824	4053		MITTERMAIER R			
672	1058	1088	1093		4666	5136	5999	6699		412			
1292	1399	1716	2065		MINELLI S					MITTWOCH U			
2536	2649	2650	3354		7781					2059			
5597	5598	5599	5724		MINER RW					MIWA M			
6661	7102	7192	7392		10803					4093	4095	4205	4206
7396	8041	8042	10423		MINOT GR					4207	4551	5267	6314
MILLER E					9600					MIXER H			
1565	1627	1628	1930		MINDUFLET C					2962	5259		
4944	5214	6783	7863		10800					MIXER HW			
MILLER EB					MINOURA K					1926	2345	5037	5260
1848	2869				10040					MIYADERA K			
MILLER EM					MINTS MM					8509			
9108					3169					MIYAKAWA T			
MILLER ER					MIRA OJ					5994			
5846	7104	8982	10436		11597					MIYAKE Y			
11134					MIRAND EA					12455			
MILLER ES					5764					MMERLUND-ESSLER E			
10625					MIRIMOVA FD					11021			
MILLER EV					8046					MOBIUS W			
2790					MISCHEL W					693			
MILLER G					6851					MOCHT DI			
11120					MISCHTSCHENKO JP					12645			
MILLER GJ					438	3849				MODESTOV VK			
7056					MISRA G					6856			
MILLER H					8760					MODIGLIANI F			
1977					MISTRUZZI L					6478			
MILLER HL					6075					MOELLER DW			
4642					MISZURSKI B					1161			
MILLER J					4756					MOES A			
2098					MITCHELL CJ					5415			
MILLER JH					2153	6681				MOGILNETSKIY BN			
1660					MITCHELL DD					6464			
MILLER LL					9676					MOGILNITSKII BN			
921					MITCHELL FJ					487	3084	3144	3308

3608
 MOH CC 745 8051 8710 9397
 10085 12349
 MOHENY JB 742
 MCHLER FL 3611 3853
 MCHLER JD 6602
 MCHNEY JB 2704
 MOHNKE W 959
 MOHS FE 1444 3603
 MOIR WM 2749
 MOISEENKO EV 9326
 MOJE 9540
 MCKROVSKAY SP 8052
 MOLDAQUE P 12375
 MCLE RH 110 1192 2127 2293
 2479 4023 6982 8053
 8054 8918 9018 10700
 11015 11681 12483
 MOLESWORTH EH 439
 MCLISCH H 8510 8511 8512
 MOLL FC 2604
 MCLLER B 11135
 MCLLER E 334
 MGLLURA JL 8055
 MOLCMUT N 2275
 MOLONEY JB 1504
 MGLONEY WC 909 6804 10423
 MOMIGLIANO E 3645 3640
 MONACELLI M 12189
 MCNIER MM 5914
 MCNKHOUSE FC 1096
 MCNNIER P 3654
 MONOD O 554 7982 11523 11576
 MONOILOV SE 1750
 MONROE RA 1359 5497
 MONTAG C 840 2073 2899
 MONTAGNA W 981 1086 9477
 MONTET D 3245 4090 7556 8711
 9998 10011
 MONTGOMERY AH 2750
 MCNTGOMERY DC 2750
 MONTGOMERY H 8778 11343
 MONTGOMERY M 6395
 MONTGOMERY ML 11138 12556
 MONTGOMERY POB 792 817 818 996
 2130
 MONTGOMERY RM 2750
 MOOMAW DA 769
 MOON LE 7184
 MOON VH

4125 4278 6463
 MOOR JR 10941
 MOORE CN 3411 3656 3714 3775
 12566
 MOORE CV 9652 9659 9691
 MOORE D 10636
 MOORE DE 1639 1640
 MOORE FD 4667 5012
 MOORE HN 3852 4029
 MOORE JP 2214
 MOORE JW 2631
 MOORE M 8408
 MOORE MC 6260 6277 6278
 MOORE S 9652 9691
 MOORE TE JR 6894
 MOORE VM 560
 MOORE WG 3203 3750
 MOOREHEAD J 9749
 MOOS WS 1593 5667 6532 6782
 7075 7100 8056 8060
 MOPPETT W 273 852 3111 3296
 3544 3562 12041
 MORAIS E 1833
 MORASSUTTI MP 11139
 MORCZEK A 6851 7372
 MOREA R 4483
 MOREHOUSE CT 10533
 MOREHOUSE MG 6944 8057 8058
 MOREL F 10398
 MORELAND FB 11141
 MORELLINE CM 10801
 MORET R 1435
 MOREZEK A 6903
 MORFITT JW 8884
 MORGAARD C 11140
 MORGAN A 12589
 MORGAN BH 5358 5748 5749
 MORGAN DR 4125 4278 6463
 MORGAN DT 8765
 MORGAN FE JR 9214
 MORGAN GW 2179 11477 11758 11760
 MORGAN JE 945 1469 1544 5607
 6113 7257 9460 10689
 MORGAN KZ 1779 2179 3001 5105
 5527 5727 5813 6465
 6466 6772 9153 10273
 11642 11800
 MORGAN P 9242
 MORGAN RH 9746
 MORGAN WP 3412

MORGATSCHOW AW 3849
 MORGENROTH J 12190
 MORI A 6359
 MORI K 4093 4095 4206 4207
 4551 5267 6314
 MORI T 12646
 MORI Y 6956
 MORITZ AE 923
 MORIWAKI D 3409 3820 3895 9053
 MORKEN OA 3619 6999
 MORKOVIN D 12376
 MORMAN A 6510
 MOROWITZ HJ 2653
 MOROWOKA T 11585
 MORRIS JP 3537
 MORRIS PA 3037
 MORRIS R 2 1069 2590 2657
 8712 8713
 MORRIS RM 9190
 MORRISON JW 8714
 MORRISON M 9564
 MORRISON RB 5821
 MORRISON RR 12572
 MORROW IB 998 1101
 MORROW PE 7055 8059 8868 10430
 11144
 MORSE JG 10585
 MORSE ML 925 2263
 MORSE S 251 12093
 MORSE WI 1533
 MORTIMER R 9450 9620
 MORTIMER RK 5539 5812 6898 7229
 7354 9513
 MORTON DG 4208
 MORTON JJ 8817 8833 9498 11682
 MORTON JL 7847 8992 9995
 MORTON ME 5863 11244
 MORTON NE 5848
 MORTON R 9572
 MORTON RJ 10258
 MOSCARIELLO A 11142
 MOSELEY JE 5093
 MOSELEY RD JR 7357
 MOSER H 10184 12309
 MOSES C 1261 2204 7042 10426
 10429 10746
 MOSES LE 6812
 MOSES MJ 715 1992 2151 2433
 MOSES SG

1816
 MCSHER WA
 2530 2901
 MOSHMAN J
 1372 2026 5346 5498
 6467
 MOSIMAN RS
 10406
 MOSKALEV YI
 8991 9026
 MOSKALEV YL
 8061
 MOSKALEV YU I
 11143
 MOSLEY VM
 1243 4522
 MOSS EM
 11213
 MOSS IH
 10309
 MOSS WT
 9339
 MOSSBERG H
 1490 6468 6469
 MOSSE M
 9466
 MOSSER DG
 7065 8313
 MOSSIGE J
 4652 12315
 MOSTOWA RS
 3755
 MOTACEK D
 2695
 MOTIDA N
 4037
 MOTOJIMA R
 333 3160
 MOTTF F
 11585
 MOTTA VC
 9794
 MOTTRAM JC
 45 63 73 168
 205 323 360 516
 1287 1489 1489 3145
 3208 3301 3430 3458
 3590 3606 3671 3766
 3813 3839 3936 3995
 4340 4373 6287 6313
 6470 7301 7506 7509
 7510 7511 8439 8513
 8576 8798 8895 8927
 9275 9382 9575 9865
 9980 11852 11853 12042
 12043 12340
 MOULDEN E
 11378
 MOULDEN EJ
 1764
 MOULDER PV
 1661 1683 1685 1688
 1689 2535 11145
 MOULINARD J
 797
 MOURGUE M
 11146
 MOUTINHO-DE-OLIVEIRA MM
 8715
 MOUTSCHEN J
 9451
 MOXNES NH
 4362
 MRAZ F
 10342
 MRAZ FR
 8879 9029 11148
 MUCKE D
 6851 7372
 MUDGE GH
 11407
 MUELLER IH
 5276
 MUELLER R
 10427
 MUELLER T
 7548
 MUGARD H
 1222
 MUHLMANN E
 8514
 MUHSAM E

3371
 MUIR JR
 8920
 MUIR RM
 6471
 MUKAI F
 5396 9452 9872
 MUKAI H
 8515
 MUKERJI N
 606
 MUKERJI RN
 301 3230
 MUKHIN EN
 9011
 MULLER E
 11512
 MULLER H
 2382
 MULLER HJ
 29 30 281 355
 476 532 1931 2570
 2586 3095 3212 3213
 3304 3529 4297 5054
 5129 5355 5739 5743
 5981 6009 6266 6472
 6473 6474 6475 6476
 6477 6885 6907 7561
 8065 8839 11644 12251
 12261 12405 12406
 MULLER HR
 471
 MULLER J
 8063 10419
 MULLER JH
 4053 4109 5108 5142
 10239 11154 11157 11848
 MULLER K
 1609 2935 7859
 MULLER KM
 3972
 MULLER PT
 12192
 MULLER RH
 415 12069
 MULLER W
 12191
 MULLI K
 11007
 MULLIGAN RM
 4456 4479
 MULLINS LJ
 4174 4288
 MULRYAN B
 3055
 MULRYAN BJ
 2998 3000 3030 3150
 10481
 MULTRY WC
 11254
 MUND W
 3197 7654 8394
 MUNERATI O
 9379
 MUNN JI
 10300 10312 10352 10364
 MUNOZ CM
 6869
 MUNOZ DEL CASTILLO J
 8516
 MUNRO LA
 4957
 MUNRO R
 12223
 MUNSON RJ
 1192 8918 12222 12483
 MUNTZ JA
 6490 8062 9993 11161
 12237 12238
 MUNTZING A
 8811 10013
 MUNZEL W
 12511 12512
 MURACHI K
 5967
 MURAMATSU T
 335
 MURATI K
 9053
 MURDEN CH
 7213
 MURO-HIDEO K

846
 MUROFUSI
 11456
 MURPHEY JB
 9016
 MURPHREE RL
 926 1005 5760
 MURPHY DP
 457 3039 3123 3265
 4118 6299 16056 12091
 MURPHY ED
 2313 2805
 MURPHY JB
 9 4196 7525 8517
 8518 8817 8833 9207
 9932 12382
 MURPHY VP
 1314
 MURPHY WE
 8336
 MURPHY WT
 1520
 MURRAY A III
 11466
 MURRAY BE
 7449
 MURRAY JM
 316 3346
 MURRAY MJ
 6298
 MURRAY MR
 4883
 MURRAY R
 2857 3413
 MURRAY RG
 5231
 MURRAY WS
 263
 MURTHA EF
 10659
 MUSKATBLIT E
 3575
 MUTA T
 526
 MUTERMILCH S
 8425
 MUTH H
 967 2084 5619 10347
 10349 11169 11172 11646
 12449
 MUTSCHELLER A
 2561 4668 6441 6443
 MUXART R
 10871
 MYANT NB
 7224 9789 11173
 MYER HL
 5095
 MYERS HM
 11175 11177
 MYERS JW
 1838
 MYERS LS
 10587
 MYERS LS JR
 7261
 MYERS W
 1838
 MYERS WG
 1577 5190 9654
 MYSZYNSKI G
 10236
 MYTAREVA LV
 8066
 NABOURS RK
 3351 4539 6297
 NACHMANSOHN D
 10997
 NADAL R
 2400
 NADSON G
 5 3526 3527 3703
 6480 8716 12166
 NADSON GA
 3940 5920 8520 9784
 9988 9994 10032 10058
 12167
 NAGAI MA
 4001
 NAGAI S
 12357
 NAGAREDA CS

6812 7856 8277 9430
 NAGELSEN MG
 689
 NAHAO A
 11218 11582
 NAHEN L
 12134
 NAHMIA ME
 3002 3002 3002
 NAIMAN DN
 2988 5088
 NAITHANI SP
 8745
 NAKAGAWA J
 3179 3356
 NAKAHARA W
 9970
 NAKAIOZUMI M
 2936
 NAKAMURA M
 8719
 NAKAO A
 10315 10316 10360 11077
 NAKAO Y
 1424 7389 9045 9900
 11348
 NAKASHIMA Y
 128 3246
 NAKAYAMA H
 10002
 NAKAZAWA R
 10034 10035
 NARANJO A
 10283
 NARAT JK
 10054
 NARDI GL
 11219
 NARIMATSU K
 3180
 NASH JB
 10954 11071
 NASSET EC
 413 12044
 NASTA M
 3378 3379
 NATARAJAN AT
 8265
 NATHAN MH
 2043
 NATSUMOTO S
 6359
 NAUJOKS H
 504 3545
 NAUTA WJH
 6613
 NAVASHIN M
 8742 9901 9927
 NAVILLE B
 6803
 NAYLOR E
 4138
 NAYLOR JM
 1011
 NEAL FE
 10697
 NEAL W
 10278
 NEAL WB
 10477
 NEARY GD
 8078
 NEARY GJ
 1192 8918 12383 12434
 12483
 NEBEL BR
 305 3980 4502 4504
 6320 6452
 NECHAEVA NN
 488
 NEEFF TO
 3113
 NEEL JV
 2830 5848 8079 9055
 NEELY OA
 4590
 NEERING JC
 3118
 NEFF J
 11137
 NEHEMIAS JV
 5436 5591 5666 5683

5821 6929 7142 7258
 7276 11532
 NEIFAKH AA
 7796 10123
 NEIGAUZ MK
 3821
 NEIL RH
 11221
 NEILL MN
 9509
 NEISEL MN
 12647
 NELIS P
 3363
 NELL W
 599
 NELSON A
 7253 7254 7682 9139
 12203 12606
 NELSON DJ JR
 1110
 NELSON JE
 2314
 NELSON W
 1248
 NELSON WO
 6418
 NEMENOFF MI
 7555
 NEMENOW M
 3930 6296
 NEMENOW MI
 3685
 NEMENOW MY
 7324
 NEMES JL
 1002 1064
 NEMETH MR
 985
 NEMIROVICH-DANCHENKO OR
 9115
 NEMNICH O
 402
 NEMOURS A
 3374
 NERANCY JT
 3537
 NERI L
 12378
 NERMUT M
 5968
 NERURKAR MK
 10561
 NERURKAR MV
 10561
 NESHCHADIMENKO IP
 9278
 NESS AT
 11524
 NETTELSHIP A
 4884
 NETTLESHIP A
 5507
 NEU L
 2514 2673 5294
 NEU O
 9580
 NEU V
 5294
 NEUFELD J
 629 1012 10622 10745
 NEUFFER L
 3142
 NEUHAUS ME
 7024
 NEUKOMM S
 12422
 NEUMAN FV
 12491
 NEUMAN K
 11649
 NEUMAN MW
 2998 2999 3000 3030
 3150 6029
 NEUMAN W
 10348 12554
 NEUMAN WF
 1056 2998 2999 3000
 3030 3055 3150 6029
 6222 8923 9753 10350
 10358 10412 10468 10481
 10872 11220 11651 11652

NEUMANN A
 9613
 NEUMANN F
 8424
 NEUMAYR A
 2218
 NEVE RA
 2050 5589
 NEVENZEL JC
 12648
 NEVIL A
 7692
 NEVILLE GA
 2806
 NEW WD
 11563
 NEWBURGER RA
 11111
 NEWCOMBE HB
 900 4568 4570 5354
 6295 8082 9089 9453
 10020 12426
 NEWCOMER HS
 8521
 NEWELL FW
 8084 11653
 NEWELL PC
 7494
 NEWELL RR
 5957 11395
 NEWMAN A
 402
 NEWMAN RH
 5814
 NEWMAN RN
 10463
 NEWOROSCHKIN JP
 510 9717
 NEWSHAN LGS
 2872
 NEWSOM BD
 8964
 NEWSOM BJ
 906
 NEWSOM DB
 5827
 NEWTON RA
 86
 NEWTON WA JR
 1656
 NEY H
 3152
 NEYMAN MB
 9076
 NICE CM JR
 8085
 NICHII R
 332
 NICHOLAS DJD
 2057
 NICHOLLS CM
 12465
 NICHOLS C
 8743
 NICHOLS C JR
 4669
 NICHOLS O
 707
 NICKERSON JTR
 6031
 NICKERSON WJ
 3037
 NICKSON JJ
 893 895 1828 1884
 3067 5585 6670 7312
 9200 10480 10808 11361
 11422
 NICKSON M
 6292 6293 6294 10461
 NICKSON MJ
 1873
 NICOLA MD
 5437
 NICOLLE A
 1975
 NIEDERHOFF P
 134
 NIELSEN AM
 4250
 NIELSON G
 932
 NIEUWERKERK HTM

5503 8670	6949 7662 7877 9228	6284 6287
NIGHTINGALE A	NORANJO A	NUTTALL JR
6881	11065	10269
NIGRELLI RF	NORBY B	NUZHODIN NI
1573	6387	6861 8941
NIHEI Y	NORDENSKIOLD H	NUZUM FR
2712	8722	8522
NIIZEKI H	NORDENSON NG	NYBOM N
8720 8721	6290 9582	1046 1177 1693 2296
NIKIAS A	NORDENSTROM-BLOMQUIST BEW	8724 8725 8754 9437
7120	5881	9438 10147 10541
NIKITIN IN	NORDFELDT S	NYE SW
3666	10476	5694 5768
NIKITIN SA	NORDHEIM LW	NYKA W
440 458 6708	12649	3864 6402
NIKITINA KI	NORDIN WA	NYLANDER PEA
7921	11334	11225
NIKLAS A	NORGAARD F	NYLIN G
10503 11115 11512	4131	10809 10851
NIKOLAEVA NV	NORHAGEN A	O BRIEN JP
9135	11654	8093
NILAN RA	NORMAN A	O HARE J
6809 7080 8051 8087	6096 6958 7116 8090	159
8177 8717 8718 9397	NORRIS C	O NEILL TA
10085	3534	7068
NILES GM	NORRIS CC	OAKBERG EF
11913	11973 11996	2958 6899 9340 11052
NILES NH JR	NORRIS LD	OAKES WR
1259	10929	987 2931
NILOVA VP	NORRIS RJ	OAKLEY HEH
10036	610 3142 7289	9916
NILSSON F	NORRIS WP	OAKLEY WD
2714	623 5868 6289 10470	9771 9772 9773 10193
NIMS LF	10528 10578 10619 10621	10194 10223 10623 10946
930 1518 2235 2721	11222 11223 11338 11803	OANA M
5833 6038 6379 7215	11940 11943 11950 11952	3324
8088	11955 11965 11966	OBA K
NISHIMURA Y	NORSEN J	3399
8719 8720 8721 8892	2090	OBERLE EM
9404 9405	NORTH DT	5742 7174 7378
NISHINA Y	8932	OBERLING C
1443 4176 4536	NORTH N	3752
NISHIYAMA S	2721	OBERLING CH
7917	NORTHEM HT	3678
NITZGE K	4172	OBERSTE-BERGHUS
3978	NORTHROP JH	6842
NIVEN CF JR	3454	OBO F
5776 8089 9014 9494	NORTON JJ	12711
NIX M	8518	OBRESHKOVE V
733 1372 1596	NORWOOD WD	3247 3248 3483 4388
NIXON JJ	5541	OBRIEN JP
1471	NOTZEL H	724 1077 4603 4670
NIZET A	8723	4724 7397 9978
12408	NOVACK NA	OCHLERT G
NIZET E	9701	6816
2833	NOVAK JR	OCONNELL JEA
NIZZA P	11480	6236
719 1473	NOVARO A	OCONNOR CM
NIZZA RD	1004	10510 12207 12213 12370
6069	NOVICK R	OCONNOR MH
NOBELE D	2828 4781 4786 5227	10927
39	NOVIKOVA AP	OCONOR VJ
NODINE JH	9541	1385 10415 11376
10484	NOVITSKI E	ODDIE TH
NODL F	759 6207	3756 12650 12651 12652
10165	NOVKOVA AP	12653 12654 12655 12656
NODON A	9804	12657 12658 12659 12660
155	NOVY FG JR	12661 12662 12663 12664
NOELL WK	2616	12665 12666 12667 12668
7074	NOWELL PC	OEBALD E
NOGIER T	7212 7268 7328 8091	11132
11206 11726 11728 11729	8092 8963	OEBLAD E
11730 11731	NOYES HE	954 1282 5548 5865
NOGUCHI Y	11871	7393 9105 10487 11099
3719	NOYES P	11215 11226 11272 11654
NOLAN C	1091 1268 10356 10843	ODELL TT
1758	11090 11091	11227
NOLAN JF	NURNBERGER CE	ODELL TT JR
10588 11221	216 11655	1560 10485
NOLAN WE	NURNBERGER L	ODENTHAL F
1111 5831	40 3204 8908 9581	1257
NOLD MM	11586	ODINOKOVA VA
9765 10324 10943	NUSBAUM R	10549
NOCJIN RO	10856	ODUM HT
5905	NUSBAUM RE	11229
NOONAN AM	2552 7448 10179 10361	OEHLERT G
1075	11093 11095	9304
NCCNAN T	NUSS J	OEHLKERS F
2099	8888	8785
NCCNAN TR	NUSSBAUM E	OFTEDAL P
1075 5344 5519 5563	10126	4652 12316
5738 6163 6241 6291	NUTTAL JR	OGG JE

9141				ORD MG				4676	6880	7341
OHARE JP				1228	8095	8141	8686	OURAND K		
3609				12374				11172		
OHASHI S				ORD MJ				OURY		
6956				6337				8389	8393	
OIKEMUS AH				ORE A				OUSPENSKY B		
10659				2627				3575		
OKA H				ORLOV AS				OUTERBRIDGE TS		
8812				7484				10591		
OKADA H				ORLOV BA				OVADIA J		
2008				7795	8028			7813		
OKADA S				ORLOVA LV				OVERALL JE		
7459	10192	10769		2864				9301		
OKADA YK				ORNDOFF BH				OVERAND WG		
229				141	8467	12026	12045	10185		
OKAMI Y				12046				OVERBECK L		
1654				ORNITZ EM JR				8179		
OKANIVA				2286				OVEREND DS		
11456				ORR CR				1067		
OKAUE S				11233				OVERKAMP H		
3647	3909			ORTH JS				11236		
OKUBO T				6800	7020			OVERMAN RR		
7917				OSANN M				3106	7709	11183
OKULOV NM				8616				OVERMAN RT		
8094				OSBORN GK				12354		
OLDEN EJ				1389	7337	7891	7892	OVERSTREET R		
2714				7893				5268	6280	6629 9716
CLEARY J				OSBORN SB				11237	11238	
3055				2797	11179	11755	12669	OWEN M		
OLENOV JM				OSBORNE JC				9725	10792	12202
8816				11235				OWEN ME		
OLIVA L				OSBORNE JW				7354		
7039				988	1645	10642		OWEN SE		
OLIVER CP				OSBORNE MP				4673		
3518				9730				OWENS RD		
OLIVER R				OSBORNE P				11448		
8970	9118	10613	11230	1297				OYA T		
12373	12411	12447		OSBORNE TS				138		
OLIVIER HR				10048				OYAMA T		
4081	5051	7640	7641	OSGOOD EE				8799		
OLIVIERI F				1582	1583	1584	1584	OZATA H		
3185				1585	1997	3033	4421	8525		
OLIVO JP				4671	6151	6304	7040	PACCIARDI A		
11280				OSGOOD EF				798		
OLLIVIER H				7319				PACE N		
5050				OSHRY E				10517		
OLMSTED CA				2181	10514	11192		PACK GT		
5589				OSIPOVSKII AI				223	527	3435
OLCMUCKI M				8972				PACKARD C		
11368				OSLUND R				57	127	226 227
OLSEN R				10				228	314	549 573
10707	11270			OSSINSKAJA WW				609	3085	3578 4374
OLSON AR				3890				4451	4674	4755 6279
202	283	602	8842	OSTANPKOVICH VE				7526	8526	8527 8528
9881				11468				8529	8530	11888 12047
OLSON BH				OSTER HL				12057		
4802				5857				PACKHAM EA		
OLSON EC				OSTER II				7319		
2771				5355	7096	8881	12251	PAGE IH		
OLSSON G				OSTERGREN G				4381		
6083	10761			8813				PAGE N		
OLTMANN W				OSTERTAG B				8275		
8786				6283				PAGENSTECHER H		
CMEARA JP				OSTRO M				8461		
1743				2735	4728			PAGLIARO JA		
ONEIL JB				OSTROVSKY E				10108		
10488	11231			12108	12109			PAGNIEZ		
ONEILL T				OTANI S				9912		
813	1405			2008				PAGNIEZ P		
ONEILL TA				OTIS EM				8532	9503	
1168				5490	6281			PAHL G		
ONG SG				OTSUBO K				6790	12347	
1945				5329				PAIGEN K		
ONG H				OTSUKA S				1430		
8814				574				PAILLARD R		
ONO J				OTT A				1698	5319	
3488				3807				PAINTER E		
ONO Y				OTTE JW				3053		
3235				1505				PAINTER EE		
OPATOWSKI I				OTTEN H				2613	2817	2930 5216
744	2693	2719	4734	7115				5217	5471	5876 5945
4736	4955	6286		OTTOLENGHI A				6063	6261	6277 6278
OPPENHEIM A				7306				10332		
4933				OTTOW B				PAINTER TS		
OPPERMANN K				3266				3212	3213	
8523	8524	10292		OTZEN P				PAIS A		
ORAM MS				7383				140		
3808				OUDIN				PAL RK		
ORBELI LA				11588	11589			6213		
6859				OUGHTERSON AW				PALACIOS J		
ORCOYEN JG				2173	2174	2175	2176	10025		
492				2178	4136	4300	4672	PALADINO T		

5048
 PALAZZI D
 1241
 PALMER ED
 3009
 PALMER EL
 11155
 PALMER HD
 1656
 PALMER LE
 6770 7434
 PALMER RF
 1336 10282 10369 10601
 PALMER W
 7909
 PALMER WL
 1851 5245
 PALUMBO LT
 3474
 PALUMBO RF
 9525
 PANASENKO NP
 9011
 PANCOAST HK
 11974
 PANCOAST MK
 6521
 PANDRE EM
 9264
 PANDURANGA RAO V
 3715
 PANKOVA NV
 9255
 PANNEWITZ GV
 167
 PANSCHIN IB
 5128
 PANSCHINA N
 5128
 PANSORF J
 3216
 PANSIN IB
 3842
 PANTIC V
 10570
 PANY J
 9179
 PANZIRONI PE
 1987 6204
 PACLETTI
 834
 PACLETTI C
 7439
 PACLETTI M
 800
 PACLETTI R
 9317
 PAOLO B
 801
 PAPADOPOULOU D
 9245
 PAPAGEORGES N JR
 2098
 PAPE R
 1321 2217 3040 6210
 6211 6212 6902
 PAPILLON J
 965
 PAPOYAN SA
 7615
 PAPPENHEIM A
 9614
 PAPPERITZ W
 4264 5469
 PARADE GW
 8096
 PARCHWITZ E
 8996
 PARCHWITZ HK
 8996 8997
 PARES G
 9949
 PARIS R
 1348 6216
 PARIS WH
 6927
 PARK HD
 5365 6106
 PARK HF
 6275
 PARKER DB
 10790

PARKER DR
 2884 5614
 PARKER E
 4455 6651
 PARKER F JR
 1675
 PARKER FW
 6034
 PARKER HM
 2554 2672 5819 7373
 8098 8099 8100 10262
 11481 11482 11587 11594
 11807 12094 12462 12466
 12470 12670
 PARKER JP
 1984
 PARKES A
 62
 PARKES AS
 42 58 269 327
 3468 4810 5145 7411
 9428 10057
 PARKS AS
 60 61
 PARNANEN PO
 666
 PARR W
 5532 7299
 PARR WH
 813 1168 1179 1405
 5679 8916 9213
 PARRISH DL
 8134
 PARRISH ME
 1536
 PARROTT M
 5635
 PARROTT MW
 9778 10497 10637
 PARSONS LD
 3934 4400 4885
 PARSONS RP
 1876
 PARTANEN CR
 8101
 PARTHASARATHI N
 3731
 PARTHASARATHY N
 9823
 PARTOS E
 8533
 PARTRIDGE CWH
 9493
 PARVIAINEN S
 666 6048
 PASCAL C
 4577
 PASCHER F
 4733
 PASCHKIS KE
 10359
 PASHKE G
 8343
 PASINETTI L
 3393 3396 3498 3720
 3973
 PASQUINI P
 3122 3380 3857
 PASSALACQUA F
 11240
 PASSONNEAU JV
 970 2188 5508 7395
 10182
 PASYSKII AG
 7185 7266 11756
 PATAU K
 11006
 PATERSON E
 698 2728 2886 4358
 6220 6274 7822 9156
 12257 12536
 PATERSON R
 2461 4886 10392
 PATON JM
 8949
 PATRICELLI
 9566 9929
 PATRICK H
 8879 9029 10342 11148
 PATRICK SJ
 6134
 PATSCHADJI AR

4958
 PATT DI
 5347
 PATT H
 12343
 PATT HM
 820 904 1092 1165
 1180 1631 1672 1673
 1729 1942 2024 2157
 2160 2522 2647 2700
 2701 2947 2953 2954
 2956 2957 2971 3019
 4401 5143 5721 5817
 6090 6272 6273 6361
 7004 7038 7286 7361
 8102 8727 10333 10335
 10752 10913 11096 11197
 PATTEN R
 847
 PATTEN REP
 357 3382
 PATTERSON E
 8103
 PATTERSON HW
 5831
 PATTERSON JT
 404 517 3071 3072
 3295 3304 3316 3352
 3477 3665 3968 4675
 PATTERSON PA
 2486
 PATTI F
 2284 2528 6103 6814
 PATTON HS
 11683
 PAUL LW
 11757
 PAUL W
 1570 1588 1956 2201
 2576 2687 2691 2711
 5954
 PAULI W
 11609
 PAULI WE
 224 505 588 12174
 PAULIN A
 8534
 PAULISSEN LJ
 1231 6927
 PAULSON SR
 6921
 PAULY H
 6901 8104 12228 12439
 PAUSDORF H
 599
 PAVLOVIC M
 12197
 PAVLOVIC MR
 8208
 PAVLOVITCH M
 9314
 PAVLOVITCH R
 8726
 PAVLOVSKAYA TE
 7185
 PAVLOVSKY A
 9653
 PAYNE AH
 6940
 PAYNE BR
 11743
 PAYNE F
 8535
 PAYNE JT
 1494 6271
 PAYNE PR
 10317
 PAYNTER M
 6600
 PAYSINGER JR
 5760 6939
 PEACOCK PR
 342 4429
 PEACOCK W
 10195 11286
 PEACOCK WC
 10337 10500 11000 11002
 11284 11287
 PEACOCKE AR
 10185
 PEARCE ML
 2045 2046 2047

PEARLMAN N
 6391 10362
 PEARSE HE
 70 6271 10357
 PEARSON IA
 1872
 PEARSON NS
 10941
 PEARSON PB
 1030 10370 11241
 PEARSON WN
 5866 8260
 PECHER C
 11242 11243
 PECK A
 10388
 PECK SM
 558
 PEERS JH
 7442
 PEGUIRON ML
 12422
 PEIFFER VG
 7170
 PEIGHTAL TC
 2373
 PEIRCE CB
 11484
 PEKAVA J
 102
 PELC SR
 2541 7282 8728 10862
 12319 12387
 PELIKAN W
 883
 PELLEGRINO C
 8105
 PELLER S
 4040
 PENCHARZ R
 722 2689
 PENCHARZ RI
 3224
 PENDERGRASS EP
 1458 3039 3637 4769
 5082 5203 5204 5209
 6269 6270
 PENDERGRAST WJ
 1567
 PENICK GD
 1138
 PENKARN J
 9569
 PENKAVA J
 203 349 1503 6731
 9633 9903
 PENN J
 9944
 PENNER E
 8854
 PENNETTA G
 11082
 PENNYBAGKER J
 1922
 PENTIMALLI F
 8536
 PENTZ EI
 8106 8958
 PERAULT R
 4793 4961 5124
 PERCZEK L
 10484
 PEREDELISKII AA
 9127
 PERETZ LG
 3505
 PERETZ LH
 3755
 PERIOFF WH
 10484
 PERJE AM
 2299
 PERKINS EH
 7725 8107 8108 9181
 9280
 PERKINSON JD
 3241 10654
 PERKINSON JD JR
 10658 11067 11069 11071
 11176
 PERLBERG H JR
 2595

PERLEY AM
 11466
 PERLMAN I
 11244
 PERLMAN N
 1338
 PERMUTT S
 5872
 PERRI T
 2523 5285
 PERRONI GL
 10877
 PERRY CH
 2138 2389 2737
 PERRY IH
 3996
 PERRY MW
 11975
 PERRY S
 6888
 PERRY SP
 3834
 PERRYMAN CR
 4769
 PERRYMAN R
 5203 5204
 PERSON CO
 1011
 PERTHES G
 10103 11593
 PERTSOVSKII ES
 9127
 PERUSSIA A
 10993
 PERVINSEK W
 6262
 PETER O
 1869 6124
 PETERS E
 11847
 PETERS K
 5535
 PETERS MV
 1516
 PETERS T
 7417
 PETERSEN AJ
 8462
 PETERSEN BW
 3128
 PETERSEN DF
 5339 6104 6793 6849
 7022 7029 7059 8109
 10109
 PETERSEN O
 5357
 PETERSEN WF
 7532 9571
 PETERSON B
 6136
 PETERSON DC
 9189
 PETERSON EW
 5919
 PETERSON RD
 2258
 PETERSON SC
 4781
 PETIT G
 8729
 PETRAKIS NL
 2731 7910
 PETRIELLO LI
 9338
 PETROV IR
 8110
 PETROV NN
 11245
 PETROV PV
 9116
 PETROV RB
 8111
 PETROV RV
 8112 8113 9210 9341
 PETROVA AS
 8114
 PETROVA J
 4185 5087 9984 10003
 PETROVA ON
 6861
 PETROVICH IK
 9800

PETRY E
 8537 8538 8539 9914
 9915 10004
 PETTERSSON T
 9146
 PEYROU PP
 5128
 PFAHLER GE
 11 11911 11976 12048
 PFALZ GJ
 414 441
 PFANDER F
 6854
 PFAU A
 7901
 PFAU AM
 10372
 PFEIFFER R
 3935 4544
 PFEIFFER RL
 4115 6162
 PFEIFFER T
 9917
 PFUHL W
 4148
 PHALDAGNE P
 1614
 PHELPS VR
 6285
 PHEMISTER D
 97
 PHILIP JF
 5499
 PHILIPP
 10823
 PHILIPP E
 11559 11744
 PHILIPP K
 1257 1976 8886
 PHILIPPON GS
 5920
 PHILIPPOV G
 3703
 PHILLIPS AW
 9013
 PHILLIPS CES
 12390
 PHILLIPS G
 1066
 PHILLIPS GW
 3467
 PHILLIPS LL
 8177
 PHILLIPS MD
 689
 PHILLIPS ME
 9142 9142
 PHILLIPS PH
 1412 5612 5709 7234
 PHILLIPS RJS
 5577 7222
 PHILPOT JSL
 2479 6102 9330 12488
 PHILPOTT OS
 2809
 PIATT D
 932
 PICARD E
 586 3363
 PICCHIO C
 1112
 PICCIRILLO R
 974 2456 5429
 PICCIRILLO RT
 631 1267
 PICHLER F
 9919
 PICKERING BI
 1982 2578
 PICKERING JE
 5732 6195 6579 7238
 7649 9108
 PICKHAN A
 3822 3969 4887
 PICKREN JW
 4480
 PIECHL N
 4888
 PIEMONTE M
 5326
 PIEPENBORN J
 11508

PIEPER J
8540
PIEQUET J
2400
PIERCE FT
633
PIERCE M
2857
PIERGROSSI A
2135 2136
PIERRE-LEHMAN M
1197
PIERRE-OCTAVE R
8909
PIETRA R
6268
PIFFAULT C
1279 3560 4422 9797
12671
PIGALYEV IA
12330
PIGOURY L
1473
PIGOURY L
719
PIHL A
7739 12303 12388
PIKKARAINEN O
3170
PIKOVSKI M
4756
PILATI L
3513
PILLER S
7458
PILZ F
9920
PINAJIAN J
10342
PINAJIAN JJ
11148
PINCUS G
5419 5420
PINCUSSEN L
8542 8543
PINET
965
PINEY A
1284
PINKERTON M
7804 7805
PINNEY E
2513
PINO JA
1927
PINSON EA
2247 8115 10353 10355
10934 11246 11247 11248
PINSONNEAULT G
2566
PINTO F
11082
PINTO HB
10914 11410
PINUS AA
8116
PIRCHAN A
4500
PIRIE A
5670 7279 8117 8367
9251 12389
PIRINGER-KUCHINKA A
6246 6902
PIROCCHI L
3790
PIROTTE M
1350
PIROTTE MG
10181
PIROVANO A
354 3577 5233
PISANI G
5908 6032
PITOI S
3253
PITTENGER T
9514 9873
PITTENGER TH
8650
PITTER J
936
PITTMAN OD

8118
PITTS RF
11494
PIZETTI F
6170
PLAGENS GM
3475
PLAINE HL
6993 7010
PLANEL H
5695
PLASENCIA HT
4144
PLATE E
8477
PLATT M
2204 3838
PLATT WR
11249
PLATZMAN R
12402
PLATZMAN RL
8225 10802
PLAUT J
4672
PLAUT JA
4676
PLAYFAIR PL
2744
PLESCH J
4889 8544
PLESTED KJ
9130
PLISKE EC
6915 7086
PLOTNIKOWA TW
3202
PLOTZK A
8545
PLOUGH HH
1448 2494 2569 5985
12672 12673
PLUMMER G
1121
PLUS N
2548
PLUSS J
5550
PLUYGERS E
2064 2526 5873
PLYSHEVSKAYA EG
12698
POBEDINSKII MN
7087 8119
POBEDINSKY MN
12440
POBLE EA
11757
POCHAPIN IM
2572
POCHIN EE
7224 11252
POCK GT
6076
PODIO G
2064 2526 5873
PODKAMINSKY NA
550
PODLJASCHUK LD
328 3308 6464
POHLE E
43
POHLE EA
12 166 489 490
597 853 1285 2749
3436 3563 3702 3850
4530 4890 7364 12023
12050 12051 12052 12053
12056
POLAK E
313 757
POLAKOV A
280
POLEZHAYEV AB
9308
POLIKARPOV GG
9343
POLISHCHUK FM
8120
POLITZER G
224 225 514 588
8375 12103

POLKIASHUK LD
3084
POLLACK BL
2609
POLLARD E
2179 5416 5480 6267
6789 7226 8276 9106
9456 9869 10051 12453
POLLARD EC
877 1948 5605 7028
7295 10582
POLONOVSKI M
4677
POLVANI C
10993
POLYAKOV IM
12674
POMERANTSEVA MD
8926
POMERAT CM
6217
POMEROY D
9884
POMMER A
3086 3416
POMMERENKE WT
9663
POMOSHCHNIKOVA NA
6863 11896 12647
POMPER S
6218
POND V
8235 8236 8237 8238
8239
PONOMARENKO NE
8121
PONTECORVO G
4563 5196 6266 6475
6721 9454
PONTHIEU J
1934
PONTIUS GV
8308
PONTOVICH VE
12675
PONZIO M
22 3495 8122
POOS F
7547
POPAVSKII NK
8123
POPAK G
6718
POPOFF GD
11233
POPOVICI G
6152
POPP L
2832
POPP WC
2934
POPPE E
2017 5996 8124
POPPE H
6841 6854
POPPEL MH
10816 11810
POPPI U
8546
PORDES F
9375 11558
PORPORIS AA
11127
PORT S
10944
PORTER BW
9330
PORTER CA
9344
PORTER CL
8062
PORTER EC
731
PORTER JR
8125
PORTER JW
5838 6085 6112 8730
9455 11703
PORTER KA
12504
PORTER LM
6225

PORTIS MM
 8782
 PCRTIS S
 9950
 PORTMANN AF
 1949
 PORTMANN UV
 170 4145 4267 5439
 12011
 PCSENER K
 7403
 PCSHERSTNIK SY
 9537
 PCSIN DQ
 6215
 PCST J
 8925
 POST JS
 7211
 POSTEL S
 6528
 POSTELL PE
 5912
 POTQZKY H
 4161
 POTTER GD
 7450 7995
 POTTER JC
 4472
 POTTER JS
 9412 10092
 PCTTER M
 7983
 POTTER RL
 7623 8126
 POTTER VR
 12502
 POTTINGER MA
 912 5714
 POTTS AM
 6528
 PCULSEN BR
 6265
 POULSSON E
 8547
 POURBAIX MAISIN JY
 3197
 POWELL C
 755
 POWELL CC
 9220 12676
 POWELL CP
 1024 5657
 POWELL DB
 9144
 POWELL WF
 9456 10582
 POWER JM
 2555
 POWER MH
 10380 10414 11152
 POWERS EL
 1062 2104 5936 6263
 7003 7804 7805 8102
 10542 11147 11827 12279
 POWERS EL JR
 1793 5310 6264
 POWSNER HJ
 6427
 POZZA E
 9317
 PRABHU SS
 4891
 PRADEL J
 12476
 PRADIER G
 9385
 PRASLICKA M
 12516
 PRAT S
 4988
 PRATER WO
 11253
 PRATT AM
 6782
 PRATT C
 9289
 PRAYTOR EH
 626
 PRAYTOR HB
 5905
 PREHN RT

9246 10019
 PREMINGER N
 4892
 PREROVSKY K
 522
 PRESCOTT SC
 8857
 PRESTON A
 9133 9810
 PRESTON RG
 9119
 PREUSCHOFF P
 3209
 PREUSS LE
 1659 10990
 PREVITERA L
 11381
 PREVON P
 8549
 PREZYMA AP
 11254
 PRICE CHG
 1867 2274
 PRICE FL
 1891
 PRICE GR
 32
 PRICE PB
 1341 5703 7179
 PRICE S
 8800 8847
 PRIEST SG
 5861
 PRIME F
 8548 8624 9972
 PRIME JR F
 8623
 PROBST H
 8000
 PROCTER BE
 6031
 PROCTOR BE
 657 737 779 872
 1392 1403 1743 1774
 2491 2783 2846 3032
 5444 5526 5559 5685
 5686 5742 5804 5948
 6143 7174 7378 7772
 8129 8130 8131 8733
 9272
 PRODAN MT
 3669
 PRODI G
 7045
 PROKHUNCHUKOV AA
 8976
 PROKUDINA EA
 8132 8192
 PROMSY G
 8549 9868
 PROSSER CL
 2427 2922 2986 5060
 5217 6259 6260 6261
 6262 6277 6391 7135
 12238
 PROTAS LR
 3171
 PROTU M
 3681
 PROUT G
 11036
 PROUT T
 5566
 PROWAZEK S
 3648
 PRUDHOMME R
 3649
 PRYADKINA MD
 7482
 PUCCIONI L
 3767
 PUCHER GW
 8407
 PUCK TT
 8922 10599 12376
 PUCKETT N
 962 1179
 PUCKETT NL
 6921
 PUCKETT WO
 3405 3710 3931 4389
 PUECH A

59 466
 PUGET
 944
 PUGH HL
 2634
 PUGH RE JR
 4737
 PUGSLEY AT
 3756
 PUJO DE
 11016
 PULLINGER BD
 4606
 PULLMAN EW
 6063
 PULLMAN I
 10238 10708
 PUNCHER GW
 7518
 PUNIN W
 2727
 PUNTENNEY I
 5386 12392
 PUROHIT SN
 7443
 PURSER PR
 8951 9000 9257
 PURZER F
 2402
 PUSEY WA
 12055
 PUTMAN JL
 1762
 PUTNAM TJ
 11420
 QUAIFFE JV
 11677
 QUASTLER H
 988 1302 1482 1514
 1645 1795 2306 2474
 2516 2776 2824 2922
 4787 4788 4789 5220
 5248 5472 5870 6033
 6050 6144 6678 7186
 7469 7645 8824 8828
 9232 9791 12335
 QUEEN FB
 10369
 QUENISSET F
 11767
 QUERIDO A
 7007
 QUICK D
 11595
 QUIGLEY JA
 12475
 QUIMBY E
 12054
 QUIMBY EH
 223 527 2041 2419
 3260 3435 4764 4783
 5316 6440 6453 6582
 9142 9142 9295 10373
 10455 11486
 QUINBY JR
 4678
 QUINLIN PM
 10453
 QUIVY D
 1986
 QVIST CF
 9000
 RAAB W
 4893
 RABINOWITCH E
 12680
 RABINOWITZ A
 2224
 RABUCHIN I
 6301
 RACHMANOW A
 6258
 RACHMILEWITZ M
 4894
 RADERMECKER M
 10975
 RADHKOFF IA
 10944
 RADIVOJEVIC DV
 8208
 RADIVOJEVITCH DV
 9314

11602				
RATHBONE RR				
3344				
RATHGEN GH				
9005	11355			
RATTI A				
9290				
RAUCH H				
1502				
RAUCH RF				
885				
RAUSCH L				
5620				
RAUSCHKOLB D				
7830				
RAUT C				
8801				
RAVAZZONI C				
2918	2939	2940		
RAVE W				
2840				
RAVENTOS A				
5380	5574	5726	6964	
9212				
RAVINA A				
9503				
RAWSON RW				
1019	2452	9346	10443	
RAY CT				
10403	11083	11360	11375	
11380				
RAY DT				
6140				
RAY J				
9385				
RAY OM				
4094	4322	6181		
RAY RD				
8136	10406	10407	11382	
RAY-CHAUDHURI SP				
1028				
RAY-CHOUDHURI SP				
5154				
RAYET P				
1350				
RAYMOND WHA				
10336				
RAYNAUD A				
2361	2362	5039	5951	
RAYNER B				
5795	10614	11162	11660	
RAZGOVOROV BL				
9173				
READ J				
721	743	1792	2896	
4157	4340	4584	4849	
5004	5685	6077	6208	
6255	6377	6600	8793	
8794	8829	9377	9803	
9805	10073	11489	12393	
12533				
READ MS				
8890				
REARDON J				
8002				
REBATTU B				
8550				
REBATTU R				
8550				
REBOUL J				
2420				
REBOUL JA				
12681				
RECAMIER D				
11775				
RECHEW HJL				
1110				
REDD JB				
2089	2455	2533	5958	
5972				
REDFIELD				
8553				
REDFIELD A				
8556				
REDFIELD AC				
8551	8552	8554	8555	
8557	8558	12060	12061	
12062				
REDFIELD B				
1734				
REDFIELD ES				
8558				

264

3351 4539	221 9573 12037 12038	11428
ROBINETT PW	ROGERS JCT	ROSENBAUM JD
2887	3218 3704	2173 2174 2175 2176
ROBINOW M	ROGERS NM	2178 6880
10230	374	ROSENBAUM M
ROBINSON D	ROGERS RW	75
2995	7098 9132	ROSENBAUM PJ
RCBINSON DW	ROGERS W	11131
1874	60 61 269	ROSENBERG AJ
ROBINSON J	ROGERS WP	7731
8010	5964	ROSENBERG IN
ROBINSON JC	ROHDE CJ JR	11107
1745	12582	ROSENBERG KS
ROBINSON JM	ROHRSCHEIDER W	12548
4256 6366	285 289 379 614	ROSENBERG M
ROBINSON JN	1143	5968
2789	ROKHLINA EI	ROSENBERG R
RCBINSON LG	3862	2543
5350	ROLAND CF	ROSENBERG S
RCBINSON RF	1989	5553 7071 11941
689 11762	ROLF AF	ROSENBERG SA
RCBINSON RR	3598	10538 11485
10475	ROLFE DT	ROSENBLUM C
ROBSON JM	11084 11377	11627
1773	ROLLASON GS	ROSENFELD AH
ROBSON M	2836	12547
2810 2959 9023	ROLLESTON SH	ROSENFELD G
ROBSON ME	10826	5419 5420 11388
2316	ROLLINS M	ROSENFELD I
ROBSON MJ	10922	3052 10389 11417
1248 1527 1623 1625	ROMAN H	ROSENOW G
1667 2042 2717 2902	2409 4702 5110 8803	8566
5710 12494	ROMAN PW	ROSENSTOCK HB
ROCHE J	2365	11695
10398 10912 11105	ROMANINI A	ROSENTHAL HL
ROCHEMONT R DU MESNIL DE	1478 12362	10214
7193	ROMANO P	ROSENTHAL L
ROCHLIN D	10877	8149
7534	ROMANOFF AL	ROSENTHAL M
ROCHLIN G	4596 4687	3791 4375
11691	ROMANOFF EB	ROSENTHAL MW
ROCHLIN-GLEICH-GEWICHT E	9165	8150 8151 11928
5	ROMANTSEV EF	ROSENTHAL R
ROCHLIN-GLEICHGEWICHT EJ	6856 9090	10958
12064	ROMINGER CJ	ROSENTHAL RL
ROCHLINE EI	11637	1690 1982 2578 2699
9988	ROMNEY RB	2991 7343
ROCK CARLING E	11308	ROSENZWEIG W
12329	RONCHI V	10633
RCCKHOLD WT	2279	ROSIN A
7716	RONDELL PA	4894
RODENHISER HA	6770 7434	ROSKIN G
4193	ROODYN DB	459
RODESCH J	9330	ROSNER L
1304 7394 12410	ROOFE P	10143
RODET	6251	ROSOFF B
11763 12244	ROOFE PG	10121 12204
RODIONOV VM	1289 1592 1655 2768	ROSS D
2864	7133 9726 9727 9728	7663
RODIONOVA LZ	10859 11333	ROSS JF
9127	ROOT RE	9687
RODZEVITCH M	10701 11047	ROSS JM
5241	ROOT SW	3297 4376
ROEPKE RR	5689 10375 10390 10947	ROSS JP
2298 4936 5065	11070	3333
ROESCH D	ROOT WS	ROSS MH
7418 11951	8986	710 825 1908 1950
ROESCH WC	ROSAHN PD	2058 2326 2327 3050
9152	746 5887	ROSS MS
ROESLER H	ROSE EJ	2181 10514
3446	602	ROSS SW
ROFFO A	ROSE FC	10634
81	7186	ROSS WCJ
ROFFO AE	ROSE H	6249
4468	11424	ROSS WH
ROFFO AE JR	ROSE HW	9634
4004 4005 4027 4199	8266	ROSSEL A
4685	ROSE JE	8568
ROFFO AH	11386	ROSSI HH
189 1316 3134 4027	ROSE RG	1094 1386 2405 5560
4198 4199 8563 8564	9730 11363	10633
ROGACHEV LS	ROSE SM	ROSSIER J
7600	7186	3206
ROGER GH	ROSEDALE RS	ROSSIER PH
3432	11233	5142
ROGERS BS	ROSENAU G	ROSSING P
7643	8565	4745
ROGERS CM	ROSENAW G	ROSSITER RJ
7162	8567	11309
ROGERS F	ROSENBAUM D	ROSSLI V
9967	9714	4795
ROGERS FT	ROSENBAUM I	ROST F

8152
 ROST GA
 8569 12515
 ROST JH
 11202
 ROSTOTSKIY BK
 9100
 ROSWIT B
 3029
 ROTBLAT J
 11419
 ROTFELD LS
 7631 7632
 ROTH EJ JR
 11597
 ROTH FE
 7154
 ROTH H
 2229
 ROTH HH
 10349
 ROTH JS
 1319 7298
 ROTH LJ
 9157 9257
 ROTH N
 8570
 ROTH P
 11977
 ROTH SG
 1722
 ROTHBERG H JR
 9863
 ROTHENBERG SF
 11420
 ROTHER J
 220 6364 8571
 ROTHERMEL SM
 5665 7978 8153 8348
 ROTHFELS KH
 1608
 ROTHSCHILD LL
 8522
 ROTHSCHILD NS
 11973
 ROTHSTEIN A
 9345
 ROTTMANN W
 4201
 ROUFFART J
 23
 ROUFFART M
 23
 ROUNDS DE
 10179 10361 10377 11093
 11095
 RCUSER G
 9749
 ROUSSEAU J
 10090
 ROUSSY G
 3752
 ROUX M
 9944
 ROVELLO F
 2678
 ROWE SC
 10125
 ROWE WP
 8154
 ROWELL JB
 674 683
 ROWEN JH
 8090
 ROWEN M
 7075 10237
 ROWLAND RE
 1171 10318 11925
 ROWLANDS Iw
 3468
 ROWLANDS S
 1955 2010 2295
 ROWNTREE C
 9971
 ROY TW
 11049
 ROYER R
 9040
 ROYSTER GW JR
 8920
 RUBADEAU DO
 1389 7891 7892 7893

RUBENFELD S
 8155
 RUBIN BA
 2002 2150 2355 2431
 2432 2608 2722 5803
 5922 6159 9205
 RUBIN EH
 12058
 RUBIN HJ
 10271
 RUBIN I
 2336
 RUBIN IC
 1450 7290
 RUBIN MI
 10627
 RUBIN P
 9347
 RUBINSTEIN DL
 12569
 RUDALI G
 4945
 RUDDY MV
 4017
 RUDE JC
 4612
 RUDINGER C
 8572
 RUDISELL H JR
 5151
 RUDLOFF CF
 3859
 RUF F
 1976
 RUFFIN JM
 7119
 RUGGLES H
 9961
 RUGH R
 978 1108 1217 1310
 1329 1330 1368 1393
 1394 2493 2681 2705
 2784 4165 4284 5390
 5639 5754 5841 5933
 6089 6206 6247 6248
 6830 6876 6922 7044
 7404 8158 8159 8160
 9259 10120 10575 11421
 RUIZ AS
 2071
 RUMIANTSEV PD
 9127
 RUML D
 5597 7392 7396
 RUMP W
 3234
 RUNDO J
 6931
 RUNNER GA
 12066
 RUPERT CS
 5236
 RUSBY HH
 8573
 RUSCH HP
 7129
 RUSS C
 2508 7042 10746
 RUSS DR
 6897 9557
 RUSS L
 8614
 RUSS S
 73 324 612 3114
 3219 3484 3988 4268
 4423 4688 4898 6287
 6688 6689 7515 7520
 8401 8402 8574 8575
 8576 8798 8895 9934
 9955 12067 12068
 RUSSELL DS
 1922 2975
 RUSSELL EJ
 9924
 RUSSELL ER
 1828 9200 11422 12551
 RUSSELL ES
 8161
 RUSSELL KP
 11424
 RUSSELL LB
 639 676 771 1589

1597 2390 5311 5395
 5744 8162 8163 8164
 8165 12344
 RUSSELL M
 3838
 RUSSELL MA
 3927 8804
 RUSSELL RS
 2993 9363 10089 12383
 12460 12683
 RUSSELL WL
 639 676 771 938
 1095 1589 1597 1601
 5311 5395 5744 8165
 8166 8167 12263 12345
 RUSSELL WO
 1436
 RUST JH
 926 1005 1074 1160
 1271 1359 1391 1753
 2260 2271 4930 5497
 5551 5646 5717 5760
 5820 6791 6939 6950
 8034 9157 9187 9208
 9257
 RUTH HJ
 1182 1438 5624 6871
 7263 7398
 RUTHENBURG AM
 10378
 RUTISHAUSER A
 8700 9834
 RUTLEDGE BA
 7323
 RUTMAN RJ
 8146 8291
 RUTS VK
 8157
 RUTZ A
 6245
 RYAN FJ
 5028
 RYBY IJ
 2275
 RYER R III
 7727
 RYGH D
 9735 11514
 RYSER H
 5773
 RYVKINA DE
 12624
 SAARINEN P
 10183
 SABIN FR
 3287
 SABINE JC
 8168 8169
 SABNIS TS
 4899
 SABRAZES J
 1317
 SACERDOTE DE LUSTIG E
 11101
 SACERDOTE DU LUSTIG E
 11102
 SACHER G
 672 1845 6202 6242
 6244 6456 6605 9736
 10522 11250
 SACHER GA
 895 1136 1171 1338
 1634 2237 2556 2948
 2949 2950 5473 6203
 6243 6382 6788 7798
 8170 8732 10362 10715
 11187
 SACHES G
 1737
 SACHS F
 991 2192
 SACHS FL
 2222
 SACHS WH
 8855
 SACKIS J
 2948 6684
 SACKS J
 9737
 SADUN EH
 1500
 SAEKI H

3898
 SAELAND E
 7034
 SAELHUF CC
 7532 9570 9571
 SAENGER EL
 11528
 SAENZ AC
 11346
 SAFRONOVA KL
 3910
 SAFRONOVA MI
 9326
 SAGER F
 6018
 SAHASKRABUDHE MB
 9224 9261 10561
 SAI E
 4473 4474 4482
 SAIDMAN J
 587
 SAIKA M
 12646
 SAIKI M
 12684
 SAINT GEORGE AU
 12069
 SAINT-MILCC
 5255
 SAITU
 11429
 SAITO K
 600
 SAITO T
 3667 3699 8726 8721
 SAKUMA Y
 11425
 SALAMAN MH
 1800 2862 4498
 SALANT W
 8577
 SALEN EB
 3919
 SALERNO PR
 628 5546 5552 7069
 7072 7440 10157 10538
 11426 11483 11485
 SALES DE COGORNO NM
 5099
 SALINGER H
 3195
 SALISBURY P
 2098
 SALISBURY PF
 1660
 SALKOVA EG
 8889
 SALLESE A
 9243
 SALLMANN L
 453
 SALLMANN LV
 751 780
 SALNTSEV AI
 12553
 SALCMON K
 1226 1786 2113 2172
 2250 6163 6241
 SALTER WT
 10151 10152 11428
 SALUNKHE DK
 8171
 SALVA JA
 2716 2843
 SALZ G
 2711
 SALZGEBER B
 2209 2977
 SALZMANN A
 4796
 SAMOKHVALOVA GV
 3932
 SAMPSON GO
 7803
 SAMS CF
 12685
 SAMSSONOW N
 4010 4011
 SAMTER M
 7075
 SAMUELS LT
 7197

SAN PETRO A
 11204
 SANASRABUDHE MB
 8989
 SAND SA
 8172
 SANUBERG GH
 12613
 SANDERS P
 1209 1252 1373 5486
 5516 5662 7665 8255
 SANDERS PC
 7147
 SANDERS R
 704
 SANDERS SM JR
 9110
 SANDERSON M
 2535 5008 6522 6872
 7333 10998 11094 11331
 12240
 SANDERSON MH
 1480 1688 1689 11953
 SANDERSON MM
 2951
 SANDIDGE RP
 9509
 SANDKUHLER S
 8250 9120
 SANFORD JP
 11871
 SANGER BJ
 24
 SANGIORGI G
 13
 SANIGAR EB
 4077
 SANORSKII VA
 8173
 SANDTSKII VA
 9063
 SANSOM BF
 9249
 SANSOME ER
 5172 5195 5197
 SANTESSON L
 400
 SANTHOLZER W
 3687
 SANTISTEBAN GA
 5407
 SANTORI G
 3546
 SANTOS C
 11765
 SANTOS GW
 8961 9123
 SAPADIN L
 978 1368
 SAPEGIN AA
 3891 3941
 SAPIRO NI
 3922
 SAPP OL
 7708
 SARACHEK A
 1352 1396 1411 5628
 8805
 SARACINO R
 937
 SARALEGIN A
 9653
 SARALEGUI JA
 3417
 SARALEGUI SA
 556
 SARASIN R
 2394
 SARFATI R
 11696
 SARGENT JA
 6845
 SARGENT S
 770
 SARIAN JN
 1646 2116
 SARIC MR
 8174
 SARICH MR
 8903
 SARKAR I
 1028

SARTORY A
 47 131 137 160
 176 337 353 367
 375 1429 3099 3657
 4679 4763 8734
 SARTORY R
 47 131 137 160
 176 337 353 367
 375 1429 3099 3657
 4679 4763 8734
 SASAKI
 11429
 SASAKI R
 12459
 SASSA K
 2941
 SATINA S
 8841 9412 10092
 SATO D
 4176 4458 4536
 SATO K
 1443
 SATO R
 6263 6264
 SAUER H
 5651 5652 5698
 SAUL GB II
 6938
 SAUNDERS GT
 11708
 SAUNDERS JP
 10659
 SAUNDERS JW JR
 724
 SAUNDEKS TS
 8778
 SAUROV MM
 10220 12686
 SAUROW E
 4350
 SAVAGE GM
 2792
 SAVAGE LJ
 1683
 SAVCHENKO PF
 3732
 SAVEL MP
 10671
 SAVITSKII IV
 9774 11430
 SAVITSKY JP
 5708 6909
 SAWADA T
 2935 3239
 SAWYER CN
 1233
 SAWYER D
 7829 9827
 SAWYER RL
 7026
 SAX K
 881 2505 2565 3999
 4151 4152 4173 4232
 4327 4459 4486 4689
 4937 6238 6239 6240
 7032 8695 8969 9381
 9407 11458
 SAX NI
 12527
 SAXE E
 9033
 SAXON KP
 4731
 SAYEG JA
 5719 9461
 SAZERAC R
 8373 9889
 SBARRA AJ
 6826
 SCAGLIA G
 3059
 SCAGLIONE S
 1506
 SCARTOZZI C
 2654
 SCHAAF J
 7636
 SCHAAL G
 601
 SCHACK JA
 2965
 SCHAEFER H

2397	3459	6237	
SCHAEFER HJ			
702	1710	2061	6954
6984	7019		
SCHAEFER W			
460			
SCHAEFFER AA			
4926			
SCHAFER EL			
833			
SCHAFER H			
11870			
SCHAIRER L			
8240			
SCHAIRER LA			
8233	8234	8241	
SCHALET A			
9143			
SCHALTENBRAND G			
6219	6435		
SCHANK AR			
8182			
SCHARDL D			
7745			
SCHARFF RW			
8175			
SCHARNAGEL IM			
6076			
SCHARNBECK H			
7977			
SCHATZ C			
186			
SCHECHMEISTER IL			
1133	1727		
SCHECHTMANN J			
3220			
SCHECHTMANN JL			
7024			
SCHEELE LA			
10774			
SCHEER KE			
7456	10138	10155	
SCHEFFEY LC			
4900			
SCHIEE HG			
2424			
SCHENCK HP			
5189			
SCHEPMAN W			
65			
SCHERAGA HA			
2235			
SCHEREMETJEW A			
3531	3688		
SCHERER E			
5537	7493		
SCHERTIGER AM			
8824	8828		
SCHHEYER WJ			
8946			
SCHICKS E			
10676			
SCHIFF L			
10568			
SCHILLER J			
3253			
SCHILLIG K			
12138			
SCHINDLER			
7545			
SCHINZ HR			
748	773	5106	5752
7158	9038	9044	9552
SCHIRREN CG			
8310			
SCHJEIDE OA			
631	974	1129	1267
1509	2356	2456	2457
5429	7261	10587	
SCHLACK CA			
5378			
SCHLAEGEL TG JR			
6234			
SCHLANG HA			
1296			
SCHLECHTER E			
483	500		
SCHLEICHER E			
7342			
SCHLESINGER MJ JR			
5797			
SCHLUMBERGER HG			

8176	12049		
SCHLUNDT H			
3115	3537	11004	
SCHMERMUND HJ			
1021	1957	1958	5954
7951			
SCHMID J			
9608			
SCHMIDT C			
10373			
SCHMIDT CF			
6235			
SCHMIDT EA			
9551			
SCHMIDT G			
646			
SCHMIDT IG			
4078			
SCHMIDT JW			
1117	2281		
SCHMIDT KL			
5555			
SCHMIDT M			
6122			
SCHMIDT W			
5191	6022	8195	
SCHMIT-JENSEN HO			
3377			
SCHMITT HP			
11493			
SCHMITT ML			
8027			
SCHMITZ H			
2325	5993	11978	
SCHMITZ HE			
5096			
SCHMITZ R			
2521			
SCHMITZ W			
3459	6237		
SCHNAP B			
11204			
SCHNEIDER BA			
2173	2174	2175	2176
2178	6880		
SCHNEIDER E			
175	7809	11159	
SCHNEIDER G			
7458			
SCHNEIDER L			
6225			
SCHNEIDER M			
5512	5867	7064	7627
SCHNEIDER NJ			
5572			
SCHNEIDER W			
2624			
SCHNEIDERMAN H			
2964	5906		
SCHNEIDERMAN HA			
1390	8695	8696	
SCHNITZLER H			
6323			
SCHOBBER R			
8998			
SCHOCH D			
12392			
SCHOEN E			
10184			
SCHOEN M			
6156			
SCHOENBERG MD			
5906			
SCHOENBORN HW			
5691	7150		
SCHOLES G			
11818	12396		
SCHOLES ME			
2110	2111	2210	
SCHOLZ W			
3701	6227	6228	6229
6230	6231	11150	
SCHON M			
2397	2648	2648	
SCHONENBERG H			
11431			
SCHONIG A			
3309			
SCHOOULAR JC			
1359	6791	9187	
SCHOOULAR AB			
8177			

SCHOOLMAN HM			
1398			
SCHOONOVER JW			
3564			
SCHOPPER E			
1782			
SCHORK PK			
2748	6985	7311	
SCHOTTELNDREYER H			
2751			
SCHOUPPE K			
416			
SCHOUR I			
5978	6014	6015	
SCHRADER W			
2852			
SCHRAUB A			
2397	8064	10135	11172
12206	12449		
SCHRECK R			
2309	4790	6776	
SCHREIER IK			
5759			
SCHREIER K			
5379	10008		
SCHREK R			
1449	1860	4935	4967
5073	5100	5230	8178
SCHREUS HT			
89	7360		
SCHRIBAUX			
4202			
SCHRIEBNER GM			
11960			
SCHRODER G			
8183			
SCHROEDER CH			
3598			
SCHROETTER H			
6742			
SCHROETTER HV			
341			
SCHRUMPF-PIERRON P			
10800			
SCHUBACK A			
401			
SCHUBERT A			
11432			
SCHUBERT G			
1021	1570	1588	1956
2201	2401	2686	2687
2691	2698	2711	2898
3038	3154	5009	5068
5750	5934	5954	5955
6205	8179	8180	8944
12318	12435		
SCHUBERT J			
1610	1622	1895	2013
2038	2766	5256	8151
8181	8981	9744	9745
9747	10255	10521	10523
10525	10566	10604	10959
10960	11433	11434	11664
12468			
SCHUBERT M			
188	417	854	
SCHUCH RL			
12581			
SCHUCK EA			
632			
SCHUCK J			
12687			
SCHUGT P			
219	3116		
SCHULERT AR			
7954			
SCHULL WJ			
5848	8079	9055	
SCHULTE HF			
10272			
SCHULTZ HW			
8184			
SCHULTZ J			
8806	11915		
SCHULTZE KF			
506	5930		
SCHULTZE MO			
9748			
SCHULZ LP			
5977			
SCHULZ MD			
3026			

SCHULZE R				9166	9650	9665	9681	SELDERS AA				
2637				9700	10162	10164	10384	1336	9106	9457	9605	
SCHUMANN CE				10605	10639	10825	10827	9935	9936			
7430				11437	11439	11440	11441	SELDIN				
SCHURCH O				11442	11443	11496	11816	10834				
3157	3551	3660		SCOTT LD				SELIGMAN AM				
SCHURER F				4690	4985			10378				
294				SCOTT OCA				SELIVERSTOVA LA				
SCHUTZE A				3806	5862			5424				
8578				SCOTT OK				SELLARS JH				
SCHWAB L				4715				8888				
2604				SCOTT P				SELLE WA				
SCHWAB W				4590				692	2349	5814	10435	
10138				SCOTT RF				SELLEI C				
SCHWARTZ D				11298				4097				
712	873	1106	1240	SCOTT SG				SELLERS EA				
5675	8185	9195	9359	3689				6833	6953			
9441				SCOTT TW				SELLING L				
SCHWARTZ E				12705				6304				
9544				SCRIBNER G				SEMENOV LF				
SCHWARTZ EE				11937				6446	8192			
8956				SCRUGGS WC				SEMPoux D				
SCHWARTZ G				6973				10547				
6765	7545			SCUDDER J				SEN CUPTA JC				
SCHWARTZ MS				1394				8808				
5809				SCULLY NJ				SEN NK				
SCHWARTZ S				6487	11362			8808				
32	2736	6224	6225	SEABORG GT				SENN N				
6226	6328	6329	6653	5221				10829				
10153	11325	11435	11436	SEALANDER JA				SENTEIN P				
11692				9775				4792				
SCHWARTZBAUM JS				SEAMAN AJ				SEREBROVSKY AS				
8186				7040				518				
SCHWARTZMANN P				SEAMAN WB				SERIZAVA Y				
8630				6836	8190	10682	11127	10002				
SCHWARZ F				SEARCY RL				SERLIN I				
3912				6944	8057	8058		8193	8194			
SCHWARZ G				SEARLE NZ				SERRA JA				
794	3883	9380	9607	11013	11014	11189		4762				
9787	11555			SEARS ER				SERRANO ES				
SCHWARZ HP				9145	9360			1505				
1340	5525	8147		SEARS LMS				SERRES A				
SCHWARZ L				9145				5695				
346				SEBILEAU M				SERVANT P				
SCHWEIGERT BS				8579				2558	2559			
5776	8187			SECKT H				SERVIGNE M				
SCHWEIGERT M				11548				11267				
4901				SEED L				SETALA K				
SCHWEISTHAL R				11120				1826	2676	5033		
1626	1630	1669	1671	SEELIG MG				7226	9106			
6783	7863			3690	4383			SETLOW J				
SCHWEITZER E				SEGAL G				9866				
8188				4075	4655	6399		SEUDERLING Y				
SCHWEITZER GK				SEGALE C				6049				
2016				11766				SEULBERGER P				
SCHWEITZER W				SEGALE GC				8195				
5486	5516	5662	7147	218	3136			SEVERENS JM				
SCHWEITZER WH				SEGRE M				4335				
8222				6398				SEVRINGHAUS EL				
SCHWERIN K				SEGUY G				489				
3339				11767				SEWELL RL				
SCHWIENHORST M				SEIBERT H				4511				
291				7563				SEYDL G				
SCHWIND SB				SEIBERT HC				1477				
9750				6397	6528			SEYMOUR AH				
SCHWINGHAMER EA				SEIBERT RA				1862	1946	2848	5112	
8189				8135				6566	10219			
SCCPINARO D				SEIBOLD H				SEYMOUR PH				
2924	2925			3344				6839	6895	10640	10677	
SCOTT CM				SEIDE J				SEYSS R				
3792	3793	3989		92	106			843				
SCOTT G				SEIDLIN SM				SGALITZER M				
9955				5425	8191	11013	11014	95				
SCOTT GM				11189	11192			SGOBBO FP				
73	324	3219	3484	SEIFRIZ W				9911				
3988	4268	4423	4688	3823				SGOURAKIS E				
6223	8576	12067	12068	SEIGNEUR LJ				2387	5935			
SCOTT J				7659				SGRO A				
1494	10969			SEIK L				12193				
SCOTT JK				6491				SHACTER B				
1056	1990	5418	6222	SEIL HA				699	700	1951	2221	
7274	8868	8930	9753	9755				SHADITCH GS				
10176	10189	10348	10350	SEITZ L				8726				
10358	10399	10553	10701	9591				SHAFAER CL				
12554				SEITZ W				2931				
SCOTT K				11030	11048			SHAFAER JC				
6280	7710	11237	11238	SEKI L				6074				
11438	11519			868	1131	1635	10182	SHAFAER WG				
SCOTT KG				SEKI SL				3398				
758	2107	2364	4265	682	819			SHAFAER YG				
4515	4766	4784	5918	SELDEN GL				11698				
6072	6221	6400	6704	5861								

8419
 SIELMANN H
 401
 SIENKEN B
 11420
 SIEVERT R
 3268
 SIEVERT RM
 1847 3692 3884 4377
 5138 9126 12688
 SIFFERT R
 1885
 SIFFERT RS
 11451
 SIGMUND R
 1007 12360
 SIGNER R
 4691
 SIKL H
 4500
 SIKOV MR
 5344 5563 5738 9228
 9303
 SILBER RH
 11627
 SILBERBERG M
 10448 10452 11452
 SILBERBERG R
 10448 10452 11452
 SILBERSTEIN HE
 1843 9763
 SILCOX LE
 5189
 SILSON JE
 11787
 SILVERBACH I
 6653
 SILVERMAN A
 8204
 SILVERMAN FN
 10230
 SILVERMAN G
 2423
 SILVERMAN LB
 11392 11788
 SILVERMAN MS
 1235 5493 5637 7073
 7231 7496 8205 8206
 8987 9297
 SILVERMAN SB
 2845
 SILVERSTONE H
 10161 11325
 SILVESTRI G
 2654
 SILVO O
 6045
 SIMA I
 6392
 SIMMERMACHER W
 9917
 SIMMONS BS
 11454
 SIMMONS E
 11815
 SIMMONS EL
 1623 1667 1728 1890
 1918 2042 2251 2315
 2717 2902 2987 3020
 4757 5032 5111 6391
 6604 6631 7126 7128
 7134 7563 11661 12200
 SIMMONS SJ
 9748
 SIMO M
 4692 4693 10034 10035
 SIMON KA
 9321
 SIMON N
 1885 2446 2812
 SIMON S
 4032
 SIMON-REUSS I
 12224
 SIMONDS JP
 12399
 SIMONETTI
 11596
 SIMONOV PV
 7778 9176
 SIMONS CS
 1271 5551

SIMONSON C
 5417
 SIMONSON E
 7671
 SIMONSON HC
 7246
 SIMONYI A
 10989
 SIMPSON CA
 11914
 SIMPSON L
 1758 7503
 SIMPSON ME
 5762
 SIMPSON WL
 8801
 SINASON H
 4951
 SINCLAIR R
 801
 SINCLAIR WK
 2051 2363 8957 10451
 SINEX FM
 11107
 SINGER G
 4764
 SINGER L
 6390
 SINGER M
 5031
 SINGER TP
 9993 12237
 SINGH BN
 4100 4229 4534
 SINGH J
 3717
 SINGHER HC
 11455
 SINGLETON WR
 931 1360 2000 2149
 2154 2434 2891 5353
 7053 7061 7221 7947
 8207 8697 8738 8790
 9361 9896 9906 10832
 SINISTRERO C
 9291
 SINOTO Y
 4176 4458 4536
 SINSKEY RM
 12689
 SIPE CR
 1576 1928 1932 2748
 5312 6027 7311
 SIPOVSKII PV
 3372
 SIRAKI
 11456
 SIRI W
 1663 11789
 SIRI WE
 5947
 SISAKYAN NM
 12690
 SISSAKIAN NM
 12287
 SISSONS HA
 11608 12441
 SITTENFIELD MJ
 288
 SIVERTSEVA VN
 7474
 SIZOVA M
 4356
 SIZOVA MA
 3763 3937
 SKAGGS LS
 2824 5776 6678
 SKALKA M
 10024
 SKANSE BN
 2994
 SKEFER OG
 6302
 SKIPPER FH
 10874
 SKIPPER HE
 753 1758 1980 2052
 6388 6389 7503 11459
 SKIRMONT E
 1697 6892 9710 10329
 11815
 SKOK J

9095
 SKOOG F
 3871 8843
 SKOPAL F
 7410
 SKOV H
 9107
 SKOW RK
 1216 1776
 SKRINDE RT
 1233
 SKVORTSOV LL
 5078
 SLADIC DS
 8208
 SLADIC G
 12197
 SLADITCH DS
 9314
 SLATER M
 8032 8201 8305
 SLATIS HM
 6891
 SLAUGHTER DP
 4694
 SLAUGHTER EJ
 7441
 SLAUGHTER JC
 4216 4246 4452 4575
 4617
 SLAUGHTER JS
 4618
 SLEPKOW W
 3870
 SLIZYNSKI BM
 2584 3970 4999 7594
 SLOOSSE A
 8580
 SLOSSE
 9518
 SLOUKA V
 10024 12218
 SLUKA E
 9607 12496
 SMALL MD
 7472
 SMELSER GK
 6162
 SMETANA H
 4231
 SMIRNOV FA
 3863
 SMITH AH
 8209 10467 10475 11181
 SMITH AJD
 3418
 SMITH B
 9120
 SMITH BS
 12469
 SMITH C
 1575 4346 8210 8211
 SMITH CI
 8180 8359
 SMITH CL
 1053 1614 1744 1788
 7714 8047 8165 8230
 8347 10064 11351 12197
 12198 12199 12200 12201
 12202 12203 12204 12205
 12206 12208 12209 12210
 12211 12212 12214 12215
 12216 12218 12219 12220
 12221 12222 12223 12224
 12224 12225 12226 12227
 12228 12229 12230 12231
 12232 12233 12234 12235
 12236 12245 12246 12247
 12248 12249 12250 12251
 12252 12253 12254 12255
 12256 12257 12258 12259
 12293 12294 12295 12296
 12297 12298 12299 12300
 12301 12302 12303 12305
 12306 12307 12308 12309
 12310 12311 12312 12313
 12314 12315 12316 12317
 12318 12319 12321 12429
 12430 12431 12431 12432
 12433 12434 12435 12436
 12437 12438 12439 12440
 12441 12442 12443 12444

12445	12446	12447	12448
12449	12450		
SMITH DE			
1061	1631	1672	1673
1729	2024	2160	2522
2647	2700	2701	2947
2953	2956	2957	2971
5647	5720	6273	6897
7303	7361	8212	9557
10333	10335	10752	11197
SMITH DJ			
5791			
SMITH DS			
1388			
SMITH EB			
8581			
SMITH EC			
11923			
SMITH EE			
11096	12669		
SMITH ER			
10331			
SMITH ES			
12394			
SMITH F			
805	982	1182	2203
2289	2290	2292	5474
5874	5917	6039	6870
7085	7263	9388	10505
SMITH FA			
10163	10430	10553	10848
11144			
SMITH FJ			
207	461		
SMITH FS JR			
10272			
SMITH GA			
8930			
SMITH GF			
4317	4465	4642	4643
4695	4696		
SMITH GM			
3392			
SMITH GN			
11604			
SMITH HE			
7904			
SMITH HH			
8172	8887		
SMITH HP			
3127			
SMITH JE			
7961	8213		
SMITH JJ			
1587			
SMITH JM			
12462			
SMITH KC			
8214			
SMITH KM			
4402	4653	5159	
SMITH L			
627	745	1454	1936
2546	2850	2865	4462
4697	4698	4805	5307
6387	6669	8710	8810
9188	9444	9604	10088
10833			
SMITH LA			
7320			
SMITH LH			
8215	9124	12503	
SMITH LJ			
8161			
SMITH LW			
7677			
SMITH ME			
3757	4543	11462	
SMITH MI			
10924			
SMITH PK			
5430	5522	11463	
SMITH RC			
10790			
SMITH RE			
11464	11465		
SMITH RG			
11742			
SMITH RG JR			
8216			
SMITH SA			
3632	7264	7467	7785

SMITH VW			
2412			
SMITH WE			
11686			
SMITH WW			
805	940	982	1018
1181	1182	1183	1438
1441	2289	2290	2292
2774	2885	3148	5362
5363	5475	5624	5917
6039	6870	6871	7085
7398			
SMITH-STOCKING H			
4000			
SMITHERS DW			
9648	9649	9695	
SMITHIES DH			
12395			
SMOCK RM			
8898			
SMOLLOVSKAIA EI			
11245			
SMYTH FS			
12071			
SNELL AM			
3569			
SNELL FM			
2830			
SNELL GD			
3427	3520	3523	4076
4355	4410	6385	6386
11872			
SNELLMAN B			
3913			
SNEZHKO AD			
8362	9283		
SNIDER G			
3693	3836		
SNIDER R			
2859			
SNIDER RS			
1555	5327	6384	6541
6546	7391		
SNOWMAN RT			
10493	10499		
SNYDER GE			
3181			
SNYDER ML			
2801	5021		
SNYDER R			
7114			
SNYDER RH			
2955	6382	6383	6758
10218	11520		
SNYDER RS			
6542			
SNYDER TW			
7216			
SNYDER WS			
629	1012	2652	10622
10745			
SOBEL E			
1893			
SOBELS FH			
7504	8217	12245	
SOBERMAN RJ			
5889			
SOBOL DJ			
1776			
SODERHOLM LH			
8736			
SOET JC			
11498			
SOETENS R			
10537			
SOFRONOV BN			
8218			
SOGNNAES RF			
10462	10999		
SOGO PB			
10137			
SOILAND A			
4279			
SOKOLOFF B			
392	828	1464	1713
2089	2455	2533	5640
5958	5972	6511	7243
SOKOLOV VV			
9539			
SOKOLOVA NV			
8278			
SOKOLOVA TS			

11896			
SOKOLOVITCH M			
7322			
SOKUROVA EN			
8219	9009		
SOLBERG AN			
4006	4007		
SOLDATENKOV PF			
8220			
SOLDATOV IB			
8995			
SOLEY MH			
4699	10436	10824	10828
10831	10836	11068	
SOLOMON			
8389	8393		
SOLOMON AK			
11107			
SOLOMON I			
7554	8532	9503	
SOLON LR			
8004			
SOLOWEITSCHIK S			
173			
SOMMERMEYER IK			
4221			
SOMMERMEYER K			
1276	2270	2511	2648
2733	4107	4219	4254
4700	6153	6381	8886
SOMMERS SC			
736	875	1201	1212
1293	2183	2205	5573
6941	10469	11538	
SONDAK VA			
7230	11540		
SONDHAUS CA			
10736	12542		
SONEHARA S			
3694			
SONENBERG M			
9346			
SONG CS			
8260			
SONNENBLICK BP			
4298	4549	6380	
SOREF E			
8582			
SOROKINA MI			
7308			
SORRENTINO J			
11810			
SOSKA J			
12235			
SOSMAN M			
159			
SOSOVA VF			
7884	9115		
SOSYURA YB			
9170			
SOULE AB			
4893			
SOULES KH			
12493			
SOUTH DJ			
10219			
SOUTHAM CM			
11798			
SOUTTAR HS			
3695			
SOYKA O			
2679			
SUYKUYA-PACHNEROVA E			
2679			
SPACK C			
7811			
SPACK CH			
6523			
SPAIN P			
2552	10179	10361	10379
11095			
SPAIN PC			
10377	11090	11091	
SPAIN R			
11093			
SPALDING CK			
670	1201	1309	11399
11799			
SPALDING JF			
1679	8013	8221	8222
9462	9739		
SPANGLER JM			

4602				10530	10553	11547		812			
SPAR IL				SPIERS CWF				STAHL FW			
9282				12560				521			
SPARGO B				SPIERS FW				STAHL WF			
707				1347	2961	7207	8962	11457			
SPARKS A				12691				STAHLI G			
10348	10358			SPIES JW				4583			
SPARKS AF				3469				STAHLY GL			
10350				SPIES TD				1577	4721		
SPARROW AH				4203	6486	6635	12574	STAKMAN EC			
715	931	998	1101	SPIESS H				683	1878		
1114	1239	1486	1522	1768				STALKER WM			
1573	1613	1870	1992	SPINDLER HV				11739			
2002	2151	2267	2353	6372				STALL BG III			
2354	2433	2435	2436	SPINELLI A				11561			
2538	2946	4973	5053	3310				STANCATI MF			
5169	5182	5412	5549	SPINKS JWT				3410			
5604	5801	5843	6378	1717	1791	2883	2928	STANFORD RW			
6379	7026	7219	8172	2983	8780	10261	10488	11413	12692		
8207	8223	8224	8225	SPIRITES MA				STANLEY M			
8226	8227	8228	8229	7031				10284			
8230	8231	8232	8233	SPITTLER AW				STANLEY P			
8235	8236	8237	8238	7323				3610	3679		
8239	8240	8241	8242	SPOERL E				STANNARD JN			
8788	8898	9205	9443	664	5626	5671		1226	1357	1494	1494
9481	12517			SPOERL ES				1495	1786	1990	5418
SPARROW AR				1324	7904	11554		5519	5625	6829	6952
8234				SPOONER GM				7056	7058	7271	8245
SPARROW RC				10840				8246	8273	9706	9876
8242				SPRADLING S				10039	10063	10169	10171
SPASSKAYA IG				1179				10172	10196	10430	10540
8243				SPRAGUE G				11195	11549	12336	
SPAUD EA				1268				STANSKI F			
361				SPRAGUE GF				1651			
SPEAR FG				8848	9857			STANTON E			
217	544	594	1868	SPRAGUE HB				3124			
3269	3460	3556	3696	520				STANTON WR			
3837	3958	4255	4323	SPRAY CM				2051			
4340	4730	6149	6374	10963				STAPELTON GE			
6375	6376	6377	8763	SPRINCE H				5056			
10837	11993			4602				STAPLETON GE			
SPECK RS				SPRINKS JWT				641	643	677	713
1029				11231				714	899	1081	1219
SPECKMAN TW				SPRUNT DH				1221	1470	2011	2263
5868	10470	11223	11943	3502				2860	2875	5034	5461
11952	11964	11966		SPURLING RG				5500	5928	5943	6370
SPECTOR EB				9596	9600			6371	6541	6543	6826
7476				SPURRELL WR				6935	7046	7196	7862
SPECTOR WS				3221				8247	10543	10706	12242
10252				SPYROPOULOS C				STAPP C			
SPEDER E				1358				3496			
11545				SQUIRE HM				STARK E			
SPEERT H				9249				11851			
2373				SRIVASTAVA KP				STARK FM			
SPEHLER H				8745				1900			
1426				SSIPOWSKY PW				STARKENSTEIN E			
SPEIDEL CC				3814				8584			
6373				ST ARNAUD RJ				STARR P			
SPEIRS RS				2983				11424			
8244				ST AUBIN PM				STAUB H			
SPELLMAN MW				9216				10299			
5713	7154			ST GEORGE AV				STAUNIG K			
SPENCE DL				415				3979	4035		
1718				ST STENDER H				STEADMAN LT			
SPENCER H				6805				1027	1494	1844	2067
10121	10529	11228	11543	ST. AMAND GS				10158	10701	10890	11300
11633				5387				11304			
SPENCER JL				STABILE DE				STEARNER P			
5736	7076	8737	8738	10659				5476			
SPENCER M				STACEY KA				STEARNER S			
9727	11603	12531		12317				11094			
SPENCER RR				STACHOWITZ W				STEARNER SP			
3506	3772	4314		8583				1542	1632	1647	1676
SPENCER WP				STADLER J				1730	1890	1918	1919
1146	1796			717	12367			2131	2987	5111	5697
SPERLICH A				STADLER LJ				5728	6367	6368	6369
4156				298	2409	3092	3093	6684	6832	6872	7333
SPERTI G				3175	3424	4702	5173	7471	8955	10182	11166
7289				8739	8838	8848	9414	11331	11953		
SPERTI GS				9421	9440	9482	9824	STEARNS SP			
4701				9857	9861	9951	11912	10756			
SPESTVSEVA VG				STADMEISTER R				STEARNS R			
11289				10298				2552			
SPICER GS				STAFFORD W				STEBBINS FM			
12589				9546				4539	6297		
SPIEGEL E				STAFNE EC				STEDDON LM			
95				1484				10613			
SPIEGEL-ADOLF M				STAGGERS FE				STEDMAN DE			
445	5880	12072		7820	7821	9711		10407			
SPIEGELMAN S				STAHEL E				STEELE HD			
5870	9791			551				1154			
SPIEGL CJ				STAHL A				STEELE JM			

11464
STEELE R
2151 2433 10539 11550
STEENSTROM KW
12087
STEEVES TA
8101
STEFANIAK JJ
4802
STEFFANSEN D
9715
STEFFENS
11801
STEFFENSEN D
5777 8791 8849
STEGER R
9051
STEGGERDA FR
1488
STEHNAY AF
9764 11386 11551 11552
STEIN E
258 1290 3330 3840
5454 6724 8840 8850
8851
STEIN G
9819 10117 12227
STEIN J
10816
STEIN M
9212
STEIN SN
5919
STEINACH E
3063
STEINBACHER J
5074
STEINBERG B
2919
STEINBERG RA
9511
STEINBROCK HL
6779
STEINBURG G
12648
STEINDLER MJ
5569
STEINER K
3060
STEINGLASS P
2432 2722 5922
STEINKAMP RC
9680 11039
STEINMANN H
1979
STELLER J
11553
STELLING MD
1003
STELYS M
117
STEMBRIDGE VA
1377
STENDER HS
7491 7500 8248 8249
STENLIK W
8586
STENSTROM H
12562
STENSTROM KW
885 5582 7065 8313
9556
STENSTROM W
216 3591 4283 4476
4703 12073 12540 12570
STENSTROM WK
4475
STENT GS
6989 10546 12381 12492
STEPANENKO BN
12693
STEPHAN-DUBOIS F
7428
STEPHEN VF
2185
STEPHEN WA
4704
STEPHENS JG
439 1715
STEPHENS SV
5643
STEPHENSON BR

11233
STERLING WA
7257
STERLING-OKUNIEWSKI S
3288
STERN C
759 1146 1796 1820
1924 3526 3527 4938
6207 6342 6459
STERN KG
10681 10686 11603 11633
12204
STERN WE
11556
STERNE AE
9576
STERNER JH
10234
STETS JF
5861
STEVENS AR JR
1462 11557
STEVENS CD
10453 10568
STEVENS CE
2606 10551
STEVENS DJ
9121
STEVENS J
11560
STEVENS KM
5809
STEVENS LG
10887
STEVENS RH
4705 11979
STEVENS WB
9730
STEVENSON GT
10483 11945 11946
STEVENSON LD
4902
STEWART KD
5902
STEWART CB
1567
STEWART FS
11329
STEWART FW
858 5317
STEWART H
9388
STEWART M
952 6394
STEWART NG
12694
STEWART PH
10453
STEWART R
1236
STEWART RD
5761
STEWART WB
10493 10499 10558
STEWART WN
8824 8828
STICKLEY E
6754
STICKLEY EE
6752 7639 9651
STIENFIELD W
973
STILLIANS AW
1510
STILLMAN H
3634
STINSON JV
5350 8040
STOCKELL A
1236
STOCKEN LA
1228 8095 8141 8686
12236 12374
STOCKL E
3592
STODTMEISTER R
7761 8250 9120
STOEL AG
4992
STOEL G
125
STOHLMAN EF

11462
STOHLMAN F JR
7030 7304
STOKES JL
9389
STOKINGER HE
1334 1725 4485 10158
10159 10160 10175 10176
10189 10358 10511 10553
10701 10969
STOKLASA J
203 271 336 349
425 449 6731 8585
8587 8588 8590 8740
8773 9410 9411 9435
9569 9633 9903 9904
STOKSTAD ELR
5018
STOLL BA
730 2339 8251
STOLLE F
5537
STOLZ A
1280
STOLZ R
8252
STONE B
10321
STONE F
1340 5525
STONE FREEBERG A
1034
STONE LHA
3407 3452
STONE PW
10437
STONE RG
3348 3381 3447
STONE RS
53 836 856 1440
1465 1837 1999 2622
3006 3965 4195 4213
4256 4659 4699 4706
4729 4764 6305 6366
9200 12285
STONE W
4675
STONE WS
5565 7818 8253
STONE WS ET AL
12695
STONER HB
10925
STONER RD
1068 1139 1294 1323
1332 6093 6094 7485
7824
STORAASLI J
11941
STORAASLI JP
1949 5553 7071 7225
8938 10922 12548
STORER J
866 1063 1326 11628
STORER JB
791 876 927 928
1118 1127 1193 1209
1252 1367 1370 1373
1985 2161 5486 5649
5662 5665 5679 7052
7146 7147 7246 7275
7978 8153 8254 8255
9843 11278
STOREY RH
620 816 2076 2105
2893
STORY EJ
12547
STOSIC L
7823
STOUT AP
4883
STOUT PR
5268
STOVER BJ
7272 10202 11947
STOVER CN JR
11562
STOWELL RE
1124 5150
STRAILE WE
7211

8595			
STURGIS C			
116			
STURGIS CG			
4589			
STURKIE PD			
1927			
STURM E			
4196	8517		9016
STURNE E			
7525			
STUTTGEN G			
6840			
STUTZ E			
8259			
STUTZ R			
1678			
STUY JH			
8519			
SUCHE ML			
3477			
SUCHOWSKY G			
5617	5618		7405
SUDAK FN			
5382	7367		
SUEMOTO H			
8814			
SUENAGE M			
11163			
SUEOKA N			
8814			
SUESS J			
1394			
SUGANO H			
6956			
SUGARBAKER E			
4164			
SUGARBAKER ED			
6053			
SUGAWA I			
11615	11616		12621
SUGIMOTO T			
8641			
SUGIMURA T			
7389			
SUGIURA K			
215	3528		3594
4117	4133		4252
4552	4654		8592
8594			8593
SUGIYAMA			
11566			
SUGIYAMA H			
5704	5776		
SUIT HD			
7000	8970		12447
SUKACHEV VN			
3605			
SULGER E			
505	513		
SULKIN NM			
4453			
SULKOWITZ HW			
577			
SULLIVAN MF			
7280	8261		9305
11374	11390		11055
SULLIVAN RL			
1153	5725		6906
9328			7466
SULLIVAN WA			
4127			
SULLIVAN WH			
11500			
SULLIVAN WJ			
11494			
SULMAN F			
12616			
SULTZER M			
11568	11769		
SULZBERGER MB			
1246	2234		6948
SUMI E			
138			
SUMI M			
12576			
SUMMERS MM			
6813	6877		
SUNDELL B			
11687			
SUNDER JH			
7042	10746		

276

975	1410	1727	1942
1996	2427	2811	2947
2954	2956	2986	3019
5141	5143	5217	5473
5609	6261	6272	6361
6768	7135	7437	8952
10333	10661		
SWIFT NM			
5185			
SWINDELL GE			
5499			
SWINEHART LA			
10990			
SWINGLEY N			
2124			
SWISHER S			
1033			
SWISHER SN			
1076	1379	1763	
SYDOW G			
6661			
SYKOWSKI P			
1078			
SYLVEN B			
4257			
SYLVESTER G			
9768	10177		
SYLVESTER GE			
1334	10158	10175	10176
10189	10969		
SYMANN T			
3914			
SYNDER R			
10884			
SYROMYATNIKOVA NV			
8267			
SYVERTON JT			
1303	4170	4258	7425
9686	11597		
SZEGO E			
8596			
SZENDRO P			
7342			
SZENES A			
8597			
SZILARD P			
145			
SZCLENOKI I			
6276			
SZONYI S			
8268			
T ANG YH			
6357			
TABACHNIK J			
9186			
TABER KW			
650	7172		
TABERN DL			
10707	11270	11327	11501
TABERSHAW I			
5116			
TABERSHAW IR			
4749	11771		
TABOADA O			
9790			
TAFT RB			
4764	12074		
TAGUNOVA G			
11315			
TAHMISIAN T			
6087			
TAHMISIAN TN			
1569	1591	1605	1732
2025	2960	5508	6360
7194	9362	10345	11133
11212	11232	12286	
TAIT CD JR			
1090			
TAIT JH			
1084	2341	9697	10610
TAKAHARA T			
6359			
TAKAHASHI T			
12075			
TAKAHASHI WN			
4442	4663		
TAKAIZUMI M			
3235			
TAKAKU T			
4180	4524		
TAKASAKI T			
1051	4141		

TAKASE A			
12579	12580		
TAKAYAMA H			
4024			
TAKED S			
9899			
TAKESHIMA K			
5848			
TAKESHIMA M			
3120	7159		
TAKETA ST			
975	1410	5141	5609
6768	7437	8952	10661
TAKETA T			
5185			
TAKEWAKI K			
6001			
TAKITA S			
3736	3737	3738	
TALBOT JM			
1254	2247	6358	
TALBOT TR			
2473			
TALIA F			
3310			
TALIAFERRO LG			
687	1595	1700	2799
4757	5600	5601	8269
TALIAFERRO WH			
687	1595	1700	2799
4757	5600	5601	7899
8269	8471	11255	
TALLEY LH			
7145			
TALMADGE DN			
11886			
TALMADGE P			
10062			
TALMADGE RV			
11317			
TALMAGE DW			
735	1188	1213	2023
6663			
TALMAGE RV			
11193			
TALSO PJ			
11378			
TANADA T			
8779			
TANAKA S			
12580			
TANIS HE JR			
4092			
TANNENBAUM A			
10161	11318	11320	11325
TANNENBAUM AE			
9993			
TANNER WA			
2755			
TANSLEY K			
1868	2975	3879	5038
6376	6587		
TAPLEY DF			
2837			
TAPLIN GV			
750	793	1091	1268
1731	2092	8867	10842
10843			
TAPPEL AL			
8270			
TARASOV BN			
10187			
TARLETON GJ			
4985			
TARLETON GJ JR			
1306	2262		
TARLOV IM			
4091	6356		
TARPLEY W			
972	1100		
TARUSOV BN			
6868			
TARVER H			
10445			
TASCHER WR			
3256	4904		
TASHIRO K			
6956			
TATUM EL			
2564	2636	4447	4709
4759	4905	5164	6489
TAUBE JI			

8266			
TAUROG A			
2305	7450		
TAUSCHE FG			
1560	10485		
TAVARES A			
1833			
TAYLOR AGC			
3461			
TAYLOR B			
6355	12557	12559	
TAYLOR CV			
3390	3494	4379	
TAYLOR DM			
7810	11491		
TAYLOR FHL			
3574	10205		
TAYLOR H			
9932			
TAYLOR HD			
8377	9207	12076	
TAYLOR JD			
11327	11501		
TAYLOR JF			
5489	10565		
TAYLOR KJ			
11743			
TAYLOR L			
11395			
TAYLOR LS			
1498	3611	3853	5655
6582	10814	12696	
TAYLOR RF			
6690	6691		
TAYLOR RM			
11346			
TAYLOR S			
11329			
TAYLOR SA			
10501			
TAYLOR WF			
5706	5781	7326	
TAYSUM DH			
17893			
TAZELLAR M			
8403			
TAZIMA Y			
7389	9050		
TCHAPEROFF ICC			
4791	12697		
TEAS HJ			
2780			
TELEKY L			
4385			
TELFER JD			
7562			
TELLEKSON BJ			
10883			
TELLEZ-PLASENCIA H			
10025			
TELDM HA			
2666			
TEMPLE DM			
9018			
TEMPLE LA			
9111	9222	11604	
TEN THIE PA			
4224			
TENEFF S			
598			
TENNANT R			
3986	4136	4300	4676
TENNANT R JR			
3186			
TENNENHOUSE G			
5569			
TEPLIAKOVA EG			
9137			
TEPLY LJ			
8271			
TER-POGOSSIAN MM			
6836			
TERAO A			
124			
TERASAKI T			
10630			
TERATA B			
9517	12561		
TERESI JD			
2577	6382	6409	
TERNOVSKY MF			
3744			

TERPOGOSSIAN MM
10682
TERRILL HM
108 3163
TERRILL JG JR
1161
TERRY JL
9111
TESCHENDORF W
9583
TESLUK H
10558 11334
TESSMER C
1938 2911
TESSMER CF
2763 7695 9840
TESTULIN M
3735 3794
TEUBNER FG
5334
TEW JT
1109 1125 1764
THACHER C
12095
THAI-TUONG
11156
THEIS RC
8598
THEISMANN H
6817
THEODORSSON P
11753
THERESE R
8374
THERKELSEN AJ
12302
THIBAudeau AA
7363
THIEL R
3195
THIER PF
3570
THIERSCH JB
1462 4469
THIMANN KV
5755
THIRRING H
2798
THODAY JM
634 1775 4710 5004
6077 6673 6674 7362
THOM M
6019
THCMAS CC
1614 1744 1788 3369
6623
THOMAS CI
8938 10204 10923
THCMAS ED
8993 10170
THOMAS HE
3565
THOMAS I
10855
THOMAS JO
3390
THCMAS LJ
2516 6033
THOMAS M
12076
THOMAS RG
1226 1786 3401 7058
7271 8272 8273 10196
11336
THCMAS RO
16627
THOMAS SF
722 2689
THCMAS V
10242 10684 10693
THCMAS WDE
2057
THCMASEN L
673
THCMASSEN L
5821
THOMLINSON RH
10174
THOMPSON DM
6696
THCMPSUN EC
2885 5422 6039

THOMPSON HE
1844 2067
THOMPSON JF
1193 5672
THOMPSON JW
5095
THOMPSON KF
2512
THOMPSON MV
2728 2886
THOMPSON P
7813
THOMPSON PE
10188
THOMPSON R
3935 4544
THOMPSON RC
2121 5337 5388 7607
9305 9562 9771 9772
9773 10193 10194 10223
10320 10607 10608 10609
10946 11174 11337 11611
11722 12529
THOMPSON RM
726
THOMPSON RS
12094
THOMPSON TL
2211
THOMPSON WR
408
THOMSON DM
8136 10413 10612 10629
THOMSON JF
1171 1453 5496 5571
7025 8274 9843 10867
11136 11137 11213 11278
11502
THOMSON MS
34
THONNARD A
10181
THORNDIKE AM
1587
THORNLEY MJ
9288
THORNTON DM
6705 11366
THORPE R
9647
THORSSNESS ET
3271
THORSON TA
7650
THOUVENIN
2352
THRANE M
3283
THREEFOOT S
9647
THREEFOOT SA
10403 11083 11360 11375
11380
THRELFALL CJ
10925
THURNHER B
2218
THYGESEN JE
1760 2091 11689
TIER H
9788
TILDEN-BROWN F
10835
TILIS AI
9137
TILL JE
8276
TILL M
12300
TILLISCH JH
2934
TILLOTSON F
11363
TILLOTSON FW
1135
TIMBRELL G
325
TIMM C
8599
TIMMES JJ
4767
TIMOFEEF-RESSOVSKY NW

204 360
TIMOFEEFF-RESSOISKY NW
11746
TIMOFEEFF-RESSOVSKY NW
303 2158 3384 3478
3945 3992 4069 4105
4243 4263 4348 4489
5152 6035 7139 8858
TIMOFEEFFRESSOVSKY NW
3938
TIMOFEEV-RESOVSKII NV
3074 3075 3076 3096
TIMOFEEV-RESSOVSKII HA
603
TIMOFEEV-RESSOVSKII NW
6343 6353
TIMOFEEVA TA
8900
TIMOFEEVA-RESOVSKAIA EA
3073
TIMOFEEVA-RESOVSKAYA EA
9218
TIMONEN S
7582
TING TP
1098 1151 4189 4190
4414 4415
TINSLEY M
6225
TIPTON SR
5387
TISCHER H
1474
TITSLER RP
3240 7996 12032
TIVEY H
1582 1583 1584 1584
1585 7040
TIZZONI G
311 393 8600
TJIO JH
1692
TOBIAS C
9620
TOBIAS CA
746 975 992 1471
1830 2287 5034 5404
5539 5762 5812 5864
5887 6352 6869 7249
7255 8947 9487 11417
11789
TOBIN LH
4667
TOBIN MJ
1077
TOCH P
8277 9430
TOCHILIN E
5466 10634
TOLBERT BM
10137
TOLBERT EN
1030
TOLBERT NE
5913
TOLLMAN JP
4106
TOLOMEI G
10016
TOMIOKA T
3222 3223
TOMITA S
3659
TOMITA T
3700
TOMONAGA M
942
TOMPKINA P
10884
TOMPKINS M
672 1058 1087 1088
2649 2650 3354 5724
6061 8042
TOMPKINS PC
10274 10886
TONGES E
3933
TONHAZY NE
2520
TONKINSON SM
8078
TOOLAN HW

2215	2278	6351	64				4149	4319
TOOLE EH			TRIPPOD C				TUPPER RLF	
2555			2442				10323	
TOGLE VK			TRKULA D				TUR J	
2555			7660	7980			10166	
TOOSY MH			TROITSKII VL				TURANO L	
2246	10624		9099	12201			572	1538
TOPPNER R			TROWBRIDGE WV				TURCHIN FV	
6005			6107				12698	
TORDA C			TROWELL OA				TUREKIAN KK	
1512			1116	9088			11371	
TORGENSEN O			TRUDOVA RG				TURKOWITZ H	
6736			638	1442	5961	6348	4128	4450
TORI G			9372				TURNER CD	
2969 *			TRUHAUT R				3476	3662
TORIKATA R			8917				TURNER CW	
531			TRUJILLO T				3886	
TORNOVA-SVEHLIK MM			7433				TURNER D	
7719			TRUJILLO TT				8603	
TOROPTSEV IV			2800	8283	11748		TURNER DFD	
8278			TRUM BF				6349	
TORPOVA GP			1074	1271	1272	1359	TURNER EL	
9042			1391	4930	5497	5551	4690	
TORREY JD			5646	5717	5760	5820	TURNER FM	
11772			6791	6908	6939	695C	814	2223 11825
TORRIOLI M			8034	9019	9187	92v8	TURNER MD	
3612	3885		TRUMP JG				3106	
TOSTESON DC			3046	5263	7829	9827	TURNEY DF	
11841			11416				5664	
TOTHER J			TRUNNELL JB				TURPAEV TM	
8596			2452	10195			12624	
TOTTER JR			TRUSOVA NE				TURTON T	
7395			9533				8889	
TOUMANOFF C			TSAL-SIAN-MIN				TUSQUES J	
3196			11367				1435	
TCURTELLOTTE WW			TSANG JC				TUTT M	
1193	1453	5672	535				2128	5795 9725 10614
10867	11136	11137	11278				10615	10986 11162 11667
TOWBIN A			TSCHACHOTIN S				TUTT ML	
8279			8602				11158	11160
TOWNDROW R			TSCHAIKOWSKY WK				TUTTLE LW	
10122			3949				4265	7285 7446 7786
TOWNE J			TSCHASSOWNIKOW N				7845	8288 9277 9646
5096			3450				9665	9668 9681 11816
TOWNER JE			TSCHERNITZ H				TUVE MA	
5993			4572				4025	
TOWNSEND GF			TSEBRIKOW				TUZHILKOVA TN	
1396	8741		418				8289	
TOWNSEND WA			TSEBRIKOW L				TWEEDY WR	
2319			3485				6422	10618 11372
TOXAWA H			TSIVOGLUO EC				TYAN E	
12579			1407	12473			3253	
TOYCMA T			TSUKAMOTO R				TYLER AF	
1831	5389		84	9977			12077	
TOYOSHIMA J			TSUKIFUJI N				TYLER JR	
3698			1447				471	
TRAMONTANO-GUERRITORE G			TSUZUKI M				TYLER SA	
3539			15	2868	8284	12327	672	1665 6244 8955
TRAMPUSCH HAL			12337	12338	12339		9703	10611 10620 10985
4949			TSYPIN AB				11187	11250 11503
TRANNOY R			8285				TYOR MP	
9628	10060		TUANUTQVA GV				10375	10390
TRAUB FB			11698				TYREE EB	
1247	5979	11802	TUBIANA M				1631	1672 2024 2647
TRAUB HP			1199	2227	7439	10839	2700	2701 2947 2954
3529			11368				2956	2957 2971 3019
TRAUFFAUT G			TUCHMANN-DUPLESSIS H				5143	5720 6272 6361
8826			1207				7303	7813 8212 10333
TRAUTMANN J			TUCKER KL				10752	11096 11197
5617	5618	7636	358	366	12571	12575	TYTELL AA	
9008		8280	TUCKWILLER PA				4771	6036 12699
TREADWELL AD			4168				TYTELL AG	
4711			TUFFIER				6036	
TREADWELL ADG			10515				UBER FM	
10798			TUGENBURG A				3500	3768 9485
TREBER H			7335				UCHIMURA Y	
9492			TUGGLE A				6345	6346 6347
TRENTIN JJ			3962	4520			UEBERSCHAR KH	
2200	8281	9154	TUKEY HB				7628	
TRIBONDEAU			5334				UEHLINGER E	
12141			TULLIS JL				3660	
TRIBONDEAU L			716	738	740	1539	UGGERI B	
9384	11534	11535	1544	1871	1938	2763	5953	
11635	11775	11776	2778	2911	2920	2927	UHLMAN G	
11778	11779	11874	2937	5125	5139	5538	8180	
TRILLAT A			6020	7775	9357		UHLMANN E	
8601			TUMANJAN MA				542	
TRILLAT J			12201				UHLMANN EM	
146			TUMANYAN MA				5158	
TRILLAT JJ			8286	8287			UHLMANN G	
66	8282		TUMIDAJSKI J				8179	
TRILLAT SS			8476				ULLMANN HJ	
			TUNG T					

4816
 ULLRICH FW 2911
 2748
 ULLRICH TW
 1938
 ULREY CT
 3163
 ULRICH
 11445
 ULRICH A
 5268
 ULRICH H
 4723
 UMANSKII EE
 2831
 UMBACH K
 2190
 UMBREIT WW
 2520
 UMECA T
 12085
 UMEZAWA H
 1654
 UNANDER-SCHARIN L
 6082
 UNCAPHER RP
 1861 2745
 UNDERWOOD E
 10635 10679
 UNDERWOOD EE
 6750 10465
 UNDERWOOD GB
 1888
 UNGAR F
 5419 5420
 UNGAR G
 5399 7406
 UNGAR J JR
 3990
 UNO SH
 531
 UPHAM HC
 5561 5733 6933
 UPHOFF D
 649 759 1208 1461
 1626 1630 1669 2276
 6434 7863 11577
 UPHOFF DE
 1924 6342 6778
 UPSON WO
 11613
 UPTON AC
 685 1155 5345 5346
 5385 5498 5576 5811
 5842 6780 7054 7220
 7423 7618 7700 8032
 8303 8304 8305 8956
 9183 9321 10675 11227
 URBACH E
 3422 6323
 URBANI E
 5275
 URBANI-MISTRUZZI L
 5275 5959
 URETZ RB
 8783 9484 9486 9865
 URI N
 9704
 URRY HC
 1341 5703 7179
 URSO IS
 8134 9004 9159
 URSO P JR
 7697
 USPENSKAYA MS
 9270
 USPENSKII YN
 8307 8900 9271
 UYEKI E
 7440
 UYEKI EM
 1836 1907 8309
 UZEL AR
 7312
 VADOVA AV
 11245
 VAHARU T
 8256
 VAIREL E
 6216
 VALAER PJ
 10114

VALEEFF I
 272
 VALENCIA JI
 5981 6477
 VALENCIA RM
 5981
 VALENTINE RF
 1116 10235
 VALENTINE W
 194 2428
 VALENTINE WN
 1829 1947 2045 2046
 2047 2762 2861 4948
 VALENTOVA O
 397
 VALETTE G
 10655
 VALKEN KCA
 9973
 VALLEBONA A
 218 419 442 529
 3136
 VALLEE BL
 2314 10652 10653
 VALLERY-RADOT P
 1916
 VALSYUK PA
 8316 8317
 VAN ALLEN WW
 11804 11805 11806
 VAN ATTA EA
 3291
 VAN ATTA EW
 3125
 VAN BAAREN HJ
 1305
 VAN BEKKUM DW
 5328 5503 8541 8670
 9248 9731 10156 12226
 12271 12305 12377 12409
 VAN BOGAERT L
 6183 10975
 VAN CANEGHEM P
 8310
 VAN CAUWENBERGE H
 837
 VAN CLEAVE CD
 3697 10201 10650 10976
 11151
 VAN DE GRAAFF RJ
 3046
 VAN DEN BRENK HAS
 9238 12436
 VAN DEN ECKHOUDT JP
 5793
 VAN DER HORST L
 6616
 VAN DER WERFF JT
 2760 2779 5107 5140
 VAN DILLA MA
 2314 7272 10202 10893
 11947 11948
 VAN DYKE DC
 2080 2661 5762
 VAN DYKE JG
 6915 7086 7623
 VAN ECK-VERMANDE GJ
 1925 197C 5207
 VAN FAROWE D
 7850
 VAN HALTERN HI
 4934
 VAN HERWERDEN MA
 8604
 VAN HEYNINGEN R
 5670 7279
 VAN HOVE
 4043
 VAN LANCKER J
 8311
 VAN MALE DE GHORAIN R
 5615
 VAN MERVENEE CJ
 4224
 VAN MIDDLESWORTH L
 10203 10645 10984 12701
 VAN NIEKERK J
 4529
 VAN SLYKE F
 2099 5517 5518 6949
 VAN SOMEREN VD
 4042

VAN VAERENBERGH PM
 9172 9263 9265
 VAN VALKENBURG PA
 742 2704
 VAN WYLEN GJ
 5821
 VAN WYLEN GT
 5683
 VAN ZANDT HAWN C
 2604
 VANCE J
 12692
 VANDERHAEGHE F
 12380
 VANDERSCHUEREN
 9506
 VANDOR F
 6006
 VANLANCKER J
 12502
 VANNIKOV LL
 9816
 VANNOTTI A
 10207 10208
 VANROOJEN J
 6340
 VANVOORHIS S
 10956
 VANYSEK F
 135
 VARETON E
 3078
 VARSCHAWSKATA BB
 9522
 VARSHAVSKII BM
 2831
 VARTERESZ V
 2663
 VARTERESZ W
 8268
 VASILEV BI
 9416
 VASILEV IM
 9351 9353
 VASTERLING HW
 6816
 VAUGHAN BD
 10210
 VAUGHAN J
 2128 5795 9757 10613
 10614 10615 10792 10986
 11162 11230 11660 12202
 12439
 VAUGHAN JM
 6287 10988 11160
 VAUGHN J
 11608
 VAVASSEUR J
 6216
 VAZQUEZ JJ
 12049
 VECCHI G
 596 598
 VEDESHKINA VM
 7482
 VEKERDI L
 10989
 VELDHIJS AH
 10990
 VELLE G
 2444 2477 2547 2579
 VENTERS KD
 5876 5945
 VENTERS L
 9270
 VEOMETT R
 2168 9027 11354
 VEOMETT RC
 7167
 VEPKHOVADZE R
 11612
 VERDUCCI P
 9431
 VERETENNIKOFF S
 3196
 VERGA V
 5356
 VERHAGEN A
 8312
 VERKHOVSKAYA IN
 10190
 VERMUND H

7065 7470 8313	9921 12099 12100 12101	11043
VERNADSKII V	12102	VON HAMPERL H
7635 8834	VINZENT R	3511
VERNADSKII VI	554	VON HEINRICH H
495	VIOL CH	8609
VERNADSKII VL	9755	VON HEVESY G
3530	VIRGIN HI	6549 6550
VERZAR F	7684	VON KISS P
10916	VISCHIA Q	7111
VESELAIA IV	12397	VON MASSENBAACH W
10124	VISCONTI DI MODRONE N	12355
VESELOU IY	4545 5288 6676	VON PALUGYAY J
12702	WISEK WJ	4438
VESIN MS	9157 9257 10992	VON ROSEN G
2674	VIVIEN J	5160
VETTER H	941 1190 1353	VON RUTKOWSKI W
1995 10991	VIVIEN JH	9376
VEVASSEUR J	1746	VON SALLMAN L
1348	VLASOVA ZA	6339 11322
VIALE G	10464	VON SALLMANN L
8605	VLASYUK PA	892 2282 2892 6869
VIALE L	6864	VON SANDEN K
2918 2924 2925 2939	VODICKA Z	2346
2940	10865	VON WETTSTEIN U
VIANELLO C	VOEGTLIN C	2331
7523	3021 4712 11782	VONDERLAGE FC
VICKERY AL	VOELCKER JA	12354
9742 10381 11100	8607	VONKRIES J
VICKLUND RE	VOGEL B	8009
2303	9133	VOORHIS SV
VICTORR J	VOGEL FS	11606
3634	3229 6613 7785	VORDER MC
VIDAL C	VOGEL HH	2334
3340	8318 10649 11297 11516	VORESS HE
VIDAL D	VOGEL HH JR	5912 10206 12704 12705
197 8606	718 1060 1169 1594	VORLANDER
VIDEBAEK A	1638 1736 2159 5598	11905
2091	5599 5817 6087 6832	VORDBEV EI
VIDOVIC V	7296 7681 8319 9496	6856
5579	10248 10791	VOS D
VIEHWEGER G	VOGEL M	8541 12226 12377
11690	1175	VOSKRESENSKII NM
VIER M	VOGT A	473
7433	2621	VOSKRESENSKY SP
VIERHELLER F	VOGTLIN J	9804
3417	832	VOUTILAINEN A
VIETEN H	VOIGT AF	8322
2376 2407	9064	WACASEY JW
VIETHEN A	VOINO-YASENETSKII AV	8031
3596	6799	WACHOWSKI TJ
VIGNESS I	VOKE EL	4748
4283	3583	WACHSMANN F
VILLANI G	VOLCHOK HL	686 1960 2725 8323
8105	12703	8875 9247
VILLANUEVA-MEYER H	VOLF V	WACHTER A
10726	10996	11623
VILLARS R	VOLKER JF	WACHTER JP
4183 4569 5459	10999	7168
VILLAUME I	VOLKIN E	WADDELL KC
2091	2557 5524 10199	91 317
VILLEE C	VOLKOVA MS	WADDINGTON CH
4561	7266	4713
VILLEE CA	VOLLMER EP	WADE EG
4777 4983	1718	11216
VILLEE CA JR	VOLOKHOVA NA	WADLEIGH W
4594 6173	8320	1776
VILLEE CE	VOLTA A	WAFFLER H
4738 4739	11001	7158
VILLELLA JB	VOLTZ F	WAGENAAR RO
7415 7623 8126	3462	5369 5704 5776 8324
VILLEMIN F	VOLUTER G	WAGER R
11780 11781	2394	12523
VILTER CF	VON BERDE K	WAGGENER RE
6635	3191 5168	5611
VILTER RW	VON BULTON W	WAGGONER PE
4203 6486 12574	8608	1082 10037
VINAZZER H	VON BORSTEL RC	WAGNER A
1995 10991	5410 7012 7593 8792	3164 9587
VINCENT ET	9132 12309	WAGNER CE
673 5683 5821	VON ESSEN CF	2006
VINCENT J	1446	WAGNER H
2168 9027 11354	VON EULER H	785 831
VINCENT JG	1803 4835 4836 8321	WAGNER M
7167	VON GILLERN C	6707
VINING D	6145	WAHL I
6684 10386	VON GUDZENT F	1878
VINOGRADOV AP	11208	WAHLBERG T
8314 8315 9352	VON HALLE E	5564 5845
VINTEMBERGER P	5676	WAHL SS
196 447 3364	VON HALLE ES	12086
8378 8379 8380 8381	1273	WAINWRIGHT SD
8391 9505 9568 9847	VON HALLES E	7692

WAINWRIGHT WW
 2632 10928 10935
 WAKABAYASHI M
 12706
 WAKAMATU C
 12711
 WAKAMORI N
 124
 WAKELEY CPG
 18 107 11997
 WAKISAKA G
 2932 9021 11163 11165
 11616 12621
 WAKISAKS G
 11615
 WAKUNIG T
 8813
 WALC B
 2663
 WALC N
 8325 9002
 WALKER ER
 8736
 WALKER JK
 7402
 WALKER L
 11865
 WALKER LA
 10545
 WALL PD
 1090
 WALL PE
 7766
 WALLACE B
 1481 2007 2458 2462
 6046 7486 12264
 WALLACE EJ
 10486 11388
 WALLACE H JR
 9747 11433
 WALLACE HD
 10937
 WALLACE J
 6225
 WALLACE P
 10638
 WALLACE PC
 9770 10162
 WALLACE WS
 6336
 WALLBACH G
 4209
 WALLMAN E
 4714 4714
 WALSH D
 10863
 WALSH RJ
 10170
 WALTER C
 3035
 WALTER J
 1977 2662
 WALTERS JW
 3401
 WALTERS NH
 10364
 WALTERS OM
 589 12078
 WALTHER E
 6841
 WALTON GN
 6007
 WALTON H JR
 7798 11954
 WALY A
 10067
 WAMMOCK H
 6628
 WANG LK
 11317
 WANG SC
 1393 1749 2465 5341
 8914
 WANG T
 1627 10754
 WANNER H
 4797
 WANNER RL
 10940 10941
 WANTOCH H
 3486
 WARD AH

7166 8959 10241 11015
 11808 12605
 WARD CL
 8326
 WARD FD
 3751
 WARD G
 11419
 WARD WR
 3418
 WARDELL HG
 7573
 WARNER
 10868
 WARNER DE
 7658 9707 10771 11868
 WARNER L
 6294
 WARNER SG
 4139 4197 4680
 WARNER WL
 8862
 WARREN J
 9696
 WARREN JM
 5332 7444
 WARREN R
 1617
 WARREN S
 111 736 792 817
 996 1135 1293 1513
 1821 1901 2130 2205
 2272 2329 2507 2617
 2623 2675 2761 2815
 2900 2908 2942 2989
 3956 3990 4269 4467
 4481 4579 4715 4906
 4969 4970 5125 5208
 5219 5653 5896 6054
 6333 6334 6335 6423
 6634 6941 7341 8327
 8328 9354 9638 9639
 9640 9641 9642 9643
 10259 10264 10737 10780
 10861 10926 11363 11505
 WARREN SL
 310 2641 3285 3419
 4126 4170 4258 4264
 4485 6331 6332 6620
 9526 9975 10365 10508
 10813 10956 11606 11875
 11876 11897 12079 12080
 12707
 WARREN SR JR
 1458
 WARSHAW SD
 8329 12547
 WARSHAW SM
 5585
 WARTERS M
 6602
 WARTHIN AS
 166 7364 10866 11994
 WARTHININ AS
 1285
 WASE AW
 10213 10425 10498
 WASSERMAN A
 8612
 WASSERMAN LR
 1719 5034 10666 10944
 10958
 WASSERMAN M
 12519
 WASSERMAN RH
 6908 7689 8330 9245
 9765 10324 10376 10506
 10943
 WASSERMANN F
 11326
 WATERFIELD RL
 8882
 WATERMAN N
 340 3252 3341 3448
 WATERS CA
 4578 9309
 WATERS LL
 4553
 WATERS T
 2090
 WATJEN J
 214

WATKINS CH
 216 9690
 WATKINS FB
 755
 WATKINS WW
 2677
 WATRIN J
 119
 WATSON JA
 6769 7310 7672 7673
 10295
 WATSON JC
 5489 10565 11088
 WATSON JD
 1491 6336 12384
 WATSON JHL
 1659
 WATSON MS
 6085
 WATSON TA
 5528
 WATT WL
 409
 WATTENBERG L
 6328 6329
 WATTENWYL HV
 8649 11578 11618 11620
 11621 11898
 WATTS E
 9106
 WATTS NP
 2524 10945
 WATTS RWE
 6920 8331
 WATTS WE
 1971
 WAUGH RL
 9078
 WAWRO WW
 2732
 WAXLER SH
 4532
 WAY JL
 5430
 WEATHERWAX JL
 1927 6582
 WEAVER EA
 5161
 WEBB JLA
 10524
 WEBER D
 7465
 WEBER F
 8613 8835 9510 11625
 WEBER R
 1678
 WEBER RP
 1488 5482 6326 6327
 7273 9801
 WEBSTER C
 9644
 WEBSTER DR
 894
 WEBSTER EW
 7829 9827
 WEBSTER J
 8416
 WEBSTER SH
 9189
 WEDD BH
 8614 12020
 WEDEN EA JR
 7637
 WEDER B
 5550
 WEEKS MH
 5388
 9776 9771 9772 9773
 10193 10223 10623
 10946
 WEGELIN
 6257
 WEGELIN C
 4716 8332
 WEIB L
 7499
 WEICHERT U
 4907
 WEICKER B
 6325
 WEIGLE JJ
 10564
 WEIHE M

8851
 WEIKEL J
 9767 11302
 WEIL SS
 11764 11773
 WEILL J
 11497
 WEINBERGER D
 11703
 WEINER N
 7422 8333
 WEINMAN EO
 5428 5590
 WEINRAUCH H
 8279
 WEINREB M
 6015
 WEINSTEIN
 9785
 WEINTRAUB RL
 4908
 WEINTKAUB S
 5408 6511
 WEIR JA
 7374
 WEIR WC
 10467
 WEIS HA
 7537
 WEISBECKER L
 8929
 WEISBERGER A
 5553
 WEISMAN TH
 5671
 WEISS C
 6567 9186
 WEISS HV
 12708
 WEISS J
 972 6324 8769 9819
 10117 11818 12396
 WEISS RJ
 5914
 WEISS S
 339
 WELANDER AD
 1862 1946 2848 5112
 6566 6936 9225
 WELCH C
 6869
 WELCH GP
 975
 WELLNITZ J
 7433 8255
 WELLNITZ JM
 8222
 WELLS JC
 5109
 WELLS W
 1447
 WELS P
 233 3162 6169 8615
 8616 9910
 WELT P
 6123 6124
 WENDER I
 10873 11033
 WENDROWSKY V
 3761 5766
 WENDT GV
 213
 WENGER P
 1698 9719
 WENSINCK F
 9248
 WENTWORTH JH
 976
 WERDEN AA
 8784
 WERDER AA
 1303 9242
 WERER AA
 11597
 WERKGARTNER H
 5536
 WERLE E
 2380
 WERPEL S
 9601
 WERNER
 11966

WERNER R
 8617
 WERNER SC
 985 2419 10373
 WERNER W
 2381
 WERNHART K
 174
 WERTHEIMER J
 12062
 WERTHEMANN A
 8334
 WERTHMANN A
 570
 WESLEY R
 1297
 WEST E
 6823 10600
 WEST ES
 2258
 WEST HD
 7788 10502 10953
 WESTENBRINK HGK
 592
 WESTERN F
 5277 10256
 WESTFALL BB
 4382 10924 11462
 WESTIN B
 10487
 WESTMAN A
 2660 5046 7513 9588
 9589 9979
 WESTPHAL U
 5861
 WETHERBY WD
 12076
 WEXLER BC
 722 2689
 WEXLER D
 3302 3406
 WEXLER S
 10955
 WEYANT DE
 983
 WEYMOUTH PP
 1048 1830 5034 6779
 10958 11789
 WEYZEN WM
 8541 12377
 WHEATCROFT MG
 1002 1064 7505
 WHEELER AC
 6285
 WHEELER B
 2241 10554
 WHEELER HB
 86
 WHEELER HE
 9909
 WHEELOCK MC
 2666
 WHELDEN RM
 4059 4259 9895 9898
 10044
 WHIPPLE GH
 821 3285 3490 3985
 5789 6331 7056 9526
 9687 9975 10493 10499
 11817 11875 11876 12071
 12079 12080
 WHITAKER WM
 926 1005
 WHITBY L
 6322
 WHITBY LEH
 342
 WHITE A
 2311 2903 4943
 WHITE AA
 1554
 WHITE CJ
 9344
 WHITE DF
 10317
 WHITE J
 6786 6787 7214 11934
 WHITE L JR
 6388 6389
 WHITE MJD
 3819
 WHITE MR

1622 2766 8335 10127
 10521 10523 10566 10604
 10960 11664
 WHITE NG
 2520
 WHITE PL
 11557
 WHITE RK
 9300
 WHITE SG
 980 1439
 WHITE VB
 562
 WHITE WF
 12268
 WHITEHOUSE RNH
 12308
 WHITEHOUSE WM
 5808
 WHITELY HJ
 10925
 WHITFIELD R
 10536
 WHITING AR
 1649 1904 2823 3279
 4122 4509 4717 4722
 4754 4768 4909 4919
 4927 4940 5091 6321
 6792 6808 7593 8336
 WHITING PW
 3077 3317 4008 4014
 4051 4103 4928 5252
 WHITMAN WG
 3538 3566
 WHITMORE WF
 11036
 WHITMORE WH
 4718
 WHITNEY C
 344
 WHITNEY IB
 10215 10992
 WHITNEY LB
 11316
 WHITNEY R
 5347
 WHITTINGHILL M
 1511 2469 3971 5007
 5937 11461
 WHITTLESEY E
 1658
 WIAIT DE
 9790
 WICHELS P
 212
 WICHTERMAN R
 1790 6131 6838
 WICK AN
 1149
 WIDDOWSON EM
 10962 10963 10964 11118
 WIDMANN BP
 3564
 WIDNER WR
 2161 2767
 WIED GL
 646
 WIEDERHOLD O
 12105
 WIELAND H
 3130
 WIESENACK G
 10236
 WIGAND R
 152
 WIGODER S
 292
 WIGODER SB
 357 606 847 3079
 3382
 WIJSMAN RA
 668 8337 8339
 WILBERG C
 10519
 WILBOUCHEVITCH A
 8618
 WILBRANDT R
 4910
 WILBRANDT W
 4719
 WILBUR KM
 4911 5818 7306

11809			
WILSON D			
7177	9812		
WILSON DE			
7786			
WILSON GB			
4504	6320		
WILSON GC			
10954			
WILSON H			
6418			
WILSON HB			
1334	9768	10158	10175
10176	10177	10189	10967
10969			
WILSON HJ			
10956	11606		
WILSON JDO			
3401			
WILSON JE			
6822	7347	7740	10648
WILSON JG			
1150	1250	2112	2171
2266	2437	5753	6318
6319			
WILSON JW			
981	1086	9477	
WILSON K			
2976			
WILSON LP			
5603	5642		
WILSON M			
10443			
WILSON ME			
1124			
WILSON ML			
10188			
WILSON RH			
11509			
WILSON RR			
8338			
WILSON S			
10185			
WILSON SM			
9253	11939		
WILSON WL			
4916			
WILTSHIRE LL			
7712			
WINCHESTER AM			
3316			
WINDEYER BW			
11626			
WINDHOLZ F			
5225	5226	6658	
WINFIELD A			
8620			
WINKLER AW			
11463			
WINKLER C			
8343	11665		
WINKLER H			
3918			
WINTER H			
8776			
WINTER KA			
3899			
WINTHROW RB			
1059			
WINTREBERT P			
8621			
WINTROBE MM			
9718	10421	10593	11786
WINTZ H			
123	591	3234	9553
9591	9782	11629	
WINTZ HL			
270			
WINZER HT			
469			
WIRTH JE			
382	2083	4847	5010
WIRZ P			
3373	7334		
WISEMAN BK			
1838			
WISH L			
816	2105	2893	9760
WISSLER RW			
1248	9023	12493	12500
WITHERBEE W			
9932			

284

WOLFF S
 5410 5735 6966 7451
 8346 8347 8792 9488
 9489 9490 9905 12246
 WOLFSBERG O
 12176 12177
 WOLKEN JJ
 2790
 WOLKOWITZ W
 6490
 WOLLMAN E
 4175 4434 4639 4720
 WOLLMAN SH
 2642
 WOLMAN A
 1547 1711 11792 11811
 WOLSTENHOLME GEW
 10510 12207 12213 12370
 WOLTERINK LF
 10552 10555 10672 10673
 10674
 WOOD B
 684
 WOOD CAP
 2819
 WOOD OS
 7201
 WOOD EM
 5514 7079
 WOOD F
 9972
 WOOD FC
 4143 8623 8624 12083
 12084
 WOOD J
 5848
 WOOD L
 9078
 WOOD MC
 1375
 WOOD RG
 10526
 WOOD TH
 5610 5858 9602 10781
 WOODARD HO
 8962
 WOODARD HQ
 4397 4484 5317 6315
 7365 7722 8935 9678
 WOODBURG DH
 10543
 WOODCBURNE AR
 2809
 WOODBURY DT
 11627
 WOODBURY RA
 11670
 WOODCOCK CC
 1178 11129
 WOODRUFF LA
 10178
 WOODRUFF NH
 2179
 WOODS AC
 4158
 WOODS MC
 620 2076
 WOODSIDE EE
 1401
 WOODWARD AE
 7528
 WOODWARD CR
 9389
 WOODWARD G
 3838
 WOODWARD GE
 6316
 WOODWARD KT
 5665 6932 7707 7978
 8153 8348 8910
 WOODWARD VM
 5370 8844 9603
 WOODWORTH P
 10513
 WOOLRICH PF
 11397
 WORD EL
 6926
 WORKS L
 1563
 WORMALL A
 10323 10973

WORMAN FCV
 1126 5664 7665
 WORSCHITZ F
 4525
 WORT DJ
 4318
 WORTELY G
 12683
 WOSKRESSSENSKY NM
 855
 WOSTMANN BS
 11251
 WOTTGE K
 4270
 WOURTZEL E
 8625
 WRIGHT BJ
 9362 11212 11232
 WRIGHT CS
 490 597 1838 9995
 12053
 WRIGHT EA
 9237 9239 9835 10636
 12442
 WRIGHT EV
 3997
 WRIGHT GP
 11717
 WRIGHT I
 6511
 WRIGHT KA
 6552 7854 9827 12378
 WRIGHT PM
 5757
 WRIGHT S
 210 2563 3114 3117
 5848
 WRIGHT SW
 942 5757
 WROBEL CJ
 5177
 WUNSCHE HW
 4054 9610
 WURTH B
 4763
 WYARD SJ
 6881
 WYBOURN RC
 5512
 WYCKOFF H
 11395
 WYCKOFF HO
 11783
 WYCKOFF RWF
 3182
 WYCKOFF RWG
 1243 2746 4146 8349
 8350 8351
 WYMAN LC
 5347
 WYNEN W
 267 4218 8352
 WYNNE ES
 1436
 WYSS O
 2211 7818 8253
 YA POKHLINA E
 9994
 YAEGER RG
 10560
 YAGI Y
 10912
 YAGUCHI T
 4182
 YAKIMACH A
 4171
 YAKOVLEVA KK
 8220
 YAKOVLEVA LA
 8933
 YALOW AA
 5425 8191 11013 11014
 11189
 YALOW RS
 7420 8353
 YAMADA H
 2932
 YAMADA K
 12580
 YAMADE A
 10910
 YAMAKAWA H

139 312
 YAMAMASU T
 12621
 YAMAMOTO
 11456
 YAMAMOTO D
 10911
 YAMAMOTO R
 11627
 YAMAMOTO T
 463 508 509 608
 YAMAMOTO Y
 462
 YAMAMSU T
 11615 11616
 YAMADKA K
 3869
 YAMASAKI I
 211
 YAMASHITA H
 3991 4093 4207 4551
 6314
 YAMASHITA I
 4095
 YAMASHITA K
 784 9052 9390 9907
 9908
 YAMASOBA Y
 2935
 YAMAWAKI T
 909
 YAMAZAKI J
 5848 8873
 YAMAZAKI JN
 5757
 YAMISHITA H
 4205 4206
 YANADZUME K
 10910
 YANDERS AF
 5567
 YANOFISKY C
 1249
 YARNELL RA
 5350
 YEE H
 10443
 YETTEWICH G
 932
 YIANNAKOPOULOS A
 7456
 YODA T
 2932
 YOH TF
 1719
 YONEHACHI N
 9899
 YOSHIDA Y
 9053
 YOSIDA N
 4435
 YOSNIMINE Y
 11163
 YOST DM
 11057
 YOST HT JR
 2066 2114 5236 5737
 6250 6362 8354 9442
 9906
 YOUNG GA
 10556
 YOUNG HN
 2494
 YOUNG JC
 1235
 YOUNG L
 11041
 YOUNG LE
 6037
 YOUNG NF
 2214 2450
 YOUNG PA
 4104
 YOUNG RA
 6535
 YOUNG RE
 1530
 YOUNG RJ
 9302
 YOUNG RW
 2818
 YOUNGKEN HW JR

2802
 YU MI
 9563
 YU N
 3463
 YUDIE M
 972
 YUDINTSEVA EV
 8936
 YUILE CL
 5109 10493 10499 10558
 YUNKER R
 1425 6927
 YUNOKI S
 304
 ZABOZLAIEVA EA
 7743 7744 11828
 ZACEK J
 2368 2543 2695
 ZACHARIAS P
 4026
 ZACHARJEWSKAJA MA
 3890
 ZACHERL H
 376 470 7527
 ZADEK I
 10920
 ZADIK EP
 3233
 ZADIK P
 3250
 ZAHL PA
 2280 4092 4315 4424
 4477 4553
 ZAIN H
 5181
 ZAIRTYANTS VB
 10917
 ZAJICEK J
 7993 12401
 ZAKHAROVA AI
 12587
 ZAKOVSKY J
 1321
 ZAKUTINSKII DI
 8355 8356 9802
 ZALENSKY OU
 12709
 ZAMBELLI E
 10921
 ZANCER GE
 1382 1383 10938 10939
 ZANKEVICH EK
 4261
 ZAPOLSKA H
 3761
 ZAPPAROLI TV
 9379
 ZARETSKAYA YM
 7480
 ZAVADSKAIA ND
 10209
 ZAVADSKIY NV
 9273
 ZAVON MR
 1110 10114
 ZAWARZIN AA
 8357
 ZBARSKY SH
 6513
 ZDANSKY E
 5536
 ZDANSKY R
 8358
 ZDOBNIKY V
 8626

ZECHUISEN H
 8363
 ZEEHUISEN H
 154
 ZEITEL BE
 8155
 ZEKHOVA Z
 12198
 ZELEY V
 8359
 ZELLE MR
 4753 9141 12242
 ZELLER EA
 1356
 ZELLER H
 87 148 359
 ZELLER JH
 1544
 ZEMAN W
 6311 6312
 ZEMLYANOI AG
 8360
 ZERAHN K
 5147 5206
 ZHAKHOVA ZN
 7386
 ZHEZHEL NG
 6865
 ZHGUN AA
 7778 9176
 ZHINKIN L
 4386
 ZHINKLIN L
 3663
 ZHIRMUNSKAYA EA
 1044
 ZHOLKEVICH A
 10032
 ZHOLKEVICH AI
 3507
 ZHORNO LY
 8361
 ZHULANOVA ZI
 9090
 ZIEGLER K
 6652
 ZIKMUND A
 4085
 ZILBER LA
 8362
 ZILBERG YG
 7479
 ZILLOTTO D
 7393 10918 11215
 ZILLI E
 6204
 ZILVERSMIT DB
 10563
 ZIMMER E
 5172 5195
 ZIMMER EA
 2503 2504
 ZIMMER EM
 5171
 ZIMMER KG
 1869 3588 3846 3938
 3992 4069 4105 4166
 4220 4236 4263 4306
 4347 4348 4540 5000
 5152 6030 6035 6343
 6565 6662 8858 10231
 ZIMMERN A
 6344 10167 12125 12710
 ZINGSHEIM M
 2630
 ZINK HK

2610
 ZINOVEVA EG
 7797
 ZIPF RE
 7447 11951 11958
 ZIPSER A
 10914 11410 11525
 ZIRKLE R
 6310
 ZIRKLE RE
 1338 1523 1536 1638
 2162 2670 2764 2810
 2860 2952 2959 3618
 3734 3847 3928 3964
 4167 4189 4190 4311
 4380 4414 4415 4432
 4487 4847 5061 5693
 5864 6174 6306 6307
 6308 6371 6516 6541
 6542 7366 8783 9865
 11899 12237 12238 12239
 12240 12241 12404
 ZIRONI A
 12117
 ZIZMER N
 11192
 ZOEPFRITZ H
 9593
 ZOHARY D
 9367
 ZORN EM
 6422 10416 10618
 ZUBKOVA SR
 9350
 ZUEFLE JH
 1022
 ZUELZER M
 11559 11744
 ZUELZER WW
 1656
 ZUGERMAN I
 2827
 ZUMPE H
 9549
 ZUNZ E
 41 71 101 156
 9524
 ZUPPINGER A
 552 5773 9599 12331
 ZURHELLE E
 4028
 ZWAARDEMAKER H
 114 144 157 184
 209 329 3089 3090
 3325 6194 8363 8627
 8628 8629 8630 8631
 8632 8633 8634 8635
 8636 8638 12510
 ZWAARDEMAKER JP
 8637
 ZWAARDEMAKER R
 3326
 ZWEIFACH BW
 8019
 ZWEIFEL C
 3337
 ZWEMER RL
 1718 11018
 ZWERG HG
 498 4361 6127
 ZWILICHOWSKAJA EJ
 601
 ZWINGLI F
 4098

TID-3097

MASTER

BIOLOGICAL EFFECTS OF IONIZING RADIATION

An Annotated Bibliography

Abstracts

Compiled by:
MARYLOU INGRAM, M.D.

UNITED STATES ATOMIC ENERGY COMMISSION
Division of Technical Information

LEGAL NOTICE

The AEC reports listed in this document are accounts of Government sponsored work. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission:

A. Makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness, or usefulness of the information contained in these reports, or that the use of any information, apparatus, method, or process disclosed in these reports may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of any information, apparatus, method, or process disclosed in these reports.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission, or employee of such contractor, to the extent that such employee or contractor of the Commission, or employee of such contractor prepares, disseminates, or provides access to, any information pursuant to his employment or contract with the Commission, or his employment with such contractor.

Printed in USA. This bibliography consists of 2 bindings, total price \$~~12.00~~. Available from the Clearinghouse for Federal Scientific and Technical Information, National Bureau of Standards, U. S. Department of Commerce, Springfield, Virginia. 22151

3.00 65

BIOLOGICAL EFFECTS OF IONIZING RADIATION

An Annotated Bibliography

Covering the Years 1898 - 1957

Abstracts

Compiled by:

MARYLOU INGRAM, M.D.

Atomic Energy Project

University of Rochester

Rochester, New York

DTI Extension Issuance Date

December 1966

FOREWORD

These volumes represent the fruition of more than a dozen years of personal devotion to an objective that arose from the recognition of a gap and a need. It is only necessary to read the compiler's introduction to sense the trials and frustrations that attended the preparation of this compendium, the problems of locating the literature, of abstracting it, and of devising a system of arrangement which would enable an interrogator to find his way profitably through the accumulated information. These volumes are a tribute to the perseverance with which Dr. Marylou Ingram followed through with her chosen task.

It is perhaps unique that a branch of science should have the essential literature of its first half dozen decades of life so well represented in annotated form, as the Division of Technical Information has done with Dr. Ingram's work through the year 1957, and with Mr. Charles M. Pierce's work for the years 1958-60 (TID-3098). The rapidly expanding number of research reports in radiation biology since 1960 adds no small degree of urgency to the continuation of this program. The efforts of the Division of Technical Information to find compilers to further the program are to be commended.

Charles L. Dunham, M.D., Director
Division of Biology and Medicine
U.S. Atomic Energy Commission

INTRODUCTION AND DESCRIPTION OF CONTENTS

Originally, a review of the literature on both biological and chemical effects of ionizing radiation was begun by the compiler and Dr. W. B. Mason in preparation for a general review article which they wrote in collaboration with Dr. G. Hoyt Whipple, Jr., and Dr. J. W. Howland. This review was distributed as a UR report (UR-196, 1952) and used as a general reference for students in the Department of Radiation Biology at Rochester for several years. Apparently the need for a literature review had been common to many investigators in Radiation Biology, for a surprising number of inquiries were received about the status of the literature review and its availability. As a result of such inquiries and requests for bibliographic material, the compiler (continuing to add references to the collection) agreed to make the review reasonably comprehensive (but limited to biological effects) and to publish and distribute it through the AEC's Division of Technical Information Extension (DTIE), Oak Ridge, Tennessee (formerly the Technical Information Service).

The association with the group at Oak Ridge has been a felicitous one although, in many respects, the staff of the Division of Technical Information Extension at Oak Ridge and the compiler seemed related to each other in the manner of the bread and gravy that never came out even. During long periods when the bibliography was largely an extracurricular activity of the compiler, or when the work on it was suspended entirely, the staff at Oak Ridge would often have time and facilities to handle much more than the trickle of material received from Rochester. On other occasions, chiefly during summers when academic duties were lighter and additional help could be hired on a temporary basis in Rochester, the compiler proposed a serious effort to complete the bibliography for references published up to the period ending about one year previously, only to learn that the Oak Ridge staff had just been made responsible for completing some other project quickly; hence forced to curtail work on the bibliography. By the end of each cycle, more references would have been added to the bibliography, and a new proposed cutoff date for references selected. The final decision was to include references published through 1957.

This bibliography has never had a formal budget nor a permanent "home" in the Atomic Energy Project at Rochester. It has the distinction of having been nearly always the first project to be uprooted from its temporary position and shunted to another in the unflagging efforts of the AEP staff to assuage the thirst for space. In this respect, the bibliography has come to share certain characteristics usually associated with such disparate sets as orphans and bootleg activities.

In deciding about pertinence of references included in the bibliography it was sometimes necessary to be fairly arbitrary. The decisions were made on the basis of the following major criteria

1. The subject matter was restricted to the biological effects of *ionizing radiation*. Literature about the effects of non-ionizing radiation was included only if it referred to ionizing radiation, as, for example, when effects of the two types of energy were compared.
2. The subject was restricted to *biological effects*. This automatically eliminated many studies in which

radioactive isotopes were used as tracers and were assumed to have no effect in themselves. Not all tracer studies could be eliminated, however, for often they contained discussions of possible effects of the tracer, or reported studies on metabolic systems that would greatly influence the absorption, distribution or excretion of the radioisotope and therefore have important implications with respect to biological effects of doses larger than tracer doses. Many of these references are included in the section of the subject index on "Quantitative Aspects of Changes Induced by Ionizing Radiation in Living Systems."

Chemical studies carried out *in vitro* and not oriented toward biological effects have been excluded.

3. Many references in the field of Health Physics were excluded because they were concerned solely with problems of physical measurement rather than biological effects. These references, however, like the tracer study references, could not be excluded automatically. Those discussing biological effects likely to occur following exposures under conditions where radiometry was carried out were usually included.

4. Decisions about pertinence of references concerned with radiation therapy were among the most difficult. For example, reports of five year survival studies representing a group of patients receiving radiation therapy for a given kind of tumor in contrast to survival among a similar group treated by some other method, e.g., surgery, were usually excluded. Radiation therapy reports that included discussions of the mechanism of effect of radiation have been considered pertinent.

In general, the search for references was less exhaustive in the area of tracer studies and clinical radiation therapy than in other areas. Bibliographies covering these subjects are included in the section, Reviews and Bibliographies, in the present compilation.

An extensive bibliography, *The Effects of Radiation and Radioisotopes on the Life Processes* covering literature published during 1958-1959 and 1960 has been compiled by Charlie M. Pierce and indexed by William E. Bost, Helen L. Ward and Hugh E. Voreess. It is available as TID-3098 from the USAEC, Division of Technical Information, to official Government requesters. Public Availability is from the Clearinghouse for Federal Scientific and Technical Information, U. S. Department of Commerce, Springfield, Virginia, 22151, for \$15.00 per copy.

It has not been possible to read all references in the original, although most references in English, French or German have been read or consulted in the original. References in these and other languages may be misclassified, or inappropriately included or excluded on the basis of information contained in an abstract when that was the only information available to the compiler.

The notations at the end of many of the abstracts refer to the source in which the reference was originally found when that source was *Biological Abstracts*, *Chemical Abstracts* or *Nuclear Science Abstracts*. The abstracts themselves, of course, are not the same as those in the abstract journals, except for many abstracts from *Nuclear Science Abstracts* which have been used with the permission of the Division of Technical Information Extension, Oak Ridge,

Tennessee.* The notations indicating the abstract journals have proved helpful and time saving to the compiler on countless occasions when some question about the accuracy of the reference notations arose, as, for example, when an article was not found in the volume indicated by our reference card when the article was sought in the library. In such cases a preliminary check with the abstract journal frequently showed that a simple typographical or copying error had been made in working up the reference, in which case the correction could be made and the article found promptly. The abstract journal notations are included for the convenience of users of the bibliography who may encounter similar errors when attempting to find the original articles. The letters refer to the abstract journal, CA for *Chemical Abstracts* BA for *Biological Abstracts* and NSA for *Nuclear Science Abstracts*. The first numbers indicate the abstract volume number and the last set of numbers the abstract number in the volume. For example, BA 1-1000 would be abstracted in *Biological Abstracts*, Volume 1, abstract number 1000.

The subject index for the most part represents the literature as it exists, not necessarily as one might wish it to be. An early attempt to make an outline first and fit the references to it was totally unsuccessful. For this reason, development of the subject outline was deferred until several thousand references had been collected. These were then sorted and re-sorted until a workable outline, the subject index, emerged, based on the material *per se*. Outlines of areas with which the compiler is less familiar have been outlined to the best of her ability. All sections reflect the material available.

Some decisions about the pertinence of references may appear strange, even ludicrous, to experts in the fields represented. Blame this on the limitations of the compiler's scholarship. In other instances, entirely pertinent references may have been omitted simply because they escaped the dragnet of the literature search. In no instance

was a reference excluded because of personal opinion about its scientific merit, for—as any investigator learns sooner or later—the main value of a reference to one scientist may lie in some part of the work that the author (or reviewer) considered incidental. In any event, the bibliography is not intended to be editorial in any sense.

In many instances, reasons for the subject classifications of references are not obvious from the abstract or title, and it will be necessary to consult the original article before the pertinence of the material to a particular subject heading is apparent.

Serious effort has been made to cross reference all items as completely as possible using all available information about the total contents of each publication. Indeed, this is a major reason for compiling the bibliography in its present form, *viz.*, to permit one to find a large proportion of available pertinent references by searching under a few main headings without having to flip back and forth interminably between a simple alphabetical subject index and a set of abstracts. Nevertheless, it has been necessary to restrict, to some extent, the degree of subdivision of the subject index in order to keep the publication manageable in size. The outline form should be reasonably adaptable to change or addition, however. Those wishing to subdivide further certain subjects of special interest should find it relatively easy to do so by listing additional subheadings and the appropriate reference accession numbers which would all be found under the present main headings.

An obvious alternative to this type of classification of bibliographic material is a computer-contrived index. Such an index (KWIC) has been prepared for this bibliography by the Division of Technical Information Extension at Oak Ridge using titles (rewritten as necessary) as guides to the contents of the articles. Also included in this index are key words from titles appearing in the previously mentioned bibliography, *The Effects of Radiation and Radioisotopes on the Life Processes* (TID-3098). This combined index is published as TID-3099 and is also available from the Clearinghouse for Federal Scientific and Technical Information, U. S. Department of Commerce, Springfield Virginia, 22151. This will permit comparison of the two methods of classifying bibliographic material. Perhaps, in the interest of rigorous comparison, the computer-contrived index should be based on the original title or title rewritten with the benefit only of the abstract supplied by the various abstract journals. In any event, the experiment should be something of a pioneering effort in the comparison of two systems of information storage and retrieval.

*Note by AEC DTIE Staff

Although it is not the intent to use the original abstract from other announcement journals except NSA (and it is our belief this practice has been stringently adhered to), the AEC Division of Technical Information Extension has received from the editors of *Biological Abstracts* an indication of their willingness to permit the use of BA abstracts in the original. For their generosity and cooperative spirit, the Division of Technical Information Extension is very grateful.

HOW TO USE THE BIBLIOGRAPHY

The bibliography is comprised of subject indices, in the index volume, and references in the abstract volume. References and their accompanying abstracts are arranged from references 1 through 12,726 in numerical order of accession numbers. The accession numbers were assigned according to the order in which the references were added to the bibliography. This number is the identification number used whenever an abstract is referred to in the subject outline volume.

The subject index is of a hierarchical type consisting of general categories, each followed by one or more subdivisions. Papers of comprehensive or general nature are listed under Reviews and Bibliographies. This category is further subdivided into Reviews of General Biological Effects, Reviews of the Effects on Microorganisms, Reviews on the Effects on Multicellular Plants, etc. Familiarity with this general classification scheme is essential to optimum utilization of the bibliography. The detailed subject index as well as author indices comprise the remainder of the index volume.

Under each subheading of the subject outline, references containing pertinent information are listed in order of accession number. Most references contain information pertinent to more than one classification, hence are listed under various classifications to which the compiler considered them pertinent.

To find references on a given subject, first consult the condensed subject index and then the appropriate sections of the detailed subject index. Look up the references in the reference volume(s) according to accession numbers shown under the appropriate headings and subheadings in the subject index.

For example, suppose one wished to find references pertinent to effects of acute and chronic x-irradiation of the skin. This is a broad classification and references would be found in the sections on (1) Reviews (skin), (2) Bibliography (skin), Morphological Effects (skin), Physiological Effects (skin), Biochemical Effects (skin), and Late Effects (skin). If one is also interested in other aspects of effects on skin, for example, studies comparing radiation effects on skin of various species, he should find all these references under the same subheadings since they would be listed according to the topic considered, regardless of what other classes they belonged to. If one is interested *only* in the comparative study, he could avoid reviewing the references on other aspects of radiation effects on skin by consulting instead the section on "differences inherent in species" under "Quantitative Aspects of Factors Influencing the Response to Irradiation," selecting only those references that pertain to skin.

If one wished to include studies on *in vitro* effects of ionizing radiation on skin, he would consult references listed under the subheading, *skin*, in sections on "Morphological Effects After *In Vitro* Irradiation" and "Physiological Effects After *In Vitro* Irradiation." On the other hand, if one wished to find *only* those references to studies in which the effects of *in vitro* irradiation of skin were compared with *in vivo* irradiation, he would consult first the subsection on *In Vitro* vs. *In Vivo* Effects, under the main heading, "Quantitative Aspects of Factors Influencing the Response to Irradiation."

Some section headings in the subject outline are followed by a notation referring to other sections that are particularly likely to contain additional pertinent references.

These reminders are not substitutes for cross referencing, they are simply for the convenience of users who are not thoroughly familiar with the general outline.

In many instances the pertinence of the reference to the subject classification may not be apparent from the title or abstract presented and it will be necessary to consult the original article to find the information on which the classification was based.

CONDENSED SUBJECT INDEX

REVIEWS AND BIBLIOGRAPHIES

Reviews

- biological effects of ionizing radiation, not subclassified
- effects on microorganisms including viruses
- effects on multicellular plants
- cellular effects
- effects on embryos
- effects of atomic bombs
- acute radiation injury, acute radiation syndrome
- effects on immune mechanisms
- effects on the blood, blood forming tissues and circulation
- effects on the gastrointestinal system
- effects on the nervous system
- effects on skin
- effects on endocrine glands
- effects on eyes ears
- effects on the respiratory system
- effects on neoplastic tissue
- histological changes induced by radiation
- effects of radiation protective agents and other agents or procedures modifying the response to radiation
- therapeutic uses of radiation
- radium poisoning
- effects of internally deposited radioactivity
- late effects including carcinogenesis
- mechanism of effects
- biological effects of cosmic radiation
- uses of radioactive isotopes
- health protection, health physics
- genetics effects
- application of ionizing radiation in preservation of food and other perishable materials
- biochemical effects

Bibliographies

- biological effects of ionizing radiation, not subclassified
- effects on microorganisms
- effects on multicellular plants
- cellular effects
- effects on embryos and on growth and development
- effects of atomic bombs, acute radiation injury, acute radiation syndrome
- effects on specific tissues or organs
- effects on reproduction and fertility
- uses of radioactive isotopes in biology and medicine
- effects of internally deposited radioactivity
- mechanism by which ionizing radiation produces biological effects
- effects of radiation protective agents and other agents modifying the response to radiation
- genetic effects

applications of ionizing radiation in preservation of food
and other perishable materials
biochemical effects
health protection and health physics

THEORETICAL CONSIDERATIONS OF EFFECTS OF IONIZING RADIATIONS ON BIOLOGICAL SYSTEMS

target theory and related concepts
release of substances that cause or alter observed
changes
alteration of metabolites growth factors or other sub-
stances required by the biological system under study
identification of the critically important part of cell,
tissue or organ
deleterious effects on cell division
effects on H₂O
molecular events including ionization, free radical
formation, etc
change in molecular size or configuration, including
polymerization, depolymerization
point-heat theory
physiological function of radioactive materials normally
present
comparison of mode of action of ionizing radiation and
other physical or chemical agents
indirect effects—molecular level
indirect effects—within cell or organism
theoretical mathematical interpretation of radiation
lethality and morbidity data
mechanism of action of radiation protective agents or
other agents modifying response to irradiation
permeability

MORPHOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY IRRADIATION, MULTICELLULAR ANIMALS

Comparison of effects of ionizing radiation with effects of
other agents
Morphological effects listed by type of effect
Morphological effects listed according to tissue
immature invertebrates
mature invertebrates
zygotes and embryos of vertebrates
post-embryonic vertebrates (listed according to tissue)
Morphological effects in tissues *other than those irradiated*

PHYSIOLOGICAL CHANGES AFTER TOTAL OR PARTIAL BODY IRRADIATION, MULTICELLULAR ANIMALS

Comparison of effects of ionizing radiation with effects of
other agents
Physiological changes listed according to type of effect
Physiological changes listed according to organ or tissue
immature invertebrates
mature invertebrates
zygotes and embryos of vertebrates
mature vertebrates (listed according to tissue)

Physiological changes in tissues *other than those
irradiated*—listed according to tissue

PHYSIOLOGICAL CHANGES AFTER *IN VITRO* IRRADIATION

Comparison of effects of ionizing radiation with effects of
other agents
Physiological changes *in vitro* (according to type of effect)
Physiological changes *in vitro* (listed according to tissue)

BIOCHEMICAL CHANGES AFTER TOTAL OR PARTIAL BODY IRRADIATION, MULTICELLULAR ANIMALS

Comparison of effects of ionizing radiation with effects of
other agents
Biochemical changes listed according to type of effect
Biochemical changes listed according to tissue or organ

BIOCHEMICAL CHANGES FOLLOWING *IN VITRO* IRRADIATION

Tissues from multicellular animals listed according to
tissue

QUANTITATIVE ASPECTS OF FACTORS INFLUENCING RESPONSE TO IRRADIATION

Biological and physiological factors
Effects of chemical composition of cells or tissues
Physical factors
Chemical and pharmaceutical agents

GENETIC EFFECTS

Comparison of effects of ionizing radiation with effects of
other agents
Microorganisms
Multicellular plants
Multicellular animals
man
vertebrates other than man
invertebrates

LATE AND LATENT EFFECTS OF IRRADIATION

Comparison of effects of ionizing radiation with effects of
other agents
Late and latent effects listed according to type of effect
Late and latent effects listed according to tissue

RADIATION EFFECTS ON BACTERIA AND UNICELLULAR PLANTS

Comparison of effects of ionizing radiation with effects of
other agents
Physiological and biochemical effects on unicellular plants
listed according to type of effect

RADIATION EFFECTS ON MULTICELLULAR PLANTS

Comparison of effects of ionizing radiation with effects of
other agents
Morphological changes
Physiological changes

ACKNOWLEDGMENTS

Many persons have assisted in the compilation of this bibliography at one time or another. Some were students working during the summer or on a part-time basis during the academic year, others were full-time employees who assisted during the course of their regular duties. The invaluable assistance of the following persons is acknowledged gratefully and with sincere pleasure: Philip Cooper, Elizabeth Crahan, Arpad Galocy, Rita Gertzog, Jacqueline Griggs, Lynn Katz, Barbara Martin, Bernice Morehouse, Kathleen Parkin, William Quinlan, Mary Schneider, Mary Schroeder, Betty Smith and Alice Struthers.

Mr. Norman Zaichick, Argonne National Laboratory, very kindly permitted me to check this bibliography against an extensive bibliography he was compiling on radioactive isotopes.

Without the encouragement, assistance and support of Mr. Hugh Voress, Dr. Helen Ward, William E. Bost, and M. Madge Spencer and their colleagues at the Division of Technical Information Extension, Oak Ridge, this bibliography would never have been distributed beyond my own card file.

This work was supported by the Atomic Energy Commission through the Atomic Energy Project at the University of Rochester, Rochester, New York.

Marylou Ingram, M D
University of Rochester
School of Medicine and Dentistry

REFERENCES

1

THE EFFECT OF X-RAY ON THE DIVISION RATE OF PARAMECIUM. R. T. Hance and R. Clark. *J. Exp. Med.* 43, 61 (1926).

Division rate of *P. caudatum* and *P. multimicro-nucleatum* was depressed for a period of 2-5 days after exposure then returned to normal. Short exposures were most effective, continued exposures producing little additional effect until they were prolonged to 3-4 hours when results were acceleration of division. Repeated doses at intervals were only slightly more effective than single exposure, but caused cells to swell without loss of viability. BA 1-80.

2

INDUCING ENDOSPERM CHANGES IN MAIZE WITH NEUTRON IRRADIATION OF POLLEN E. F. Frolik and R. Morris. *Genetics*, 33, 105 (1948). BA 1-243.

3

X-RAYS AND LIVING MATTER. J. A. Crowther. *Nature* (London) 118, 86-88 (1926).

Two lectures giving resume of work on biological action of x-rays, especially in the realm of physics BA 1-376.

4

THE DANGER OF MALFORMATION OF THE FETUS IN ROENTGEN-RAY TREATMENT DURING PREGNANCY. E. Ries. *Am. Jour. Obstet. and Gyn.* 11, 361 (1926).

Results of irradiation of the uterus in 21 women in various stages of pregnancy are reported 11 fetuses showed some damage, 10 were normal, 1 born dead (autopsy findings are reported). The stillborn fetus was first exposed at about 109 days of age. Author states that some defects found at post mortem examination, viz absent right adrenal, kidney and ureter and absent uterus and vagina, must have antedated radiation. Bony malformations observed may or may not have been radiation-induced. BA 1-638.

5

EFFECT OF X-RAYS ON CYTOPLASM AND NUCLEUS OF THE CELL BASED ON STUDIES OF LIVING CELLS. G. Nadson and E. Rochlin-Gleich-Gewicht. *Compt. Rend. Soc. Biol.* 94, 249 (1926).

Organism *Allium cepa*. BA 1-2051.

6

THE EFFECT OF BETA-RAYS ON BACTERIAL GROWTH C. H. Boussevain. *Amer. Rev. Tuberc.* 14, (2) 172-176 (1926).

Tubercle bacilli grow on synthetic culture medium when K is replaced by radioactively-equivalent amount of Rb, but not if Cs, Na or Li is substituted for K. Suggests beta rays necessary for bacterial growth. BA 1-2316.

7

ACTION OF TEMPERATURE ON THE RADIOSENSITIVITY OF THE EGG OF ASCARIS. A. Dognon. *Compt. Rend. Soc. Biol.* 94, 466-468 (1926).

Sensitivity increases with temp. above optimum temp. for activity. Below 20° C temp. has almost no influence on sensitivity. Above 30° C there is rapid increase in sensitivity. BA 1-2371.

8

THE EFFECTS OF X-RAY ON THE PANCREAS. N. F. Fisher, J. T. Groot and A. Bachem. *Amer. J. Physiol.* 76, 299-305 (1926).

Three erythema doses to pancreas produced fibrosis and diabetes. Can recover by proliferating new tissue from periphery of gland. Four-5 erythema doses caused disappearance of gland. Species dog. BA 1-2372.

9

THE PREVENTION OF PIGMENT FORMATION IN THE HAIR FOLLICLES OF COLORED MICE WITH HIGH-VOLTAGE X-RAY. R. I. Hance and J. B. Murphy. *Jour. Exp. Med.* 44, 339 (1926). BA 1-2374.

10

GERMINAL EPITHELIUM IN X-RAYED TESTES OF RATS. R. Oslund and A. Bachem. *Proc. Soc. Exp. Biol. and Med.* 23, 761 (1926).

Graded doses of x-rays were delivered to the testes of rats and histological studies were carried out on testes at various times between 1 day to 6 months after exposure. Injury and recovery pictures are described. BA 1-2378.

11

EXPERIMENTAL STUDIES ON COMBINED EFFECTS OF ROENTGEN RAYS AND ULTRAVIOLET RAYS. G. E. Pfahler, J. V. Klauder, and J. L. Martin. *Amer Jour. Roentgenol.* 16, 150 (1926).

Combined rays produce more severe reaction of ears of rabbits. BA 1-2381.

12

THE SUSPENSION STABILITY OF THE HUMAN BLOOD IN ROENTGEN THERAPY. E. A. Pohle. *Ann. Clin. Med.* 4, 987 (1926).

Compared blood of patients being treated with blood of normal individuals. Radiation appears to retard erythrocyte sedimentation rate. BA 1-2382.

13

RADIUM EMANATION AND ITS BIOLOGICAL ACTION. REVIEW AND CRITICISM (Italian). Giuseppe Sangiorgi. *Ann. d. Igine* 36, 386 (1926). BA 1-2387.

14

THE EFFECTS OF X-RAYS UPON MITOTIC CELL DIVISION IN TISSUE CULTURES IN VITRO T.S.P. Strangeways and F. L. Hopwood. *Proc. Roy. Soc. (London)*. B100, 283(1926).

Tissues choroid and sclerotic of 7-9 day-old chick embryo. BA 1-2388.

15

EXPERIMENTAL STUDIES ON THE BIOLOGICAL ACTION OF HARD ROENTGEN RAYS. Masao Tsuzuki. *Amer. Jour. Roentgenol.* 16, 134-150 (1926).

Studied relative radiosensitivity of various organs of rabbits after whole-body exposure. BA 1-2389.

16

CHRONIC ULCER OF THE STOMACH EXPERIMENTAL PRODUCTION AND EFFECT ON GASTRIC SECRETION AND MOTILITY. John A. Wolfer. *Ann. Surg.* 84, 89-94 (1926).

Produced gastric ulcer by direct irradiation of exposed stomach mucosa (dogs). Adjoining areas shielded with

lead plates. Ulcers lasted 400-500 days. Some perforated, others healed. No effect on secretion. BA 1-2949.

17

THE EFFECT OF X-RAYS ON LIVING TISSUE. S. W. Allen. J. Med. Research 9, 462-74 (1903).

Conclusions: x-ray exposure of vinegar worms and protozoa is fatal; x-rays act as inhibitors of the heart in cold blooded animals and are over stimulating to growing plants. Exposures produce a local increase in leukocytes; no microscopic change in deep malignant growths; exposure of healthy skin produces a low grade ulceration. (Based on authors' conclusions).

18

ACTION OF X-RAYS UPON THE DEVELOPING CHICK EMBRYO. Hector Colwell, J. Reginald Gladstone, and C. P. G. Wakely. Jour. Anat. 60, 207 (1926).

Series I: Effect of x-rays of different degrees of hardness on embryos which have been allowed to develop normally for 4 days before start of irradiation are described.

Series II: daily doses of x-rays for 3 days; embryos removed after 7 days; total period of incubation 168 hours.

Series III: incubation continued for 210 hours; eggs irradiated on each of last 5 days of incubation. BA 1-3704.

19

THE PRESENT STATUS OF OUR KNOWLEDGE OF THE EFFECT OF IRRADIATION UPON THE GENERATIVE ORGANS AND THE OFFSPRING. H. J. Bagg. Amer. Jour. Roentgenol. 16, 529 (1926).

Lecture on research in this field. Reference is made to reports of observations on: man, rat, frog, rabbit, mouse. BA 1-4582.

20

THE EFFECT OF RADIUM ON MITOSIS IN VITRO. R. Canti and M. Donaldson. Proc. Roy. Soc. (London) B100, 413 (1926).

(Chick choroid) Mitosis stops if enough radiation is administered. Mitosis may reappear after cessation of radiation. BA 1-4583.

21

RADIOACTIVE MATERIAL AN INDUSTRIAL HAZARD? F. Flinn. J. Am. Med. Assoc. 87, 2078 (1926).

Five deaths from jaw necrosis among employees of plant using luminous paint are reported. BA 1-4585.

22

EXPERIMENTS ON THE SELECTIVITY OF THE SECONDARY RADIATIONS. Maro Ponzio. Brit. J. Radiol. 31, 502-05 (1926).

Bacteria treated with secondary radiation from Cu, Mo, Ag, Sn, Sb, Bi, Ba, and Pb. Secondary radiations from elements of greater atomic weights are more destructive. BA 1-4589.

23

SURVIVAL OF TISSUES CULTIVATED IN PLASMA OF IRRADIATED ANIMALS (French). J. Rouffart and M. Rouffart. Compt. Rend. Soc. Biol. 95, 865 (1926).

More vigorous growth and division resulted when fibroblasts cultivated in serum from animals which had been exposed to 90 microcurie-hours of Ra irradiation. BA 1-4591.

24

EXOPHTHALMIC GOITRE: A FOLLOW-UP STUDY OF CASES TREATED WITH ROENTGEN RAY. B. J. Sanger. Arch. Internal Med. 37, 627-640 (1926).

Of 50 patients treated and studied (some observed for 5 years) 82% became entirely well and remained so. BA 1-4592.

25

PERPETUATION OF THE INJURY PRODUCED BY

X-RAYS ON DRY SEED. (French). S. Ancel. Bull. Soc. Bot. France 72, 991-995 (1926). BA 1-6534.

26

INFLUENCE OF WAVE LENGTH OF RADIATION AS REGARDS CHANGES IN ALKALINE RESERVE IN BLOOD OF RABBIT. (French). CH. de Gheldere. Compt. Rend. Soc. Biol. 94, 1263 (1926).

The effect on alkaline reserve varies with the wave length of radiation delivered to the abdomen of rabbits. BA 1-6572.

27

EFFECT OF RADON IRRADIATION ON ANTIBODIES (French). R. Bruynoghe. Compt. Rend. Soc. Biol. 95, 736-737 (1926).

Diphtheria toxin lost part of its toxicity; antidiphtheria serum lost part of its anti-toxic potency. Microbial agglutinins not destroyed. BA 1-6886.

28

AN ANATOMICAL STUDY OF ABNORMAL JAWS IN THE PROGENY OF X-RAYED MICE. Percy L. Johnson. Amer. Jour. Anat. 38, 281 (1926). BA 1-7756.

29

INDUCED CROSSING-OVER VARIATION IN THE X-CHROMOSOME OF DROSOPHILA. H. J. Muller. Amer. Nat. 60, 192 (1926).

Extent of crossing-over following exposure varies with region of chromosome under consideration. BA 1-8602.

30

CHROMOSOME BREAKAGE BY X-RAYS AND THE PRODUCTION OF EGGS FROM GENETICALLY MALE TISSUE IN DROSOPHILA. H. J. Muller and A. L. Dippel. Brit. Jour. Exp. Biol. 3, 85 (1926). BA 1-8604.

31

SEARCH FOR A BETTER TEST OF RADIOREACTION OF SEEDS OF LEGUMINOSAE. S. Ancel. Bull. Soc. Bot. France 73, 71-73 (1926).

Seeds (30-60 in each test) were exposed at different stages of germination to various x-ray doses. In all cases, rootlets showed greatest effect, main root less, stem least. BA 1-8845.

32

URANIUM EXCRETION STUDIES. R. J. Ferretti, G. R. Price, and Samuel Schwartz. p. 243-255 (NNES IV-20). INDUSTRIAL MEDICINE ON THE PLUTONIUM PROJECT (CH 3592). Robert S. Stone, ed. New York, McGraw-Hill Book Co., Inc. 1951.

Determination of uranium concentration in urine has proved to be the most important single test for evaluation of uranium exposure; illustrated by data on 86 exposed individuals. Levels as high as 100 µg of uranium per liter are rarely found, even in the most heavily exposed individuals. (from authors' abstract).

33

EFFECT OF X-RAYS ON GLYCOLYSIS IN BIRD BLOOD. A. Bornstein and O. Ascher. Zeitschr. Ges. Exp. Med. 52, 615-618 (1926).

Glycolysis can be produced by x-irradiation of goose blood if it is kept at 37° after exposure. No glycolysis occurs in unirradiated blood. Irradiation at 37° caused more glycolysis than did irradiation at 0°. BA 1-8937.

34

ON SOME EFFECTS OF PRIMARY AND SECONDARY X-RAYS ON THE SKIN OF THE FROG TADPOLE. H. E. Colwell and M. S. Thomson. Lancet 211, 59 (1926). BA 1-8938.

35

DO X-RAYS INJURE CONTENTS OF THE GRAVID UTERUS? Erno Deutsch. Monatsschrift Kinderheilk 31, 284-286 (1925-1926). BA 1-8940.

36

THE EXTENT OF BIOLOGICAL EFFECT OF X-RAYS OF

DIFFERENT WAVE LENGTHS (French). A. Dognon. Jour. Radiol. et Electrol. 10, 145-151 (1926).

Eggs of *Ascaris megalocephala* exposed and effect recorded as % malformed embryos. Effect of different wave lengths varies with biological activity under consideration. BA 1-8942.

37
INJURIES TO PROGENY FOLLOWING X-RAY RADIATION W. Flaskamp. Strahlentherapie 24, 282-287 (1926). BA 1-8945.

38
X-RAYS AND SINGLE CELLED ORGANISMS (German). G. H. Klovenkorn and O. Gaertner. Strahlentherapie 24, 548-550 (1927).
Hyphomycetes killed after 10 min. exposure to x-rays. Amebae only slightly affected after 45-75 min. BA 1-8946.

39
EFFECT OF X-RAYS ON THE PROGRESSION OF PREGNANCY AND THE DEVELOPMENT OF THE FETUS (French) (RATS AND GUINEA PIGS). D. Nobele and Lams. British Jour. Radiol. 31, 449 (1926). BA 1-8949.

40
RADIATION OF THE OVARY AND PROGENY. A review. Ludwig Nurnberger. Strahlentherapie 24, 125 (1926). BA 1-8950.

41
ACTION OF X-RAYS ON ADRENALIN IN BLOOD (French). E. Zunz and J. LaBarre. Compt. Rend. Soc. Biol. 96, 126 (1927).

Increased adrenalin in blood of dogs following "hyper-coagulating dose" of hard x-rays. Also calcaemia and glycaemia. BA 1-8954.

42
ON THE OCCURRENCE OF THE OESTROUS CYCLE AFTER X-RAY STERILIZATION IN MICE THREE WEEKS OLD. A. S. Parkes. Proc. Roy. Soc. (London) 172, 199 (1926). BA 1-9320.

43
ROENTGEN RAY STIMULATING DOSES OF THE OVARIES, PERMANENT AND TEMPORARY STERILIZATION. E. Pohle. Amer. Jour. Med. Sci. 173, 91 (1927).

Man, rabbit, mouse, lepidoptera. BA 1-9321.

44
A NOTE ON THE DIFFERENT KINDS OF MALIGNANT TUMORS EXPERIMENTALLY OBTAINED BY MEANS OF RADIUM. F. Daels and G. Bacten. Lancet 211, 666 (1926).

Rat, mouse. BA 1-9595.

45
EXPERIMENTS ON THE RADIATION OF TUMORS WITH SPECIAL REFERENCE TO THE BLOOD SUPPLY. J. C. Mottram. Brit. Med. Jour. 1, 275 (1927).

Mouse. BA 2-9696.

46
EXPERIMENTAL INVESTIGATION OF X-RAY INJURY IN DESCENDANTS. R. Dyroff. Strahlentherapie 24, (2) 288 (1926).

When one parent guinea pig is irradiated, effects do not show up until the third generation. BA 1-11161.

47
VARIATIONS IN THE VEGETATIVE AND CONIDIAL STRUCTURES IN CULTURES OF *A. FUMIGATUS* SUBJECTED TO RADIATION WITH RADIUM (French). A. Sartory, R. Sartory, and J. Meyer. Bull. Sci. Pharmacol. 34, 193-202 (1927).

Effects much more marked when cultures grown in sugar solution + NaCl than when grown in non-dissociated medium. BA 1-11464.

48
A LAW OF THE RELATION BETWEEN EXPOSURE AND BIOLOGICAL EFFECT OF RADIATION. W. Bovie. Jour. Cancer Res. 10, 161-174 (1926).

Mathematical expression for susceptibility of tissue. (Human blood). BA 1-11578.

49
CHANGE IN SERUM PROTEIN INDUCED BY IRRADIATION WITH X-RAY. K. Breitlauder and C. Lasch. Klin. Wochenschr. 6, 743 (1927).

No change in total or residual N, refractive index, viscosity or surface tension. BA 1-11579.

50
THE ACTION OF X-RAYS ON THE ORGANISM (PRELIMINARY PAPER). M. Burrows, L. H. Jorstad, and E. Ernst. Proc. Soc. Exp. Biol. and Med. 24, 311-12 (1927).

Graded small doses of x-rays were delivered twice weekly to rats on carefully controlled diets. Doses of 25 and 50 ma minutes increased both growth and length of life of rats fed on vitamin A and B deficient diet. Doses of 75 and 100 ma minutes caused deterioration and death. Moderate x-ray doses simulate U-V in liberating vitamin A from tissue stores. BA 1-11580.

51
THE PROPERTIES OF SPLEEN ADENOSINETRIPHOSPHATASES AND THE EFFECT OF X-IRRADIATION. G. Ashwell and J. Hickman. J. Biol. Chem. 201, 651-659 (1953).

Homogenates were prepared from spleens of mice after total body exposure to 640 r of x-rays, and from spleens of unirradiated control mice. Spleens of irradiated mice broke down ATP much faster than did spleens of controls. Both connective tissue and parenchymal fractions contributed to the increased activity of several enzymes considered. Only myokinase, 5 nucleotidase and inorganic phosphatase were found in homogenates; a true ATP-ase was not found. Effect of Ca and Mg on *in vitro* reactions described.

52
BIOLOGICAL EFFECTS OF RADIATIONS (French). Foveau de Courmelles. Compt. Rend. Assoc. Franc. Avanc. Sci. 49, 592-594 (1925-1926).

Infra red radiation can influence response to x-rays and various other types of radiation may also have antagonistic effects. Considers briefly the effects of infra red, ultra violet and x-rays; compares x-rays to drugs which in low doses excite; in large doses depress. Describes radiation sickness following abdominal exposure; also stresses individual sensitivity, variability and, finally, raises question of indirect effects. BA 1-11582.

53
CLINICAL LABORATORY EXAMINATION OF PLUTONIUM PROJECT PERSONNEL p. 113-139. L. O. Jacobson and Edna K. Marks. INDUSTRIAL MEDICINE ON THE PLUTONIUM PROJECT. (NNES IV-20). Robert S. Stone, ed. New York, McGraw-Hill Book Co., Inc. 1951.

Hematological and urine studies were conducted to provide a check for chance radiation exposure; to find damage to these systems; to provide legal protection for the contractor. Only in a few instances was exposure to radiation excessive. Interpretation of minor variations in hematological constituents was difficult and often impossible. (From authors' summary.)

54
ELEMENTARY IDEAS REGARDING THE ACTION OF X-RAYS ON TISSUES. L. Hoche. Bull. Med. 41, 202 (1927). BA 1-11584.

55

RADIUM IN OPHTHALMOLOGY. A FURTHER STUDY, EXPERIMENTAL AND CLINICAL. Laura A. Lane. Jour. Amer. Med. Assoc. 88, 232-240 (1927).

Evidence of delayed reaction and remote effects of radium. Heavily screened gamma radiation produced little injury. (Rabbit). BA 1-11586.

56

INFLUENCE OF X-RAYS ON BIOELECTRICAL DIFFERENCES OF POTENTIALS. A. Liechti. Biochem. Zeitschr. 171, 240-255 (1926).

57

THE MEASUREMENT OF QUANTITATIVE BIOLOGICAL EFFECTS OF X-RAYS. Charles Packard. Jour. Cancer Res. 10, 319-339 (1926).

Percent of *Drosophila* eggs which hatch after exposure was criterion of effect. BA 1-11589.

58

THE EFFECTS OF X-RAY STERILIZATION ON THE DEVELOPMENT OF THE ACCESSORY ORGANS OF REPRODUCTION IN THE MOUSE. (Parts I and II). A. S. Parks and F. W. R. Brambell. Jour. Roy. Micros. Soc. 47, 97-106 (1927).

Irradiation of female mouse produces destruction of follicles. No interference with development of accessory organs, uterus, vagina, or clitoris. BA 1-11590.

59

EFFECT OF RADIOTHERAPY ON POLYPEPTIDEMIA. A. Puech. Bull. Soc. Sci. Med. et Biol. Montpellier 7, 136 (1926).

Polypeptidemia "of cytolytic origin" following exposure. BA 1-11591.

60

CHANGES IN THE OVARY OF THE MOUSE FOLLOWING EXPOSURE TO X-RAYS. F. Brambell, W. Rogers and A. S. Parks. Proc. Roy. Soc. (London) B101, (707) 95 (1927).

Part II: Irradiation at or before birth. BA 1-11840.

61

CHANGES IN THE OVARY OF THE MOUSE FOLLOWING EXPOSURE TO X-RAYS. F. Brambell, W. Rogers and A. S. Parks. Proc. Roy. Soc. (London) B101, (706) 29-56 (1927).

Part I: Forty-seven female mice 3 wks old exposed to full sterility dose of x-rays. BA 1-11840.

62

ON THE OCCURRENCE OF THE ESTROUS CYCLE AFTER X-RAY STERILIZATION. A. Parkes. Proc. Roy. Soc. (London) B101, 71 (1927).

Part II: Irradiation at or before birth. BA 1-11873.

63

AN EARLY CHANGE IN THE NUCLEUS OF THE CELLS OF TUMORS FOLLOWING EXPOSURE TO RADIATION. J. C. Mottram. British J. Radiol. 32, 61-63 (1927).

Increase in size of nuclei in both normal and tumor cells. (Mouse sarcoma). BA 1-12186.

64

THE X-RAY ACTIVITY OF SECONDARY ELECTRONS UPON MICROORGANISMS. S. S. Trillat. Compt. Rend. Acad. Sci. (Paris) 184, 170-172 (1927). BA 1-12583.

65

EFFECT OF "OVER-SOFT" X-RAYS ON BACTERIA. W. Schepman and H. Flecke. Klin. Wochenschr. 5, 1608 (1926).

X-rays of long wave length; various species of organisms. Equal doses of hard rays produce only 1/2 effect which results from irradiation with soft rays. BA 1-12745.

66

EFFECT OF X-RAYS OF LONG WAVE LENGTH ON

MICROORGANISMS. (French). J. J. Trillat. Compt. Rend. Acad. Sci. (Paris) 183, 614-616 (1926).

Bactericidal effect noted in case of *B. prodigiosus*. BA 1-12756.

67

EFFECT OF RADIATION ON GUINEA PIGS. (French). P. Mendeleeff. Compt. Rend. Soc. Biol. 94, 1274-1277 (1926).

Measured electrical resistance of liver tissue before and after exposure to x-rays. Also studied tissue culture of various tissues on media using plasma from normal and irradiated animals. BA 1-13672.

68

A HISTOLOGICAL STUDY OF THE RESPONSE OF THE INTESTINAL MUCOSA OF THE DOG TO IRRADIATION, WITH SPECIAL REFERENCE TO GIANT CELL FORMATION. A. B. Dawson. Jour. Exp. Zool. 46, 467-491 (1927). BA 1-13488.

69

PRODUCTION OF AN EXPERIMENTAL EPITHELIOMA BY MEANS OF RADIUM. (French). F. Daels and G. Bacten. Bull. Assoc. Franc. Etude Cancer 15, 162-173 (1926). BA 2-17520.

70

THE EFFECT OF LEAD AND RADIUM ON MATURE AND IMMATURE RED BLOOD CORPUSCLES. Herman E. Pearce. Arch. Internal Med. 37, 715 (1926). BA 2-5978.

71

EFFECT OF X-RAYS ON BLOOD ADRENALIN LEVEL. (French). E. Zunz and J. LaBarre. Bull. Acad. Roy. Med. Belgique 6, 649 (1926).

Irradiation of spleen produces increased carotid pressure. When cross circulated (carotid-jugular) B. P. in recipient increases. Direct irradiation of adrenal produces hypertension. (Rabbit, dog). BA 2-9711.

72

A STUDY OF THE DIRECT AND INDIRECT ACTION OF X-RAYS ON THE TISSUES OF THE EMBRYONIC FOWL. T. S. P. Strangeways and H. B. Fell. Proc. Roy. Soc. (London) B102, 9-29 (1927).

Cessation of mitosis. Tissue cultures from irradiated 6 day chick grow if removed soon after exposure; do not grow if removed 24 hrs. after. BA 2-16356.

73

ON THE EFFECTS OF BETA RAYS FROM RADIUM UPON DIVISION AND GROWTH OF CANCER CELLS. J. C. Mottram, G. M. Scott, and S. Russ. Proc. Roy. Soc. (London) B100, 326-335 (1926).

Effect: Inhibits cell division. BA 2-9697.

74

PHYSIO-PATHOLOGY OF THE THYMUS. PRELIMINARY EXPERIMENTS. (Italian). A. Amato. Sperimentale Arch. Biol. 81, 6-15 (1927).

X-ray produces precocious involution of thymus (dogs). BA 2-11117.

75

REGENERATION OF PANCREAS AFTER X-RAYS. M. Rosenbaum. Wien. Klin. Wochenschr. 40, 1315-1319 (1927).

Describes histological changes including marked hypertrophy of islands of Langerhans and abnormal mitoses. (Chick). BA 2-19140.

76

EPILATION IN MICE AS A BIOLOGIC STANDARD FOR DETERMINING ROENTGEN RAY DOSAGE. H. H. Hazen and L. C. Milstead. Arch. Dermat. and Syphilol. 13, 230 (1926).

Preliminary paper. BA 2-9690.

77

EFFECTS OF X-RAY AND RA ON TEETH AND JAWS (German). M. Leist. *Strahlentherapie* 24, 268-281 (1926).

Injures odontoblasts; affects dentine formation; injures alveolar bone and marrow. (Rat, dog). BA 2-16351.

78

COMPARATIVE STUDIES OF HISTOLOGICAL SKIN CHANGES PRODUCED BY X-RAYS AND LIPOID SOLVENTS. L. H. Jorstad and C. W. Lane. *Proc. Soc. Exp. Biol. and Med.* 24, 886 (1927).

Preliminary paper. BA 2-5213.

79

TISSUE REACTIONS TO RADIATION. J. Ewing. *Amer. J. Roentgenol.* 15, 93 (1926). BA 2-9682.

80

RELATION OF POLYNUCLEAR NEUTROPHILES AND THEIR REACTION TO X-RAY, TO CERTAIN LYMPHODENOPATHIES. H. Fox. *Amer. Jour. Path.* 3, 545 (1927).

Polynucleosis of Hodgkin's disease is "indifferent to radiation" except in malignant and febrile cases when this is variable. Species monkeys and other zoo animals. BA 2-11082.

81

CULTIVATION IN VITRO OF SPLEEN EXPOSED TO ROENTGEN RAYS. (Spanish). A. Roffo. *Rev. Soc. Argentina Biol.* 3, 379 (1927).

No effect on growth. BA 2-9704.

82

BIOLOGICAL EFFECTS OF EXTERNAL RADIATION. (NNES VI-2). Henry A. Blair, ed. New York, McGraw-Hill Book Co., Inc. 503 p. 1954.

A review of studies of acute and chronic irradiation of various species of experimental animals at the University of Rochester Atomic Energy Project during the period of 1943 to 1948. Chapters abstracted individually.

83

EFFECTS OF X-RAYS UPON GROWTH, DEVELOPMENT, AND OXIDIZING ENZYMES OF *HELIANTHUS ANNUUS*. Edna Louise Johnson. *Bot. Gaz.* 82, 373-402 (1926).

BA 2-9576.

84

ACTION OF MESOTHORIUM AND X-RAYS ON THE UNICELLULAR *G. PECTORALE*. (German). Ryotaro Tsukamoto. *Gann* 20, 61 (1926).

(Unicellular plant which contains chlorophyll.)

BA 2-654.

85

TRANSFORMATIONS INDUCED BY X-RAYS IN TUMOR TISSUES. (Italian). V. Rivera. *Riv. Biol.* 8, 1-15 (1926). BA 2-9296.

86

HYPOPLASIA OF BONE MARROW ASSOCIATED WITH RADIOACTIVE COLLOIDAL GOLD THERAPY. T. W. Botsford, H. B. Wheeler, R. A. Newton and W. E. Jaques. *J. Am. Med. Assoc.* 151, 788-791 (1953).

Bone marrow biopsy specimens were taken from six patients at autopsy after intratumor or intraperitoneal injection of more than 50 mc. of Au¹⁹⁸. Hypoplasia of the marrow was found. It is suggested that the marrow destruction was due to radiation from gold particles carried from the site of injection to the bone marrow.

87

THE ACTION OF X-RAYS ON SUBSTANCES AS SEEN IN THEIR EFFECT ON YEAST. H. Zeller. *Biochem. Zeitschrift.* 172, 105 (1926).

Difference between irradiated and non-irradiated substances on CO₂ production by yeast. (German) (cholesterin, salts of nucleic acid, thyroid, hemoglobin, others). BA 2-9580.

88

RADIOTHERAPY TESTS ON PLANTS. (Italian) V. Rivera. *Boll. R. Staz. Pat. Veg.* 6, 337-345 (1926).

Studies were carried out in which each of 2 crown galls on one plant received a different dose of x-rays. A third gall on the same plant served as unirradiated control. Growth of irradiated galls increased initially but the growths were dead at end of summer. Control grew uniformly; remained green at end of summer. BA 2-9295.

89

BIOLOGICAL DETERMINATION OF THE SCATTERING OF HARD X-RAYS TO AVOID ERRORS OF MEASUREMENT IN PHYSICAL DOSIMETRY. (German).

H. T. Schreus. *Klin. Wochenschr.* 5, 1762 (1926).

Amount of scattering depends on size of field; hardness of rays. Studied amount of radiation producing equal damage to pea or bean seedlings. Biologically effective intensity increases with size of field. BA 2-5134.

90

DEPRESSION AND STIMULATION OF GROWTH IN EXPERIMENTALLY IRRADIATED PLANT NEOPLASIA. (Italian). V. Rivera. *Riv. Biol.* 9, 3-10 (1927).

Regression of growth 22 hours post-exposure, then increased growth to 14-15 days. Finally tumor mass size diminished. Cells of tumor vary in radiosensitivity.

BA 2-9292.

91

THE EFFECT OF HIGH VOLTAGE CATHODE RAYS ON LIVING TISSUE, AN EXPERIMENTAL STUDY. V. C. Jacobson and K. C. Waddell. *Amer. Jour. Path.* 3, 560 (1927).

Forty white rats had unshaved abdominal skin exposed to x-rays (1 ma and voltages of 100,000, 200,000 and 350,000, TSD 1"). Rats were killed 1 min. and 14 days post exposure. Changes in hair and skin are described. BA 2-5212.

92

THE PART OF THE CELL ATTACKED BY IRRADIATIONS. (German). J. Seide. *Naturwiss.* 16, 128 (1928).

Review of work up to 1926. BA 2-9705.

93

EXPERIMENTAL PARTHENOGENESIS AND EPHEBOGENESIS IN VERTEBRATES. (German). Wilhelm Bosaeus. *Upsala Lakareforen Forhandl.* 31, 415-462 (1926).

Review of literature. X-ray is one method used to induce parthenogenesis. BA 2-3479.

94

EXPERIMENTAL NEPHRITIS PRODUCED BY IRRADIATION. (dogs). F. W. Hartman, A. Bolliger, and H. P. Doub. *Amer. Jour. Med. Sci.* 172, 487 (1926).

Renal epithelium is readily damaged by high voltage x-rays. Blood vessel walls become thickened; some endarteritis noted. Renal function decreased. BA 2-9686.

95

INFLUENCE OF X-RAYS ON PRODUCTION OF CEREBROSPINAL FLUID. (German). C. Inaba, M. Sgalitzer, and E. Spiegel. *Klin. Wochenschr.* 6, 1655 (1927).

X-ray injures plexus epithelium and thereby reduces production of C.S.F. BA 2-9690.

96

VARIATIONS OF THE PIRQUET REACTION UNDER THE INFLUENCE OF DIFFERENT DOSES OF X-RAYS. (German). J. Liebersohn and I. Shimanko. *Strahlentherapie* 24, 343 (1926).

Skin test for tuberculosis. BA 2-1685.

97

RADIUM NECROSIS OF BONE. D. Phemister. *Amer. Jour. Roentgenol.* 16, 340 (1926). (dog). BA 2-9701.

INDIRECT EFFECTS OF IRRADIATION WITH X-RAYS STUDIED BY METHOD OF VASCULAR ANASTOMOSIS. (French). R. Ferroux, R. Gayet, and J. Jolly. *Compt. Rend. Soc. Biol.* 97, 665 (1927).

Carotid-jugular anastomosis. Completely reject idea of indirect action (studied nuclear changes in lymph nodes). BA 2-9684.

THE ACTION OF X-RAYS ON COLPIDIUM COLPODA. J. A. Crowther. *Proc. Roy. Soc. (London)* B100, 390-404 (1926).

Deduced size of structure affected by radiation responsible for death of organism. BA 2-16344.

THE SENSITIVITY OF *V. FABA* TO RADIATIONS. (Italian). Vincenzo Rivera. *Riv. Bio.* 8, 505 (1926).

Plants not killed even by strong dosage of x-rays. Extensive bibliography. BA 1-8846.

VARIATIONS OF COAGULABILITY, GLYCAEMIA AND CALCAEMIA FOLLOWING X-IRRADIATION. (French). E. Zunz and J. LaBarre. *Compt. Rend. Soc. Biol.* 96, (1927).

(Dog) 2-6 hours after exposure blood from spleen shows hypercoagulability due to acceleration of transformation of pro-serozyme to serozyme. Variable effect on coagulability of recalcified plasma. Plasma Ca and glucose increased. BA 1-8955.

RADIOACTIVITY OF SOIL AND AIR AND ITS INFLUENCE ON BIOCHEMICAL SOIL PROCESSES. (German). J. Pěkava. *Actes 4 ème Conf. Int. Pédologie* 3, 252-253 (1924-1926). BA 2-12372.

PHOTOPHARMACOLOGY IV: EFFECT OF RADIATION ON DIGITALIS. D. I. Macht and J. C. Krantz, Jr. *Proc. Soc. Exp. Biol. and Med.* 23, 340 (1926).

X-rays, radium, U-V and high temperatures all caused destructive changes. BA 2-12771.

IS THE RETARDATION OF DEVELOPMENT PRODUCED WITH X-RAYS DUE TO ACTION ON THE RESERVE? (French). S. Ancel. *Bull. Soc. Bot. France* 74, 12-17 (1927).

Cotyledon, root and stem of seedling lentils were irradiated separately. Retardation of growth after x-irradiation was due to lesions in cells of plantlet, not to injury of reserve in cotyledon. BA 2-16120.

ACTION OF X-RAYS ON NORMAL MERISTEM OF R. COMMUNIS. (Italian). V. Rivera. *Boll. R. Staz. Pat. Veg.* 6, 144-152 (1926).

Young plants were exposed to 180 KV x-rays. Normal meristematic tissue is sensitive to radiation. (Temporary cessation of growth of terminal shoots with subsequent formation of abnormal leaves.) BA 2-16126.

BIOLOGICAL EFFECT OF SHORT WAVE RADIATION ON *H. SENTA*. (German). J. Seide. *Zool. Anzeiger* 69, 81-96 (1926).

Germ cells of the rotifer *H. senta* were more sensitive than somatic cells to Ra and x-rays; somatic cells more sensitive to ultra-violet. BA 2-16333.

AN INTRODUCTION TO THE STUDY OF X-RAYS AND RADIUM. H. Colwell and C. P. G. Wakeley. Oxford Med. Press: London, (1926).

Introductory text for students of physics and medicine. BA 2-16342.

QUANTUM PHENOMENA IN THE BIOLOGICAL ACTION OF X-RAYS. E. U. Condon and H. M. Terrill. *Jour. Cancer Res.* 11, 324-333 (1927).

"Because x-rays are absorbed in discrete quanta of energy instead of continuously, a statistical theory of the number of organisms surviving after a given period of exposure can be developed." BA 2-16343.

COMPARISON OF THE EFFECT OF UNFILTERED AND FILTERED RADON TUBES BURIED IN RABBIT MUSCLE. Max Cutler. *Amer. Jour. Roentgenol.* 16, 535-543 (1926). BA 2-16345.

EFFECT OF X-IRRADIATION ON THE CHOLINESTERASE IN RAT INTESTINE. J. H. Burn, P. Kordik and R. H. Mole. *J. Physiol.* 116, 5-6 (1952).

Strips of intestine were examined by suspending them in a bath and determining their reaction to acetylcholine. The colon of irradiated rats was more sensitive than that of control rats. There was a fall of cholinesterase in the jejunum and ileum 48 hours after irradiation.

RADIATION PNEUMONITIS. S. Warren and O. Gates. *Arch. Pathol.* 30, 440-60 (1940).

Experimental and pathologic observations on lungs. The lung reacts to radiation as do superficial tissues, with congestion, edema and degenerative changes of cells and intercellular substance. Certain phases of the reaction in the lung are distinct from other forms of pulmonary inflammation. Observations made in animals as well as in man.

SENSITIVITY TO SECONDARY RAYS PRODUCED BY METALS. (German). A. Liechti. *Klin. Wochenschr.* 5, 545-548 (1926).

Strips of various metals laid on dog's ear, irradiated from opposite side. Effect of secondary rays more marked for metals of high atomic number. Subcutaneous applications have no effect nor do colloidal preparations. BA 2-16352.

A HISTOCHEMICAL STUDY OF IRRADIATED BONE. M. S. Burnstone. *Am. J. Pathol.* 28, 1133-48 (1952).

Ten mice were injected subcutaneously with a carrier free solution containing radioactive phosphorus, P^{32} , as sodium phosphate. Seven days later marrow cells of the large marrow cavity were replaced by atypical reticular cells, that contained greater than normal amounts of glycoprotein, glycogen, and alkaline phosphatases, and were associated with a glycoprotein-containing matrix which calcified.

THE ROLE OF AUTOMATINE AS A RADIOACTIVATED SUBSTANCE IN THE HEART. (German). H. Zwaardemaker. *Zeit. Kreislaufforsch.* 20, 121-131 (1928).

Postulates "automatine" is excitant of all automatic organs, produced experimentally by corpuscular radiation of precursor "automatinogen" in blood and skeletal muscle. Radiation required to activate it is supplied by K. BA 2-17221.

MICROSCOPIC CHANGES OF CERTAIN ANEMIAS DUE TO RADIOACTIVITY. H. S. Martland. *Arch. Path. and Lab. Med.* 2, 465-472 (1926).

Autopsy findings on former radium dial painter. Profound anemia and leukopenia. Fatty marrow replaced with red regenerating marrow showing regeneration of megakaryoblastic type. BA 2-17433.

116

BASAL METABOLISM IN CHRONIC MYELOGENOUS LEUKEMIA. M. Riddle and C. Sturgis. *Arch. Internal Med.* 39, 255-274 (1927).

Transient increase in BMR was observed for not more than 3 days after x-ray treatment. Suggest increased rate of destruction of WBC may be an important cause of the increase. BA 2-17578.

117

PHYSIOLOGICAL ORIGIN OF CANCER. GEOPHYSICS OF A PATHOLOGICAL ENVIRONMENT. (French). M. Stelys. *Compt. Rend. Acad. Sci. (Paris)* 184, 1281-1283 (1927).

On basis of local distribution of cancer in certain French regions, author concludes that cancer is due to excess CO₂ and radioactive substances in the air. BA 2-17588.

118

FUNCTIONAL STUDIES THROUGHOUT THE COURSE OF ROENTGEN RAY NEPHRITIS IN DOGS. F. Hartman, A. Bolliger, and H. Doub. *Jour. Amer. Med. Assoc.* 88, 139-145 (1927).

Numerous kidney function studies done. Except for acute stage, x-ray nephritis is comparable with chronic interstitial nephritis in man. BA 2-11170.

119

CHANGES IN THE SALIVARY GLANDS OF GUINEA PIGS DUE TO X-RAYS. (French) J. Watrin and P. Florentin. *Compt. Rend. Soc. Biol.* 97, 1297-1298 (1927).

No change in secretory cells; increase in excretory channels. BA 2-10153.

120

THE PERIOD OF INDUCTION IN BLOOD CLOTTING, OR THE SEQUENCE OF EVENTS PRECEDING FIBRIN FORMATION. C. A. Mills. *Chinese Jour. Physiol.* 1, 123-142 (1927).

X-ray was one agent used to hasten liberation of prothrombin in the plasma. BA 2-9833.

121

CHOLESTEROL CONTENT OF BLOOD SERUM AFTER X-RAY IRRADIATION. (German). R. Hubert. *Klin. Wochenschr.* 7, 208-211 (1928).

In non-carcinomatous patients, x-ray produces an increase in serum cholesterol; in carcinomatous patients, a decrease. BA 2-9809.

122

VARIATIONS IN IONIC ALKALINITY OF THE BLOOD THROUGH THE ACTION OF X-RAYS. (French). J. Cluzet and T. Kofman. *Compt. Rend. Assoc. Franc. Avanc. Sci.* 49, 589-592 (1925-1926).

After usual therapeutic irradiation there is slight alkalosis. With larger doses: acidosis and change in acid-base balance. (Rabbits irradiated over splenic area; patients receiving x ray therapy for tumor.) BA 2-9775.

123

EFFECT OF X-RAYS ON ENDOCRINE GLANDS.

(German). H. Wintz. *Strahlentherapie* 24, 412-438 (1927).

Histological and physiological changes described. Different portions of gland (especially ovary) show differences in sensitivity. Sensitivity also varies with physiological activity. BA 2-9710.

124

THE EFFECT OF URANIUM RADIATION ON THE SILK WORM, BOMBYX MORI. L. Arata Terao and N. Wakamori. *Proc. Imp. Acad. (Japan)* 2, 188-191 (1926).

Eggs, larvae, pupae exposed. In general, cocoons from irradiated series were heavier. With very long exposures (e.g. entire larval period) cocoons were lighter. BA 2-9709.

125

EFFECT OF RADIUM EMANATIONS ON EXPERIMENTAL TAR CANCER AND ON ITS PRELIMINARY CHANGES. (German). G. Stoel. *Zeitschrift Krebsforsch.* 26, 386-403 (1928).

Three stages of response: 1. temporary cessation of mitoses; 2. renewal of division with abnormal mitoses; 3. permanent suppression of division. Tar cancer reacted same as normal tissue. (mouse). BA 2-9706.

126

DISCORDANCE OF EFFECTS OF X-RAYS IN FRACTIONATED DOSES ON THE SKIN AND ON THE TESTIS. (French). C. Regaud and R. Ferroux. *Compt. Rend. Soc. Biol.* 97, 431-434 (1927).

Effect of repeated doses additive for testis, not for skin. BA 2-9703.

127

THE QUANTITATIVE BIOLOGICAL EFFECTS OF X-RAYS OF DIFFERENT WAVE LENGTHS. Charles Packard. *Jour. Cancer Res.* 11, 1-15 (1927).

Used death rate of *Drosophila* eggs as indicator. Homogeneous beams (0.20, 0.54, 0.70 AU) of 2 intensities (0.22 and 0.154 e/sec) and heterogeneous beams (0.154 e/sec) produce similar effects when total dose is the same. Biological effect parallels ionization. BA 2-9700.

128

NATURE OF BIOLOGICAL EFFECTS OF X-RAYS. (German). Yoshisada Nakashima. *Strahlentherapie* 24, 1-36 (1926).

Denaturing of protein molecules is a fundamental process in biological effect of x-rays. BA 2-9698.

129

X-RAY STANDARDIZATION PROBLEMS. F. Hunt. *Physical Therap.* 45, 422-431 (1927).

Review of units in use and outline of National Bureau of Standards plans for establishing international x-ray unit. BA 2-9689.

130

THE EFFECT OF RADIATION ON VAGINAL CELLS IN CERVICAL CARCINOMA. II. PROGNOSTIC SIGNIFICANCE. R. M. Graham. *Surg. Gynecol. Obstet.* 84, 166 (1947).

131

ACTION OF RADIUM ON *A. FUMIGATUS*. (French). A. Sartory, R. Sartory, and J. Meyer. *Compt. Rend. Acad. Sci. (Paris)*, 183, 77-79 (1926).

Cultures on 41 different media given continuous and discontinuous irradiation. Morphological changes: echinulate spores with double membranes and enlarged cells. Biochemical changes: reduction of saccharose and lowered pH in solutions containing NaCl; reducing power of organism and pH of media increased in non-dissociated media. BA 2-5133.

132

EFFECT OF X-RAYS ON BLOOD SUGAR. (Italian). A. C. Ferrari. *Arch. Farmacol. Sperim. e Sci. Affini* 42, 174-179 (1926).

Rabbits: blood sugar increases 50-100% after 30 min. exposure. (1 ma, 30 cm distant, filters: 2 mm Al and 1/4 mm of Zn.) Various parts of body exposed with same result. BA 2-5286.

133

AN ANALYSIS OF CHROMOSOME STRUCTURE AND BEHAVIOR WITH THE AID OF X-RAY INDUCED REARRANGEMENTS. L. Husted. *Genetics* 21, 537-553 (1936).

134

CAN RADIOACTIVE SUBSTANCES REPLACE K IN SUSTAINING THE HEART BEAT OF THE FROG? (German).

P. Niederhoff. Pfluger's Arch. Ges. Physiol. 213, 823-825 (1926).

Zwaardemaker's statements that radioactive substances can replace K not confirmed. BA 2-5217.

135
INFLUENCE OF ALPHA RADIATION ON BLOOD SUGAR. (French). Fr. Vanysek. Acad. Tcheque Sci. Bull. Internat. Res. Trav. Présentés Cl. Sci. Mat. et Med. 26, 157-162 (1925).

Few mgm. ionium injected into rabbits cause marked hyperglycemia. Animals given adrenalin prior to ionium have greater hyperglycemia. BA 2-5346.

136
EFFECT OF KIDNEY DECAPSULATION. W. Hülse and S. Litzner. Zeitschr. Ges. Exp. Med. 52, 84-102 (1926).

X-radiation increases kidney circulation and exerts protective action against sublimate. BA 2-5695.

137
FORMATION OF PERITHECIA IN FUMIGATUS UNDER INFLUENCE OF RADIUM. A. Sartory, R. Sartory, and J. Meyer. Compt. Rend. Acad. Sci. (Paris) 183, 1360-1362 (1927).

Treatment with 10.2 mc Ra under conditions of experiment suppressed conidial and stimulated perfect fruiting. Single spore cultures of ascospores developed conidial state of *A. fumigatus*. BA 2-6903.

138
ON AUTOLYSIS OF FISH MUSCLE (JAPANESE WITH ENGLISH SUMMARY). T. Oya and E. Sumi. Jour. Imp. Fish. Inst. (Tokyo) 22, 336-343 (1927).

Hard x-ray 1:5 min. exposure: no effect; 30 min. accelerates; 180 min. retards autolysis. Hard x-ray III-IV: 10 min. accelerates; 180 min. retards autolysis. Hard x-ray VI: 10 sec. no effect, 1 min. accelerates, 180 min. retards autolysis. BA 2-1214.

139
HISTOLOGICAL CHANGES IN RADIATED CARCINOMAS. (German). Hojo Yamakawa. Gann 20 68-69 (1926).

Radiation causes degeneration of tumor cells. BA 2-655.

140
THE EFFECT OF RADIATION OF TESTES AND OVARY ON THE DESCENDENTS. (Italian). Antonio Pais. Atti. R. Acad. Naz. Lincei. Rend. Cl. Sci. Fis. Mat. e Nat. 4, 227-233 (1926).

1. Remarks re "stimulating effect" of small doses. (humans).

2. Large doses: descendents show the characters of non-irradiated parent; weak doses: of the irradiated parent. (rabbits and mice). BA 2-653.

141
STUDIES OF THE EFFECTS OF ROENTGEN RAYS ON GLANDULAR ACTIVITY: V. EXTERNAL PANCREATIC SECRETION. A. C. Ivy, J. I. Farrell, and B. H. Orndoff. Skand. Arch. Physiol. 49, 156 (1926).

Dose	Result
1/10 HED	no effect on quantity of secretion; decreased concentration of lipase and trypsin
50% HED	increased total secretion and lipase
1 HED	total output about normal. BA 2-651.

142
THE PHYSIOLOGICAL ACTION OF X-RAYS OF DIFFERENT WAVE LENGTHS. (French). A. Dognon. Compt. Rend. Acad. Sci. (Paris) 182, 655-657 (1926). BA 2-649.

143
PRODUCTION OF MALIGNANT TUMORS BY MEANS OF RADIUM (French). Frans Daels. Bull. Assoc. Franc. Etude Cancer 15, 102-109 (1926).

Salts diluted 1:10,000 with Talc. or 1:20,000 in aq. solution in glass tubes. Subcutaneous application produced sarcomas in rats and mice; only mild foreign body reaction. BA 2-1471.

144
AWAKENING OF THE HEART, BROUGHT TO REST THROUGH DEPRIVAL OF K, BY RADIUM BETA RAYS. (German). H. Zwaardemaker, Pfluger's Arch. Ges. Physiol. 215, 460-467 (1927).

Heart of eel, frog, toad stops when perfused with K-free Ringers solution; starts again if exposed to β rays (Ra) while perfusion continues. Eventually stops again, may start when Ra removed. BA 2-1295.

145
STUDIES ON LEUKEMIA. II. CONCERNING THE ACTION OF ROENTGEN RAYS. P. Szilard. Amer. Jour. Med. Sci. 173, 348-353 (1927).

Rate of leukocyte destruction increased over a period of 1 mo. after in vitro irradiation of (1) leukemic leukocytes in leukemic serum and (2) in normal serum. Rate of destruction same for (1) and (2). BA 2-1533.

146
SECONDARY ACTION OF X-RAYS ON MICRO-ORGANISMS (French). J. Trillat. Compt. Rend. Acad. Sci. (Paris) 183, 1304-1307 (1926).

B. prodigiosus was irradiated with hard x-rays delivered through sheets of various metals over the cultures. Increase in sterilizing effect increased with increasing atomic no. of metals. BA 2-2279.

147
DEVELOPMENT OF RICINUS IN A THORIUM MEDIUM RADIOACTIVATED BY THE ADDITION OF THORIUM X. Q. Averseng, M. Jaloustre, and M. Maurin. Presented by M. L. Mangin. Compt. Rend. Acad. Sci. (Paris) 182, 804-805 (1926).

Irradiated castor oil plants developed more branches, leaves, inflorescences and fruits, greater weight of seed; more oil. BA 2-5128.

148
EFFECT OF DRUGS AND IRRADIATION UPON YEAST. THE BASIS OF THE ARNDT-SCHULZ LAW. (German). H. Zeller. Biochem. Zeitschr. 171, 45-75 (1926).

X-ray was one agent used to inhibit fermentation of yeast. BA 2-5082.

149
EFFECT OF X-RAY ON SALT AND WATER BALANCE IN THE RAT. W. O. Caster. Federation Proc. 11, 195 (1952).

Following total body irradiation with an LD₅₀ dose of 160 kv. x-ray, rats lose 10-20% of their body weight. Twenty rats were maintained under conditions suitable for metabolic studies for a 3-week control period, irradiated with 700 r of x-ray, and studied for 2 more weeks. The potassium and sodium balances became negative, the chloride balance was at first positive and became negative after 4-6 days. (from authors' summary).

150
CHANGES IN THE WEIGHT AND ELECTROLYTIC CONTENT OF RAT TISSUES FOLLOWING TOTAL BODY X-IRRADIATION. W. O. Caster. Radiation Research 1, 128 (1954).

Changes in weight of rat organs were recorded at 3 and 12 hrs. and 1, 2, 3, 4, 6, 8, and 10 days after total-body irradiation with 700 r of x-rays. Spleen and thymus showed the greatest percentage weight loss. Greatest absolute weight loss was in muscle. Little change in skin and liver. Increases in weight observed in lungs, testes, and parts of gastrointestinal tract.

151
BIOLOGICAL INDIFFERENCES OF TISSUES TO X-RAYS.

(German). L. Karczag, G. Farkas, and G. Gyorgyi. Arch. Exp. Zellforsch. 4, 206-211 (1927).

Frog skin, spleen and fibroblasts stained with indicators then x-rayed show no change in pH. Egg white and other colloids do. Believe living cells can compensate for changes produced. BA 2-5214.

152
ANAPHYLAXIS AND EXPOSURE TO X-RAYS. (German). F. Klewitz and R. Wigand, Zeitschr. Ges. Exp. Med. 50, 427-431 (1926).

X-ray treatment had no effect in preventing anaphylactic shock in guinea pigs. BA 2-5215.

153
INHIBITING ACTION OF X-RAYS ON EXPERIMENTAL VACCINATION OF THE RABBIT. (French). A. de LeFevre, Compt. Rend. Soc. Biol. 96, 208-209 (1927).

Rabbits were irradiated 14 days before vaccination with 1-100 dilution of smallpox vaccine. Control rabbits had more and larger pustules; generalized response same. BA 2-5216.

154
CONCENTRATION OF RADIOACTIVE ATOMS IN THE HEART OF COLD BLOODED ANIMALS. (German). H. Zechuisen and G. M. Streef, Pflüger's Arch. Ges. Physiol. 215, 170-186 (1926). BA 2-5220.

155
THE NEW ULTRAPENETRATING RADIATIONS AND THE LIVING CELL. (French). Albert Nodon, Rev. Sci. Franc. and Etrang. 65, 609-617 (1927).

X-rays and radium cause germinal changes. Milikan's discovery of cosmic rays of great penetrating power leads to speculation regarding biological effects of these rays. BA 2-5218.

156
ACTION OF X-RAY ON ADRENALINEMIA. E. Zunz and J. LaBarre, Arch. Internat. Physiol. 27, 371-396 (1926).

Irradiation of splenic area (rabbit; 100-175 r) raises carotid pressure but not in adrenalectomized animal. Arterial blood removed during irradiation of donor causes hypertension in recipient rabbit. Irradiation of adrenals (dogs; 100-300 r) also causes hypertension. BA 2-5221.

157
SIGNIFICANCE OF RADIOACTIVITY FOR ANIMAL LIFE. H. Zwaardemaker, Ergeb. Physiol. 25, 535-573 (1926).

Analysis of ash of perfused hearts reveals regulatory mechanism for K; no such mechanism for heavy radioactive elements. Cold blooded hearts may be kept beating if radioactive component is K or Rb. Heavy elements accumulate in toxic amounts. BA 2-5222.

158
WATER AND ELECTROLYTE METABOLISM IN THE RAT FOLLOWING TOTAL BODY X-IRRADIATION. W. O. Caster and W. D. Armstrong. Intern. Physiol. Congress XIX 263 (1953).

159
CHRONIC NEPHRITIS PRODUCED BY X-RAY. J. O'Hare, H. Altnow, T. Christian, A. Calhoun, and M. Sosman. Boston Med. and Surg. Jour. 194, 43-45 (1926).

(Rabbits) Animals lived 1 day-5 mos. after treatment. Progressive sclerosis of kidney produced in 28 rabbits. (Exposed one kidney directly and compared with untreated contralateral kidney; both acute and chronic exposures.) BA 2-6091.

160
CAUSE OF DEVELOPMENT OF PERITHECIA IN FUMIGATUS. A. Sartory, R. Sartory, and J. Meyer. Compt. Rend. Acad. Sci. (Paris) 184, 1020-1021 (1927).

Observations on *A. fumigatus* in media containing electrolytes: Ra radiation causes increased concentration of H ions, decreased exodiastase activity, increased endodiastase activity. Enzymatic activity and sexual reproduction are closely related. BA 2-6904.

161
GRANULAR DEGENERATION OF IRRADIATED PLANT TUMORS. (Italian). V. Rivera. Boll. Accad. Pugliese Sci. 1, 3-7 (1926).

X-irradiation of crown gall on *Pelargonium* caused secondary tumors surrounded by rapidly dividing pseudocambium cells; formation of fibrovascular elements; degeneration of cytoplasm and nucleus. Secondary tumor dies because of obliterated conducting system. BA 2-9291.

162
EFFECTS OF X-RAYS ON NORMAL AND PATHOLOGICAL PLANT TISSUES. (French). V. Rivera. Ann. Inst. Pasteur 40, 614-658 (1926).

Radiosensitivity varies with type of cell and stage of development. (plants). BA 2-9293.

163
EFFECTS OF X-RAYS IN THE MOUSE TESTICLE. (French). N. Dobrovolskaia-Zavadskaia. Arch. Anat. Microsc. 23, 396-438 (1927). BA 2-9679.

164
INFLUENCE OF TEMPORARY ISCHEMIA ON THE RADIO-SENSITIVITY OF THE SKIN AND THE SEMINAL EPITHELIUM. (French). R. Ferroux and C. Regaud. Compt. Rend. Soc. Biol. 97, 663-665 (1927).

One testis was irradiated intact in scrotum, one with circulation temporarily occluded by clamps. No aggravation of lesion with ischemia, rather some protection from injurious effects. BA 2-9683.

165
CHANGES IN BLOOD COMPOSITION FOLLOWING TOTAL BODY X-IRRADIATION IN THE RAT. W. O. Caster and W. D. Armstrong. Federation Proc. 13, 190 (1954).

Following total body irradiation with an LD₅₀ dose of x ray there is an increase in weight and HCl concentration in the gastric contents; this is associated with a decrease in plasma chloride and an elevated plasma CO₂. By the third day the plasma electrolytes are in a normal range. On the fourth day the chloride level is normal. After this the chloride balance is negative. (From authors' summary).

166
THE EFFECT OF ROENTGEN RAYS ON THE HEART. 1. THE MICROSCOPIC CHANGES IN THE HEART MUSCLE OF RATS AND RABBITS FOLLOWING A SINGLE EXPOSURE. A. S. Warthin and E. A. Pohle. Jour. Amer. Med. Assoc. 89, 1825-1829 (1927).

Surface dose to precordium = 1 human erythema dose, 1100 x-ray units. No clinical, no gross pathological changes at autopsy. Only 1 rabbit and 2 rats (out of 24 and 30 respectively) showed microscopic degenerative changes. BA 3-5598.

167
EFFECT OF X-RAYS ON ACID-BASE EQUILIBRIUM. (German). G. Von. Pannewitz. Strahlentherapie 24, 327-330 (1926-1927).

Acidosis develops immediately after exposure, followed in few hours by alkalosis which may last several days. Effects on acid-base balance are most marked after radiation of thorax and abdomen. BA 3-5595.

168
THE EFFECT OF RADIATION ON ROUX CHICKEN TUMOR. J. C. Mottram. Brit. Jour. Exp. Path. 9, 147-154 (1928).

Tumor is more resistant to β rays in vitro than in vivo. Tumor radiated in vivo may disappear while cell-free filtrate from tumor area remains infective. Serum of birds resistant to inoculation can destroy the infective property of such filtrates in vitro. BA 3-5594.

169
OBSERVATIONS ON THE BIOCHEMICAL CHANGES IN THE BLOOD FOLLOWING RADIUM THERAPY. H. Matthews and V. Mazzola. Amer. Jour. Obstet. and Gynecol. 16, 97-102 (1928).

No evidence of renal impairment was observed following therapeutic radiation. Blood urea was elevated slightly in both benign and malignant conditions after exposure.

170
THE STANDARDIZATION OF THE ROENTGEN RAY DOSE. O. Glasser and U. V. Portmann. Jour. Roentgenol. and Radium Therapy 19, 47-61 (1928). BA 3-5590.

171
THE CHEMICAL AND BIOLOGICAL CHANGES INDUCED BY X-RAYS IN BODY TISSUES. M. T. Burrows, L. Jorstad, and E. Ernst. Radiology 11, 370-378 (1928).

X-ray liberates vitamin A from tissues. Foods rich in vitamin A protect rats against weight loss following large doses of x-ray. BA 3-5589.

172
THE QUESTION OF LOCAL OR GENERAL RADIATION. (German). A. Beck and D. Engel. Strahlentherapie 26, 729-734 (1927).

Mice given heavy dose, localized, of x-rays had tumors implanted under radiated and non-radiated sites several days post-exposure. Tumors grew faster on non-radiated sites. Concludes radiation produced tissue changes which inhibited tumor growth. BA 3-5588.

173
ACTION OF ULTRAVIOLET AND X-RAYS ON REACTION OF THE SKIN. (German). S. Kaplansky and S. Soloweitschik. Zeit. Ges. Exp. Med. 55, 111-114 (1927).

Effects: Erythema and increased pH of skin following exposure to either ultraviolet or x-ray. (rabbit). BA 2-5551.

174
THE INFLUENCE OF X-RAYS ON PLANT GERMINATION AND GROWTH. (French). K. Wernhart. Compt. Rend. Soc. Biol. 96, 1090-1091 (1927). BA 3-5304.

175
ON WHAT DOES THE SLIGHT BIOLOGICAL ACTION OF X-RAYS ON UNICELLULAR ORGANISMS DEPEND? (German). E. Schneider. Klin. Wochenschr. 5, 97-99 (1926).

Unicellular organism is more independent of its surroundings. BA 3-5302.

176
REPRODUCTION IN ASPERGILLIS SUBJECTED TO RADIUM. (French). A. Sartory, R. Sartory, and J. Meyer. Bull. Sci. Pharm. 34, 12-15 (1927).

Increased sexual reproduction is considered to be a deleterious effect of radium. BA 3-5301.

177
EFFECT OF THORIUM X ON THE NUTRITION AND GROWTH OF A. NIGER. (French). H. Lassalle and R. Delas. Compt. Rend. Soc. Biol. 94, 971-972 (1926).

Five-eight micrograms in media accelerated growth and hastened sporulation; 18 mcg: no effect on sporulation but increased dry weight, % lipoids and phytosterin, and decreased lecithin; 50 mcg: good growth; 120 mcg: poor growth, retarded sporulation. BA 3-5300.

178
THE EFFECT OF X-RAY STIMULUS ON SEEDLINGS.

(German). E. Bersa. Akad. Wiss. Wien Math. Nat. Kl. Sitzungsber. Abt. 1 135, 425-451 (1926).

Finds no stimulating effect on *Vicia faba* and *Sinapis alba*. BA 3-5298.

179
THE EFFECTS OF RADIUM IN PRODUCING LETHAL MUTATIONS IN D. MELANOGASTER. F. B. Hanson and F. M. Heys. Science 68, 115-116 (1928).

423 control pairs of flies: no lethals. 426 pairs exposed to 150 gm Ra: 8.2% lethals. 426 pairs exposed to γ rays only: 2.8% lethals. BA 3-4655.

180
HEREDITARY CONSTITUTION AND X-RAYS. R. T. Hance. Sci. Monthly 27, 264-266 (1928).

Tested physiological strength of adult characters determined by 1-2 genes (homozygous and heterozygous agouti mice). Gave smallest x-ray dose likely to inhibit pigment production. Hair of heterozygote was replaced by white; of homozygote by darker than normal hair. Concluded weaker determinant was destroyed. BA 3-4652.

181
INFLUENCE OF THORIUM AND URANIUM SALTS ON NITROGEN FIXATION BY AZOTOBACTER. K. Hiral. Proc. 1st International Cong. Soil Sci. 3, 154-159 (1928).

U salts increased N-fixation and reproduction in Azotobacter sp. BA 3-2301.

182
EXPERIMENTAL NEPHRITIS. F. W. Hartman. Ann. Clinical Med. 5, 599-615 (1927).

Renal insufficiency is produced by x-irradiation of kidneys (dogs). Histological changes are tubular destruction, fibrosis, round cell infiltration, glomerular and capsular fibrosis and hyalinization, and vascular changes. (endarteritis). BA 3-1938.

183
CERTAIN PROPERTIES OF CANCER TISSUE TREATED WITH X-RAYS AS DEMONSTRATED BY SWELLING EXPERIMENTS IN VITRO. (German). M. Magath. Zeitschr. Krebsforsch. 25, 122-135 (1927). BA 3-1848.

184
THE IRRADIATION THRESHOLD OR THRESHOLD OF THE STIMULUS WITHIN THE HEART. (German). H. Zwaardemaker. Pfluger's Arch. Ges. Physiol. 217, 1-10 (1927).

Frog hearts perfused with K-free solutions become quiescent when K is reduced by 1/3. Th, U, Ra, and external radiation can restore activity. Amount of radiation required to restore activity is proportional to length of quiescent period. BA 3-1694.

185
CONCERNING A HORMONE OF HEART ACTIVITY. (German). I. Haberlandt. Pfluger's Arch. Physiol. 218, 129-136 (1927).

Hormone from sinoauricular junction and base of ventricle of frog heart showed diminished activity when tested on the isolated ventricle although the isolated heart exposed to the same dose was not affected. Frog heart in situ responds to x irradiation by increasing its rate of contraction. BA 3-1660.

186
WILL X-RAY IRRADIATION STIMULATE THE IMMATURE OVARY TO PRODUCE HORMONES? (German). C. Schatz. Klin. Wochenschr. 6, 2435-2436 (1927).

Mice, 3-4 weeks old, irradiated with 10-100% sterility dose, did not develop premature oestral crisis. (45 animals). BA 3-1512.

187
LEUKEMIA IN GUINEA-PIGS. C. C. Congdon and E. Lorenz. Am. J. Pathol. 30, 337-59 (1954).

Leukemia appeared at an earlier age in the irradiated animals than in the controls. Data on the leucocyte count indicated a sudden appearance of the disease without preleukemic alteration in the peripheral blood. Lymphatic leukemia occurred in 3.6 per cent of 112 strain 2 guinea pigs, in 6.7 per cent of 30 strain 13 guinea pigs, and in 2.5 per cent of 161 heterogeneous hybrid guinea-pigs. X-irradiation and gamma irradiation were not established as leukemogenic agents for the guinea-pig. (from authors' conclusions).

188

BIOLOGICAL EFFECTS OF X-RAYS AND THEIR INVESTIGATION BY MEANS OF TISSUE CULTURE. M. Schubert. *Strahlentherapie* 24, 551-554 (1927).

Embryonic chick heart: grows normally if planted immediately after irradiation; no growth if remains in egg 3 hrs or more after exposure. Extract of irradiated embryo prevents growth of normal tissue. BA 3-1008.

189

CULTURES IN VITRO OF SPLEENS PREVIOUSLY SUBJECTED TO X-RAYS. (French). A. H. Roffo. *Compt. Rend. Soc. Biol.* 97, 1034-1036 (1927).

Irradiation had no effect on growth of cultures of embryo chicken spleen. BA 3-1005.

190

A COMPARISON OF THE SUSCEPTIBILITY TO X-RAYS OF *DROSOPHILA MELANOGASTER* AT VARIOUS STAGES OF ITS LIFE CYCLE. J. W. Mavor. *Jour. Exp. Zool.* 47, 63-83 (1927). BA 3-1003.

191

X-RAY CARCINOMA IN MICE. (German). A. R. Jonkhoff. *Zeitschr. Krebsforsch.* 26, 32-41 (1927).

Irradiated 20 mice; eight mice died. Six mice received repeated exposures, and of these 4 developed malignant sarcomas. BA 3-1002.

192

BLEEDING TIME AND CLOT RESISTANCE STUDIES IN MICE, RATS AND RABBITS FOLLOWING WHOLE BODY X-IRRADIATION. A. L. Copley. *Federation Proc.* 11, 27 (1952).

Bleeding time tests were developed using the rat's tail and the rabbit's paw immersed in physiological saline at 37.5 C. In 66 normal rats 154 bleeding times were within 3 minutes. In 37 normal rabbits 75 bleeding times ranged from 20 to 270 seconds. Bleeding times of 9 minutes or more were found 6 days after radiation. (from authors' abstract).

193

EFFECT OF X-RAYS ON PRODUCTIVITY AND THE SEX RATIO IN *DROSOPHILA MELANOGASTER*. F. B. Hanson. *Amer. Nat.* 62, 352-362 (1928).

Observations on daily egg production, mortality rate of eggs, larvae and pupae; differences in sex ratio, visible mutations. BA 3-1000.

194

CROSS CIRCULATION EXPERIMENTS. PART B. IS THERE AN "INDIRECT" EFFECT OF RADIATION? p. 115-139. BIOLOGICAL EFFECTS OF EXTERNAL RADIATION (NNES VI-2). Henry A. Blair, ed. New York. McGraw-Hill Book Co., Inc. 1954.

Purpose: to gather evidence on indirect radiation effects. Cross-circulation experiments were performed on cats. In 7 experiments, cross-circulation was established and then one animal was radiated while the other was shielded. Report includes data on leucocyte and lymphocyte count. Leukopenia did not develop in the unirradiated animal. (from authors' summary).

195

EFFECT OF X-RAYS ON DEVELOPMENT OF INFECTIONS. (French). L. Bazy. *Bull. Acad. Med. (Paris)*. 99, 123-125 (1928).

Guinea pigs were given s.c. injection of streptococci in talc a 1 vaseline and some of the animals were treated with 500 r weekly. Ordinarily abscesses were non-fatal in untreated animals; treated animals had high mortality; developed diffuse cellulitis of abdominal wall. Concludes x-ray sensitizes tissue to pyogenic infection. BA 3-996.

196

INFLUENCE OF TEMPERATURE ON SENSITIVITY TO X-RAYS OF EGGS OF BIRDS AND BATRACHIANS.

(French). P. Ancel and P. Vintemberger. *Compt. Rend. Soc. Biol.* 97, 796-799 (1927).

Concluded radiosensitivity of eggs not appreciably modified by temperature at moment of radiation. Dosage 1.250 r - 1.705 r, Temp. 8° and 25°. BA 3-973.

197

THE INFLUENCE OF RADIOACTIVE WATERS ON THE GERMINATION AND DEVELOPMENT OF PLANTS.

(French). D. Vidal. *Ann. École Nat. Agric. Montpellier* 18, 215-276 (? year).

Seedlings watered with H₂O which had high natural radioactivity. This resulted in stimulation of germination. BA 3-852.

198

GROWTH AND GERMINATION OF SUNFLOWERS AS INFLUENCED BY X-RAYS. E. L. Johnson. *Amer. Jour. Bot.* 15, 65-76 (1928).

Low doses do not have stimulating effect. "Medium" doses have inhibitory effect proportional to dose. Plants compensate for this after about 3 weeks and differ very little from controls at maturity. BA 3-849.

199

INFLUENCE OF TEMPERATURE ON THE RADIO-SENSITIVITY OF GERMINATING LENTIL SEEDS. (French). S. Ancel. *Compt. Rend. Soc. Biol.* 97, 800-802 (1927).

Root growth was retarded by x-irradiation. Temperatures of 4°, 5°, 18°, 24°, 25° did not influence sensitivity. BA 3-847.

200

ON THE CUMULATION OF INJURIOUS EFFECTS DETERMINED BY THE SUCCESSIVE ACTION OF 2 FACTORS ON LEGUMINOUS SEEDS. (French). S. Ancel. *Bull. Soc. Bot. France* 74, 346-349 (1927).

Mutilated and normal germinated seeds were treated with x-ray. Mutilated seeds were affected more than normals. Effect of mutilation plus x-ray on growth reduction was greater than sum of two effects when tested separately. BA 3-846.

201

THE ACCELERATING INFLUENCE OF X-RAYS ON THE DEVELOPMENT OF PLANTS. (French). S. Ancel. *Arch. Phys. Biol.* 5, 106-118 (1926).

Historical summary and experiments to check reports of stimulating effect of weak doses on plant development. Concludes stimulating effect does not exist. (Beans, lentils, wheat). BA 3-845.

202

NATURAL RADIOACTIVITY AND THE ORIGIN OF SPECIES. A. R. Olson and G. N. Lewis. *Nature (London)* 121, 673-674 (1928).

Calculated predicted number of variants in field grown tobacco based on intensity of gamma rays in atmosphere. Predicted figure agreed closely with natural variance actually observed. Conclude that naturally occurring variants are largely due to radioactivity of environment. BA 3-355.

203

CHEMISTRY OF SUGAR DECOMPOSITION IN PLANT CELL AND INFLUENCE OF RADIOACTIVITY ON ANAEROBIC RESPIRATION IN PLANTS. (German).

J. Stoklasa and J. Pěnkava. Zeitschr. Probleme Garung, Atmung und Vitaminforsch. 12, 362-433 (1926).

Ra emanation causes increased CO₂ production, increased O₂ demand; if O₂ is sufficient, Ra stimulates enzymatic processes. β and γ rays act on glycolytic enzymes. BA 3-851.

204
SOMATIC GENOVARIATIONS OF THE GENES W, w^e AND w IN D. MELANOGASTER UNDER THE INFLUENCE OF ROENTGEN RAYS. (German). N. W. Timofeef-Ressovsky. Z. wiss. Biol. Abt. D. Wilhelm Roux' Arch. Entwicklungsmech. Organ 115, 620-635 (1929).

More visible mutations found among descendants of rayed flies, including a reverse mutation of scute gene. BA 4-26607.

205
ACTION OF RADIATION ON THE BLOOD SUPPLY OF TUMOURS. J. C. Mottram. Lancet. 2, 966-968 (1928).

Radiation decreases the blood supply in the several rats and mouse tumors studied. BA 4-28155.

206
MEASUREMENTS OF THE POLARIZATION OF THE SKIN AFTER RADIATION WITH ROENTGEN AND ULTRAVIOLET RAYS. (German). Keller, Philipp, and H. Rein. Arch. Dermatol. and Syphilis 155, 67-70 (1928).

Polarization of skin (considered measure of cell membrane permeability) was lowered by x ray erythema and other inflammatory responses of skin. Polarization increases just prior to erythema and during pigmentation following it. BA 4-28119.

207
HEART LESIONS PRODUCED BY THE DEEP X-RAY. AN EXPERIMENTAL AND CLINICAL STUDY. F. W. Hartman. Adolph Bolliger, H. P. Doub, and F. Janney Smith. Bull. Johns Hopkins Hosp. 41, 36-61 (1927).

Twenty-one dogs and 5 sheep irradiated over anterior chest wall, 3 dogs irradiated through right chest wall, chronic exposures for 30 d. to 5 mo. Histological and EKG changes described. BA 4-27976.

208
HISTOLOGY OF CARCINOMA HEALING AFTER X-RAY. (German). R. Dyroff. Monatsschr. Geburtshilfe u. Gynäk. 80, 153-157 (1928). BA 4-27956.

209
X RAYS AND HEART AUTOMATICITY. (German) H. Zwaardemaker and T. P. Feenstra. Strahlentherapie 29, 527-533 (1928).

Isolated frog heart perfused with K-free Ringers solution stopped pulsating when it lost 1/3 of its K. Very soft x rays caused revival in 80 per cent of experiments. BA 4-27181.

210
PHYSIOLOGICAL ACTION OF X-RAYS. Samson Wright and H. A. Bulman. Jour. Physiol. (London) 68, append. p. IV (1929).

Lethality and clinical picture in cats and rabbits receiving whole body exposure to x-rays for various periods of time (single exposure) are described. Results are compared with those observed after chest or abdomen irradiation only and with clinical picture of chronic histamine poisoning. BA 4-27178.

211
RADIUM HEMOLYSIS (German). Iwao Yamasaki. Strahlentherapie 29, 363-366 (1928).

Ra causes hemolysis both in air and in N₂, more rapidly in N₂. Both β and γ rays can produce hemolysis. BA 4-27180.

212
INFLUENCE OF X RAYS ON BLOOD PROTEIN. (German). Paul Wichels and Alfred Behrens. Z. ges. exp. Med. 56, 387-397 (1927).

After irradiation serum albumin increases in normal persons, decreases in allergic persons. Extent of reaction determined in part by magnitude of dose and susceptibility of individual. BA 4-27176.

213
OBSERVATIONS ON THE PHYSIOLOGICAL INFLUENCE OF UNIPOLAR HIGH FREQUENCY ELECTRIC DISCHARGES IN CONNECTION WITH RADIUM IRRADIATION. Georg von Wendt. Am. J. Physiol. 90, 552-553 (1929).

The report is concerned mainly with effects of electric discharges but notes: "An immediate reaction of certain leukocytes to the radiation can be observed, with a tendency to motion towards the radiation direction. A weak Ra effect, not seen microscopically under normal circumstances, can be made very effective by high frequency discharges." BA 4-27175.

214
THE EFFECT OF RADIUM ON CANCER. (German). J. Wätjen. Virchow's Arch. Pathol. Ant. u. Physiol. 275, 156-180 (1930).

Mitosis stopped 24 hr. after irradiation of human cancer, and in 5-6 days there was marked regression of cancer tissue. BA 4-27174.

215
A STUDY OF RESISTANCE TO TUMOR RE-IMPLANTATION IN RATS CURED OF CANCER BY RADON. Kanematsu Sugiura and Stanley R. Benedict. Am. J. Roentgenol. Radium Therapy 20, 142-148 (1928).

Immunization following progressive absorption of tumors (Jobling rat carcinoma) after small doses of β radiation is more marked than that following larger doses. Absorption of cancer cells after γ ray treatment does not produce immunity. BA 4-27172.

216
INFLUENCE OF CATHODE RAYS ON LEUCOCYTES OF RABBITS. Wilhelm Stenstrom, Charles H. Watkins, Carl E. Nurnberger, and Madeleine Fallon. Proc. Soc. Exp. Biol. Med. 26, 380-383 (1929). BA 4-27170.

217
THE DELAYED LETHAL EFFECT OF RADIUM ON TISSUE CULTURES IN VITRO. F. G. Spear. Proc. Roy. Soc. (London) B 106, 44-49 (1930).

Delayed lethal effect on cultures of choroid and sclerotic of chick embryos is constant with constant product of intensity x time (mgms Ra x hrs.). BA 4-27169

218
EFFECT OF RADIUM, ULTRA-SOFT X RAYS AND ULTRAVIOLET RAYS ON INFUSORIA. (Italian). G. C. Segale and A. Vallebona. Radiol. med. (Genova) 14, 3-5 (1927).

V. microstoma, C. steini, G. scintillans all highly radioresistant. BA 4-27168.

219
EFFECT OF GRADED TREATMENTS OF X RAYS OF VARIED WAVE LENGTHS ON THE STRUCTURE AND FUNCTION OF THE OVARIES. (German). P. Schugt. Strahlentherapie 27, 603-662 (1927). BA 4-27167.

220
ON THE POINT OF ATTACK OF ROENTGEN RAYS UPON THE BIOLOGICAL OBJECT. (German). Julius Rother. Strahlentherapie 27, 197-256 (1927). BA 4-27166.

221
THE EFFECTS OF X-RAYS ON THE ADRENAL GLAND. F. T. Rogers and C. L. Martin. Am. J. Physiol. 93, 219-226 (1930).

Irradiation of 1 dog adrenal directly (other adrenal previously excised) with 3 1/2 HED caused slight fibrosis (3-12 mo. observation in all cases); with 6-8 HED caused fibrous proliferation without dysfunction; with "heavy doses" produced degenerative changes in

medulla first, then zona reticularis and zona glomerulosa, and fibrosis throughout. BA 4-27164.

222
DEMONSTRATION OF RADIATION INJURY TO THE RETICULO-ENDOTHELIAL SYSTEM BY RADIOACTIVE COLLOIDS. J. L. Cutler and E. R. Gabrieli. *Federation Proc.* 13, 32 (1954).

$\text{CrP}^{32}\text{O}_4$ was given intravenously to rats. Distribution of radioactivity among different organs was determined. There was more radioactivity in the group receiving the most P^{32} , especially in the liver. (from authors' summary).

223
THE SKIN ERYTHEMA FOR COMBINATIONS OF GAMMA AND ROENTGEN RAYS. Edith H. Quimby and George T. Pack. *Radiology* 13, 306-312 (1929).

Found it necessary to use 35% more of combined radiation than of either radiation alone to produce same effect. BA 4-27161.

224
BIOLOGICAL EFFECTS OF CATHODE RAYS. (German). G. Politzer and W. E. Pauli. *Fortschr. Gebiete Roentgenstrahlen* 40, 35-36 (1929). *Proc. 20th Congress, German Roentgen Society, Vienna, 1929.*

Changes in the epidermal cells of salamander larvae after exposure to x-rays and radium γ and β rays are described. BA 4-27160.

225
THE SPECIFIC EFFECT OF X RAYS. (German). G. Politzer. *Strahlentherapie* 27, 533-544 (1927).

Primary and secondary effects of x-rays on mitosis of epidermal cells of urodele larvae are described. BA 4-27159.

226
THE RELATION OF WAVE LENGTH TO THE DEATH RATE OF *DROSOPHILA* EGGS. Charles Packard. *J. Cancer Research* 13, 87-96 (1929). BA 4-27157.

227
THE BIOLOGICAL MEASUREMENT OF SCATTERED RADIATION. Charles Packard. *J. Cancer Research* 13, 373-382 (1929).

Used *Drosophila* egg method to determine amount of x radiation scattered backward from large area of paraffin. Scatter was 23 per cent at 60 KV, 37 per cent at 190 KV. BA 4-27156.

228
A BIOLOGICAL MEASURE OF X-RAY DOSAGE. Charles Packard. *J. Cancer Research* 11, 282-292 (1927).

Drosophila eggs killed at equal rates by x rays of equal intensity regardless of wave length. One hundred eighty r kill 50% of eggs. Suggests intensity of beam can be found by determining time required to kill 50% of eggs. BA 4-27155.

229
INFLUENCE OF TH AND U RADIATION ON THE DEVELOPMENT OF SEA URCHIN EGGS. (German). Yō. K. Okada. *Zool. Anz.* 75, 157-175 (1928).

Radiation has destructive effect, decreases viability of eggs. A variation of effects up to monstrosity of larvae observed. BA 4-27153.

230
EFFECT OF X RAYS ON PREGNANCY AND THE DEVELOPMENT OF THE FETUS. (German). J. de Nobele and H. Lams. *Strahlentherapie* 25, 702-707 (1927). BA 4-27152.

231
EFFECT OF RADIATION ON EXPERIMENTAL GUINEA PIG TUBERCULOSIS. (German). Hans Löwenstädt. *Virchow's Arch. Pathol. Anat. u. Physiol.* 266, 99-132 (1927). BA 4-27145.

232
ELECTROLYTE EXCRETION AND TISSUE CONCENTRATION AFTER ACUTE WHOLE-BODY X-IRRADIATION. V. D. Davenport, J. Z. Bowers and N. Christensen. *Am. J. Physiol.* 171, 718 (1952).

Male rats received total body exposure to 660 r. There were no differences between control and irradiated rats in electrolyte excretion. No differences attributable to irradiation were seen in water and electrolyte concentrations of plasma and muscle. At 24 hours there was a fall in potassium concentration of the small intestine and an equivalent rise in both sodium and chloride and an increase in liver potassium.

233
EFFECT OF ROENTGEN RADIATION ON THE PERMEABILITY OF THE RED BLOOD CORPUSCLES FOR ELECTROLYTES. (German). Fritz Lehmann and Paul Wels. *Pflüger's Arch. ges. Physiol.* 213, 628-641 (1926).

Cow RBC's decrease in volume when x rayed in isotonic glucose solution due to increased permeability to salts. BA 4-27141.

234
CHANGES IN THE FUNCTIONAL CONDITION OF BLOOD VESSELS AFTER ROENTGEN RADIATION. (German). N. W. Lazarew and Anna Lazarewa. *Strahlentherapie* 26, 347-362 (1927).

Irradiated forearms of healthy persons: capillaries parallel to course of erythema, and vessels in deep venous plexus of skin become first constricted and then, after a few hr, dilated for a few days. These changes recur at about 14th and 35th days. BA 4-27139.

235
CHANGES IN THE FUNCTIONAL CONDITION OF BLOOD VESSELS AFTER X RADIATION. II. EFFECT OF X RADIATION ON SUBSEQUENT PROGRESS OF EXPERIMENTAL IRRITATIONS. (German). N. W. Lazarew. *Strahlentherapie* 25, 255-279 (1927).

Irradiated one ear of dog, later both ears irritated with hot H_2O or Croton oil. When latter given within 2 wks, hyperemia greater in irradiated ear: later there is little difference in the ears. BA 4-27138.

236
THE EFFECT OF X RAYS ON THE N AND NaCl METABOLISM. (German). Anna Jugenburg. *Strahlentherapie* 25, 288-303 (1927).

Thirty six guinea pigs in metabolism cages; 33 of 36 which received 1/2 skin unit dose showed decreased fecal N, increased urinary Cl and diuresis. N was retained in organs, which contained more N than organs of controls; 1/10 skin unit dose increased N output. BA 4-27131.

237
THE FUNDAMENTAL PROCESSES OF THE BIOLOGICAL EFFECT OF RADIATION. (German). H. Holthusen. *Strahlentherapie* 25, 157-173 (1927).

Postulates that radiation acts by photochemical process. Sequence of processes of biological radiation effect given in tabular form. BA 4-27125.

238
BIOLOGICAL EFFECTS OF X RAYS AND CORPUSCULAR RAYS. (German). H. Holthusen. *Naunyn-Schmiedeberg's Arch. exp. Pathol. u. Pharmacol.* 147, 36-45 (1929). BA 4-27124.

239
EFFECT OF RADIANT ENERGY ON THE EYE. X RAYS AND RA RAYS. (German). W. Hoffmann. *Ergeb. Allgem. Pathol. and Anat.* 21, 479-510 (1927). Review article. BA 4-27123.

240
THE INFLUENCE OF HARDNESS OF DOSES IN R UNITS

AS COMPARED TO EQUIVALENT ERYTHEMA REACTIONS OF ALL QUALITIES OF RADIATION COMMONLY USED. (German). P. Hess. *Strahlentherapie* 27, 146-159 (1927).

Erythema dose-700r of 180 KV x-rays, 1/2 mm Zn and 1 mm Al. Number of r units required about same from 185 to 110 KV and 1 mm Cu to 1 mm Al filter. BA 4-27122.

241

THE COURSE OF POSTMORTEM AUTOLYSIS AND PROTEOLYSIS IN ORGAN MASH OF ROENTGEN RADIATED GUINEA PIGS. (German). Rudolf Herzger. *Biochem. Z.* 184, 341-358 (1927).

Irradiation of guinea pigs caused increased post-mortem autolysis of liver and lung; no increase when same tissues irradiated in vitro. Serum shows slight increase in proteolytic action, no increase in hemolytic action. BA 4-27121.

242

THE EFFECT OF X RAYS ON THE FORMATION OF SPECIFIC AGGLUTININS. (German). Curt Hempel. *Strahlentherapie* 26, 379-385 (1927).

Rabbits irradiated and infected with *B. coli*; 2 wks. later tested for agglutinins. Large or moderate doses of radiation depressed antibody production and animals died from infection. Weak doses had no effect. BA 4-27120.

243

BIOLOGICAL EFFECTS OF X-RAYS ON CHICK EMBRYOS. STUDIED IN EGGS AND ORGAN TRANSPLANTATIONS. (German). Konrad Heim. *Strahlentherapie* 27, 694-710 (1927).

Single doses of x rays given just before eggs laid, or to embryos at various stages of development, retarded growth. Greater injury resulted from irradiation of earlier embryos. Eye and brain defects, and asymmetrical growth were typical injuries. BA 4-27119.

244

INTRACORPOREAL RADIUM TREATMENT. (German). L. Halberstaedter. *Strahlentherapie* 26, 20-44 (1927).

Reviews historical aspect of intracorporeal Ra therapy; describes experimental studies using $\text{ThX}(\text{Ra}^{244})$ tubes in vitro and in vivo. BA 4-27118.

245

DEPENDENCE OF THE BIOLOGICAL EFFECT ON THE X RAY DOSAGE. (German). Heinrich Guthmann. *Strahlentherapie* 25, 280-287 (1927).

Studied number of colonies and number of surviving bacterial cells following exposure to various doses of x-ray. BA 4-27116.

246

THE FUNDAMENTAL LAW OF THE PHYSICAL ACTION OF X RAYS OF VARIOUS WAVE LENGTHS AND ITS RELATION TO THE BIOLOGICAL EFFECT. (German). R. Glocker. *Strahlentherapie* 26, 147-155 (1927).

The implications, for therapeutic use of radiation, of the theoretical concepts considered are stressed. BA 4-27114.

247

EFFECTS OF X RADIATION ON TISSUE CULTURES. (German). R. Gassul. *Strahlentherapie* 27, 545-560 (1927).

Spleen and erythrocytes of the frog were irradiated in vitro in (1) normal plasma, (2) plasma of x irradiated frog and (3) plasma with vital stain. Cells from normal frogs were compared with cells from irradiated frogs. BA 4-27110.

248

X RAY EFFECTS ON TISSUE CULTURES. (TRANS-PLANTATION STUDIES). (German). R. Gassul.

Arch. exp. Zellforsch. Gewebezücht. 6, 323 (1928). BA 4-27109.

249

ROENTGEN RADIATION AND UNICELLULAR ORGANISMS. (German). O. Gaertner and G. H. Klövekorn. *Strahlentherapie* 26, 211-213 (1927).

Lethal effects on *B. coli*, *Staph. pyogenes aureus* and *B. mesentericus* in 3 different media are compared.

BA 4-27108.

250

RADIATION AS A CARCINOGENIC AGENT. Austin M. Brues. *Radiation Research* 3, 272-80 (1955). BA 10-1180.

251

CHEMICAL, COLLOIDAL AND BIOLOGICAL EFFECTS OF X RAYS OF VARIED WAVE LENGTHS IN THEIR RELATION TO IONIZATION IN AIR. (German). Hugo Fricke and Sterne Morse. *Strahlentherapie* 26, 749-756 (1927). BA 4-27105.

252

RADIATION BIOLOGY OF CANCER. (German). Hans Dehler. *Strahlentherapie* 25, 239-254 (1927).

Author considers basic effect as observed in clinical studies of patients receiving radiation therapy. BA 4-27100.

253

X RAY EFFECTS ON BLOOD VESSELS. (German). O. David. *Arch. Dermatol u Syphilis.* 155, 99-101 (1928). BA 4-27099.

254

THE EFFECT OF X RAYS ON CULTURES OF GONOCOCCI. (German). Alfred Cohn and Max Levy-Dörn. *Strahlentherapie* 27, 746-750 (1927).

Gonococci are resistant to x rays. BA 4-27097.

255

INFLUENCE OF ROENTGEN RAYS UPON GASTRIC SECRETION. James T. Case and W. N. Boldyreff. *Am. J. Roentgenol.* 19, 61-70 (1928).

Dog stomach is highly resistant to x-ray damage. Large doses produce temporary decrease in amount of gastric juice and increase in amount of pepsin. Acidity does not change. BA 4-27095.

256

CHANGES OF THE WHITE BLOOD CELLS AFTER ROENTGEN RADIATION. (German). Alfred Behrens. *Strahlentherapie* 26, 602-606 (1927). BA 4-27087.

257

ACTION OF THORIUM X ON CHEMICAL COMPOSITION OF CERTAIN MEDICINAL PLANTS. (French). Q. Aversen, Jaloustre, and Maurin. *Compt. Rend.* 188, 345-347 (1929).

$\text{ThX}(\text{Ra}^{244})$ added to water applied to roots of Jimson weed, black mustard, rhubarb, Ricinus, and other plants produced marked increase in their active therapeutic principles. BA 4-26946.

258

EXPERIMENTAL ALTERATION OF NORMAL REACTION BY ANTIRRHINUM (RADIOMORPHOSIS). (German). Emmy Stein. *Biol. Zentr.* 47, 705-722 (1927).

Genetically pure Antirrhinum seeds exposed to Ra developed into 3 types of radiomorphs. BA 4-26952.

259

THEORETICAL CONSIDERATIONS ON CHEMICAL EFFECTS OF RADIATION. B. Gudden. *Strahlentherapie* 34, 544-557 (1929). BA 5-27057.

260

EFFECTS OF X RAYS AND RADIUM ON TISSUE METABOLISM. (German). Karl Adler. *Naunyn-Schmiedeberg's Arch. exp. Pathol. u Pharmakol.* 147, 56-57 (1929).

Aerobic and anaerobic metabolic processes in tissues from rats exposed to 600 r were studied by means of Warburg's technique. Production of chronic injury and

carcinoma with repeated small doses is described.
BA 4-27079.

261
PREVIOUS IRRADIATION AS PROPHYLAXIS AGAINST X RAYS. (French). P. Ancel and Suzanne Lallemand. *Compt. Rend. Soc. Biol.* 99, 1588-1590 (1928).

Fractional dosage applied in 48 experiments. Results not uniform but believed to indicate existence of "radio-phylaxis." BA 4-27082.

262
THE DETECTION AND ESTIMATION OF RADIUM AND MESOTHORIUM IN LIVING PERSONS. I. Howard H. Barker and Frederick B. Flinn. *Am. J. Roentgenol.* 21, 345-354 (1929). BA 4-27085.

263
STUDIES OF DEVELOPMENTAL ANOMALIES IN THE DESCENDANTS OF X-RAYED MICE. I. GENETIC BEHAVIOR. William S. Murray. *Papers Mich. Acad. Sci.* 10, 509-587 (1928).

The x-ray-produced foot abnormality in mice from Little and Bragg's x-rayed stock is hypostatic to true normal; not due to single gene. Foot defect linked in some way to x-ray produced eye defect. Foot abnormality not due to x-ray injury to motor neurones. BA 4-26598.

264
THE EFFECT ON CROSSING OVER AND NON-DISJUNCTION OF X-RAYING THE ANTERIOR AND POSTERIOR HALVES OF DROSOPHILA PUPAE. James W. Mavor. *Genetics* 14, 129-159 (1929).

Irradiation of whole body or posterior half caused marked sterilizing effect and increased frequency of non-disjunction. First 4 days post-exposure: marked sterilizing effect, no effect on crossing over; 509 days post-exposure: decreased crossing over; 9-12 days: gradual recovery to normal crossing over value. BA 4-26597.

265
THE PROBLEM OF SPECIES IN VIEW OF THE ORIGIN OF SOME NEW FORMS IN MICE. N. Dobrovolskaia-Zavadakia. *Biol. Rev. and Biol. Proc. Cambridge Phil. Soc.* 4, 327-351 (1929).

Irradiation of mice testes with sterilizing dose or less of x ray did not produce hereditary effects in majority of about 3000 descendants. Two mutations observed were same as naturally occurring mutations. Conclude rays merely reveal pre-existing latent conditions. BA 4-26584.

266
CHEMISTRY OF X-RAYED TISSUE EXPLANTS IN THE LIGHT OF VITAL STAINING. (German). Farkas. *Arch. exp. Zellforsch. Gewebezücht.* 6, 322 (1928). BA 4-27104.

267
DEPENDENCE OF THE X-RAY DOSAGE UPON A PRECEDING INJECTION OF IODOFORM GLYCERIN. (German). Walter Wynen. *Strahlentherapie* 25, 346-350 (1927).

V. faba equina irradiated with 100 to 200 r Idoform solution in front of test object decreases dose because of absorption; iodoform behind test object increases dose because of secondary radiation. Irradiation after injection is more effective in region between iodoform and x-ray source. BA 4-24682.

268
RADIUM SENSITIVITY OF *V. FABA*. (Italian). V. Rivera. *Riv. Biol. (Perugia)* 10, 3-33 (1928). BA 4-23915.

269
CHANGES IN THE OVARY OF THE MOUSE FOLLOWING EXPOSURE TO X-RAYS. III. IRRADIATION OF THE NON-PAROUS ADULT. F. Brambell, W. Rogers, and A. S. Parkes. *Proc. Roy. Soc. (London)* B 101, 316-328 (1927).

Adult females irradiated in dioestrous: sterility appears 5 weeks after radiation, but oestrus cycles continue. Follicles disappear as organized structures. Cortical elements persist, and produce oestrin. BA 4-27090.

270
THE ACTION OF X-RAYS ON THE ENDOCRINE GLANDS. Herman L. Wintz. *Radiology*, 9, 285-303 (1927). BA 4-27177.

271
THE INFLUENCE OF RADIOACTIVITY ON THE CHEMISTRY OF SUGAR DECOMPOSITION IN THE LIVING CELL. (German). Julius Stoklasa. *Strahlentherapie* 25, 304-310 (1927).

Postulates that α rays from earth and air increase respiration rate by increasing enzyme action and destroying protein molecules: β and γ rays stimulate glycolytic enzymes, break down easily oxidized intermediates. BA 4-27171.

272
INFLUENCE OF THORIUM X ON ERYTHROCYTE SEDIMENTATION RATE. (German). Ibrahim Valeeff. *Strahlentherapie* 26, 363-378 (1927).

Injected ThX (0.01 to 1 mgm) intramuscularly into rabbits. Larger doses caused increased erythrocyte sedimentation rate after 2 days. Leucopenia was observed at same time. BA 4-27173.

273
THE DIFFERENTIAL ACTION OF X-RAYS ON TISSUE GROWTH AND VITALITY. PART I. IRRADIATED CHORIO-ALLANTOIC MEMBRANE OF EMBRYO CHICK WITH HOMOGENEOUS X RAYS OF WAVE LENGTHS 0.3 TO 2A. Warnford Moppett. *Proc. Roy. Soc. (London)* B 105, 402-420 (1929). BA 4-27151.

274
EFFECT OF RADIATION OF THE OVARY ON THE PROGENY. (German). Heinrich Martius. *Strahlentherapie* 24, 101-124 (1926-1927).

Five mice irradiated, 4 subsequently conceived. Sex ratio was altered, (increased number of female offspring). All F_1 offspring were sterile. BA 4-27147.

275
EFFECT OF RADIATION ON CELL DIVISION. (German). J. Markovits. *Arch. exp. Zellforsch. Gewebezücht.* 6, 315-321 (1928).

Paramecia are most susceptible to Ra radiation during reorganization period when division rate is low, most resistant when it is high. BA 4-27146.

276
STUDIES ON THE DIRECT OR INDIRECT EFFECT OF X RAYS ON SURVIVING LYMPHOID TISSUES. (French). A. Lacassagne and G. Gricouloff. *Compt. rend. soc. biol.* 96, 862-864 (1927).

Compared effects when radiation applied to tissues in vitro, with effects following irradiation of whole animal (rabbit). Found effects the same in both instances. BA 4-27137.

277
BIOCHEMISTRY OF RADIATION. PART VII. EFFECT OF X RAYS ON THE COMPOSITION OF ARTIFICIAL PERITONEAL FLUID. (German). C. Kroetz. *Biochem. Z.* 191, 263-270 (1927).

Reports results of determination of Na, K, Cl, Ca, HCO_3 , H_2PO_4 and HPO_4 levels in normal and irradiated rabbits. BA 4-27135.

278
BIOCHEMISTRY OF RADIATION. PART VI. EFFECT OF X RAYS ON THE PERMEABILITY OF THE SURVIVING FROG SKIN. (German). Christian Kroetz. *Biochem. Z.* 191, 250-262 (1927). BA 4-27134.

279

THE EFFECT OF RADIOTHORIUM ON THE URINARY C:N RATIO. (German). A. Allen Goldbloom. *Biochem. Z.* 192, 272-297 (1928).

Daily oral administration of 22 to 240 Mache units/kilo of radiothorium caused rise in urinary C:N ratio, varying with dose. Single intravenous injections also increased ratio. Changes due to altered excretion of both C and N. BA 4-27115.

280

THE BIOCHEMICAL EFFECT OF X RAYS ON PROTEOLYTIC AND OTHER REACTIONS IN VIVO AND IN VITRO. (German). R. Gassul and A. Polakov. *Strahlentherapie* 30, 519-526 (1928).

Irradiated freshly extirpated cat livers showed first a decrease, then an increase in proteolysis. Control studies on irradiated pepsin confirmed observations for large doses. Role of enzymes in x irradiation discussed. In a series of irradiated rabbits, no change in cholesterol observed. BA 4-27111.

281

THE METHOD OF EVOLUTION. H. J. Muller. *Sci. Monthly* 29, 481-505 (1929).

Treating germ plasm of *Drosophila* with x rays increased frequency of mutation about 15000%. Many mutations were the same as those occurring naturally: most were recessive and detrimental. Postulates that effect of x rays on the genes is a chemical change. BA 4-26495.

282

X-RAY TREATMENT OF TUMORS PRODUCED BY B. TUMEFACIENS ON RICINUS. Vincenzo Rivera. *Boll. regia. staz. patol. vegetale (Rome)* 7, 3-19 (1928).

Doses of 3 to 4 mc for 6 days checked tumor growth and resulted in healing. Six mc for 48 hr resulted in immediate inhibition of growth of diseased and normal tissues. BA 4-17508.

283

GENETIC AND OTHER EFFECTS OF X-RAY AND RADIUM TREATMENT OF SEEDS, GROWING POINTS, AND SEX CELLS OF NICOTIANA SPECIES. T. H. Goodspeed and A. R. Olson. *Am. J. Botany* 15, 622 (1928).

BA 4-17591.

284

BLEEDING TIME AND CLOT RETRACTION UNDER NORMAL, PATHOLOGICAL AND EXPERIMENTAL CONDITIONS. (SPLENECTOMY, X RAY, CA ADMINISTRATION) (Italian). Giuseppe Salvatore Donati. *Boll. soc. med.-chir. Pavia* 42, 1131-1145 (1928).

Studied normal humans, patients receiving radiation therapy, and experimental animals. BA 4-17778.

285

CHANGES IN NORMAL EYE TISSUES AFTER X RADIATION. 1.) OBJECT OF EXPERIMENTS AND DEFINITIONS. (German). Wilhelm Rohrschneider. *Graefe's Arch. Ophthalmol.* 121, 526-536 (1929).

Rabbit eye: 188 KV x rays. 4 ma. Filtration: either 0.5 mm Cu and 3 mm Al: or 3 mm Al only. BA 4-17994.

286

OCCUPATIONAL POISONING IN MANUFACTURE OF LUMINOUS WATCH DIALS. GENERAL REVIEW OF HAZARD CAUSED BY INGESTION OF LUMINOUS PAINT, WITH SPECIAL REFERENCE TO THE NEW JERSEY CASES. Harrison S. Martland. *J. Am. Med. Assoc.* 92, 466-473 (1929). BA 4-18300.

287

RADIOSENSIBILITY OF NORMAL AND MALIGNANT TISSUES IN VITRO. (German). H. Laser and L. Halberstaedter. *Z. Krebsforsch.* 29, 411-433 (1929).

Tissues irradiated in vitro show inhibition of growth. Growth inhibition is preceded by latent period. Inhibitory effect increases with increasing dosage, and is greater in tissues with high rate of proliferation. No absolute difference between irradiated and normal tissues. (chick fibroblasts, osteoblasts, embryo iris; embryonal rat fibroblasts, mouse carcinoma, rat sarcoma.)

BA 4-1855.

288

RADIOSENSITIVENESS OF MALIGNANT TISSUE AND ITS BIOLOGICAL SIGNIFICANCE. M. J. Sittenfield. *Am. J. Roentgenol.* 19, 150-156 (1928).

Presents experimental evidence to show that mitotic activity and local metabolic rate do not completely explain radiosensitivity. Notes effect of colloidal Pb in tumor (increases) radiosensitivity. BA 4-18650.

289

EXPERIMENTAL PRODUCTION OF X-RAY CATARACT. (German). Wilhelm Rohrschneider. *Strahlentherapie* 31, 596-600 (1929).

Cataract produced in rabbits by 54 to 360% human erythemia doses or 30 to 200% human epilation dose. Time required roughly inversely proportional to dose. Lens most sensitive, then cornea, then conjunctiva.

BA 4-18643.

290

ANAPHYLAXIS IN GUINEA PIGS AFTER X-RAY IRRADIATION. (German). Ernst Herzfeld and Menna Tenn Doornkaat Koolman. *Deut. Med. Wochchr.* 54, 429 (1928).

BA 4-18782.

291

EXPERIMENTS ON THE INFLUENCE OF X RAYS ON PHAGOCYTOSIS OF COCCI IN THE R-E SYSTEM. (German). Maria Schwienhorst. *Beitr. pathol. Anat. u. allgem. Pathol.* 81, 375-390 (1928).

Liver, spleen and lung (in Rat) lose ability to phagocytize cocci after irradiation. No stimulating effect of x rays on R-E system observed. BA 4-18889.

292

THE EFFECT OF X-RADIATION ON THE SPERMATOGENESIS OF THE GUINEA PIG. J. Bronté Gatenby and Sylvia Wigoder. *Proc. Roy. Soc. (London)*, B 104, 351-370 (1929).

Giant spermatids were formed. Inability of cell to divide post-exposure attributed to break down of Golgi apparatus. Golgi bodies fail to reassemble at formation of spermatid nucleus. BA 4-20788.

293

TUMORS FROM ROENTGEN RAYS IN ROOT TIP TISSUES OF V. FABA. (Japanese with German summary). Muro-Hide Ko. *Gann* 22, 4-14 (1928).

Tumors arise 1.06 to 1.28 mm from root tip, contain abnormal cells. BA 4-21078.

294

IRRADIATION OF SPLEEN AND RETICULO-ENDOTHELIAL APPARATUS. (German). F. Schürer. *Wien. klin. Wochschr.* 41, 1581-1586 (1928).

(Rabbits) Irradiation of spleen with 2H caused complete blockade of R-E system for about 4 hr. Six hr post exposure phagocytosis of dyes is increased: R-E function normal in 48 hrs. BA 4-21255.

295

EXPERIMENTAL INVESTIGATIONS ON THE EFFECT OF X RAYS ON THE BLOOD AND THE BLOOD FORMING ORGANS IN WHITE LABORATORY RATS. (German). E. Woenckhaus. *Arch. Exp. Pathol. Pharmacol.* 131, 335-356 (1928).

Small doses of x-rays to young growing rats result in severe anemia. Protection of liver and spleen with Pb foil prevents production of anemia. BA 4-21275.

296

EXPERIMENTAL PRODUCTION OF TUMORS BY MEANS OF RADIUM. (German). Franz Daels. *Strahlentherapie* 25, 675-678 (1927).

Subcutaneously placed radium in paraffin was studied as a tumor-inducing agent in mice and rats. BA 4-21711.

297

THE GARDEN TULIP. Daniel Hall. *Proc. Roy. Inst. G. Brit.* 26, 102-105 (1929).

Various growing bulbs were subjected to x rays of 90,000 v for 1/2 hr. When these bulbs flowered all had narrow pointed petals; ovaries destroyed, anthers and pollen apparently unchanged. BA 4-17352.

298

CHROMOSOME NUMBER AND THE MUTATION RATE IN AVENA AND TRITICUM. L. J. Stadler. *Proc. Nat. Acad. Sci. U. S.* 15, 876-881 (1929).

Frequency of mutation induced by x rays was much lower in common oats and common wheat than in common barley. Differences ascribed to gene reduplication in the polyploid series. BA 4-17360.

299

HISTOLOGY OF THE EYES OF X-RAYED DROSOPHILA. Dana B. Casteel. *J. Exp. Zool.* 53, 373-386 (1929). BA 4-17368.

300

PRESENT STATUS OF PRODUCTION OF GENE VARIATIONS BY MEANS OF X RAY IRRADIATION. (German). N. W. Timofeef-Ressovsky. *J. Psychol. u. Neurol.* 39, 432-437 (1929). BA 4-17390.

301

LATER STAGES IN SPERMATOGENESIS OF LEPISMA DOMESTICA, WITH A NOTE ON ITS VACUOLAR SYSTEM. R. N. Mukerji. *Roy. Microscop. Soc.* 49, 1-8 (1929).

X-radiation effects all cytoplasmic structures except vacuoles. This is considered to be evidence that vacuoles are probably of the nature of metaplastic products. BA 5-122.

302

INHERITANCE IN NICOTIANA TABACUM. IX. MUTATIONS FOLLOWING TREATMENT WITH X RAYS AND RADIUM. T. H. Goodspeed. *Univ. Calif. (Berkeley) Publs. Botany* 11, 285-298 (1930). BA 5-144.

303

THE EFFECT OF X RAYS IN PRODUCING SOMATIC GENOVARIATIONS OF A DEFINITE LOCUS IN DIFFERENT DIRECTIONS IN D. MELANOGASTER. N. W. Timofeef-Ressovsky. *Am. Naturalist* 63, 118-124 (1929). BA 5-195.

304

STUDY OF THE FUNCTION OF THE SPLEEN IN GYN-ECOLOGY AND OBSTETRICS. 1. COMPARATIVE STUDY OF EFFECT OF SPLEEN EXTIRPATION OR EXPOSURE TO ROENTGEN RAYS UPON THE CLOTTING TIME OF BLOOD. Sh. Yunoki. *Jap. J. Obstet. Gynec.* 10, 39-41 (1927).

In rabbits coagulation time was delayed during period of several weeks after splenectomy: 2/3 E.D. x-ray exposure caused decreased clotting for several days; 1/2 E. D. sometimes prolonged sometimes shortened clotting time, 1/3 E.D. shortened clotting time. BA 3-12627.

305

CHROMOSOME STRUCTURE X, AN X-RAY EXPERIMENT. B. R. Nebel. *Genetics* 21, 605-14 (1936).

306

LEUKOPENIA FROM BENZOL AND FROM X-RAYS IN ANIMALS WITHOUT SPLEEN. (Spanish). José di Leo Lira. *Rev. soc. Argentina Biol.* 3, 737-741 (1927). BA 3-13213.

307

BETTER TOLERANCE TO POLONIUM INJECTED LOCALLY IN AN "INSOLUBLE" STATE. (French). A. Lacassagne and J. Lattès. *Compt. rend. soc. biol.* 97, 697-698 (1927).

Po fixed on certain metals was better tolerated locally, but eliminated more slowly. BA 3-13197.

308

BIOLOGICAL ACTION OF THORIUM. (Italian). Oscar M. Bernardi. *Boll. soc. biol. sper.* 1, 246-247 (1926). BA 3-13048.

309

MAINTENANCE OF LEUKOCYTE LEVEL AND CHANGES DURING IRRADIATION. Raphael Isaacs and Arthur C. Danielian. *Am. J. Med. Sci.* 174, 70-87 (1927).

Studied diapedesis of WBC through mucous membranes of mouth. After x-ray, elimination of WBC in this way is increased. BA 3-12477.

310

THE PHYSIOLOGICAL EFFECTS OF ROENTGEN RADIATION UPON NORMAL BODY TISSUES. Stafford L. Warren. *Physiol. Rev.* 8, 92-129 (1928).

Review article. BA 3-11912.

311

THE ACTION OF RA ON TRANSPLANTABLE TUMORS. (Italian). Guido Tizzoni and Giovauni de Angelis. *Ann. d'igiene* 37, 274-282 (1927).

Spindle cell sarcoma, endothelioma, and adenocarcinoma resist Ra effects in ratio of 1:3:5 in vitro. Relative resistance to low temperatures is in approximately the same ratio. Tumors from more differentiated cells are more resistant in vitro. BA 3-1191.

312

THE USE OF LIPIODOL TO PRODUCE SECONDARY RADIATION IN THE X RAY TREATMENT OF MALIGNANT TUMORS. (German). Fujiwo Shionoya and Hojo Yamakawa. *Proc. Imp. Acad. (Tokyo)* 3, 622-623 (1927). BA 3-11910.

313

THE EFFECT OF RADIUM EMANATION ON THE BLOOD-VESSELS. (German). E. Polak. *Acta Radiol.* 9, 169-205 (1928).

Discusses effects of ionizing radiation on the autonomic nervous system. The second part presents experiments on frogs, demonstrating vasoconstrictor action of Ra emanation, compares it with ergotamine and adrenaline. BA 3-11908.

314

A COMPARISON OF THE QUANTITATIVE BIOLOGICAL EFFECTS OF GAMMA AND X RAYS. Charles Packard. *J. Cancer Research* 12, 60-72 (1928).

LD₅₀ of Drosophila eggs is the same following exposure to 180 r units of x rays or 5300 mc min. of Ra gamma rays. BA 3-11905.

315

ACTION OF RA EMANATION ON GLYCEMIA IN WHITE MICE. (French). H. Labbe and A. Kortzareff. *Compt. rend. (Paris)* 184, 474-476 (1927).

Subcutaneous injection of solutions containing 1.05 to 1.59 mc of Ra into mice produced sharp hypoglycemia, with lowest blood sugar levels at 3 to 5 hr post-injection. Similar reactions produced in rabbits. BA 3-11903.

316

STUDIES ON THE BIOLOGICAL EFFECTS OF ROENTGEN RAYS ON MICE. I. PRIMARY GENERAL EFFECTS. Joseph M. Murray. *Mich. Acad. Sci.* 8, 401-9 (1927).

Five ma x rays at 135 KVP, 30 cm distance, for 1 to 120 sec., 5 exposures, alternate days, one day old brown mice; 45 to 120 sec. exposures result in stunted growth,

white hair, sterility (females less than 45 sec., males 45 sec.). Longer exposures result in disturbance of nervous system and death. BA 3-11904.

317
EFFECTS OF HIGH-VOLTAGE CATHODE RAYS ON THE SKIN OF THE RAT. Victor C. Jacobson and Kenneth C. Waddell. Arch. Pathol. and Lab. Med. 5, 195-222 (1928).

Intensity of reaction varied with voltage and duration of exposure; epithelial repair was slow. Believes observations support assumption that x ray effects are due to cathode rays which they produce in tissues. BA 3-11901.

318
THE EFFECT OF PENETRATING RADIUM RAYS ON PSEUDOGLOBULIN. (German). A. Fernau. Biochem. Z. 189, 172-174 (1927).

Electrodialyzed, salt free pseudoglobulin was exposed to Ra β rays. Increased turbidity followed irradiation, and turbidity increased with addition of salt. BA 3-11900.

319
STUDIES ON THE ARNETH COUNT. VIII. THE DEFLECTION OF THE COUNT BY X RAYS. Walter P. Kennedy and Cecil A. Grover. Quart. J. Exp. Physiol. 18, 79-87 (1927). BA 3-12492.

320
THE ROLE OF TIME AND INTENSITY IN THE EFFECT OF X RAY TREATMENTS ON THE GROWTH OF SEEDLINGS. (French). Suzanne Ancel. Compt. rend. (Paris) 185, 791-792 (1927).

Lentil seedlings were exposed to radiation from Coolidge tube. Intensity varied, but product of time x intensity was kept constant. Protraction of dose decreased deleterious effect on growth. BA 3-11651.

321
WHEAT SMUT AND X RAYS. (Italian). V. Rivera. Boll. regia staz. patol. vegetable 6, 237-241 (1926). BA 3-11363.

322
LOCALIZATION OF THE ROENTGEN TUMOR DEVELOPED IN THE ROOT TIP TISSUE OF V. FABIA. (German). Hideo Komuro. Gann 22, 41-62, 1-14 (1928). BA 3-9610.

323
THE EFFECT OF β RADIATION ON ROUS CHICKEN TUMOR. J. C. Mottram. Lancet 2, 1266 (1926).

Rous chicken tumors can be destroyed by β radiation in doses comparable to x ray doses destroying mouse and rat tumors. Tumor destroying dose smaller in vivo than in vitro. Successfully treated chickens show resistance to subsequent infection. BA 3-8302.

324
THE GROWTH OF TUMOR IN TISSUES EXPOSED TO X RAYS AND RADIUM. S. Russ and G. M. Scott. Brit. J. Radiol. 32, 289-296 (1927).

Tumor grew less readily in irradiated tissues whether they were irradiated before or after tumor transplantation. (Rats). BA 3-7971.

325
EXPERIMENTAL PRODUCTION OF ACUTE AND CHRONIC ARTHRITIS AND ARTICULAR NEOPLASM BY RADIUM. A. Fisher and G. Timbrell. Brit. Med. J. 1, 319-321 (1927).

0.15 to 0.04 mgm Ra in glass tubes introduced into knee joint of rabbits produced hypertrophy of synovial membrane, articular cartilage; 2 to 0.2 mgm in Pt tubes produced suppurative arthritis, subacute arthritis, localized abscess, osteosarcoma. BA 3-7864.

326
RADIOBIOLOGICAL STUDY OF EPITHELIOMATAS OF THE UTERINE CERVIX WITH TELECURIETHERAPIE. CURVES OF PYKNOSIS OF NORMAL MITOSES AND

ATYPICAL MITOSES. A. P. Dustin. Arch. Intern. med. exp. 3, 383-449 (1927).

Description of cytological changes in irradiated tumors: after 3 days 3 phenomena occur; rapid decline in mitosis, increase in pyknotic nuclei, increase of atypical mitoses. Recovery from the latter may occur. BA 3-7559.

327
ON THE OCCURRENCE OF THE OESTRUS CYCLE AFTER X RAY STERILIZATION. III. THE PERIODICITY OF OESTRUS AFTER STERILIZATION OF THE ADULT. A. S. Parkes. Proc. Roy. Soc. (London) B. 101, 421-449 (1927).

Author sterilized adult mice with an x ray dose sufficient to destroy follicles. This did not significantly affect periodicity of oestrus. BA 3-6670.

328
INTERRELATION OF PITUITARY AND GENITAL ORGANS. (German). L. D. Podljaschuk. Strahlentherapie 24, 439-458 (1927).

Author irradiated heads of young dogs and rabbits and studied changes in hypophysis and genital organs. BA 3-6467.

329
TRANSFORMATION OF VITAMIN B INTO AUTOMATINE BY ACTIVATION UNDER INFLUENCE OF RADIUM. (French). H. Zwaardemaker. Compt. rend. soc. biol. 98, 183-184 (1928).

Irradiation confers automatine characteristics to vitamin B. Author feels that administration of irradiated vitamin B is responsible for automaticity of certain organs. BA 3-6175.

330
RAPID PROOF OF HISTOLOGICAL CHANGES AFTER X-RAYING THE SKIN. (German). Oskar Hilsnitz. Strahlentherapie 22, 525-537 (1926). BA 3-13508.

331
RADIOACTIVITY AND MUSCULAR CONTRACTION. (Italian). Oscar M. Bernardi. Boll. soc. biol. spec. 1, 335-336 (1926). BA 3-6880.

332
EXPERIMENTAL STUDIES ON THE EFFECT OF X RAY IRRADIATION UPON ANIMALS. I. ON THE DEATH OF RABBITS DUE TO THE APPLICATION OF X RAYS. (Japanese English summary). Tetsuji Kimura, Retsu Nichii, and Kiyohiko Fukahori. Sei-i-kwai Med. J. 47, 1-13 (1928). BA 3-13532.

333
CHANGES IN CHOLESTEROL METABOLISM IN CARCINOMA PATIENTS AFTER ROENTGEN TREATMENT. (German). E. Jacobs and Ryunosuke Motojima. Z. Krebsforsch. 26, 57-71 (1927).

Blood cholesterol after x-ray increases in 63% of patients with no carcinoma or sarcoma; no increase in patients representing surgical cures, but a decrease in 95% of these. BA 3-13785.

334
CLINICAL INVESTIGATIONS INTO THE BASAL METABOLISM IN DISEASES OF THE THYROID GLAND. Eggert Moller. Acta Med. Scand. Suppl. 21 (1927).

B.M.R. decreased during x ray treatment of hyperthyroidism. BA 3-13812.

335
EFFECT OF ROENTGEN RAY UPON ISOHEMOAGGLUTINATION. Tokuji Muramatsu. Japan Med. World 7, 287-292 (1927).

No change due to irradiation was observed in blood groups of 30 patients studied before and after therapy. BA 3-14164.

336

INFLUENCE OF RADIUM ON THE METABOLISM OF BACTERIA WHICH PLAY A PART IN THE NITROGEN CYCLE OF NATURE. (German). J. Stoklasa and J. Kricka. *Centr. Bakteriolog. Parasiten K. II Abt.* 74, 161-183 (1928).

In general, influence of rays considered to be favorable to processes studied. BA 3-14698.

337

SOME BIOLOGICAL MODIFICATIONS PRODUCED BY THE ACTION OF RADIUM ON *A. FUMIGATUS*. (French). A. Sartory, R. Sartory, and J. Meyer. *Bull. sci. pharmacol.* 34, 273-277 (1927).

Pathogenicity of the organism for pigeons decreased after irradiation. BA 3-14511.

338

VARIATIONS IN ALKALOID CONTENT OF POMEGRANATE UNDER INFLUENCE OF CERTAIN CHEMICALS. (French). E. Maurin. *Bull. soc. botan. France* 75, 280-282 (1928).

Thorium X (Ra^{224}) added to soil low in Ca, high in silica at base of trees gave large increase of alkaloid in the root but only slight increase in stem. BA 3-15257.

339

THE ROLE OF THE SPLEEN IN BLOOD FORMATION. (German). St. Weiss and E. Kolta. *Z. ges. exp. Med.* 57, 157-163 (1927).

Dogs' spleens were x-rayed until peripheral blood WBC decreased and RBC increased. Spleens were then removed, spleen extract prepared and injected into rabbits. Extracts did not change rabbit WBC counts, but increased RBC counts. BA 3-15750.

340

X-RAYS AND P/W CONSTANT. (French). N. Waterman. *Arch. neerl. Sci.* III, C 13, 587-588 (1928).

P/W constant $\frac{P \text{ (polarization of cell surface)}}{W \text{ (resistance in Ohms)}}$.

is a measure of cell permeability. It varies with exposure of cell to x rays, is low in carcinoma cells, but brought to normal after irradiation. BA 3-11711.

341

EFFECT OF RADIUM EMANATION ON MICRO-ORGANISMS. (French). Herman von Schroetter. *Compt. rend. soc. biol.* 97, 462 (1927).

Describes species differences in sensitivity to Ra emanations. BA 3-20733.

342

EXCITATION OF BACTERICIDAL FLUORESCENCE BY MEANS OF X-RAYS. P. R. Peacock and L. E. H. Whitby. *Brit. J. Exp. Pathol.* 8, 43-49 (1927).

Observations on guinea pigs and rabbits indicating that calcium phospho-tungstate emits bactericidal wave lengths when excited by x-rays and can be used subcutaneously for bactericidal purposes. BA 3-20705.

343

CULTIVATION OF *TRICHOMONAS BUCCALIS*, A PROTOZOAN OF THE HUMAN MOUTH. H. Corwin Hinshaw. *Univ. Calif. (Berkeley) Publs. Zool.* 31, 31-49 (1927).

T. buccalis may multiply for 72 hr in contact with a capsule containing 50 mg. of Ra. BA 3-20250.

344

HYPERPLASIA OF LYMPHOID TISSUE AND LYMPHOCTOSIS. Caroline Whitney. *Medicine* 7, 1-29 (1928).

Author mentions lymphocytosis secondary to x-irradiation when properly applied. BA 3-19577.

345

CHANGES IN THE FUNCTIONAL CONDITION OF BLOOD VESSELS AFTER X RADIATION. (German). N. W. Lazarew and Amo Lazarewa. *Strahlentherapie* 25, 458-469 (1927).

Observations on isolated, perfused dog ear, and on tongue and web of frog reveal no change in tonus of capillaries during radiation. BA 3-19083.

346

IRON STORAGE AND METABOLISM. (German). L. Schwarz. *Verhandl. deut. pathol. Ges.* 23, 118-122 (1928).

Following x ray exposure, oat-fed mice develop spleen siderosis. Following x-ray exposure, bread and milk fed mice do not develop spleen siderosis. (Food Fe stored only in liver cells, Fe of blood destruction stored in spleen and Kupffer cells). BA 3-18394.

347

THE ENZYMES OF THE SKIN. VIII. LACTIC ACID FORMATION IN THE SKIN AND THE EFFECT THEREON OF DIFFERENT SORTS OF RADIATIONS. (German). J. Wohlgemuth and Toshisuke Ikebata. *Biochem. Z.* 186, 43-53 (1927).

Studied lactic acid production when various sugars were added to skin specimens: compared human cadaver skin and fresh skin from humans and animals. Activity of skin enzymes was decreased by sunlight, artificial light and particularly by x rays. BA 3-18333.

348

A PERMEABILITY TEST WITH RADIOACTIVE INDICATORS. Karl Lark-Horovitz. *Nature* 123, 277 (1929).

Used radioactive indicators to test permeability of single cells of *Valonia macrophysa*: found Pb ions do not enter sap of living cell, but enter sap of dead cells readily. Ra emanation distributed evenly between sap of living cell and surrounding sea water in 1 hr. BA 3-17875.

349

BIOLOGY OF URANIUM. (German). Julius Stoklasa and Jos. Penkava et al. *Biochem. Z.* 194, 15-77 (1928).

Describes action of U on metabolism of bacteria, seed germination, transpiration, and development of plants in culture media and vegetation vessels: also physiological effects of various types of radiation from U on germination and development of plants. BA 3-17859.

350

EXPERIMENTAL OBSERVATIONS OF THE BIOLOGICAL EFFECTS OF DEEPLY PENETRATING ROENTGEN RAYS UPON PLANTS. Subodh Mitra. *Calcutta Med. J.* 23, 73-77 (1928).

Sprouting cosmos and pansies exposed to x rays showed marked retardation of growth including diminution in size of flowers. BA 3-17847.

351

THE EFFECT OF FRACTIONAL DOSES OF X RAYS ON GERMINATING SEEDS. (French). Suzanne Ancel. *Compt. rend. soc. biol.* 98, 223-224 (1928).

Divided dosage caused less injury to lentil seedlings. BA 3-17829.

352

QUARTERLY REPORT OF BIOLOGICAL AND MEDICAL RESEARCH DIVISION. (1956). 102 p. Argonne National Lab., Lemont, Ill. Contract W-31-109-eng-38. ANL-5576.

Includes reports on: effects of irradiation on immunity to parasitic infections (mice) and hemolysin production; effect of age, parity and litter size on lethal effectiveness of whole body x irradiation in 4 inbred mouse strains; survival of mice given large doses, single and repeated of γ rays; dose-exposure time influence on radiation response (chick); other studies in dogs and amoebae. NSA 10-6460.

353

THE PRODUCTION OF PERITHECIA IN *A. FUMIGATUS*. (French). A. Sartory, R. Sartory, and J. Meyer. *Bull. sci. pharmacol.* 34, 427-429 (1927).

Sexually induced by Ra exposure results in limited acid zone of growth due to liberation of an electrolyte

into medium. It is related to production of enzymes and reflects change (decrease) in cell permeability. BA 3-17911.

354
ELECTROMAGNETIC HYBRIDS OF ZEA MAYS. (Italian). A. Pirovano. Ann. botan. (Rome). 17, 347-356 (1928). BA 3-17379.

355
THE REGIONALLY DIFFERENTIAL EFFECT OF X RAYS ON CROSSING OVER IN AUTOSOMES OF DROSOPHILA. H. J. Muller. Genetics 10, 470-507 (1925). BA 3-17327.

356
EFFECT OF X-RAYS ON THE RESPIRATION OF ROOT-TIPS OF V. FABA. (German). Egon Bersa. Akad. Wiss. Wien Math-naturw. Kl. Sitzber. Abt. I. 136, 403-418 (1927).

Respiration is depressed by irradiation. Influence of rays is independent of normal intensity of respiration. RQ is unaltered by irradiation. (Studies utilized Haldane gas analysis method). BA 4-590.

357
EFFECT OF X-RAYS ON SEEDS. Ruth E. P. Patten and Sylvia B. Wigoder. Nature 123, 606 (1929).

Broad bean, barley, and mustard seeds were irradiated with 3 HED (120 KV). All seedlings had growth stunted. Roots of broad bean became bulbous at tip and failed to develop laterals. BA 4-624.

358
EXPERIMENTS ON THE EFFECT OF X-RADIATION ON GROWING SEEDLINGS. M. C. Reinhard, and K. L. Tucker. J. Cancer Research 12, 26-29 (1928).

Radiosensitivity depends upon species, age of plant, time of day when irradiated, and part radiated. Four periods of max. sensitivity in 24 hr described for V. faba. BA 4-628.

359
ACTION OF X-RAYS AND DRUGS ON YEAST. III. ACTION OF X-RAYS ON YEAST. (German). Heinrich Zeller. Strahlentherapie 23, 336-353 (1926). BA 4-632.

360
OBSERVATIONS ON THE COMBINED ACTION OF COLLOIDAL LEAD AND RADIATION ON TUMORS. J. C. Mottram. Brit. Med. J. 1, 132-133 (1928).

Studied mice inoculated with T/63 tumor. Best results were obtained when Pb injected first, followed in 3-4 days by radiation (RaBr₂ applicator, filtered through 0.15 mm. Ag for 15 min. applied for 5 consecutive days). This treatment caused tumor to disappear. BA 4-1220.

361
COMPARATIVE STUDIES OF ACCELERATED AMPHIBIAN METAMORPHOSIS. E. A. Spaul. Brit. J. Exp. Biol. 5, 212-231 (1928).

Exposure of tadpoles to x rays increased the susceptibility to factors accelerating metamorphosis. X-ray effect increased with age. BA 4-2429.

362
A MORPHOLOGICAL ANALYSIS OF THE FOOT ABNORMALITIES OCCURRING IN DESCENDANTS OF X-RAYED MICE. Achsa M. Bean. Am. J. Anat. 43, 221-246 (1929).

A series of at least 17 types of foot abnormalities observed, varying in severity. Reduction of tarsal or carpal bones by fusion found in practically all abnormal feet. BA 4-2437.

363
THE EFFECT OF X-RAYS ON NUCLEAR DIVISION IN THE ROOT TIPS OF ZEA MAYS. (German). Egon Bersa. Akad. Wiss. Wien. Math-naturw. Kl., Sitzber. Abt. I. 136, 383-402 (1927).

Root tips exposed to 4.8 or 16 H units showed depression of nuclear divisions with return to normal rate

after varying periods depending upon dose (greater dose, longer effect.) Abnormal mitoses (observed after 36 hr) considered a secondary effect. BA 4-3806.

364
TUBERIZATION OF POTATOES INCREASED BY X-RAYS. Edna Louise Johnson. Science 68, 231 (1928). BA 4-3816.

365
COMPARATIVE STUDIES OF CYTOLOGICAL CHANGES IN THE ROOT TIPS OF PLANTS TREATED WITH COAL TAR OR X RAYS. (German). Hideo Komuro. Proc. Imp. Acad. (Tokyo) 3, 445-448 (1927).

Roots of V. faba were exposed to coal tar 30 min. to 5 days; roots of Pisum sativum exposed to coal tar 15 min. Results: marked changes (degenerative) in nucleus; often disintegration. X rays had similar but less harmful effect. In both cases: some type of dissolution. BA 4-3817.

366
HOURLY VARIATIONS IN EFFECT OF EQUAL ROENTGEN RAY DOSES ON GROWTH OF V. FABA SEEDLINGS. M. C. Reinhard and K. L. Tucker. Am. J. Roentgenol. 19, 71-73 (1928).

Greatest radiosensitivity at 10:00 AM, 11:00 AM, 1:00 PM and 5:00 PM. Seedlings most sensitive after appearance of root tip, and prior to appearance of side rootlets. BA 4-3826.

367
EFFECT OF RA ON MORPHOLOGY AND BIOLOGY OF ADULT VEGETABLE CELLS. (French). A. Sartory, R. Sartory, and J. Meyer. Bull. Sci. Pharmacol. 34, 553-564 (1927). BA 4-3827.

368
EFFECT OF X RAYS ON TERMITES. D. L. Crawford. Proc. Hawaiian Ent. Soc. 7, 36 (1927).

Kaloterms immigrants exposed to various strength x rays (max. 30 kv) for 5 to 30 min were apparently unaffected. BA 4-3927.

369
RADIUM AND ITS ACTION. W. E. Dixon. Brit. Med. J. 1, 238-240 (1929).

Describes lethal effects of radium radiation in guinea pig, rabbit and mouse, and symptoms and histological changes in animals subjected to lethal doses. Also includes descriptions of: effects on embryos, bacteria, variable tissue radiosensitivity; effects of ingested radium. BA 4-3929.

370
EXPERIMENTS ON THE ROLE OF LYMPHOID TISSUE IN THE RESISTANCE TO EXPERIMENTAL TUBERCULOSIS IN MICE. J. B. Murphy and A. W. M. Ellis. J. Exp. Med. 20, 397 (1914).

Repeated small doses of x ray destroy most of the mouse's lymphoid tissues without causing apparent injury to other tissues or harming general health. Destruction of lymphoid tissue increases the mouse's susceptibility to tuberculosis.

371
EFFECT OF EMANATION ON STRIATED MUSCLE. (French). Isidore Gunzburg. Arch. intern. physiol. 26, 21-32 (1926).

Removal of K causes altered contractility. K may be replaced by other radioactive substances and by emanation. BA 4-3932.

372
THE EFFECT OF ROENTGEN-RAYS ON THE FUNCTION OF THE STOMACH. K. Ihima. Jap. J. Obstet. Gynec. 11, 53-58 (1928).

Feels effect of radiation on stomach function is related to effect of radiation on the individual's blood

pressure. Secretion decreased or unchanged when B. P. rises: secretion accelerated in persons whose B. P. decreases. BA 4-3933.

373
EFFECTS OF ROENTGEN RAYS UPON THE FETUS. I. INVESTIGATIONS OF THE INFLUENCE AND EFFECT OF ROENTGEN-RAYS UPON THE MOUSE FETUS. SH. Kosaka. Jap. J. Obstet. Gynec. 10, 34-39 (1927). BA 4-3934.

374
RADIUM EMANATION AND GOITRE. R. R. D. Milligan and N. M. Rogers. Trans. Proc. New Zealand Inst. 59, 389-394 (1928).

Continuous addition of Rn to water in which trout were reared did not produce goitre in 6 months. Rn given intravenously in mammals is excreted rapidly by lungs, only minute quantity can traverse arterial (including thyroid) system. BA 4-3936.

375
TOLERANCE TO X-RAYS OF ANIMALS FED A LIPOGENIC DIET. (French). A. Sartory, R. Sartory, and J. Meyer. Bull. Acad. med. (Paris) 100, 856-858 (1928). BA 4-3937.

376
INFLUENCE OF X-RAYING ON THE FUNCTION OF THE RETICULO-ENDOTHELIAL SYSTEM. (German). H. Zacherl. Wien. klin. Wochschr. 41, 1613 (1928). Preliminary report. BA 4-3939.

377
BEHAVIOR OF BLOOD CHOLESTEROL AFTER IRRADIATION OF THE LIVER. (Italian). G. Margreth. Boll. soc. it. biol. sper. 2, 507-508 (1927).

X irradiation of liver did not change blood cholesterol level. BA 4-4031.

378
THE EFFECT OF X-RAYS ON THE ADRENAL GLANDS. N. F. Fisher, E. Larson, and A. Bachem. Endocrinology 12, 335-341 (1928).

Four human erythema dose (H.E.D.) of x ray to left adrenal (dogs); no adrenal deficiency when sacrificed 3, 6, and 9 weeks later. Five H.E.D. 5 weeks after rt. adrenalectomy caused death 6-1/2 months later with signs of adrenal insufficiency. All x-rayed adrenals showed some cortical destruction. No change in blood cholesterol. BA 4-4246.

379
CHANGES IN NORMAL EYE TISSUES AFTER RADIATION. II. GENERAL EFFECT OF X-RAYS AND CHANGES IN CORNEA, CONJUNCTIVE AND UVEA AFTER RADIATION. (German). Wilhelm Rohrschneider. Graefe's Arch. Ophthalmol. 212, 537-559 (1929).

Smallest dose producing changes in corneal epithelium (rabbit): 1340 r (0.5 mm Cu. 3 mm Al): 980 r (3 mm Al). No uveal injury. BA 4-4409.

380
SENSITIVITY TO X-RAYS OF GERMINATED SEEDS AT DIFFERENT STAGES OF DEVELOPMENT. (French). Suzanne Ancel. Compt. rend. soc. biol. 96, 986-989 (1927).

Lentil seedlings were irradiated with 200-1000 r at different stages of development. Sensitivity to x rays increases progressively from appearance of germ until root length is 10 mm. thereafter decreases. Used growth as criterion of effect. BA 4-11046.

381
ON THE BEHAVIOR OF CHLORINE IN ERYTHROCYTES AFTER ROENTGEN RADIATION. (German). Ludwig Koch. Strahlentherapie 25, 470-475 (1927).

Determined Cl in blood and plasma (method of Austin and van Slyke), and blood cell volume after

exposure to 600 r. RBC volume increased in all cases; Cl entered RBC except in patients with vagotonia. BA 4-11170.

382
REACTIONS OF HUMAN SKIN TO SINGLE DOSES OF BETA RAYS. IN: BIOLOGICAL EFFECTS OF EXTERNAL BETA RADIATION. Ed. by Raymond E. Zirkle, New York, McGraw-Hill Book Co., Inc. 1951. J. E. Wirth and J. R. Raper. National Nuclear Energy Series IV. 22E, Chapter 12, p. 193-99.

Threshold reaction (mild tanning) can be produced in 80 per cent of those exposed to the beta radiation from a 1 inch P³² contact disk by a dose of 200 rep and in only 60 per cent of those exposed to 170 rep. Threshold erythema may be produced under similar circumstances in 80 per cent of those exposed to 813 rep and in 60 per cent of those exposed to 635 rep.

383
HISTOLOGICAL CHANGES IN RADIUM IRRADIATED CARCINOMA. (German). August Matras. Wien. klin. Wochschr. 42, 293 (1929). BA 4-11932.

384
GENETICAL AND CYTOLOGICAL PROOF OF TRANSLOCATION INVOLVING THE THIRD AND FOURTH CHROMOSOMES OF *D. MELANOGASTER*. Theodore Dobzhansky. Biol. Zentr. 49, 408-419 (1929).

Five cases of translocation between the 3rd and 4th chromosomes were observed in progeny of flies treated by x rays. BA 4-14036.

385
DURATION OF THE EFFECTS OF X-RAYS ON MALE GERM CELLS IN *D. MELANOGASTER*. Frank Blair Hanson and Florence Heys. Am. Naturalist 63, 511-516 (1929).

When irradiated (x ray or Ra) males are continuously mated, sperm which are mature at time of treatment function for approximately 2 weeks, after which mutation rate drops sharply due to fertilization by sperm maturing after treatment. (Muller's CLB method for detecting lethals used). BA 4-14040.

386
THE DIFFERENCE BETWEEN ROENTGEN TUMORS AND THE LATERAL ROOTS INDUCED IN ROOTS DEVELOPED FROM IRRADIATED *V. FABA* SEEDS. (German). Hideo Komuro. Proc. Imp. Acad. (Tokyo) 4, 404-406 (1928). BA 4-14238.

387
ATTEMPT AT ENERGY INTERPRETATION OF THE ACTION OF K RAYS OF AL ON MICROBES. (French). F. Holweck. Compt. rend. (Paris) 186, 1318-1319 (1928).

300 pairs of ions required per 1 *B. pyocyaneus* in order to modify development: 6,000 ions lethal for most of the organisms but 45,000 ions necessary for complete sterilization (figures are means). BA 4-14332.

388
ACTION OF K RAYS OF AL ON VARIOUS MICROBES. (French). A. Lacassagne. Compt. rend. Acad. Sci. (Paris) 186, 1316-1317 (1928).

Determined relative sensitivity of *B. pyocyaneus*, *B. prodigiosus*, *Staphylococcus*, and *Enterococcus*. Relative sensitivity to β rays of Rn similar to that to K rays of Al. BA 4-14333.

389
INFLUENCE OF ROENTGEN RADIATION ON THE CHOLESTERIN CONTENT OF THE BLOOD IN HEALTHY AND DISEASED HUMAN BODIES. (German). M. Levy-Dorn and F. Burgheim. Strahlentherapie 22, 538-549 (1926). BA 4-14540.

390
HEREDITARY ABNORMALITIES OF LIMBS. THEIR

ORIGIN AND TRANSMISSION. H. J. Bagg. *Am. J. Anat.* **43**, 167-219 (1929).

Studies on descendents of x irradiated mice.

391

INTERRELATIONSHIPS BETWEEN EFFECTS OF HEPARIN, PROTAMINE, CITRATE AND TOTAL BODY X-IRRADIATION ON PLASMA AND SERUM BACTERICIDAL ACTION. D. M. Donaldson and S. Marcus. *Federation Proc.* **14**, 461 (1955).

A decrease in bactericidal action followed the intravenous injection of 500 units of heparin into normal rabbits. Attempts to reverse or halt the development of the post-irradiation suppression of serum bactericidal function by single or multiple injections of protamine sulfate were unsuccessful. Heparin added to normal blood *in vitro* before coagulation decreased the bactericidal action. (from authors' summary).

392

LOCAL IMMUNIZATION AGAINST CANCER BY IRRADIATION. (German). Boris Sokoloff. *Z. Krebsforsch.* **28**, 256-265 (1929). BA 4-15158.

393

EFFECT OF RA ON JENSEN RAT SARCOMA. (Italian). Guido Tizzoni and Giovanni de Angelis. *Mem. reale accad. naz. Lincei, Classe sci. fix. mat. e nat.* **2**, 249-263 (1927). BA 4-15483.

394

SIGNIFICANCE OF THE SOFT ROENTGEN RAYS FOR IRRADIATION TESTS WITH BACTERIA. (German). Otto Gaertner. *Strahlentherapie* **22**, 327-332 (1926). BA 4-15628.

395

A PHENOMENON OF PSEUDO-EXCITATION PRODUCED BY X-RAYS ON DORMANT COTYLEDONARY BUDS OF THE LENTIL. (French). Suzanne Ancel. *Bull. soc. bot. France* **72**, 1084-1088 (1926).

Exposed 16 seedlings in H₂O culture to x rays, the roots shielded. The 10th day after exposure, stem length was 46 mm; axillary buds had produced branches 16 mm long. Latter effect not stimulation, but result of damage to main stem terminal bud. BA 4-7374.

396

ENZYME INCREASE IN SERUM AFTER LIGHT AND ROENTGEN RADIATION, AN INDEX FOR CELL DECOMPOSITION PROCESSES. (German). Albrecht Mertz. *Strahlentherapie* **22**, 301-318 (1926).

Observations on patients receiving radiation therapy.

BA 4-7447.

397

EFFECT OF ROENTGEN RADIATION OF SYMPATHETIC NERVES ON SWEAT SECRETIONS. (Bohemian with French resumé). Olga Valentová. *Česka Dermátol.* **10**, 43-49 (1929).

Following radiation, sweat may be increased in amounts, unchanged or diminished. Secretory response corresponds to distribution of specific nerves irradiated (i.e. radiation of neck causes changes in axillae and palms; of lumbar regions, changes in soles of feet.) BA 4-7847.

398

PROTECTIVE INOCULATION AGAINST TUBERCULOSIS WITH LIVING BACILLI WEAKENED BY RADIATION. (German). Vincenzo Bisceglie. *Z. Immunitätsforsch.* **49**, 272-283 (1926).

X-ray depressed virulence of tubercle bacilli as shown by both inoculation and dye tests, x-ray effect being proportional to intensity. Guinea pigs vaccinated with irradiated bacilli and subsequently with virulent organisms did not develop TB. Controls died in 2-1/2 month. BA 4-8461.

399

EFFECT OF X-RAYS ON SPECIFIC IMMUNE BODIES.

(German). Alexander Luszitig. *Centralbl. Bakt. I. Abt. Orig.* **105**, 142-151 (1927). BA 4-8596.

400

EFFECT OF ROENTGEN RAYS ON IN VITRO CULTURES OF CHICKEN FIBROBLASTS AND PEYTON-ROUS CHICKEN SARCOMA. (German). L. Santesson. *Uppsala Läkarefören. Förh.* **34**, 591-602 (1928).

There was always a latent period between exposure and appearance of growth retardation. With exposure of 4-5 HED all cultures degenerated 7 days post exposure. Sarcoma more radio-resistant than fibroblasts. BA 4-8766.

401

SENSITIZATION BY SECONDARY RAYS FROM METALLIC SURFACES. RESEARCHES ON PHOTOGRAPHIC EMULSIONS AND SURFACE BACTERIAL CULTURES. (German). H. Holthusen, A. Schuback, and H. Sielmann. *Strahlentherapie* **24**, 577-606 (1926-1927). BA 4-8972.

402

THE ROENTGEN RAYS IN EMBRYOLOGY AND OBSTETRICS. (German). W. Dorland, A. Newman, and Maximilian John Hubeny. 3 Vols. Translated by W. Lahm, Otto Nemnich, Kempten. i. A., Germany (1928). BA 4-9852.

403

DOES NATURAL IONIZING RADIATION CONTROL RATE OF MUTATION? E. B. Babcock and J. L. Collins. *Proc. Nat. Acad. Sci. U. S.* **15**, 623-628 (1929).

Authors conclude (on basis of *Drosophila* studies at 2 sites differing in amounts of ionizing radiation by ratio of at least 2:1) that natural ionizing radiation of the earth is an important factor in evolution. BA 4-10830.

404

THE PRODUCTION OF MUTATIONS IN SOMATIC CELLS OF *D. MELANOGASTER* BY MEANS OF X-RAYS. John T. Patterson. *J. Exp. Zool.* **53**, 327-372 (1929).

Author irradiated eggs and larvae; studied sex linked gene for eye color. Size of variant area was greater when treatment was given during early developmental stages. Variant areas were due in part to gene mutations, in part to breaks in x-chromosome followed by loss of x-chromosome fragment. BA 4-10844.

405

STUDIES ON THE CELL GROWTHS OF PLANTS INDUCED BY ROENTGEN RADIATION. I. ON THREADLIKE BODIES OF THE ROENTGEN TUMORS OF THE ROOT TIP OF *PISUM SATIVUM*. (German). Hideo Komuro. *Z. Krebsforsch.* **28**, 371-373 (1929). BA 4-7193.

406

FUNDAMENTALS OF THE BIOLOGICAL ACTION OF RADIATION. (German). Hans Meyer. *Arch. Dermatol. u. Syphilis* **155**, 22-43 (1928). BA 5-602.

407

THE EFFECT OF X RAYS ON THE SPERMATOZOA OF *DROSOPHILA*. L. G. Barth. *Physiol. Zool.* **2**, 172-180 (1929).

Experiments described demonstrate a differential susceptibility of the X and Y sperm to x rays, resulting in a deficit of functional X sperm and an altered sex ratio of the progeny of x-rayed flies. BA 5-613.

408

THE INFLUENCE OF X RAYS ON THE DEVELOPMENT OF *DROSOPHILA* LARVAE. R. G. Hussey, W. R. Thompson, and E. T. Calhoun. *Science* **66**, 65-66 (1927).

Irradiation prolonged the larval stage, prolongation being approximately proportional to dose. BA 5-617.

409

SOME EFFECTS OF DEEP X RAYS ON THE CELLS OF THE BLOOD. F. A. Knott and W. L. Watt. *Brit. Med. J.* **1**, 542-543 (1929).

Leukocytes of patients receiving radiation therapy take up fewer staphylococci after therapy is started. The number of staphylococci/leukocyte decreases by 30-50% depending upon the dose and the site irradiated. BA 5-619.

410
PHYSICO-CHEMICAL ACTION OF X RAYS IN ORGANISMS. (German). G. D. Lieber. *Strahlentherapie* 29, 139-151 (1928).

K is limited to the region of hair follicles and under the epidermis; Ca is present in the form of a regular network in the skin of non-irradiated rat. After depilatory radiation, K falls to 0 and Ca is densely packed around hair follicles and in a dense layer under the epidermis. Distribution of Ca and K returns to normal prior to the regrowth of hair and epidermis. BA 5-622.

411
ACTION OF X RAYS ON HEALTHY AND DISEASED SKIN. (German). Karl Linser. *Fortschr. Therap.* 5, 117-122 (1929).

X rays have a destructive effect upon cells of the skin: especially on nuclei. Desensitization of the skin to x rays by exposure to successive small doses does not occur. BA 5-623.

412
INVESTIGATIONS ON RAYING OF INFLAMMATIONS. (German). Richard Mittermaier. *Deut. Z. Chir.* 203-204, 557-574 (1927).

X-radiation at the beginning of inflammation causes an increase of inflammatory edema which acts as a check on abscess formation. Radiation after inflammation has started increases the intensity of the response. Wounds heal more readily in irradiated animals. BA 5-625.

413
THE EFFECTS OF RADIUM AND RADIUM IN COMBINATION WITH METALLIC SENSITIZERS ON ENDAMOEBIA DYSENTERIAE IN VITRO. Elizabeth Custer Nasset and Charles A. Kofold. *Univ. Calif. (Berkeley) Publs. Zool.* 31, 387-416 (1928).

β and γ rays of Ra first stimulate then depress division of *E. dysenteriae* in vitro. Both produce morphological changes in cultures. Large dose given over short time is more effective than smaller doses acting over a long period. Sublethal doses of Hg or Pb given prior to radiation caused radiation to kill the cultures. BA 5-626.

414
THE SIGNIFICANCE OF WEAK X RADIATIONS ON THE BACTERICIDAL IMMUNITY POWER OF THE BLOOD. (German). G. J. Pfalz. *Arch. Gynäkol.* 138, 93-110 (1929).

Small x-ray doses (10% E.D.) increased the bactericidal action of the blood, the effect being the same as that following autovaccines or injections of proteins. BA 5-628.

415
RADIOACTIVE SUBSTANCES IN A BODY FIVE YEARS AFTER DEATH. A. V. St. George, Alexander O. Gettler, and Ralph H. Muller. *Arch. Pathol.* 7, 397-405 (1929).

Ra content of the entire skeleton was found to be 48,282 μ g. Bombardment of bones by Ra rays caused increased brittleness and necrosis. BA 5-630.

416
PIGMENT ATROPHY IN THE HORSE FOLLOWING X-RAY TREATMENT. (German). Karl Schoupe. *Münch. tierärztl. Wochschr.* 81, 77-78 (1930). BA 5-631.

417
INVESTIGATION OF THE BIOLOGICAL EFFECTS OF X RAYS BY THE TISSUE EXPLANTATION METHOD. (German). Martin Schubert. *Deut. Med. Wochschr.* 54, 429-430 (1928).

Author studied effect of x-irradiation on chick tissue cultures; concluded that radiation effect is not specific, and is due largely to protein degeneration products induced by radiation. BA 5-632.

418
MODIFICATION OF TISSUE PERMEABILITY BY X RAYS. (French). Tsebrikow. *Arch. intern. méd. exp.* 3, 185-199 (1927).

Measured electrical impedance of excised mouse tissues; found that cancer and x rays both decreased specific resistance, x rays causing the greater decrease. Large doses caused greater decrease than small doses; influenced cancerous tissue more than normal tissue. BA 5-633.

419
RADIOSENSITIVITY IN THE PERIOD OF REACTION. (Italian). Alessandro Vallebona. *Atti Raduno Radiologi dell' Alta Italia, Brescia-Gardone* 6, 1928 (1929).

Believes there is a period following the first appearance of erythema and preceding extreme reaction when administration of a 2nd dose gives a greater effect than the total dosage administered at one time. BA 5-635.

420
HISTOLOGY OF SKIN SENSITIZED TO X RAYS. (German). H. G. Bode and E. Riecke. *Strahlentherapie* 35, 265-289 (1930).

X radiation of skin previously treated with chemical irritants increased the inflammation and produced degenerative changes. BA 5-1324.

421
MODIFIED LYMPH NODES FROM DOGS WITH A KNOWN HISTORY OF IRRADIATION, INCLUDING A NOTE ON GLOBULE LEUCOCYTE FORMATION. Alden Benjamin Dawson. *Anat. Record* 36, 1-29 (1927). BA 5-2719.

422
EXPERIMENTAL STUDIES ON THE HISTOLOGY OF THE MAMMALIAN THYMUS. Ruth Deanesly. *Quart. J. Microscop. Sci.* 72, 247-275 (1928).

Involution of mouse thymus was induced by irradiation, and histological changes during involution and subsequent regeneration are described. BA 5-2720.

423
PHOSPHORESCENCE OF BACTERIA AND FUNGI. PARALLELISM. (French). René Guyot. *Rev. gén. sci.* 39, 113-116 (1928).

The action of radium on light production by bacteria and fungi is included in the paper. BA 5-3970.

424
INFLUENCE OF WHOLE BODY IRRADIATION ON INTRACELLULAR DIGESTION BY MOUSE PHAGOCYTES. D. M. Donaldson, S. Marcus, and K. K. Gyi. *Federation Proc.* 13, 490 (1954).

Peritoneal exudation was induced in mice by injecting a saline solution of glycogen: then chicken erythrocytes were injected intraperitoneally. Following ingestion of erythrocytes by the exudate phagocytes the most marked change is disintegration of the erythrocyte nuclear chromatin. Disintegration of nuclear material was inhibited with doses of 350 r whole body x irradiation.

425
USE OF RADIOACTIVITY IN HORTICULTURE. (German). J. Stoklasa. *Gartenbauwiss.* 1, 141-153 (1928).

Radioactive water and moderate irradiation of seed increased growth and yields. BA 5-3973.

426
THE EFFECT OF RADIOACTIVITY ON THE ENZYMATIC ACTIVITY OF BLOOD CATALASE. (Italian). Renzo Agnoli. *Atti. Soc. ligust. Sci. lett.* 7, 134-142 (1928).

In general radiation had a deleterious effect. BA 5-4002.

427

BIOLOGICAL ACTION OF IRRADIATION. (German). Friedrich Dessauer. *Strahlentherapie* 30, 506-518 (1928).

Biological effects of x rays are considered to be due to action on large molecules, particularly albumin. Studied x-ray and ultra violet effects on albumin solution and attributed observed effects to a point of intense heat resulting from emission of photoelectrons by absorbed quanta. (Point heat theory). BA 5-4034.

428

THE BIOLOGIC ACTION OF SHORT WAVE RAYS ON CELL METABOLISM. (German). Karl Adler. *Strahlentherapie* 30, 1-31 (1930).

Rat testes exposed to 600 r or 2500 r of x rays or to 2400 mgm hr of Ra demonstrated decreased tissue respiration and increased aerobic and anerobic glycolysis, the metabolic changes being parallel to histological changes. Radiation induced metabolic changes were similar to metabolism of malignant tumor tissue. BA 5-4059.

429

INFLUENCE OF X RAYS ON THE DEVELOPMENT OF "FISCHER'S PHENOMENON". (Italian). L. Avellone. *Ann. Clin. Med.* 18, 99-108 (1928).

Antecedent x irradiation intensifies the aseptic inflammatory response in the connective tissue of the rabbit's ear following injection of a foreign substance. Nature of the response (Fischer's Phenomenon) not changed. BA 5-4060.

430

INJURY TO GROWTH AFTER THERAPEUTIC X-RAYING. (German). A. Beck. *Strahlentherapie* 32, 517-533 (1929).

Seven cases (young adults or children) are described in which localized inhibition of skeletal growth followed localized radiation therapy. Effect was most prominent in long bones and feet. BA 5-4061.

431

THE BIOLOGICAL APPLICATIONS OF INTRA-ATOMIC ENERGY. (Italian). Eugenio Centanni. *Atti. soc. ital. progr. sci.* (Rome) 1926, 377-387 (1927).

Radiations due to or associated with atomic breakdown are briefly discussed. Biological effects of radiation are reviewed. BA 5-4062.

432

A THEORETICAL CONSIDERATION OF THE ACTION OF X-RAYS ON THE PROTOZOAN CALPIDIUM COLPODA. Harry Clark. *J. Gen. Physiol.* 10, 623-636 (1927).

A hypothesis (an alternative to Crowther's "small body theory") is proposed to account for variation in lethal x ray doses among individual *Colpidium colpoda*. BA 5-4063.

433

PROPHYLACTIC IRRADIATION AGAINST INFLAMMATION. (German). Shuichi Fukase. *Strahlentherapie* 36, 95-101 (1930).

X irradiation of wounded abdominal skin of rabbits with 350 r caused acceleration of healing. Hard x rays were more effective than soft x rays. BA 5-4065.

434

THE EFFECT OF ROENTGEN IRRADIATION ON WOUND HEALING. (German). Shuichi Fukase. *Strahlentherapie* 36, 102-104 (1930).

X-irradiated half of cutaneous wounds of abdominal skin of rabbits healed by first intention; non-irradiated half granulated first. BA 5-4066.

435

THE EFFECT OF X-RAYS ON CHOLESTEROL AND ITS FATTY ACID ESTER IN VITRO AND IN VIVO. (German). Rudolf Hummel. *Strahlentherapie* 36, 533-538 (1930).

Free cholesterol and its fatty acid ester dissolved in chloroform are destroyed by x rays; not destroyed when dissolved in fat or when in the blood serum *in vitro*. Cholesterol *in vivo* (mouse liver stores) also not destroyed. BA 5-4070.

436

THE EFFECT OF X-RAYS ON THE PERMEABILITY OF THE CELL MEMBRANE. (German). K. Kovács. *Strahlentherapie* 30, 77-85 (1928).

X radiation causes increased permeability of frog skin (to salt, sugar; not to hemolysin, albumin or dye) and of frog heart (to methyl violet). Postulates effect on permeability is related to change of charge at cell membrane. BA 5-4071.

437

EFFECT OF THORIUM ON LACCASE. (French). Alfred Maubert. *Compt. rend.* 184, 781-783 (1927).

Laccase (diastase) is activated by 1 to 5 μ g of Th; inactivated by 10 μ g or more. BA 5-4074.

438

INFLUENCE OF X-RAYS ON THE FUNCTIONS OF THE RETICULO-ENDOTHELIAL SYSTEM. (German). J. P. Mischtschenko. *Strahlentherapie* 32, 154-162 (1929).

Intravenously administered trypan blue disappeared less rapidly from blood of x-rayed than of non-irradiated rabbits. Author postulates that x radiation inhibits activity of reticulo-endothelial system. BA 5-4075.

439

ACTION OF X-RAYS ON TUMORS. E. H. Molesworth, B. J. Harrison, J. G. Stephens, and L. Keating. *J. Cancer Research Comm. Univ. Sydney* 1, 179-183 (1929).

Authors oppose theory that size is a determining factor in response of tumor to radiation therapy. BA 5-4076.

440

X-RAY SENSITIZATION. III. THE SENSITIZING ACTION OF THORIUM NITRATE. (German). S. A. Nikitin. *Strahlentherapie* 36, 745-750 (1930).

No difference was observed in results of subcutaneous or intracutaneous injection of $\text{Th}(\text{NO}_3)_4$ in mice, rats or guinea pigs before and after exposure to x radiation. Author concludes that effect of combined action of x rays and $\text{Th}(\text{NO}_3)_4$ does not depend on secondary emission of electrons by the latter. BA 5-4077.

441

ARE THE BACTERICIDAL POWER OF THE BLOOD AND THE THERAPEUTIC EFFECT OF PROTEIN EQUALLY INCREASED BY X-RAY EXPOSURES WHICH CAUSE INFLAMMATION. (German). G. J. Pfalz. *Med. Klin. (Munich)* 1929, 1-7 (1929). BA 5-4078.

442

COURSE OF X-RAY ERYTHEMA AND ITS RELATIONS TO SIZE OF FIELD IRRADIATED. (Italian). Alessandro Vallebona. *Diario Radiol.* 5, 3-14 (1926). BA 5-4079.

443

GENERAL EFFECT OF X-RAYS. (German). E. Woenckhaus. *Arch. Exp. Pathol. Pharmacol.* 150, 182-197 (1930).

Single doses of x radiation produced prompt leukopenia and lymphopenia in rats. Injection of heart's blood from irradiated rat into control rat caused leukopenia in recipient. Injection of heart's blood from control rat into irradiated rat caused leukocytosis in recipient. Exposure of one of each of 3 parabiotic pairs caused leukocytosis in non-exposed partner. Parabionts survived following exposure of one of the pair to a dose which would be lethal to a normal rat. BA 5-4080.

444

A THEORY OF CANCER BASED ON THE GEOLOGICAL

NATURE OF THE SOIL. (French). Georges Lakhovsky. *Rev. gén. sci.* 39, 533-544 (1928).

Geographical nature of soil effects radiations there- from which are the primordial factor in the etiology of cancer. Incidence of cancer is closely related to mineral content of soil. BA 5-4505.

445

STUDIES ON THE CONCENTRATION OF ANTIBODY- CONTAINING SERA BY THE USE OF PHYSICO-CHEMICAL METHODS. (German). M. Eisler and M. Spiegel-Adolf. *Biochem. Z.* 204, 28-45 (1929).

Unless refrigerated, freshly electrodialyzed, toluized serum albumin fails to coagulate when exposed to Ra rays. Dialysis removes NH_3 in amounts which, if added to freshly dialyzed albumin, are sufficient to prevent coagulation due to Ra rays. Ra coagulation time is independent of albumin concentrations except at very high concentration. Coagulates produced by Ra are not made water soluble by treatment with alkali. H_2O_2 produces changes similar to Ra induced changes in serum albumin. BA 5-4722.

446

CHANGES IN THE STRIATED MUSCLES IN ANIMALS AFTER ROENTGEN RADIATION. (German). Ludwig Fedder and Hans Hellner. *Strahlentherapie* 30, 682-706 (1928). BA 5-5836.

447

X-RAYS AS LOCALIZED DESTRUCTIVE AGENTS IN EMBRYOLOGY. A NEW TECHNIQUE FOR STUDYING THE POTENTIALITY OF THE FIRST TWO BLASTOMERES OF THE FROG EGG. (French). P. Vintemberger. *Compt. rend. soc. biol.* 99, 1590-1592 (1928).

Exposure of 1 of the 2 first blastomeres of the frog egg permits irradiated blastomere to develop to gastrula stage only. Remainder of embryo develops to advanced neurula stage. BA 5-6092.

448

THE EFFECTS OF LOCALIZED IRRADIATIONS ON ONE OF THE TWO FIRST BLASTOMERES IN THE EGG OF THE EUROPEAN FROG. (French). P. Vintemberger. *Compt. rend. soc. biol.* 99, 1592-1594 (1928). BA 5-6093.

449

INFLUENCE OF RADIOACTIVITY OF WATER ON BIOLOGICAL AND BIOCHEMICAL PROCESSES IN THE CELL OF LOWER AND HIGHER ORGANISMS (German). Julius Stoklasa. *Strahlentherapie* 29, 324-332 (1928).

Life, metabolic rate and vitality of organisms in radioactive waters (bacteria; algae) depend upon radio-activity and O_2 in the water. BA 5-7157.

450

HEMATOLOGICAL FINDINGS IN DOGS INJECTED WITH GRADED DOSES OF PLUTONIUM AND RADIUM. J. H. Dougherty, P. Keyanonda and J. Horner. *Federation Proc.* 13, 427 (1954).

Hematological effects of graded amounts of plutonium and radium in adult beagles were studied for 1 year. No significant alterations were found in animals receiving the 2 lowest doses. Animals given 0.81 $\mu\text{g/kg}$ of plutonium showed a moderate leukopenia within 1-2 weeks. The highest dose produced a depression in all formed elements. (from authors' summary).

451

ANEMIA, AGE OF CELLS AND SENSITIVENESS TO IRRADIATION. (German). Otto Dyes. *Strahlentherapie* 36, 552-561 (1930).

Findings relative to localized epilation in a patient treated with x ray therapy for hypophyseal tumor are presented. BA 5-7316.

452

CANCER IRRADIATION WITH CATHODE RAYS. M. F.

Guyer and Farrington Daniels. *J. Cancer Research* 12 166-187 (1928).

Cathode rays had detrimental effect on Flexner-Jobling carcinoma in rats if tumor growth was not too far advanced. Single large doses had best effect. No effect noted on tumors remote from site of irradiated tumor. BA 5-7317.

453

IRIS DISCOLORATION AFTER RADIUM TREATMENT. (German). L. Kumer and L. Sallmann. *Albrecht von Graefe's Arch. Ophthalmol.* 121, 238-240 (1928).

Increased pigmentation was noted in the iris of many children treated with Ra for angioma of eyelid. Change was more common in children with brown eyes, and was due to heavier pigmentation of surface layer or stroma of iris. BA 5-7319.

454

ALTERATIONS IN CELL PERMEABILITY BY X-RAYS MEASURED BY PHOSPHATE ELIMINATION OF SLICES OF SURVIVING TUMOR AND LIVER TISSUE M. A. Magath. *Z. Krebsforsch.* 31, 95-104 (1930).

X-radiation of normal liver causes increased elimination of phosphoric acid. In cancer no change or a diminished output of phosphoric acid follows irradiation. KCN increases phosphoric acid elimination by tumor tissue, and this effect is not altered by irradiation. BA 5-7320.

455

X RAY BIOLOGY OF THE HEALTHY AND DISEASED SKIN. (German). O. Miescher. *Arch. Dermatol. u. Syphilis* 155, 43-64 (1928).

Disturbance of mitosis is most prominent histologic feature of x-ray effect, and is maximal when x-ray effect generally is maximal. Regeneration originates from resistant resting cells. Meanwhile mitosis is inhibited in the cutis, and proliferative power of connective tissue is not equal to increased demands, with the result that ulcers may develop. BA 5-7321.

456

THE BIOLOGICAL EFFECT OF DEEPLY PENETRATING ROENTGEN RAYS UPON INDIAN SKIN AND ITS PRACTICAL APPLICATION IN DEEP ROENTGEN THERAPY. Subodh Mitra. *Calcutta Med. J.* 23, 481-517 (1929). BA 5-7322.

457

POSTCONCEPTION PELVIC IRRADIATION OF THE ALBINO RAT (*MUS NORVEGICUS*) ITS EFFECT UPON THE OFFSPRING. Douglas P. Murphy and Marguerite de Reny. *Surg. Gynecol. Obstet.* 50, 861-863 (1930).

Thirty-four albino rats irradiated when pregnant. In 5 of the litters 1 or more of the young exhibited clubbing of feet or absence of toes. The proportion of defective young varied directly with degree of exposure BA 5-7323.

458

ROENTGEN SENSITIZATION. II. CHEMICAL SENSITIZATION OF PROTOZOA. (German). S. A. Nikitin. *Strahlentherapie* 36, 539-545 (1930).

Author asserts that x-rays produce no perceptible effect on the rhythm of division of *P. caudatum*. BA 5-7324.

459

THE EFFECT OF RADIUM EMANATION ON INFUSORIA. (German). G. Roskin. *Arch. Protistenk.* 66, 340-345 (1929).

Lethal dose of β and γ rays (Ra) was lowered when paramecia were fed with ferric saccharate. *Spirostomum ambiguum* more radiosensitive than other infusoria studied. BA 5-7327.

460

PHYSICAL AND BIOLOGICAL STUDIES OF CATHODE

RADIATION. (German). Walter Schaefer and Ernst Witte. *Strahlentherapie* 31, 415-466 (1929).

Cathode ray tube with Ni window also produces x rays. Cathode rays penetrate tissue to depth of 0.1 mm and produce weak x-radiation on rebound from tissue. Therapeutic effect of cathode rays similar to that of x rays. BA 5-7328.

461
FURTHER STUDIES ON THE EFFECT OF DEEP X-RAY ON THE HEART. F. Janney Smith, F. W. Hartman, Adolph Bolliger, and H. P. Doub. *Trans. Amer. Climatol. and Clin. Assoc.* 44, 116-131 (1928).

After destruction of right auricle (dog) by x-ray, there is preponderance of ectopic auricular rhythms. Some evidence that even after complete destruction of S-A node, a pacemaker may exist in myocardium of left auricle. Heart seems more resistant when x ray directed solely through left side of dog's chest. BA 5-7330.

462
EXPERIMENTAL RESEARCHES OF GENERAL ACTION OF ROENTGEN RAYS ON MYXOSARCOMA OF FOWLS. Y. Yamamoto. *Japan. Med. World* 9, 1-3 (1929).

Tumors were transplanted subcutaneously into lateral aspects of femora of 20 fowl. One side was shielded, other side exposed to 150 KV x rays for 30-45 min. Eleven showed improvement in tumors on both sides, improvement being less on protected side. In general, fowl were weakened by irradiation. BA 5-7333.

463
EXPERIMENTAL RESEARCHES ON EFFECTS OF GERM IRRADIATION ON OFFSPRING. T. Yamamoto. *Japan. Med. World* 9, 290-295 (1929).

Female mice mated with non-irradiated males 8 days after x ray exposure. Number of young decreased but offspring showed no abnormalities and grew better than young from larger litters. Subsequent litters were of normal size. BA 5-7438.

464
EXPERIMENTAL PRODUCTION OF GASTRIC ULCERS BY RADIUM EMANATION. (German). H. Aue and A. Cečulin. *Arch. klin. Chir.* 158, 148-157 (1930).

Gastric Ra ulcer resembles human gastric ulcer, runs chronic course, has complications similar to those of human ulcer. High acidity develops as result of gastric ulcer. BA 5-7670.

465
EXPERIMENTAL CANCER AFTER COMBINED CHEMICAL AND PHYSICAL STIMULI. (Italian). Giovanni Castiglioni. *Boll. soc. ital. biol. sper.* 2, 636-642 (1927).

Tar painting alone produced tumors in 6-8 months in 80% of mice. Tar painting of 1 skin area, radiation of another produced cancer in 6-8 months at site of painted skin only. Combination of tar painting and x rays to same region produced tumors in 3-4 months in 100% of animals. BA 5-7699.

466
POLYPEPTIDEMIA IN CANCEROUS PATIENTS AND ITS MODIFICATIONS IN THE COURSE OF CURIE AND RADIOTHERAPY. (French). P. Cristol and A. Puech. *Bull. et mem. soc. radiol. méd. France* 17, 207-212 (1929).

X-ray and Ra produce polypeptidemia in tumor patients. Intensity of polypeptidemia depends upon nature of tumor. BA 5-7708.

467
ERYTHROPOIESIS IN BASEDOW'S DISEASE BEFORE AND AFTER RADIUM TREATMENT AND IN ARTIFICIAL

HYPERTHYROIDISM. (German). F. Höglér and Herz Blanka. *Wiener klin. Wochchr.* 43, 553-555 (1930).

Reticulocytes increased in Basedow's disease cases, decreased in Ra irradiated Basedow's disease cases in parallel with clinical improvement. Hypothyroidism was accompanied by decreased or low normal reticulocyte level. BA 5-7764.

468
RESISTANCE OF CARCINOMA. (Italian with French, English and German summaries). Endre Kubányi. *Rinascenza med.* 6, 132-133 (1929).

Carcinoma from mouse tumors kept at -20° C and exposed to 25 E.D. of x ray grew in mice into which it was transplanted. Small islands of intact cells were apparent in the irradiated tissue. BA 5-7790.

469
CANCER IN THE LIGHT OF GEOPHYSICAL RADIATION. H. Th. Winzer and W. Melzer. *Cancer* 5, 8-25 (1927).

Cites cases of tumor susceptibility in regions or houses over radioactive subsoils. Spontaneous healing of cancer in domestic animals and salmon observed when changed from one location to another. Proposes that allergic-like condition may result from continuous exposure and that exposure to repeated small doses may immunize organisms to radiation damage. BA 5-7920.

470
THE SIGNIFICANCE OF THE RETICULO-ENDOTHELIAL SYSTEM DURING IRRADIATION OF CARCINOMA OF THE CERVIX. (German). H. Zacherl. *Strahlentherapie* 33, 515-536 (1929).

Strong x-radiation of body lowers storing capacity, small doses increase capacity of reticulo-endothelial system. Carcinolytic power of serum of women with cancer of cervix is decreased after radiation therapy, and function of the already impaired R-E system is further depressed. BA 5-7929.

471
THE EFFECT OF THE X-RAY ON THE NODULES OF VERRUGA PERUANA. Henry R. Muller and Joseph R. Tyler. *J. Exp. Med.* 51, 23-26 (1930).

Development of early nodules produced experimentally in monkeys may be inhibited by single erythema dose of x-rays. BA 5-8320.

472
A STUDY OF THE EFFECTS OF LONG WAVE X-RAYS ON THE STAPHYLOCOCCUS AUREUS AND ON THE MICROSPORUM AUDOUINI. Albert Bertrand and Albéric Marin. *Can. Med. Assoc. J.* 20, 496 (1929).

X-rays in doses used had no effect on cultures of the organisms. BA 5-8372.

473
X-RAY AND MUTATIONS. (Russian). N. M. Voskresenskiĭ. *Priroda* 1930, 494-507 (1930). BA 5-10341.

474
RADIATION AND GENETICS. T. D. A. Cockerell. *Am. Naturalist* 64, 474-476 (1930).

Consideration of possibility that naturally occurring radioactive substances may determine mutation and species formation. BA 5-10370.

475
IRRADIATION OF THE TESTES AND HEREDITY IN THE MOUSE. (French). N. Dobrovolskaia-Zavaskiaia. *Arch. Biol.* 38, 457-501 (1928). BA 5-10376.

476
THE PROBLEM OF GENIC MODIFICATION. H. J. Muller. *Z. indukt. Abstamm.-u. Vererblehre. Suppl.* 1, 234-260 (1928). BA 5-10396.

477
THE EFFECT OF RADIOACTIVE SUBSTANCES ON THE

RAPID DEVELOPMENT OF BACTERIA IN THE SOIL; OPTIMUM OF RADIOACTIVITY. (French). D. Chouchak. Bull. soc. hist. nat. Afrique du Nord 20, 10-11 (1929). BA 5-10761.

478

BIOLOGICAL PROPERTIES OF RAYS OF 4-8 ÅNGSTRÖM UNITS. (French). L. J. Colanéri. Bull. et mém. soc. radiol. méd. France 17, 100-102 (1929).

Rays absorbed by skin; produce erythema of 2-4 weeks duration. BA 5-10762.

479

THE QUESTION OF THE FUNDAMENTAL BIOLOGICAL REACTION OF RADIATION. Friedrich Dessauer. Radiology 14, 1-16 (1930).

The general destructive effects of x and ultraviolet rays are based on a non-specific reaction which is considered to be further proof of the point-heat theory. BA 5-10763.

480

EXPERIMENTAL INVESTIGATIONS OF THE X-RAY SENSITIVITY OF THE ADRENALS. (German). Hans Frey. Acta Radiol. 9, 23-53 (1928).

Changes observed in irradiated adrenal glands are due to secondary influence on the adrenals of radiation induced changes in sensitive organs (e.g. ovaries). Believes that while adrenals are not radiosensitive, indirect effects on them as a result of radiating other organs cannot be avoided. BA 5-10764.

481

THE SIGNIFICANCE OF THE r-UNIT FOR THE DETERMINATION OF THE DOSE OF γ RAYS OF RADIUM. (German). Otto Glasser and F. R. Mautz. Strahlentherapie 34, 845-854 (1929). BA 5-10765.

482

THE EFFECT OF X-RAYS ON THE CELL AS A PHYSICAL PROBLEM. (German). R. Glocker. Strahlentherapie 33, 199-205 (1929).

Biological action of x-rays considered to be due to mechanical action of electrons, the impact probability and the number of impacts necessary to cause cell death being statistically predictable. Studies on *V. faba* used to illustrate hypothesis. BA 5-10766.

483

H.E.D. AS A BIOLOGICAL MEASURE OF RADIATION EFFECT. (German). Karl Wilhelm Hausser and Emil Schlechter. Wiss. Veröffentlich. Siemens-Konzern 6, 121-124 (1927). BA 5-10767.

484

EXPERIMENTAL AND HISTOLOGICAL OBSERVATIONS ON THE EFFECTS OF A SINGLE IRRADIATION WITH BUCKY'S RAYS ON THE HEALTHY RABBIT EYE. (German). Ilona Krasso. Z. Augenheilk. 70, 237-256 (1930).

Rabbits were exposed to doses ranging from 96 to 4500 international units: 980 units caused reversible changes in cornea. Administration of 3360 units in 3 doses caused marked injury of substantia propria of cornea; 3360 to 3400 units caused epilation of eyelids and temples. BA 5-10770.

485

INFLUENCE OF RADIOACTIVITY ON THE ELIMINATION OF CERTAIN METALS FROM, AND THEIR DISTRIBUTION IN THE ORGANISM. (Italian). P. Mascherpa. Atti soc. ligust. sci. lett. 8, 114-128 (1929).

Radioactive Co-protein combination in lungs breaks up sooner than normal Co-protein and is eliminated more rapidly (4 days vs. 7 days). Radioactive Co is more toxic to kidneys and lungs than normal Co. BA 5-10772.

486

EFFECT OF X-RAYS ON THE ADRENALIN CONTENT OF THE SUPRARENAL OF RABBITS. (Japanese). Tomozo Matsuda. Iji Shimibun 1211, (1927). BA 5-10773.

487

THE EFFECT OF X-RAYS ON NERVE TISSUES. (Russian). B. N. Mogil'Nitskii. Compt. rend. acad. sci. U.R.S.S. Ser. A 1929(6), 149-150 (1929). BA 5-10774.

488

THE EFFECT OF X RAYS ON ANIMALS. (Russian). N. N. Nechaeva. Compt. rend. acad. sci. U.R.S.S. 1929, 147-148 (1929). BA 5-10775.

489

STUDIES OF THE SYSTEMIC EFFECT OF ROENTGEN RAYS. I. BLOOD CHEMICAL CHANGES IN DOGS FOLLOWING EXPOSURE TO FILTERED ROENTGEN RAYS OF SHORT WAVE LENGTH. Ernst A. Pohle and Elmer L. Sevringhaus. Am. J. Roentgenol. 23, 291-298 (1930).

Dogs were given 500 r of x-rays to one or more regions of the body. No change was noted in hemoglobin, total non-protein N, uric acid, NaCl or cholesterol in the blood. BA 5-10776.

490

STUDIES OF THE ROENTGEN ERYTHEMA OF THE HUMAN SKIN. III. MACROSCOPIC AND SKIN CAPILLARY CHANGES AFTER COMBINED EXPOSURE TO ROENTGEN RAYS AND ULTRAVIOLET RAYS. Ernst A. Pohle and Cecil S. Wright. Radiology 14, 351-363 (1930).

Skin changes occur more rapidly following x-radiation alone, but end results are approximately the same following x-radiation alone and combined with ultraviolet radiation. BA 5-10777.

491

THE "OVARIAN DOSIS". SEVERAL INSTANCES OF PREGNANCY AFTER IRRADIATION WITH X-RAYS. K. Ihdimä. Japan. J. Obstet. and Gynec. 12, 323-327 (1929).

Reports 6 cases of pregnancy following x-irradiation. Permanent amenorrhea was caused in older women by a dose of x rays that caused only temporary amenorrhea in younger women. BA 5-10986.

492

X RAY CASTRATION AND PREGNANCY. (Spanish). Jesús García Orcóyen. Arch. med. cirug. 28, 113-117 (1928).

"Castration dose" of x-rays was followed by pregnancy in 2 women. BA 5-11006.

493

INFLUENCE OF X RAY IRRADIATION ON BLOOD LACTIC ACID. (German). G. Joos and J. Heeren. Frankfurter Z. Pathol. 39, 466-472 (1930).

In patients with malignant tumors blood lactic acid increased 10 to 40% immediately after irradiation (as a result of lowering of alveolar CO₂ tension): 4 to 6 hr after exposure blood lactic acid level fell 20 to 35% due to increased utilization of lactic acid in body. BA 6-11169.

494

CYTOLOGICAL AND OTHER FEATURES OF VARIANT PLANTS PRODUCED FROM X-RAYED SEX CELLS OF *NICOTIANA TABACUM*. T. H. Goodspeed. Botan. Gaz. 87, 563-582 (1929).

X-ray induced variants include modification of all vegetative and floral organs and reduced fertility. Cytologically, variants demonstrate normal chromosome number and behavior; non-disjunction of 1 or more chromosome pairs; fragmented chromosomes. Only visible somatic effect on x-rayed parent plant is abscission of all smaller flower buds. BA 5-13444.

495

THE CONCENTRATION OF RADIUM BY LIVING ORGANISMS. (Russian). V. I. Vernadskii. *Compt. rend. acad. sci. U.R. S.S.A.* 1929, 33-34 (1929). BA 5-13648.

496

EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF X RAYS ON BONE MARROW. (German). Anfibale Casati. *Strahlentherapie* 32, 721-738 (1929).

Hind legs of rabbits were exposed to 800 r, 140 KV, 300 MA; filtration 0.5 mm Zn and 2 mm Al. This exposure was followed by 400 r exposure on each of the 2 subsequent days. Major effect on marrow was not cell destruction but interference with cell differentiation. BA 5-13743.

497

X RAYS AND GERMINAL INJURY: PRINCIPLES IN ANIMAL EXPERIMENTATION. (German). Hans Duncker. *Strahlentherapie* 37, 142-163 (1930). BA 5-13744.

498

EXPERIMENTAL INVESTIGATIONS OF THE EFFECT OF X RAYS ON GASEOUS METABOLISM. (German). Sigurd Frey and Hans George Zwerg. *Bruns' Beitr. klin. Chir.* 149, 310-321 (1930).

X-irradiation caused increased oxygen consumption in dogs. Irradiation of spleen caused 100% increase, heavy dose to whole body caused 50-60% increase, light doses to whole body or to liver and testes about 30% increase; thyroid, 14% increase followed by 10% decrease; irradiation of hypophysis caused 8% fall by 3rd day. Believes effects are due to cell destruction and that they are similar to effects following injection of foreign protein. BA 5-13745.

499

THE EFFECT OF X RAYS ON THE VEGETATIVE NERVOUS SYSTEM. (German). Gerhard Gabriel. *Strahlentherapie* 34, 813-822 (1929). BA 5-13746.

500

THE SKIN ERYTHEMA DOSE AS A BIOLOGICAL MEASURE OF THE RADIATION EFFECT. (German). Karl Wilhelm Hausser and Emil Schlechter. *Strahlentherapie* 27, 348-352 (1927).

Skin erythema may be used as measure of biological dose of x rays, not of Bucky's grenz. rays. BA 5-13747.

501

EFFECTS OF X RAYS ON BASAL METABOLISM. (German). Anna Jugenburg. *Strahlentherapie* 24, 288-300 (1929).

Effects of x rays on metabolism found to be available. Respiratory quotient approached 1 after x-raying animals, and in general there tended to be some decrease in O₂ consumption. BA 5-13748.

502

GRAYED HAIR AS AN INDEX OF RELATIVE EFFECTIVE X-RAY DOSAGE IN THE HOUSE MOUSE. Clyde E. Keeler. *Am. Naturalist* 64, 188-190 (1930).

In tests with 3 male black mice it was found that the appearance of gray hair is an index of sterilization following x-radiation, and also an indication of the extent of scattering of the cone of rays. BA 5-13749.

503

ROENTGEN RAYS AND HEMOLYSIN. (Italian). Antonio Merlini. *Arch. atti soc. ital. chir. (Rome)* 34, 749 (1928).

In rabbits exposed to x-rays the hemolytic titer was raised. BA 5-13753.

504

THE DEVELOPMENT OF CHILDREN BORN AFTER

TEMPORARY IRRADIATION STERILITY OF THE MOTHER. (German). H. Naujoks. *Strahlentherapie* 37, 572-583 (1930).

Of 6 children born of previously irradiated mothers, 1 child was "nervous", 1 backward in speech, 1 adipose. No other abnormalities noted. BA 5-13754.

505

BACTERICIDAL ACTION OF X RAYS. (German). W. E. Pauli and E. Sulger. *Strahlentherapie* 32, 761-768 (1929).

Growth of *B. pyocyaneus* on agar was checked by 2.3 H.E.D. of x-rays; 5.6 H.E.D. checked growth of *Staphylococcus* on agar. Lowering the temperature from 41° C to 37° C increased the killing power of the rays. Irradiation of local inflammation at site of injection of a mixture of *B. pyocyaneus* and *Staphylococci* in rabbits hastened healing but did not prevent the production of secondary infections. BA 5-13755.

506

NITROGEN EXCRETION IN THE URINE AFTER ROENTGEN AND RADIUM IRRADIATION. (German). K. F. Schultze. *Strahlentherapie* 47, 642-658 (1930).

N determined in 24 hr urine specimens in 12 normal persons, 22 patients with carcinoma of cervix treated with x rays, and 8 similar cases treated with Ra; 12 of 22 x-ray treated cases showed an increase in urinary N after exposure; all Ra treated cases showed an increase. BA 5-13757.

507

THE INFLUENCE OF X RAYS ON THE MULTIPLICATION OF HYDRAS. (Russian with German summary). G. S. Strelin. *Ann. roentgenol. et radiol. (U.S.S.R.)* 7, 199-203 (1929).

Multiplication in the hydra *Pelmatohydra oligactis* is stimulated by 475 r of x ray, but only in those hydras ready to germinate at the time of irradiation. BA 5-13758.

508

EXPERIMENTAL RESEARCHES OF GENERAL ACTION OF ROENTGEN RAYS ON MYXOSARCOMA OF FOWLS. T. Yamamoto. *Japan. J. Obst. Gynec.* 11, 271-275 (1928).

Both irradiated and non-irradiated femoral tumor implants underwent regression in chickens bearing one implant on each femur (one irradiated, one control). Irradiated tumors gave positive transplants in 5 of 9 cases. Irradiation of site before tumor was transplanted to it decreased the susceptibility of the tissue to the transplant. (4 of 8 transplanted this way were positive). Irradiation shortened life of chicken and increased immunity of chicken to tumors. BA 5-13760.

509

EFFECT OF X-RAYS ON HEART FUNCTION OF THE FROG. T. Yamamoto. *Japan. J. Obst. Gynec.* 11, 290-292 (1928).

X-irradiation of excised, beating frog hearts for 30 to 80 min. had no effect unless adrenalin chloride had been added to culture solution prior to irradiation, in which case pulsation became irregular. Irregularity would be terminated by addition of atropine to solution, but not merely by replacing solution with fresh Ringer's. BA 5-13761.

510

THE CHANGES OF CATALASE AND LIPASE IN THE BLOOD OF PATIENTS TREATED WITH X RAYS. (German). M. J. Goldstein and J. P. Neworoshkin. *Strahlentherapie* 36, 736-744 (1930).

After local irradiation, catalase was increased in the blood of 18 patients; lipase was increased in some, decreased in others. Greatest increase in catalase

occurred after irradiation of the lymphatic gland region. Changes in blood catalase appeared not to be related to changes in disease process. BA 5-13842.

511

INFLUENCE OF ORAL AND INTRAVENOUS ADMINISTRATION OR RADIUM BROMIDE ON THE URINARY C N QUOTIENT. (German). A Allen Goldbloom. Biochem. Z. 197, 14-19 (1928).

Daily oral administration or a single intravenous injection of RaBr_2 to rabbits raises the C N quotient due to decreased N elimination. BA 5-14222.

512

FURTHER EXPERIMENTS ON THE RELATIONS BETWEEN X-RAYS AND CALCIUM EFFECTS ON TUMOR TISSUE (German). M. A. Magath and M. J. Kolomijetz. Z. Krebsforsch. 30, 457-472 (1930).

Tumor tissue treated with Ca shows decreased imbibition. This behavior of cancer tissue reversed after x-irradiation, although x-irradiation alone reduces imbibition of cancer cells. Embryonal tissue behaves similarly to cancer tissue. Effect is not related to pH change nor to Ca retention (which does not occur in irradiated tissue). Author feels x-ray effect is on organism as a whole. BA 5-14416.

513

EFFECT OF THE INCUBATION PERIOD OF A BACTERIAL CULTURE ON ITS SENSITIVENESS TO X RAYS (German). E. Sulger. Strahlentherapie 36, 546-551 (1930).

X-irradiation for 90 min. was fatal to unincubated cultures of *B. pyocyaneus* (av. of 6 experiments). After 1, 2, and 3 hr of incubation, no change in radiosensitivity was observed. After 4 hr, however, L.D. was 120 min. 9 hr cultures required 210 min of exposure. 10 hr cultures, 150 min. Longer incubation gave variable results. BA 5-14921.

514

THE EFFECT OF X RAYS ON THE REGENERATION OF THE LENS. (German). G. Politzer. Z. wiss. Biol. Abt. D. Wilhelm Roux Arch. Entwicklungsmech Organ. 121, 39-71 (1930).

Salamandra maculosa from which the lens of one eye had been removed were exposed to x rays filtered through 1 mm Al. 6 Holzknicht units had no effect on lens regeneration. One dose of 20 units, 9 doses of 4 units, or 14 doses of 4 units produced delay in onset of regeneration, and abnormal lenses when regeneration did occur. BA 5-15434.

515

OCCURRENCE OF TRIPLOID AND TETRAPLOID INDIVIDUALS IN X-RAY PROGENIES OF NICOTIANA TABACUM. T. H. Goodspeed. Univ. Calif. (Berkeley) Publ. Botany 11, 299-308 (1930). BA 5-16355.

516

THE EFFECT OF CARBON DIOXIDE ON THE OCCURRENCE OF NON-DISJUNCTION IN DROSOPHILA. J. C. Mottram. J. Exp. Biol. 7, 370-372 (1930).

Exposure of female flies to CO_2 or to β rays from Ra before fertilization increases the occurrence of non-disjunction. BA 5-16463.

517

PROOF THAT THE ENTIRE CHROMOSOME IS NOT ELIMINATED IN THE PRODUCTION OF SOMATIC VARIATIONS BY X-RAYS IN DROSOPHILA. J. T. Patterson. Genetics 15, 141-149 (1930). BA 5-16468.

518

STUDIES ON STEP-ALLELOMORPHISM. IV. THE MUTATION SCUTE-6 AND A CASE OF 'NON-ALLELOMORPHISM' OF MEMBERS OF AN ALLELOMORPHIC SERIES IN *D. MELANOGASTER*. (German).

A. S. Serebrovsky. Z. Wiss. Biol. Abt. D. Roux Arch. Entwicklungsmech. Organ. 122, 88-104 (1930).

A new scute allelomorph produced by x rays. BA 5-16474.

519

HISTOGENESIS OF SO-CALLED X-RAY CANCER OF PLANTS. II. TISSUE ABNORMALITIES AS THE RESULT OF MULTINUCLEATION OF CERTAIN PORTIONS OF THE ROOT TIPS OF *V. FABA*. (German). Hideo Komuro. Z. Krebsforsch. 31, 490-494 (1930). BA 5-16607.

520

THE EFFECT OF X-RAY ON POTATO TUBERS FOR SEED. Howard B. Sprague and Maurice Lenz. Science 69, 606 (1929).

Strong doses causing definite lesions in leaves may also reduce number of tubers formed. In this case however, tubers may attain larger size. BA 5-16719.

521

THE EFFECTS OF THE DECAY OF INCORPORATED RADIOACTIVE PHOSPHORUS ON THE GENOME OF BACTERIOPHAGE T_4 . F. W. Stahl. Virology 2, 206-234 (1956).

Using five genetic characters of the coliphage T_4 as criteria of effect, the author shows that P^{32} decay in DNA portion of phage inactivated the genetic characteristics.

522

RELATIONS OF ACTINOTHERAPY TO BLOOD COAGULATION AND ARREST OF HEMORRHAGE (English, French and German Summaries). Karel Prerovsky. Bratislav Lekárske Listy 10, 49-56 (1930).

Hard x rays can increase blood coagulability in vitro and in vivo. X rays act directly on blood by releasing cytozyme from destroyed cellular elements. Ra salts act in an analogous manner. BA 5-16787.

523

BIOLOGICAL EFFECTS OF RADIUM IRRADIATION. R. G. Cant. Acta Radiol. 10, 320-331 (1929).

Evidence is presented to support the author's thesis that the effect of x rays on mitosis is not one of stimulation. The transient increase of cells in mitosis observed after irradiation is at most a compensatory phenomenon and may represent prolongation of some mitotic stages. The major aim is interpretation of histological observations in serially biopsied tumors from patients receiving radiation therapy. Supporting data include studies on chick choroid and fibroblasts in vitro, irradiated mustard and cress seeds and in vitro studies on tumor cells. BA 5-16804.

524

THE RELATION OF DIETARY TO THE EFFECTS OF LARGE AMOUNTS OF X-RAYS ON THE ORGANISM. Louis H. Jorstad and Edwin C. Ernst. Radiology 15, 13-29 (1930).

White rats, 88 in number, on various diets, were exposed to 124 to 155 r of 200 KVP x rays every 2 weeks for 6 months or until death. Rabbits on well-balanced diet plus cod liver oil tolerated exposures relatively well but did not gain weight as rapidly during the period of x-ray exposures as they did before and after the exposure period. BA 5-16805.

525

THE CAUSE OF DEATH FROM RADIUM. A. James Larkin. Radiology 15, 296-302 (1930).

A description of clinical and histological changes in rabbits following whole body exposure to lethal doses of Ra (lethal dose delivered in 1 week). BA 5-16806.

526

EFFECT OF IRRADIATION ON THE HEARING APPARATUS. (Japanese, English Abstract by author).

in B A) Tetsusaburo Muta Dai Nihon Jibi Inkoka Kaiho 32, (1927)

Application of 100 9 mg of RaBr to guinea pig ear causes degenerative atrophy of nervus cochlearis Effect of radiation is greatest on nerve fibres, less on nerve ends, weakest on ganglion cells BA 5-16807.

527
FURTHER STUDIES ON THE SKIN ERYTHEMA WITH COMBINATIONS OF TWO TYPES OF RADIATION Edith H Quimby and George T Pack Radiology 15, 30-41 (1930)

When γ -rays and hard β -rays, γ rays and soft x rays, or γ -rays and hard x rays, are combined in equal parts, it requires 1/3 more radiation to produce a threshold erythema on human skin than for any of these types of radiation used alone BA 5-16808.

528
VARIOUS REACTIONS OF TISSUES TREATED WITH X-RAYS AS GOVERNED BY THE TIME FACTOR, AND THE RELATIONS OF BIOMETRIC DOSAGE TO THE X-RAY THERAPY OF MALIGNANT TUMORS (French) C Regaud and R Ferroux Z Krebsforsch 32, 10-26 (1930)

Testicular sterilization cannot be effected by a single dose of x rays sufficient to cause fatal skin necrosis Since skin effect is not cumulative while testicular effect is cumulative, complete destruction of seminal epithelium can be effected by repeated doses Authors endorse fractionation of dose in treatment of human cancers BA 5-16809.

529
X-RAY IRRADIATION AND THE PRODUCTION OF ANTIBODIES (Italian) Alessandro Vallabona Cong Ital Radiol Med, 8th Congr Florence May 14-16, 1928 Giuseppe Sambolino e Figli Genova, 1928, 16 p

Lethal doses of x ray caused slight increase in rate of agglutinin production in rabbits sub-lethal doses diminished production for 10 days after which the production remained constant until the 22nd day and then diminished again until it reached zero on the 60th day BA 5-16811.

530
INVESTIGATION OF A BIOLOGICAL PROTECTIVE SCREEN PART XI PROTECTIVE EFFECTS OF VARIOUS AMINES H Langendorff and R Koch Strahlentherapie 98, 245-54 (1955)

The authors report their experiments regarding the protective action of different amines against the damaging influence of radiations With the exclusion of tryptamine, all of the tested substances proved to be ineffective The authors further discuss certain methodical questions in connection with the performance of such experiments NSA 10-1995.

531
EFFECT OF X-RAYS ON MICROBIAL ANTIGENS (German) R Torikata and S H Uno Z Immunitatsforsch 65, 152-160 (1930)

Studies on impenin, a heat labile substance present in watery solutions of bacterial proteins As determined by phagocytosis experiments, impenin is destroyed by x rays BA 5-17559.

532
RADIATION AND GENETICS H J Muller Am Naturalist 64, 220-251 (1930)

A discussion of the effect of radiation in inducing changes in gross morphology of chromosomes and of the nature of point mutations Not more than 1/1000th of natural mutation rate accounted for by naturally occurring radiation BA 5-19312

533
THE EFFECTS OF X-RADIATION ON COTTON J W McKay and T H Goodspeed Science 71, 644 (1930)
Qualitative and quantitative changes in hereditary material of cotton produced by x-irradiation BA 5-19318.

534
AN ANALYSIS OF THE EFFECTS OF THE DIFFERENT RAYS OF RADIUM IN PRODUCING LETHAL MUTATIONS IN DROSOPHILA Frank Blair Hanson and Florence Heys Am Naturalist 63, 201-213 (1929) BA 5-19340.

535
THE TEMPERATURE COEFFICIENT OF THE ACTION OF ULTRA-VIOLET RAYS ON THE ASCARIS EGG (French) A Dognon and J C Tsang Compt rend soc biol 98, 22-24 (1928)

The temperature coefficient is considerably less for ultra-violet than for x rays BA 5-19595.

536
THE EFFECTS OF X-RAYS ON THE GALL BLADDERS EXPERIMENTAL PRODUCTION OF AN X-RAY CHOLECYSTITIS Julius Brams and Leo Darnbacher Radiology 13, 103-108 (1929)

Acute cholecystitis was produced in dogs by administration of x rays within dosage range used in therapeutic work Authors conclude that gall bladder epithelium is more radiosensitive than is neighboring gastro-intestinal epithelium BA 5-19619.

537
THE EFFECT OF X-RAYS ON THE VEGETATIVE NERVOUS SYSTEM (German) P Del Buono Strahlentherapie 34, 201-312 (1929)

Irradiation of hypophysis-thalamencephalon region caused leukocytosis, hypertension and hyperglycemia BA 5-19620.

538
ROENTGEN RAYS AND THE GRANULE STORING ACTIVITY OF THE RETICULO-ENDOTHELIAL SYSTEM (Italian) G Dellepiane Boll soc ital biol sper 5, 458-462 (1930).

Following x-ray irradiation of the hepatic region of rabbits the liver fixed less Pb than normally, the diminution being related to the dose of x rays used. BA 5-19622.

539
THE EFFECT OF RADIUM EMANATION I RADIUM EMANATION IN CEREBROSPINAL FLUID (German). Ernst Freund and Robert Loebel. Z. ges. phys. Therap. 39, 109-112 (1930).

The hematoencephalic barrier offers no hindrance to radon. (dogs, patients). BA 5-19623.

540
EFFECT OF ROENTGEN RAYS AND RADIUM ON THE LIFE DURATION OF SPERMATOOZOA. T Fuke. Jap. J. Obst. and Gyn. 13, 467-469 (1930).

Hanging drop preparations of epididymal fluid of rabbits was exposed to x rays for 1 to 30 min. (120 KV, 4 ma, focus distance 30 cm filtration 1 mm Al); other preparations exposed to RaBr. Younger cells showed greater effect; longer irradiation with smaller dose more effective than short exposure to high dose. BA 5-19624.

541
THE EFFECT OF X-RADIATION ON FRACTURE HEALING (German). Shuichi Fukase. Fortschr. Gebiete Röntgenstrahlen 41, 581-588 (1930).

Quality of callus improves with increasing x-ray doses up to 400 r beyond which it declines below normal. Quantity of callus is decreased in all dosage groups. BA 5-19625.

542
THE EFFECT OF GRENZ RAYS ON THE SKIN. HISTO-

LOGICAL STUDIES. (German). Karl Herxheimer and Erich Uhlmann. Arch. Dermatol. u. Syphilis 157, 467-482 (1929). BA 5-19627.

543

EXPERIMENTAL INVESTIGATIONS OF THE EFFECT OF FRACTIONATED X-RAY DOSES ON ASCARIS EGGS. (German). A. Kahistorf. Strahlentherapie 31, 199-206 (1929).

A higher % of anaerobic unhatched Ascaris eggs was damaged by repeated fractional radiation than by a single exposure to intense radiation. Impossible to injure all eggs even with doses of 20,000 r, some being highly resistant to radiation. BA 5-19630.

544

THE EFFECT OF GAMMA IRRADIATION ON CELL DIVISION IN TISSUE CULTURE IN VITRO. PART II. R. G. Cantl and F. G. Spear. Proc. Roy. Soc. (London) B105, 93-98 (1929).

Hanging drop preparations from choroid and sclerotic of chick embryo were exposed to γ rays of Ra. Exposures longer than 1-1/2 min. caused a decrease in number of mitotic cells, with a return to normal after a period of apparently increased mitotic activity, (increased number of cells in mitosis). After 30 min. exposure, normal mitotic rate was not regained. Apparent increase in mitotic activity following smaller doses may represent delay in completing mitosis. BA 5-19621.

545

THE MUTAGENIC EFFECT OF RADIUM AND ROENTGEN RADIATION. (German). H. Stubbe. Strahlentherapie 37, 124-136 (1930).

Survival of 20 to 50% of irradiated Antirrhinum seeds is reported in contrast to 80% of non-irradiated seeds. Vitality of 2-3 wk. old seedlings similarly reduced. Surviving plants showed decreased fertility, and increased number of detrimental mutations in F_1 generation. All wave lengths and all quantities of radiation produced like results. BA 5-19323.

546

INVESTIGATIONS OF SKIN TOLERANCE TO PROTRACTED FRACTIONAL ROENTGEN IRRADIATION. (German) A. Kahlstorf. Strahlentherapie 38, 499-520 (1930).

Tolerance of skin of back of rabbits to x radiation was greatly increased by fractionation of dose, 4 epilation doses being tolerated without epilation if doses were administered fractionally over a protracted period. Similar effects noted in human skin. BA 5-19631.

547

FURTHER STUDIES OF THE EFFECT OF RADIATION ON BLOOD CHOLESTEROL IN MALIGNANT DISEASE Walter L. Mattick and Melvin C. Reinhard. J. Cancer Research 14, 426-433 (1930).

Cholesterol content of blood was determined before and every half hr for 3 hr after therapeutic irradiation of 25 cancer patients. Authors conclude that high voltage x or γ radiation causes a decrease in blood cholesterol concentration. BA 6-19636.

548

PHYSICAL BASIS OF RADIUM EMANATION THERAPY. (German). Stefan Meyer. Sitzber. Akad. Wiss. Wien. Math.-naturw. Kl. Abt. 2a 138, 557-580 (1929).

Experiments gave no ground for assumption that radon is absorbed through the skin (in baths) in amounts comparable to that inhaled. BA 5-19637.

549

THE RELATION BETWEEN DIVISION RATE AND THE RADIOSENSITIVITY OF CELLS. Charles Packard. J. Cancer Research 14, 359-369 (1930).

Susceptibility of Drosophila eggs to x rays rose as the rate of division at the time of exposure increased, but

did not parallel the rate of increase. Injury was proportional, secondarily, to cell activity after exposure. BA 5-19638.

550

THE SENSITIZING EFFECT OF HEMATOPORPHYRINS FOR X RAYS. (German). N. A. Podkaminsky. Strahlentherapie 38, 98-102 (1930).

Injection of hematoporphyrin followed by exposure to x rays leads to subacute and chronic forms of "Roentgen disease" analogous to those seen in some forms of "light disease." BA 5-19639.

551

THE ENERGY ABSORBED IN TISSUES IN RADIUM AND ROENTGEN RAY THERAPY. (German). E. Stahel. Strahlentherapie 33, 296-321 (1929).

Measured energy absorption by calorimetry and found amount of energy (in ergs) required to produce a certain biological effect is considerably smaller in the case of x rays than in the case of γ -rays. Also, local treatments found to deliver more energy than distant treatments. BA 5-19640

552

RADIOBIOLOGICAL STUDIES OF ASCARIS EGGS. (German). Adolf Zuppinger. Strahlentherapie 28, 639-758 (1929).

Biological effect varies with intensity of radiation, a greater effect being produced by rays of shorter wave length. Fractional doses distributed over 10 days have twice the biological effect of the total dose in one application. BA 5-19642.

553

THE EFFECT OF ROENTGEN IRRADIATION ON THE HEMATOLOGICAL PICTURE OF SPLENECTOMIZED ANIMALS. (Italian). Goffredo Froia. Pathologica 21, 313-318 (1929).

The effect of x rays plus splenectomy on the blood picture is additive. Arneth count shifts to right after splenectomy, shifts further right after irradiation. Young erythrocytes appear in peripheral blood. BA 5-19701.

554

STUDY OF THE MICROBIAL FLORA OF EPI-THELIOMAS OF THE UTERINE NECK: ITS IMPORTANCE IN RADIATION THERAPY. (French). René Vincent and Octavé Monod. Gynéc. et obstet. 20, 709-719 (1929).

In general, infection increased during treatment. 28 of a total of 116 cases treated presenting infectious complications during treatment, the complications not being attributable to any one organism. The hemolytic streptococcus was the most frequently encountered pathogenic agent. BA 5-20769.

555

EFFECTS OF TUBES OF RADIUM EMANATION ON THE DEVELOPMENT OF SOME PLANT MICROORGANISMS. (Italian). Vincenzo Rivera. Boll. regia staz. patol. vegetale (Roma) 9, 241-247 (1929).

Describes zones of growth inhibition around tubes of nitron (radium emanation) on agar cultures of *B. tumefaciens*, *B. fluorescens* and *P. crustaceum*. BA 5-22812.

556

THE BIOLOGICAL EFFECT OF X RAYS OF DIFFERENT WAVE LENGTHS ON VICIA FAVA EQUINA. (Spanish). S. A. Saralegui. Prensa med argentina 16, 821-837 (1929). BA 5-22943.

557

ENZYMATIC HYDROLYSIS OF ACETYLCHOLINE AND OTHER ESTERS BY TISSUES FROM X-IRRADIATED ANIMALS. J. Doull and O. K. Cummings. Federation Proc. 13, 349 (1954).

Measurements of pseudocholinesterase and true cholinesterase activity of tissues from x-irradiated animals indicated that although lethal doses of x-ray had no effect on the true cholinesterase of any of the tissues studied, lethal and sublethal doses produced marked changes in the pseudocholinesterase activity of liver, ileum, spleen, and thymus glands of rats. (from authors' summary).

558
PIGMENT (MELANIN) STUDIES OF THE HUMAN SKIN AFTER APPLICATION OF THORIUM X, WITH SPECIAL REFERENCE TO THE ORIGIN AND FUNCTION OF DENDRITIC CELLS. Samuel M. Peck. Arch. Dermatol. and Syphilol. 21, 916-956 (1930).

Histologic changes resemble those following X radiation. BA 5-23609.

559
THE EFFECTS OF ROENTGEN RAYS ON THE TRANS-PLANTABILITY OF MOUSE CARCINOMA. (German). W. Caspari. Deut. Z. Chir. 227, 85-97 (1930). BA 5-23668.

560
RADIATION SENSITIZATION, WITH CASE REPORT. Vernor M. Moore. Radiology 15, 262-267 (1930).

Postoperative Ra therapy for carcinoma of left breast was followed in 1 month by collapse, pain about heart, cyanosis, edema of arms, erythema, fever. Recovery was complete, but symptoms recurred after subsequent smaller dose of Ra. BA 5-23897.

561
HEMATOLOGICAL CHANGES DUE TO IRRADIATION WITH BUCKY RAYS. (German). Alexander Böhm. Strahlentherapie 35, 592-596 (1930).

Leukopenia and left shift in differential WBC count followed irradiation. Author attributes these effects to stimulation of the parasympathetic nervous system. BA 5-25461.

562
GLUTATHIONE IN PLANT TISSUES. Virginia B. White. Science 71, 74-76 (1930).

Glutathione occurs throughout plant kingdom (except in algae) in meristematic regions of stems and roots, in reproductive organs and in phloem of angiosperms. Grains treated with x rays for short time show increased glutathione (increased color in sodium nitroprusside test) after longer exposure, color changes in quality; after still longer exposure color reaction is very faint. BA 5-27046.

563
SOME EFFECTS OF CATHODE RAYS ON SEEDS. Warren F. Busse and Farrington Daniels. Am. Jour. Bot. 16, 139-153 (1929).

Treatment of seed with cathode rays injures the embryos, causing dwarfing and one or more local injuries in the seedlings. Nearly all plants show injury to main root, and injury to one side of the hypocotyl. BA 5-27183.

564
THE RADIOSENSITIVITY OF ACTINOMYCES. (German) Edmondo Ingber. Strahlentherapie 28, 581-588 (1929).

Pure cultures of *A. bovis* showed retardation of growth rate after dose of 10,575 mgm/hr of MsTh. When source of radiation was removed, growth rate returned to normal BA 5-27213.

565
THE EFFECT OF IRRADIATION ON TUMORS IN RELATION TO INTENSITY AND AMITOGENETIC DOSE. (Italian). Luigi Cappelli. Policlinico. II (Rome). Sez. prat. 37, 1053-1057 (1930).

Proposes amitogenetic action of radiation on tumor cells be used as criterion of dosage. BA 5-27351.

566
EXPERIMENTAL INVESTIGATION OF THE EFFECT OF ROENTGEN RAYS ON THE BONE MARROW. II. (German). Annibale Casati. Strahlentherapie 38, 315-321 (1930).

Normal bone marrow of young rabbits 50 days after first irradiation with 1600 r for 32 hr shows complete development of regeneration process. BA 5-27352.

567
THE PHENOMENON OF LOCAL HAIR HYPERTROPHY FOLLOWING ROENTGEN EPILATION. (German). Marie Dostrowsky. Arch. Dermatol. u. Syphilis. 162, 739-761 (1931).

In 50 of 1970 school children given x-ray treatment for Trichophyton of scalp, areas of atypical new growth appeared in which hair was thicker, coarser, more strongly pigmented. BA 5-27355.

568
EXPERIMENTAL INVESTIGATION OF HEMATOLOGIC DAMAGE DUE TO ROENTGEN RAYS ADMINISTERED BY OLD TECHNIC AND DUE TO RAYS FROM METALIX TUBES. (German). Walter Fürst. Strahlentherapie 37, 659-692 (1930).

Absence of avoidable and undesirable rays in metalix tubes verified in observations on patients. Blood injury and general injury are greatly decreased when undesirable rays are eliminated. BA 5-27356.

569
RADIOGENIC MICROCEPHALY A SURVEY OF 19 RECORDED CASES WITH SPECIAL REFERENCE TO OPHTHALMIC DEFECTS. Leopold Goldstein. Arch. Neurol. u. Psychiat. 24, 102-115 (1930).

Records of 19 microcephalic feebleminded children, irradiated in utero were studied with special reference to ophthalmic defects. BA 5-27357.

570
LUNG CHANGES IN EXPERIMENTAL ROENTGEN IRRADIATION. (German). M. Lüdin and A. Werthmann. Strahlentherapie 38, 684-710 (1930).

Rabbits received local x irradiation of chest (160 KV, 2.3 ma., 8 mm Al filter) to a field 5 x 5 cm or 12 x 12 cm. Changes included destruction of alveolar epithelium, edema of lung, overgrowth of bronchial mucous membrane, autonomous growth of bronchial epithelium with cell picture similar to carcinoma. BA 5-27361.

571
THE EFFECT OF RADIOACTIVE RADIATIONS UPON EUGLENA. W. F. G. Swann and C. del Rosario. J. Franklin Inst. 211, 303-317 (1931).

When exposed to α radiation from Ra emanation dissolved in the media, the death rate of Euglena cells was proportional to the strength of the dissolved emanation and to the number of live Euglena cells present. BA 5-27363.

572
MODIFICATIONS OF THE CAPILLARIES UNDER X-RAY IRRADIATION. (Italian). Luigi Turano. Arch. Radiol. Nap. 6, 349-363 (1930).

Observations by Müller's capillaroscopy showed "aneurysmal" capillaries in radiodermatitis. Author believes response to radiation is determined by vegetative nervous system. BA 5-27364.

573
A BIOLOGICAL CALIBRATION OF AN X-RAY DOSIMETER. Charles Packard. J. Cancer Research 14, 134-143 (1930).

A commercial dosimeter was compared with biological method (*Drosophila* eggs) of measuring intensity of x-ray beams. Dosimeter found to be accurate for x rays of 200 to 100 KV. BA 5-27447.

574

EXPERIMENTAL INVESTIGATION OF BLOOD PLATELETS. (German). Shinzo Otsuka. Okayama Igakkai Zasshi 39, No. 7. (1927).

Platelets are present in increased numbers in peripheral blood of rabbits after splenectomy and after 1/2 H.E.D. of x rays. BA 5-27523.

575

HISTOLOGIC STUDIES OF HUMAN SKIN IRRADIATED WITH SUB-ERYTHEMA DOSES OF X-RAY. (Italian). Giuseppe Bertaccini. Giorn. ital. dermatol. e sifilol. 71, 593-613 (1930).

A description of histological changes following x irradiation of 8 apparently healthy areas in 5 dermatologic patients is presented. Changes were perivascular and perifollicular infiltrates, and dilatation and congestion of small vessels. BA 5-28049.

576

EXPERIMENTAL RENAL DISEASE PRODUCED BY X-RAYS. PRODUCTION AND FUNCTIONAL STUDY OF A STANDARDIZED LESION. Adolph Bolliger and M. S. S. Earlam. Med. J. Australia 1, 340-355(1930).

A renal lesion (a lipid nephrosis preceded by nephritis) of fairly constant intensity causing death in 40 days was produced consistently in dogs from which the opposite kidney had been removed. BA 5-28154.

577

THE BACTERICIDAL ACTION OF ROENTGEN RAYS. Hirsh W. Sulkowitch. Bull. Johns Hopkins Hosp. 44, 439-442 (1929). BA 5-28636.

578

EXPERIMENTAL CANCER IN PLANTS AND THE THEORY OF LAKHOVSKY. (French). I. Gheorghiu. Compt. rend. soc. biol. 106, 754-756 (1931).

Over 50 plants were inoculated with *B. tumefaciens*; part of these then exposed to rays from radio-cellulo-oscillator of Lakhovsky. Only 3 permanent recoveries resulted and these were thought to be due to effect of x rays. BA 6-81.

579

INFLUENCE OF RADIUM ON THE DEVELOPMENT OF CRESS SEEDLINGS (*LEPIDIUM SATIVUM*). (In French). Mina Engus. Compt. rend. soc. biol. III. 1094 (1932).

Ra rays caused development of root malformations in *Lepidium sativum* seedlings. CA 27-1379.

580

EXPERIMENTAL STUDIES ON TISSUE REACTION TO RADIATION USING A SEGMENT OF A GROWING MOUSE TAIL AS A BIOLOGICAL INDICATOR. Halsey J. Bagg and C. Robert Halter. Am. J. Roentgenol. 24, 640-647 (1930).

A segment of 9 to 12 mm² of tissue of tail of growing mouse may be used as an indicator of radiation effects, the magnitude of effect being measured in terms of epilation, retardation of tail growth, or spontaneous amputation. BA 6-296.

581

PRODUCTION OF ION CLUSTERS BY X-RAYS. U. Fano. Nature 151, 698 (1943).

X-ray-induced chromatid breaks in Tradescantia microspores are due to simultaneous occurrence of about seventeen ionizations concentrated in a chromatid. Study was made to determine how many clusters consisting of a given number of ionizations are produced per unit volume and per roentgen. Conclusion chromatid breakage requires a substantial number of ionizations occurring at a single time and place.

582

THE BIOLOGICAL EFFECT OF RADIATION. IV. REINFORCEMENT OF ROENTGEN RAY EFFECT DUE TO

SECONDARY RAYS. (German). Ph. Ellinger and E. Gruhn. Strahlentherapie 38, 58-97 (1930).

B. prodigiosus cultures begin to be injured by dose of over 500 r, are killed faster as dose is increased between 1000 r and 3000 r. Some survive 15,000 r. By using secondary rays cultures may be killed rapidly, complete sterilization being possible with a dose of 300 r. Killing effect of secondary rays increases with increasing wave length of primary rays. Bactericidal action of secondary rays increases with atomic number of secondary rays. Bactericidally active rays are almost entirely absorbed by 4 to 5 mm of air. BA 6-299.

583

EXPERIMENTAL INVESTIGATION OF THE EFFECT OF X-RAYS ON CALLUS FORMATION. (German). Shunichi Fukase. Virchow's Arch. path. Anat. u Physiol. 277, 69-92 (1930).

Both fibulae broken (subcutaneously) in 84 young rabbits and the fracture on one side was subsequently x-irradiated on 4 successive days. Following heavy doses (1600 r) bone formation was completely suspended for several weeks and healing delayed. After moderate doses (400 r) amount of callus was decreased, but healing occurred faster on radiated side. Microscopic and roentgenologic changes are described. BA 6-300.

584

THE EFFECT OF ROENTGEN RAYS ON THE ENERGY RELEASING REACTIONS OF GROWING TISSUES. (German). R. Hubert. Pflüger's Arch. ges. Physiol. 223, 335-350 (1929).

Glycolysis of growing and not growing tissue of chick embryos were determined by Warburg manometric method. Glycolysis was found to be far more sensitive than other energy-providing reactions examined. Ability to grow was damaged earlier than glycolysis. BA 6-302.

585

RADIOBIOLOGICAL INVESTIGATION OF THE GERM CELLS OF THE SEA URCHIN. (German). H. Langendorf and M. Langendorf. Strahlentherapie 40, 97-110 (1931).

The action was tested of 50, 100, 200, 300, or 400 r units administered to egg or sperm of *Psammechinus miliaris* either before or after fertilization. Number of injured larvae increased with increase in dose, the curve being exponential in type. Sperm were more radio-sensitive than egg. Sensitivity of fertilized egg was greatest shortly after fertilization, decreasing to minimum during metaphase, beginning to increase again with anaphase. BA 6-303.

586

STUDY OF RADIOSENSIBILISATION OF NORMAL AND TUMOR TISSUE. (French). J. Maisin and E. Picard. Rev. belge. sci. med. 2, 328-335 (1930).

One group of 5 tumor-bearing mice was injected twice a week for 6 weeks with colloidal U-Th²³⁰ mixture. This group as well as a second non-injected group of 5 mice received 3 exposures to 1500 r during the 2nd week of the experiment. Tumors generally resorbed within 3 weeks in injected mice. Uninjected mice showed temporary check then resumption of tumor development BA 6-304.

587

ULTRA SOFT X-RAYS. (French). J. Meyer and J. Saidman. Bull. soc. française dermatol. et syphilis. 1929, 1251-54(1929).

Rays of 4-8 Å units are almost entirely absorbed by the epidermis. A layer of 34 μ absorbs half the energy. Cutaneous vessels are not affected when these rays are used in therapy. Paper includes a summary of biologic properties and therapeutic uses of ultra soft rays, Grenz rays, ordinary rays, and ultraviolet. BA 6-307.

588

THE EFFECT OF CATHODE RAYS ON RESTING CELLS AND ON KARYOKINESIS IN SALAMANDRA MACULOSA. (German). W. E. Pauli and G. Politzer. *Z. wiss. Biol. Abt. B. Zr. Zellforsch. u. mikroskop. Anat.* 8, 404-424 (1929).

After radiation of cornea of larvae of *S. maculosa* with cathode rays 3 groups of changes appeared: necrotic changes of resting cells, and karyokinetic changes of 2 types, one characteristic of cathode rays. BA 6-309.

589

THE EFFECT OF X RAYS ON THE THYROID AND PARATHYROID GLANDS. O. M. Walters, B. J. Anson and A. C. Ivy. *Radiology* 16, 52-58 (1931).

Repeated exposure of thyroid to 385 r units at intervals varying from 7 to 14 days caused thyroid hyperplasia (4 of 8 dogs) and hyperplasia of parathyroids. In spite of parathyroid hyperplasia, a gradual slight decrease in blood Ca occurred. BA 6-321.

590

THE BONE MARROW UNDER THE ACTION OF X RAYS. (Italian). L. Siciliano and C. Banci-Buonamici. *Arch. Radiol. Nap.* 6, 1108-1136 (1930).

Authors describe histological changes in shielded marrow and consider these to be indirect effects of radiation. Also noted that when circulation of a limb was interrupted during irradiation, both local and indirect effects were decreased, presumably due to depression of release of toxic products from the irradiated limb. BA 6-317.

591

X-RAY INJURY OF TESTES, OVARY AND EMBRYO. (German). Hermann Wintz. *Monatsschr. Geburtsh. u. Gyn.* 78, 428-449 (1928).

Effects of radiation on testes, ovaries and embryos are reviewed. Degeneration of spermatogonia and depopulation of seminal canal are reparable but destruction of interstitial cells is not. Effect of small doses on interstitial cells is cumulative. Dose of 34% E.D. destroys ovulation and ovarian endocrine function. BA 6-322.

592

CHEMICAL STUDIES ON AUTOMATIN. I. (French). H. G. K. Westenbrink and Ph. Aarons. *Arch. néerl. physiol.* 14, 394-406 (1929).

A heart in which contraction has been stopped by perfusion with K free Ringer solution can contract again under influence of Ra emanations. Authors conclude that mechanism involved is the liberation of automatin, a substance which is soluble in H₂O and alcohol, dialyzable through collodion membrane, not destroyed by HCl, HNO₃, or boiling NaOH: not precipitated by AgNO₃, not absorbed by kaolin. BA 6-1140.

593

AN EXPERIMENTAL STUDY OF THE OPSONINS OF THE BLOOD. II. EFFECT OF IRRADIATION WITH ULTRAVIOLET AND WITH X RAYS. E. W. Blanchard. *Physiol. Zool.* 4, 316-323 (1931).

Opsonin of normal cat serum was almost completely inactivated by 30 min exposure to ultraviolet or by a 45 min exposure to x rays. Shorter exposure decreased the opsonic activity of the serum. BA 6-1403.

594

THE DELAYED LETHAL EFFECT OF RADIUM ON TISSUE CULTURES IN VITRO. COMPARISON OF CONTINUOUS AND SPACED RADIATION. F. G. Spear. *Proc. Roy. Soc. (London)* B 108, 190-195 (1931).

Cultures of a 8 to 9 day choroid or sclerotic of fowl embryos was exposed to continuous (6 hr) or discontinuous (1 hr per day for 6 days) irradiation with γ rays from 300

mgm Ra, 0.5 cm distance. Subcultures were made every 48 hr after exposure. Lethal effect was delayed to about same extent in both groups. BA 6-318.

595

STUDIES OF VERY SOFT ROENTGEN RAYS (SO-CALLED GRENZ RAYS). (German). Boris Rajewsky and Gerhard Gabriel. *Strahlentherapie* 30, 308-333 (1928).

Author's thesis is that Bucky's soft x-rays have no special properties not explainable by absorption coefficients. Very soft rays absorbed in surface layers affect the capillaries. BA 6-313.

596

INTRAVENOUS ADMINISTRATION OF CARBON DUST AND TRYPAN BLUE LOADED WITH RADON TO RATS WITH TUMORS. (Italian). Giuseppe Vecchi. *Arch. sci. med.* 54, 844-850 (1930). BA 6-319.

597

STUDIES OF THE EFFECT OF ROENTGEN RAYS ON THE HEALING OF WOUNDS. I. THE BEHAVIOR OF SKIN WOUNDS IN RATS UNDER PRE- OR POST-OPERATIVE IRRADIATION. Ernst A. Pohle, Gorton Ritchie, and Cecil S. Wright. *Radiology* 16, 445-460 (1931).

Eighty white rats were exposed to x rays (100 kv, 2.0 mm Al, or 140 kv, 0.25 mm Cu + 1 mm Al) preceding or following incisions in the skin. Half of each incision served as control. Single dose of 1000 r given 1 to 30 days pre-exposure did not influence healing. Single doses of 1000 r immediately, 24 hr, and 48 hr after incisions were made, retarded healing but did not alter final result. BA 6-311.

598

MORPHOLOGICAL ALTERATIONS OF BLOOD IN RATS TREATED WITH INTRAVENOUSLY ADMINISTERED RADON. (Italian). Giuseppe Vecchi and Sergio Tenef. *Arch. Sci. med.* 54, 851-860 (1930).

Diminution of erythrocytes and leukocytes. BA 6-320.

599

THE EFFECT OF ROENTGEN RADIATION ON BLOOD PRESSURE FLUCTUATION, AND ITS CLINICAL SIGNIFICANCE. (German). Hans Pausdorf and W. Nell. *Strahlentherapie* 38, 40-53 (1930).

Delayed blood pressure fall after x-ray exposure is an expression of general reaction caused by cell decay and increased irritability of vasomotor apparatus. It is important in prognosis and in determining time for re-irradiation. BA 6-310.

600

ON THE INFLUENCE OF RADIUM UPON THE BLOOD. (Japanese with English summary). K. Saito. *J. Orient. Med. Dairen* 14, (1931).

Rabbits were irradiated for 1 hr with 100, 50, 20, or 10 mgm Ra and examined 24, 48, 72, and 120 hr after exposure. RBC and Hgb were markedly depressed at 24 and 48 hr, began to increase at 72 hr, were normal in 120 hr. WBC increased at 24 to 48 hr, then dropped to subnormal levels, generally returned to normal in 120 hr. BA 6-314.

601

STUDIES ON THE BIOLOGICAL EFFECT OF ROENTGEN RAYS. EFFECT OF ROENTGEN RAYS ON THE ELECTROLYTES POTASSIUM AND CALCIUM IN HUMAN BLOOD SERUM. (German). G. Schaal, M. A. Gruschetskaja, and E. J. Zwillichowskaja. *Strahlentherapie* 40, 111-124 (1931).

Twenty patients were studied before and after irradiation with varying doses of x rays. In some, a shift in K/Ca quotient occurred after irradiation. During first few post-exposure days, shift favored K, later favored Ca. BA 6-315.

602

THE EFFECT OF X-RAY UPON BACTERIOPHAGE AND UPON THE BACTERIAL ORGANISM. T. D. Beckwith, A. R. Olson, and E. J. Rose. *Proc. Soc. Exp. Biol. and Med.* 27, 285-286 (1930).

In 3 of 7 strains of *B. coli* bacteriophage in phase of logarithmic growth, 30 min. exposure to x rays (14 inch target distance, 75 kv) resulted in reduced effectiveness towards the respective strains of bacteria. BA 6-4409.

603

ROENTGEN RAY STUDIES WITH *DROSOPHILA FUNEBRIS*. (German). H. A. Timofeev-Ressovskii. *Naturwissenschaften* 18, 431-434 (1930).

F₁ of 7083 flies from 380 matings of normal females with x-rayed males (dosage 3600 to 4800 r), F₂ of 58,375 flies and F₃ of about the same number were examined. 1137 cultures gave 84 sex-linked lethals and no visible mutations from 1988 control cultures. BA 6-3272.

604

THE BIOLOGICAL EFFECTIVENESS OF ROENTGEN RAYS OF DIFFERENT QUALITIES, DOSES MEASURED IN R UNITS. R. Glocker, E. Hayer, and O. Jüngling. *Strahlentherapie* 32, 1-38 (1929).

X rays of 80 kv (fibre filter) differed slightly from 180 kv x rays (0.7 mm Cu filter). Softer rays were about 15% more effective in producing erythema and retarding growth of bean seedlings when dose was small. No detectable difference when larger doses of the 2 were compared. BA 6-3609.

605

EXPERIMENTAL INVESTIGATION OF THE QUESTION OF THE ORIGIN OF CONGENITAL ANOMALIES OF THE EYE. (German). Hugo Gasteiger and Ko Hidano. *Graefe's Arch. Ophthalmol.* 119, 733-754 (1928).

Adrenalectomy or irradiation of parents in rats and mice resulted in some offspring with eye anomalies although the stock from which the parents came had no history of such defects. BA 6-5419.

606

THE EFFECT OF X-RADIATION ON THE SPERMATOGENESIS OF *ABRASAS GROSSULARIATA*. J. Brontë Gatenby, R. N. Mukerji, and Sylvia B. Wigoder. *Proc. Roy. Soc. (London)* B 105, 446-469 (1929).

Larvae of *Callimorpha jacobae* were killed 4 days post-exposure by dose corresponding to 12x human erythema dose (85 kv, 4 ma, no filter, 23 cm focal skin distance.) Four and one half erythema doses hastened pupation in both *C. jacobae* and *A. grossulariata*. Pupation and emergence were normal after 2-1/2 erythema doses. In parasitized *Pieris brassicae* caterpillars, x radiation caused larvae of *Apanteles glomeratus* to come out of the caterpillars. Irradiation killed most spermatocytes in growth stage in testes of *A. grossulariata* within 5 hr. Spermatogonia and spermatids were less sensitive. BA 6-3608.

607

PARTIAL INJURY TO THE GERM PLASM DUE TO RADIUM AND ROENTGEN RAYS. (German). P. Hertwig. *Handbuch der Vererbungswissenschaft* Vol. 3, No. 1, of Gebrüder Borntraeger: Berlin (1927). BA 5-16447.

608

EFFECTS OF ROENTGEN RAYS ON THE DEVELOPMENT OF THE EMBRYO OF THE HEN. T. Yamamoto. *Japan Med. World* 9, 45-52 (1929).

Roentgen irradiation prior to or in early stages of incubation had no effect on development of embryo. Resistance to irradiation was lowest in 32nd hr of incubation, gradually increased to 241st hr. No abnormal post-embryonic effects observed in birds hatched, reared and allowed to reproduce. BA 6-2340.

609

THE BIOLOGICAL EFFECT OF HIGH VOLTAGE X-RAYS. Charles Packard and C. C. Lauritsen. *Science* 73, 321-322 (1931).

Quality of beam had no effect, intensity was deciding factor when beams of hard (0.20 Å) medium (0.50 Å), and soft (0.70 Å) x rays were delivered at constant potential (50-180 kv) to *Drosophila* eggs. Identity of effect per r unit was further demonstrated on mouse tumor. BA 6-3613.

610

THE INCREASED BACTERICIDAL EFFECT OF INORGANIC COMPOUNDS IN THE PRESENCE OF X-RAYS. Robert J. Norris. *Bull. Basic Sci. Research (Univ. Cincinnati)* 3, 21-36 (1931). BA 6-3612.

611

THE HISTOLOGY OF MYELOID LEUKEMIA TREATED WITH ROENTGEN RAYS. (German). Franz Freund. *Virchow's Arch. pathol. Anat. u. Physiol.* 269, 501-519 (1928).

Section of leukemoid nodule after irradiation shows transformation of leukocytes into connective tissue cells. BA 6-4103.

612

THE EFFECT OF X-RAYS ON HAIR. Sidney Russ. *Nature (London)* 127, 894 (1931).

Hair fell out of black rat at points exposed to x-rays (approximately 150 kv), and was replaced by thinner, slightly curly white hair. BA 6-3614.

613

BLOOD CLOTTING STUDIES FOLLOWING INTERNAL RADIATION. J. H. Ferguson, G. A. Andrews and M. Brucer. *Federation Proc.* 11, 46 (1952).

'Prothrombin consumption tests' by both the 2 stage and 1 stage methods, whole blood clotting times, tests for circulatory anti-coagulant were performed on dogs receiving intravenous radio gold (Au¹⁹⁸). The prothrombin consumption tests gave evidence of radiation injury to this system. (from authors' summary).

614

ROENTGEN RAY SENSITIVITY OF THE SEVERAL PARTS OF THE RABBIT EYE. (German). Wilhelm Rohrschneider. *Graefe's Arch. Ophthalmol.* 122, 383-390 (1929).

Effects on conjunctiva, cornea and lens vary with size of dose. BA 6-3942.

615

QUANTITATIVE STUDIES ON THE LETHAL ACTION OF X-RAYS UPON CERTAIN INSECTS. Kiyooki Koidsumi. *J. Soc. Trop. Agr.* 2, 243-263 (1930).

Dacus cucurbitae Coq. and *D. dorsalis* Hendel can be killed by certain doses of x rays in any stage of life cycle. Resistance to x rays increases as development proceeds from egg to full grown larva, falls after beginning of pupation, then increases until emergence of adult. Author believes radiobiological phenomena to be subject to general photochemical reaction. BA 6-3610.

616

THE INDUCTION OF CHROMOSOMAL ABERRATIONS BY OXYGEN (Abstract). Alan D. Conger and L. M. Fairchild. (Oak Ridge National Lab.) (nd). 1p. (AECU-1697). *Genetics* 36, 347-8 (1951).

Treatment of dry pollen grains of *Tradescantia* with oxygen produces chromosomal aberrations which are identical with those found after irradiation with x or γ rays. Oxygen-treated pollen had aberration frequencies equivalent to that produced by about 600 r of x rays in air. Exposure of oxygen treated pollen to only 2 r of γ rays caused fragment frequency about equal to that expected from 1000 r of γ rays in air. NSA 6-4.

617

THE THEORY OF RATE PROCESSES AND GENE MUTA-

TION. W. D. McElroy and C. P. Swanson. (Johns Hopkins Univ.) (nd). 42p. (AECU-1713). Quart. Rev. Biol. 26, 348-63 (1951). NSA 6-6.

618

PRE-PROTECTION OF MICE AGAINST X-IRRADIATION MORTALITY BY SODIUM NITRITE (TECHNICAL). V. P. Bond, L. J. Cole, and M. C. Fishler. (Naval Radiological Defense Lab.) Sept. 21, 1951. 14p. (AD-331(B)).

Pre-irradiation intraperitoneal injection of 100-125 mgm/kg doses of NaNO_2 reduced the mortality in a group of mice receiving 600 or 750 r single dose whole body exposure to x ray. Less marked protection was observed with doses of 62 mgm/kg. It is suggested that nitrite protection may be mediated via its effect on catalase activity. NSA 6-23.

619

THE OXYGEN EFFECT OF X-RAY-INDUCED CHROMATID ABERRATIONS IN TRADESCANTIA MICROSPORES.

Herbert Parkes Rile, Norman H. Giles, Jr., and Alvin V. Beatty. (Oak Ridge National Lab.) (nd). 1p. (AECU-1685). Genetics 86, 572-3 (1951).

There is a linear relationship between aberration frequency and dose obtained with or without O_2 . Aberration frequencies are higher in O_2 . Magnitude of oxygen effect is greater for isochromatid types than for chromatid types (2.6 vs. 1.4). For equivalent dosages, chromatid interchanges are almost 4X as frequent in O_2 as in He. NSA 6-24.

620

ALBUMIN EXCHANGE BETWEEN BLOOD AND LYMPH COMPARTMENTS AND ESTIMATION OF LYMPH VOLUME (abstract). R. H. Storey, M. C. Woods, and J. Furth. (Oak Ridge National Lab.) (nd). 1p. (AECU-1691).

In normal dogs, lymph volume is calculated to be about 80% of plasma volume. In massively x rayed dogs the lymph volume is highly variable. Metabolism rate of ^{131}I labeled albumin is approximately 42% in 24 hours in normal dogs, is much reduced in dogs 4-14 days post irradiation. Authors suggest findings indicate increased capillary permeability in x rayed dogs. NSA 6-25.

621

THE RELATION BETWEEN THE EFFECTS OF TEMPERATURE AND OF OXYGEN ON THE FREQUENCY OF X-RAY-INDUCED CHROMOSOME ABERRATIONS IN TRADESCANTIA MICROSPORES (abstract). Norman H. Giles, Alvin V. Beatty, and Herbert Parks Rile. (Oak Ridge National Lab.) (nd). 1p. (AECU-1695). Genetics 36, 552-3 (1951).

Increased yield of aberrations at low temperatures cannot be attributed entirely to increased O_2 solubility. In absence of O_2 , yield of aberrations is higher at high than at low temperatures. In presence of O_2 , yield is higher at low temperatures. NSA 6-26.

622

EFFECTS OF INFRARED IRRADIATION ON THE FREQUENCY OF X- AND GAMMA-RAY-INDUCED CHROMOSOMAL ABERRATIONS IN TRADESCANTIA POLLEN TUBES (abstract). J. S. Kirby-Smith. (Oak Ridge National Lab.) (nd). 1p. (AECU-1696). Genetics 36, 558-9 (1951).

No significant difference in the aberration frequency, including interchanges, observed between material treated with x or γ rays alone and material treated with near infra-red immediately pre- or post-exposure to x rays or γ rays. NSA 6-27.

623

EFFECTS OF INJECTED RADIUM ON ALKALINE PHOSPHATASE ACTIVITY OF BONE AND TISSUES.

William P. Norris and Stanton H. Cohn. (Argonne Nation-

al Lab.) Oct. 1951. 22p. (AECU-1703; UAC-451). J. Biol. Chem. 196, 255-64 (1952).

Bone deposited radium causes significant reduction of alkaline phosphatase of bone; not of soft tissues. 1 to 10 rep/hr produces reduction in alkaline phosphatase (bone) within 24 hrs in vivo. In vitro, 10,000 r dose (x rays or radium) to serum and bone homogenates produced no change in phosphatase activity. NSA 6-28.

624

THE EFFECT OF X RADIATION ON THE ADAPTIVE FORMATION OF FORMIC HYDROGENLYASE IN *ESCHERICHIA COLI* (abstract). Daniel Billen and Herman C. Lichstein. (Oak Ridge National Lab.) (nd). 1p. (AECU-1705). J. Bacteriol. 63, 533-5 (1952).

X-irradiation of resting cell suspensions of *E. coli* with doses of 60,000 r or greater, prevents completely the ability to synthesize formic hydrogenlyase, while having no effect on preformed hydrogenlyase activity. NSA 6-29.

625

CHANGES IN THE CARDIOVASCULAR SYSTEM FOLLOWING TOTAL BODY X-IRRADIATION. W. B. Armstrong and W. O. Carter. Federation Proc. 15, 5 (1956).

A lethal dose (700 r) of irradiation to rats was followed by increased venous pressures two hours to four days following exposure. There was also evidence of a decrease in potassium and DNA concentrations.

626

THYROID RESPONSE TO TOTAL-BODY X-IRRADIATION. A. L. Botkin, E. H. Praytor, Mary E. Austing, and J. Hensen. (Army Medical Research Lab., Fort Knox) Sept. 28, 1951. 9p. (AMRL-66). Endocrinology 50, 550-4 (1952).

Changes in thyroid and serum ^{131}I content of rats indicate a stimulation of thyroid activity within 2 hrs after total body exposure to 1000 r of x rays, persisting until 1 day post-exposure. After first day and until 6th day there is progressive decrease in activity. Changes considered to be due to systemic radiation damage mediated through hypophysis. NSA 6-31.

627

A COMPARISON OF THE EFFECTS OF TEST ABLE ATOMIC BOMB IONIZING RADIATION AND X-RAYS ON SEEDS OF BARLEY, WHEAT, AND OATS; APPENDIX NO. 25 TO THE FINAL REPORT. Luther Smith. (Naval Medical Research Section, Joint Task Force One) (nd). 17p. (NP-1900).

No clear cut differences in types of seedling mutants obtained from exposure to atomic bomb or to equivalent dose of x rays (16,000 r). Also no difference in relative proportion of mutant types obtained. NSA 6-32.

628

THE SYNERGISTIC LETHAL ACTION OF CERTAIN RADIOISOTOPES IN RATS. Paul R. Salerno, H. L. Friedell, James H. Christie, and Marvin Berg. (Western Reserve Univ. School of Medicine) Oct. 22, 1951. 15p. (NYO-1624). Radiology 59, 564-9 (1952).

Studies utilizing more than one internally distributed radioactive isotope indicate that their lethal effects are synergistic if they are deposited in different organs. R-E system and hematopoietic system appear closely related; effects much more profound when both are injured than when injury is confined to either one. NSA 6-33.

629

ON THE ENERGY DISSIPATION OF MOVING IONS IN TISSUE. W. S. Snyder and J. Neufeld. (Oak Ridge National Lab.) Nov. 29, 1951. 14p. (ORNL-1083). NSA 6-34.

630

SYSTEMIC EFFECTS OF IRRADIATION OF THE EXTERIORIZED SMALL INTESTINE IN RABBITS. Marta S Billings, A. H. Dowdy, Louise Burlingame, and Juanita Lamport. (Atomic Energy Project, Univ. of Calif., Los Angeles). Oct. 26, 1951. 30p. (UCLA-152).

Doses up to 1800 r caused no significant morbidity. Doses from 1800 to 6000 r caused illness after 5 days terminating in 100% lethality in 4th week. There was no specific effect on circulating blood cells. Leukopenia and anemia following total body irradiation were not modified by lead shielding of exteriorized small bowel. Shielding of exteriorized small bowel did prevent initial shock and early death after total body irradiation. NSA 6-35

631

CYTOLOGICAL EFFECTS OF X-IRRADIATION AND COLCHICINE APPLIED SEPARATELY AND IN COMBINATION. Ole Arne Schjeide, Bennet M. Allen, and Ronald T. Piccirillo. (Atomic Energy Project, Univ. of Calif., Los Angeles). Nov. 16, 1951. 16p. (UCLA-165). J. Cellular Comp. Physiol. 40, 115-25 (1952).

A dose of 500 r of x rays plus 10 γ colchicine produced acceleration in breakdown of hematopoietic cells (compared to changes produced by either agent alone) in tadpoles between 4 and 8 hrs post exposure. Doubling the dosage did not produce such acceleration, and in fact had no effect in increasing cellular alterations. NSA 6-36.

632

THE EFFECTS OF X-IRRADIATION ON GASTRO-INTESTINAL TRANSIT AND ABSORPTION AVAILABILITY. R. D. Goodman, A. E. Lewis, and E. A. Schuck. (Atomic Energy Project, Univ. of Calif., Los Angeles). Nov. 15, 1951. 14p. (UCLA-168). Am. J. Physiol. 169, 242-7 (1952).

After total body exposure to 450 r of 250 KV x rays, male rats (white, Wistar) developed moderate decrease in gastric emptying rate as determined by Evans blue dye method. Transit time from pylorus to ileocecal junction was not affected. Maximum limit of absorption availability from small intestine was markedly diminished after irradiation; maximal change occurred between 4th and 7th post-exposure day. NSA 6-37.

633

EFFECTS OF TOTAL BODY IRRADIATION UPON LIPO-PROTEIN METABOLISM. John E. Hewitt, Thomas L. Hayes, John W. Gofman, Hardin B. Jones, and Frank T. Pierce. (Radiation Lab., Univ. of Calif.). (nd). 27p. (UCRL-1549). Am. J. Physiol. 172, 579-87 (1953).

Changes observed in lipoprotein levels in rabbits after irradiation were found to be consistent with theory of conversion of low-density lipoprotein to higher density components. Injection of heparin after irradiation hastened return of lipoprotein levels to normal. NSA 6-38.

634

THE EFFECT OF IONIZING RADIATIONS ON THE BROAD BEAN ROOT. PART IX CONCLUDED. J. M. Thoday. Brit. J. Radiol. 24, 622-8 (1951).

Technique presented for predicting percentage deficient daughter cells of a certain number of cells in mitosis. Estimated number of singly and doubly deficient cells in *V. faba* root meristems/100 cells after various dosages of x irradiation and of α particles, and percentages of fragmented nuclei are tabulated. X rays and α particles are approximately equal in their inhibition of growth of root tips. NSA 6-39.

635

THE EFFECT OF WHOLE BODY X-IRRADIATION ON THE RETICULO-ENDOTHELIAL SYSTEM AS DEMONSTRATED BY THE USE OF RADIOACTIVE CHROMIUM PHOSPHATE. E. R. Gabrieli and A. A. Auskaps. Yale J. Biol. and Med. 26, 159-69 (1953).

Rats were exposed to 25, 50, and 100 r whole body X-irradiation and reticulo-endothelial functions were tested by means of the radioactive chromium technique. Rate of removal of chromium phosphate was not altered but organ distribution of chromium phosphate was altered by doses as small as 25 r.

636

NEUTRON AND X-RAY EXPERIMENTS IN BARLEY. James MacKey. Hereditas 37, 421-64 (1951).

Dry and pre-soaked seed of barley were treated with x rays and fast neutrons and biological effect followed through first and second generation. NSA 6-41.

637

JACKSONIAN EPILEPSY FOLLOWING HIGH ENERGY SHORT DISTANCE IRRADIATION OF A TEMPLE MELANOMA. Wilhelm Hornberger. Strahlentherapie 85, 459-76 (1951). (German)

A case of Jacksonian epilepsy following 18,000 r short distance Chaoul tube irradiation of a temple melanoma is described. NSA 6-42.

638

EFFECT OF TEMPERATURE ON THE SENSITIVITY OF WHEAT GERMINATION TO X RADIATION. R. G. Trudova. Doklady Akad. Nauk S.S.S.R. 79, No. 2, 353-6 (1951). (Russian).

Effects on the mitotic activity of the root-tip meristem of wheat of 500 r of x radiation prior to exposure at 0°, 20°, and 36° C and of 250, 500, 1000 and 2000 r following exposure to these temperatures are presented graphically. NSA 6-44.

639

FAILURE OF HYPOXIA TO PROTECT AGAINST THE RADIATION INDUCTION OF DOMINANT LETHALS IN MICE (abstract). W. L. Russell, J. C. Kile, Jr., and Liane B. Russell. (Oak Ridge National Lab.). (nd). 1p. (AECU-1686). Genetics 36, 574 (1951).

Male mice were exposed to (a) 800 r in air, (b) non-irradiated in air, (c) 800 r in 5% O₂-95% He mixture, or (d) non-irradiated in same mixture. Females were fertilized by males shortly after treatment; opened surgically before term and embryos classified as alive or dead.

Results	Alive	(a) 3.9	(b) 8.2	(c) 3.6	(d) 8.3
Dead	(a) 3.6	(b) 0.98	(c) 3.5	(d) 0.96	

NSA 6-45.

640

MODIFICATION OF THE EFFECTS OF X-RAYS ON STOCK 90 OF VARIETY 1 OF PARAMECIUM AURELIA (abstract). R. F. Kimball. (Oak Ridge National Lab.). (nd). 1p. (AECU-1689).

Low oxygen tension protects against post-autogamous effects, not against immediate effects of radiation. Both division delay and death are greater when paramecia are irradiated in dilute culture fluid than when they are irradiated in undiluted culture fluid. Alcohol and sodium hydrosulfite decrease division delay but cause higher mortality. NSA 6-46.

641

PROBABLE MECHANISMS OF PROTECTIVE ACTION OF SOME CHEMICALS AGAINST RADIATION DAMAGE (abstract). George E. Stapleton, Daniel Billen, and Alexander Hollaender. (Oak Ridge National Lab.). (nd). 1p. (AECU-1690).

Studied protective effect of various chemicals against x ray damage in *E. coli* B/r. Results suggest that pre-irradiation incubation of bacterial cells with protective compounds may remove oxygen at critical locations within the cell, thereby inhibiting formation of oxidizing radiodecomposition products of H₂O. NSA 6-47

642

MODIFICATION OF THE ACTION OF X-RAYS UPON

PARAMECIUM AURELIA (abstract). R. F. Kimball and Nenita Gaither. (Oak Ridge National Lab.). (nd). 1p. (AECU-1694). *Genetics* 36, 558 (1951).

Mutagenic action of 1 to 6 r of x rays was reduced when irradiation performed in N_2 or in presence of 0.7 M C_2H_5OH . Sodium hydrosulfite (0.001 M), metabolic state (fasting or fed) and division rate had no effect on the mutagenic action, but sodium hydrosulfite did protect against lethal action of x radiation. Presence of 0.7 M C_2H_5OH during irradiation decreased both the death rate and the retardation of division. NSA 6-48.

643

CHEMICAL ASPECTS OF RADIATION SENSITIVITY ON LIVING CELLS (abstract). Alexander Hollaender, George E. Stapleton, and W. T. Burnett, Jr. (Oak Ridge National Lab.). (nd). 2p. (AECU-1699).

Sulfhydryl compounds, reducing compounds, respiratory inhibitors, alcohols and glycols, carboxylic acids and sugars yield similar curves relating concentration to protective effect against radiation damage. Curves indicate a saturation phenomenon. Two compounds used simultaneously at plateau level give added protection. NSA 6-49.

644

THE EFFECT OF ORAL TERRAMYCIN ON WHOLE BODY X-RADIATION. Gordon E. Gustafson and Simon Koletsky. (Western Reserve Univ., School of Medicine). Oct. 26, 1951. 10p. (NYO-1635). *Proc. Soc. Exptl. Biol. Med.* 78, 489-90 (1951).

Terramycin has been shown to be effective in reducing the mortality in rats when administered for a period only 48 hours prior to 660 r of whole body x-radiation. NSA 6-50.

645

PROTECTION OF MICE AGAINST A LETHAL DOSE OF X-RAYS BY CYANIDE, AZIDE, AND MALONONITRILE. Z. M. Bacq and A. Herve. *Brit. J. Radiol.* 24, 617-21 (1951).

Pre-exposure administration of cyanides, azide and malononitrile protect a significant percentage of mice against a single lethal whole-body dose of x rays. Not protective when administered post-exposure. Action of cyanide is increased by simultaneous administration of glutathione. NSA 6-51.

646

INJURIES TO HEALTH FOLLOWING UNCONTROLLED NUCLEAR FISSION CHAIN REACTIONS. George L. Wied and Gerhard Schmidt. *Arztl. Forsch.* 5, No. 12, 1/455-65 (1951). (German).

Literature review of injuries caused by atomic bombs and of indicated treatment. 40 references. NSA 6-52.

647

CHEMICAL PROPHYLAXIS OF RADIATION INJURIES. H. Langendorff. *Strahlentherapie* 85, 391-400 (1951). (German).

Cysteine, glutathione, p-chloromercuribenzoate, BAL, KCN, and HgCl affect cell reactions locally. Doca, rutin, pyridoxin, nicotinamide, d-catechol and antibiotics protect by general stress-damping effect. Importance of compound protecting free SH-groups is stressed. NSA 6-53.

648

EXPERIMENTAL INVESTIGATIONS ON EFFECTS OF VITAMINS ON LIVER METABOLISM IN ANIMALS SUFFERING FROM RADIATION INJURIES. R. Koch and A. Bohlander. *Strahlentherapie* 85, 331-41 (1951). (German).

Total body X radiation in white mice resulted in reduction of liver glycogen to 27% of original value. In

homogeneous and heterogeneous animal material the distribution of liver glycogen corresponds to normal Gaussian distribution. No change in liver total N. NSA 6-56.

649

MODIFICATION OF IRRADIATION INJURY IN MICE AND GUINEA PIGS BY BONE MARROW INJECTIONS. Egon Lorenz, Delta Uphoff, T. R. Reid, and Emma Shelton. *J. Natl. Cancer Inst.* 12, 197-201 (1951).

Intravenously or intraperitoneally injected bone marrow (post-irradiation) gives excellent protection to mice and guinea pigs. NSA 6-57.

650

TREATMENT OF RADIATION SICKNESS WITH ACTH. Kenneth W. Taber. *Radiology* 57, 702-9 (1951).

Patients were relieved of symptoms of radiation sickness after a few 10 mgm intramuscular doses of ACTH. Dose of 300 r of x ray was non-lethal to mice treated with comparable doses of ACTH, and survival of mice after 600 r dose of x rays was prolonged by this treatment. NSA 6-58.

651

FURTHER INVESTIGATIONS OF THE INHERITANCE OF REDUCED VIGOR (abstract). R. D. Kimball and R. P. Geckler. (Oak Ridge National Lab.). (nd). 2p. (AECU-1682). NSA 6-140.

652

BIOLOGICAL STUDIES OF RADIATION EFFECTS. SECT. II OF MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT, APRIL, MAY, AND JUNE, 1951. J. H. Lawrence. (Radiation Lab., Univ. of Calif.). Aug. 14, 1951. Decl. Dec. 5, 1951. (AECU-3282 (Sect II); UCRL-1437 (Section II)).

An assay of daily dose of cosmic radiation near top of the atmosphere was made for study of radiation hazards in high-altitude aviation. Data presented in tabular form. NSA 6-497.

653

EXPERIMENTAL RADIATION CATARACTS. II. CATARACTS IN THE RABBIT FOLLOWING SINGLE EXPOSURE TO FAST NEUTRONS. David G. Cogan, John L. Goff, and Elizabeth Graves. (Los Alamos Scientific Lab.). (nd). 23p. (AECU-1743). *Arch. Ophthalmol.* (Chicago) 47, 584-92 (1952).

Course of events in cataract production after single exposures to 14 Mev neutrons was similar to course following x ray exposures. Effects following 5×10^{10} neutrons/cm² (14 Mev) were comparable to effects following 500 r (1.2 Mev). Threshold dose for cataract production by neutrons is less than 2×10^9 neutrons/cm² incident on lens. NSA 6-505.

654

RADIATIONS EFFECTS. p.21-40, 56, 58-9, 64-5, 91-8, 164-70, 177-86, 192 OF QUARTERLY REPORT, FEBRUARY, MARCH, APRIL, 1951: DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH. Austin M. Brues, ed. (Argonne National Lab.). (ANL-4625).

Survival data for acute or chronically radiated new born mice; survival data and cataract formation data for mice which had only heads exposed to large doses of x radiation 6-12 hrs. after birth; plasma electrolyte balance in x-radiated dogs; binding of organic ions by x-radiated bovine serum albumin, and other topics. NSA 6-506.

655

PAPER CHROMATOGRAPHIC STUDY OF FREE AMINO ACIDS OF YOLK OF DEVELOPING NORMAL AND X-IRRADIATED CHICK EMBRYOS. Richard F. Riley and Esther Richter. (Atomic Energy Project, Univ. of Calif., Los Angeles). Nov. 26, 1951. 8p. (UCLA-171).

500 r of x radiation administered on 10th day did not alter free amino acid content of yolk of fertile chick embryos between 5th and 20th day post-exposure. NSA 6-508.

656
RADIUM TOXICITY AND EXTERNAL RADIATION-BIOLOGICAL EFFECTS, p.6-45 OF QUARTERLY TECHNICAL REPORT JULY 1, 1951, THRU SEPTEMBER 30, 1951. Henry A. Blair, Director. (Atomic Energy Project, Univ. of Rochester). Oct. 25, 1951. (UR-180 (p.6-45)).

Sodium, potassium and chloride balance studies in irradiated dogs; preliminary observations of effects of radiation on metabolic process in baker's yeast; urinary and serum fibrinolytic activity in dogs after 450-700 r of whole body x radiation. NSA 6-510.

657
EFFECT OF IONIZING RADIATIONS ON VITAMIN B₁₂. P. C. Markakis, S. A. Goldblith, and B. E. Proctor. Nucleonics 9, No. 6, 71-82 (1951).

B₁₂ in pure solution and in raw whole milk found to be relatively radiosensitive. Effect of radiation considered to be indirect. NSA 6-511.

658
EXTERNAL RADIATION-TOLERANCE AND THERAPY. M. P. Coulter and F. W. Furth. p.46-55 OF QUARTERLY TECHNICAL REPORT JULY 1, 1951 THRU SEPTEMBER 30, 1951. Henry A. Blair, Director. (Atomic Energy Project, Univ. of Rochester). Oct. 25, 1951. (UR-189 (p.46-55)).

Beneficial effects of (1) spleen shielding and (2) aureomycin and whole blood therapy in irradiated dogs NSA 6-516.

659
RADIATION SICKNESS, p.14-20, 41-54, 57, 60-3, 125-41, 152-4 OF QUARTERLY REPORT, FEBRUARY, MARCH, APRIL, 1951 DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH. Austin M. Brues, ed. (Argonne National Lab.). (ANL-4625).

Survival was enhanced in groups of irradiated LAF₁ mice by (1) intravenous or intraperitoneal injection of bone marrow suspensions, (2) peritoneal implantation of 4 spleens from baby mice (3) leaving patent blood vessel at distal tip of exteriorized, shielded spleen during irradiation. NSA 6-520.

660
DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, MAY, JUNE, JULY, 1951. Austin M. Brues, ed. (Argonne National Lab.). 112p (ANL-4676).

Reports of studies on prophylactic effect of bone marrow injections; 30-day LD-50 comparisons of radon and x radiation effects in mice; histological changes in eyes of mice subjected to 1000 r x radiation during newborn period; protective effect of 1 ml doses of plasma from blood-perfused dog spleens injected into irradiated mice; effect of large doses of cortisone on mortality in irradiated chicks. NSA 6-763.

661
A SUGGESTED CHAIN PROCESS FOR RADIATION DAMAGE. A. T. Reid and H. G. Landau. Bull. Math. Biophys. 13, 153-61 (1951). NSA 6-768.

662
THE GENETIC BASIS OF X-RAY INDUCED RECESSIVE LETHAL MUTATIONS. Irwin H. Herskowitz. Genetics 36, 357-63 (1951).

An hypothesis is suggested which recognizes lethals arising from 3 origins point mutation, independent of breakage; breakage alone; and position effect following rearrangement of breaks. NSA 6-769.

663
X-RAY INDUCED LETHAL MUTATIONS IN SEVERAL STRAINS OF DROSOPHILA MELANOGASTER. Ørstein Strømnaes. Hereditas 37, 532-59 (1951).

Males from 31 strains of *D. melanogaster* were tested for sensitivity to induction of dominant lethal mutations by 2300 r x rays. Genetic differences in sensitivity to induction of dominant lethal mutations by x rays found to exist between unrelated strains. NSA 6-770.

664
THE LETHAL EFFECTS OF RADIATION. Edward Spoerl. Sci. American 185, 22-5 (1951).

Review of physical and chemical events produced in living cells by ionizing radiations. NSA 6-771.

665
SPONTANEOUS AND X-RAY INDUCED GYNANDRO-MORPHS IN DROSOPHILA MELANOGASTER. G. Bonnier and K. G. Luning. Hereditas 37, 470-87 (1951). NSA 6-773.

666
CHANGES IN THE WHITE BLOOD COUNT AND THE URINARY EXCRETION OF LIPID-SOLUBLE REDUCING SUBSTANCES FOLLOWING RADIUM APPLICATION IN CASES OF CANCER OF THE UTERUS. S. Parviainen and P. O. Pärnänen. Ann. Med. Exptl. et Biol. Fenniae 28, 135-42 (1950).

Decreased excretion of reducing substances was observed during radium application, temporary increase on day following treatment. Radium application reduces excretion of urine and increases concentration of reducing substances in urine. NSA 6-775.

667
HORMONE-SECRETING TRANSPLANTABLE NEOPLASM OF THE PITUITARY INDUCED BY I¹³¹. J. Furth and W. T. Burnett, Jr. Proc. Soc. Exptl. Biol. Med. 78, 222-4 (1951).

Pituitary growths induced by thyroid destructive doses of I¹³¹ are readily transplantable in mice whose thyroid glands are similarly destroyed, but not in normal mice. Growths discharge gonadotropic hormones. Discharge of thyrotropic hormones by the tumors is assumed but remains to be demonstrated. NSA 6-776.

668
ON THE INTERPRETATION OF THE DOSE-FREQUENCY CURVE IN RADIOGENETICS R. A. Wijsman. Genetics 36, 478-87 (1951).

Comparison of curves of multiple-event models with the curve for a single-event model supports the theory that a linear relationship between mutation frequency and radiation dose is caused by a single event. NSA 6-777.

669
RADIATION HEMOLYSIS, A CONTRIBUTION TO OUR KNOWLEDGE OF BIOLOGICAL EFFECTS OF IONIZING RADIATION. Bruno Lindemann. Fortschr. Gebiete Röntgenstrahlen 75, 523-59 (1951). (German).

Electron-optical analyses were made of structure of x-irradiated erythrocytes. It is concluded that (1) x rays caused osmotic hemolysis of erythrocytes by altering the permeability of cell membrane due to primary denaturation; (2) degree of hemolysis depends on amount of plasma in suspension of RBC, therefore denaturation of RBC membrane is an indirect effect of x rays. NSA 6-778.

670
A SURVEY OF ROENTGEN RAY EXPOSURES RECEIVED BY PERSONNEL IN SEVERAL CLINICS AND GENERAL HOSPITALS. Eglida De Amicis, Charles K. Spalding, and Russell F. Cowing. (Cancer Research Inst., New England Deaconess Hospital, Boston). (nd). 8p. (AECU-1749). J. Am. Med. Assoc. 149, 924-5 (1952).

Reviewed 1100 film badges worn by roentgenologists over a period of 1 year, and 2740 badges worn by technicians over same period. 0.63% of radiologists badges and 0.11% of technicians badges revealed exposures greater than 300 mr in one week. NSA 6-779.

671

STRAY X-RAYS FROM ELECTRON BEAM INSTRUMENTS AND SOME BIOLOGICAL IMPLICATIONS. S. D. Larks. Am. Ind. Hyg. Assoc. Quart. 12, 175-9 (1951).

Oscillographs and electron microscopes are discussed in detail as possible sources of radiation above tolerance level. NSA 6-783.

672

THE TREATMENT OF POST-IRRADIATION INFECTION WITH ANTIBIOTICS; AN EXPERIMENTAL STUDY ON MICE; PARTS I AND II. C. Phillip Miller, Carolyn W. Hammond, Marianne Tompkins, Gertrude Shorter, George Sacher, Sylvanus A. Tyler, and Joan Gurian. (Institute of Radiobiology and Biophysics, Univ. of Chicago). (nd) 65p. (AECU-1711).

Young adult mice were treated with antibiotics after single total body exposure to x radiation in doses of 450 to 600 r. Various antibiotics given singly or in combination were studied, protective effects analyzed statistically. NSA 6-784.

673

UTILIZATION OF THE GROSS FISSION PRODUCTS; PROGRESS REPORT. L. E. Brownell, L. C. Anderson, H. J. Gomberg, J. J. Martin, W. W. Meinke, L. Thomasen, E. T. Vincent, and R. A. Wolfe (Engineering Research Inst., Univ. of Michigan). Aug. 31, 1951. 94p. (COO-86; Progress Report No. 1).

Preliminary experimental results reported for studies of effect of radiation on foods. Milk and meat were preserved for more than 3 weeks at 77°F after γ irradiation of 2.4×10^6 r. Molds found to be most resistant microorganism. Enzymes have greater radiation resistance than microorganisms. NSA 6-916.

674

ABNORMAL SPORE GERMINATION AND MICROTHALLUS DEVELOPMENT OF FUNGI INDUCED BY DILUTE COLLOIDAL POLONIUM (abstract). Edward E. Butler and John B. Rowell. (Minnesota University). (nd). 2p. (AECU-1813). NSA 6-1073.

675

ELECTROLYTES IN MUSCLE OF RAT FORELIMB AFTER INTENSE LOCAL X IRRADIATION (abstract). W. S. Wilde and C. W. Sheppard. (Oak Ridge National Lab. and Tulane Univ.). (nd). 1p. (AECU-1796). Proc. Soc. Exptl. Biol. Med. 88, 249(1955).

Single doses of 10 to 73 kr (250 kvp x rays, 720 r/min) were administered to muscles of one forelimb of anesthetized rat. Total water of exposed muscle increased with dosage to exceed controls by 25%. No change in potassium content. Studies of inulin and Na^{24} space indicated water gain was interstitial. NSA 6-1077.

676

THE EFFECT OF HYPOXIA ON THE RADIATION INDUCTION OF DEVELOPMENTAL ABNORMALITIES IN THE MOUSE (abstract). Liane Brauch Russell, W. L. Russell, and Mary H. Major. (Oak Ridge National Lab.). (nd). 1p. (AECU-1799). Anat. Record 111, 455 (1951).

Hypoxia exerts marked protective effect against x ray damage in all characters known to be radiosensitive on 11-1/2 day of gestation in fetal mice. Magnitude of protection similar for all characters studied. NSA 6-1078.

677

THE EFFECT OF X RADIATION ON THE RESPIRATION OF BACTERIAL CELLS (abstract). Daniel Billen, G. E.

Stapleton, and Alexander Hollaender. (Oak Ridge National Lab.). (nd). 1p. (AECU-1801).

60,000 r inhibited respiration in *E. coli*. Magnitude of effect varied with substrate, temperature and strain of organism. There was characteristically a latent period after exposure before respiratory rate declined. Length of latent period varied with substrate and post-exposure incubation temperature. NSA 6-1079.

678

CONDITIONS OF TRANSPLANTATION AND HORMONAL SECRETIONS OF PITUITARY TUMORS INDUCED BY P^{31} (abstract). J. Furth, W. T. Burnett, Jr., E. Gadsden, and J. N. Dent. (Oak Ridge National Lab.). (nd). 1p. (AECU-1803). NSA 6-1080

679

THE PROTECTIVE ROLE OF PYRIDOXIN AGAINST THE TOXIC EFFECTS OF P^{32} (abstract). Camillo Artom, W. E. Cornatzer, and George T. Harrell, Jr. (Bowman Gray School of Medicine, Wake Forest College). (nd). 1p. (AECU-1811).

Mice on various experimental diets received a mixture of B vitamins without pyridoxin, and were injected with single dose of P^{32} (5-6 $\mu\text{C/g}$). Pyridoxin had marked protective effect in animals in which vitamin deficiency was made more severe by adding a pyridoxin analog or by increasing metabolic demand for pyridoxin. No effect in animals with only mild deficiency. NSA 6-1081.

680

FACTORS MODIFYING THE EFFECT OF X IRRADIATION ON REGRESSION OF A TRANSPLANTED LYMPHOSARCOMA. Joanne Weikel Hollcroft, Egon Lorenz, and Marion Matthews. (National Cancer Inst. and Argonne National Lab.). Oct. 25, 1951. 27p. (AECU-1819; UAC-458). J. Natl. Cancer Inst. 12, 751-63(1952).

Simultaneous systemic and local tumor irradiation; intravenous administration of H_2O_2 immediately before tumor irradiation; and maintaining mice in high-oxygen atmosphere all increased regression of transplanted mouse lymphosarcoma after irradiation of the tumor. NSA 6-1082.

681

THE EFFECT OF SELECTIVE SHIELDING OF RABBIT INTESTINE DURING TOTAL BODY IRRADIATION. Richard S. Farr and Peter P. H. DeBruyn. (Argonne National Lab.). Oct. 1951. 11p. (AECU-1820; UAC-459). Am. J. Roentgenol. Radium Therapy 69, 1001-4 (1953).

Selective shielding of the exteriorized colon or small intestine does not decrease the lethal effect of x rays in rabbits. NSA 6-1083.

682

CELLULAR RESPIRATION, CELL DIVISION, AND IONIZING RADIATIONS. E. S. Guzman Barron and S. Louise Seki. (Argonne National Lab.). Oct. 1951. 13p. (AECU-1821; UAC-462).

Respiration of eggs and sperm of *Arbacia punctulata* decreased following large doses, increased following small doses of x rays. Inhibition of cell division was observed even following x ray doses which produced increased respiration. NSA 6-1084.

683

THE MUTAGENIC ACTION OF DILUTE COLLOIDAL POLONIUM ON FUNGI. J. B. Rowell, E. C. Stakman, and E. E. Butler. (Minnesota Univ.). (nd). 6p. (AECU-1823).

Polonium concentrations of 0.5 to 1.0 $\mu\text{C/ml}$ readily induced mutation in vegetative cells or spores of various fungi in aqueous suspension at 8° C. Spores germinated directly in water containing 1 μC of Po/ml grow and pro-

duce normal colonies. Lethal and mutagenic effects appear when cells are kept in this mixture at low temperature for long periods. NSA 6-1085.

684

SOME EFFECTS OF X-IRRADIATION ON TURTLES. Paul D. Atland, Benjamin Highman, and Betty Wood. *J. Exptl. Zool.* **118**, 4-14 (1951).

Box turtles were exposed to 500-10,000 r x rays (whole body). Effects were similar to those in other mammals but occurred at slower rate. Turtles survived at least 270 days after 500 r, 4 of 6 survived longer than 4 months after 1000 r, 2 of 6 survived 4 months after 1500 r. Higher doses caused death in 18 to 48 days. NSA 6-1090.

685

THE EFFECT OF ACETYL- β -METHYLCHOLINE, CARBAMYLCHOLINE, AND ATROPINE ON THE SURVIVAL OF X-IRRADIATED MICE (abstract). W. T. Burnett, Jr., A. W. Burke, Jr., and A. C. Upton. (Oak Ridge National Lab.). (nd). 1p. (AECU-1793). *Am. J. Physiol.* **174**, 254-8 (1953).

Parasympathomimetic drugs given by intraperitoneal injection 3 to 5 min. before total body x irradiation increased the LD-50/28 days of 8 to 10 week old C₅₇ black strain mice from 600 r to 900 r. Some late effects of radiation were noted in surviving mice. NSA 6-1093.

686

DOSAGES RECEIVED BY PATIENTS DURING X-RAY DIAGNOSTIC EXAMINATIONS. F. Wachsmann. *Fortschr. Gebiete Rontgenstrahlen* **75**, 728-33 (1951). (German).

A nomograph is given to facilitate dosage determinations. NSA 6-1100.

687

LOCALIZATION OF X-RAY INJURY TO THE INITIAL PHASES OF ANTIBODY RESPONSE. W. H. Taliaferro, L. G. Taliaferro and E. F. Janssen. (Chicago Univ.). (nd). 1p. (AECU-1846).

X ray damage to antibody formation is limited to early phases of immunizing process. (Studied hemolysin titres in rabbits following a single injection of standardized suspension of sheep cells.) NSA 6-1375.

688

PERMISSIBLE DOSAGE AND CONSIDERATIONS OF CALCULATED RISK. C. F. Behrens. (Naval Research Inst., Bethesda). July 2, 1951. 21p. (NP-3546).

A table of permissible dosage determinations for both external and internal radiation exposures is included. NSA 6-1376.

689

A BIBLIOGRAPHY ON "THE EFFECTS OF X-RAY ON BACTERIA." Radcliffe F. Robinson, Michael D. Phillips, and Margaret G. Nagelsen. (Battelle Memorial Inst.). Aug. 20, 1951. 18p. (NP-3610).

178 titles of articles published during the period 1896 through August 1951. NSA 6-1377

690

IN VIVO DIALYSIS OF BLOOD AS A MEANS OF INFLUENCING THE SURVIVAL OF X-IRRADIATED DOGS Paul S. Lavik, Jack R. Leonards, G. Warren Buckaloo, Charles Heisler, and Hymer L. Friedell. (Western Reserve Univ., School of Medicine). Dec. 15, 1951. 21p. (NYO-1637). *Fed. Proc.* **10** (1), 213 (1951).

Dogs were subjected to in vivo dialysis of their blood by means of "artificial kidney" during or following exposure to a lethal dose of x rays. No beneficial effects observed. NSA 6-1378.

691

MONTHLY PROGRESS REPORT NOV. 1951. Hymer L. Friedell. (Atomic Energy Project, Western Reserve Univ.). (nd). 6p. (NYO-1639).

Deposition of intravenously injected colloidal Au¹⁹⁸ and hematological response were markedly altered in partially hepatectomized rats. Rats receiving colloidal Au¹⁹⁸ before x-irradiation showed approximately one third of x ray effect after receiving pretreatment with cysteine. NSA 6-1379.

692

ATTEMPTS TO ALTER THE RESPONSE TO IONIZING RADIATIONS. W. A. Selle. (Atomic Energy Project, Univ. of Calif., Los Angeles). Jan. 15, 1952. 53p. (UCLA-176).

Summary in tabular form of 100 papers published since 1949 relative to attempts to alter response of animals to ionizing radiation. NSA 6-1380.

693

BIOLOGICAL EFFECT OF SHORT WAVE RADIATIONS. INVESTIGATIONS ON INVERTEBRATES. Manfred Gersch and Winfried Möbius. *Strahlentherapie* **85**, 565-80 (1951). (German).

Oligochaete worms (Enchytraeae) showed no radiation injuries after 3 exposures to 90,000 r, Gnat Larva (Corethra) showed injury to intestinal cells after moderate doses; delayed degeneration of pericardial cells and some thoracic cell complexes after higher doses, 25,000 r caused widespread cellular injury and high mortality. NSA 6-1381.

694

FURTHER OBSERVATIONS ON INHIBITION OF LYMPHOID TUMOR DEVELOPMENT BY SHIELDING AND PARTIAL-BODY IRRADIATION OF MICE. Henry S. Kaplan and Mary B. Brown. *J. Natl. Cancer Inst.* **12**, 427-35 (1951).

Shielding of indifferent areas of the body, e.g., thigh, significantly inhibits the genesis of lymphoid tumor. Mediastinal shielding had no effect. NSA 6-1382.

695

EXPERIMENTAL INVESTIGATIONS ON VITAMIN EFFECTS ON LIVER METABOLISM AFTER RADIATION INJURY. II. EFFECT OF LACTOFLAVIN AND PYRIDOXIN ON GLYCOGEN AND TOTAL NITROGEN OF THE LIVER IN TOTAL BODY IRRADIATED ANIMALS Ruprecht Koch and Adam Bohlander. *Strahlentherapie* **85**, 599-605 (1951) (German).

Irradiation of mice with total body doses of 350-400 r of x rays on each of 5 consecutive days did not change N content of liver. Liver glycogen dropped to 27% of normal after exposure. Both lactoflavin and pyridoxin treatment decreased the glycogen loss. NSA 6-1383.

696

INTRATHORACIC CHANGES FOLLOWING ROENTGEN TREATMENT OF BREAST CARCINOMA. T. A. Groover, A. C. Christi and E. A. Merritt. *Am. J. Roentgenol.* **10**, 471-76 (1953).

The authors are convinced that not all the changes observed in the chest after massive dose treatment of carcinoma of the breast are due to malignant disease: that at least some of them are attributable directly to the effect of treatment. The fact that symptoms of intrathoracic irritation follow the course of skin reaction is considered significant.

697

PROTECTIVE ACTION OF METHYLAMINE AGAINST X-IRRADIATION. Z. M. Bacq and A. Herve. *Nature* **168**, 1126 (1951).

C₅₇ black mice were injected intraperitoneally with 2 mg of methylamine immediately prior to irradiation. All non-injected mice exposed to 700 r died 5-10 days post exposure; 73% of injected mice survived. Injected mice exposed to 850 r died somewhat later than controls. Injection had no protective effect against larger doses.

Post-exposure injection shifted mortality curve to the right after 700 r. NSA 6-1375.

698
PROTECTIVE ACTION OF ETHYL ALCOHOL ON IRRADIATED MICE. Edith Paterson and Joyce J. Matthews. *Nature* 168, 1126-7 (1951).

Two 1-ml orally administered doses of ethyl alcohol (10% in saline) 80 and 20 minutes before 700 r x-irradiation decreased mortality from 100% (controls) to 63%; raised LD-50 dose from 554 r to 625 r; extended life of non-survivors. Post-exposure administration of alcohol did not have protective effect. Intravenous cysteine (20 mgm/mouse) gave greater protection than did the alcohol. NSA 6-1386.

699
EFFECT OF X-RADIATION, RADIOMIMETIC SUBSTANCES AND SURGICAL TRAUMA ON THE SULFHYDRYL CONTENT OF PLASMA. FINAL REPORT. Bernard Shacter, Helen Supplee, and Cecil Entenman. (Naval Radiological Defense Lab.). Nov. 27, 1951. 22p. (AD-333(B); Technical Objective AW-6; U20409). *Am. J. Physiol.* 169, 499-507 (1952).

Plasma sulfhydryl concentration decreased 2 days after exposure to 700 r (250 kvp x rays), and was minimal (60% of control level) 6-8 days after exposure in 3-6 month old rats of both sexes. Sulfhydryl concentration approached normal by 12th post-exposure day. Nitrogen mustard and trisethylene also decreased sulfhydryl concentration of plasma. NSA 6-1593.

700
EFFECT OF X-RADIATION AND LAPAROTOMY ON THE POLYSACCHARIDE CONTENT OF PLASMA; RELATIONSHIP TO PLASMA SULFHYDRYL CHANGES. Bernard Shacter, Helen Supplee, and Cecil Entenman. (Naval Radiological Defense Lab.). Nov. 27, 1951. 11p. (AD-334(B); Technical Objective AW-6; U20432). *Am. J. Physiol.* 169, 508-10 (1952).

Plasma polysaccharide content increased 6 days after exposure to 700 r (but not 300 r), remained elevated for a few days, returned to normal by 12th day in rats. NSA 6-1594.

701
BIOLOGY AND MEDICINE, p. 131-62 OF QUARTERLY PROGRESS REPORT, JULY 1-SEPTEMBER 30, 1951. (Unclassified Section). (Brookhaven National Lab.). 32p. (BNL-132, p. 131-2).

Report includes data on weight changes, water consumption, metabolism, histological changes in pituitary, and kinetics of phosphate interchange in tissues of x irradiated rats; cytological and morphological changes induced in plants grown in 200-curie γ field; radiation effect on nucleic acids in plants and animals; effects of radiation on anti-body production. NSA 6-1595.

702
FURTHER EVALUATION OF PRESENT DAY KNOWLEDGE OF COSMIC RADIATION IN TERMS OF THE HAZARD TO HEALTH. Hermann J. Schaefer. (Naval School of Aviation Medicine, Pensacola). Aug. 15, 1951. 23p. (NP-3564).

Data published during 1950 pertaining to heavy-nuclei component of primary cosmic radiation are summarized. Values of specific ionization for different components of heavy spectrum cover range from about 1000 ion pairs per 10 μ of living tissue to more than 1,000,000. A 15 hour daily exposure continued over weeks and months is expected to produce marked symptoms of radiation injury. Daily exposure of 1.3 hours estimated to be about equal to tolerance limit of 0.1 r in system. NSA 6-1596.

703
THE PATHOGENESIS OF POSTIRRADIATION ANEMIA.

J. B. Kahn, Jr., and I. Furth. (Oak Ridge National Lab.). Feb. 6, 1952. 34p. (ORNL-1186). *Blood* 7, 404-16 (1952).

Irradiation at or below MLD does not hemolyse erythrocytes directly, but causes increased destruction of erythrocytes. It is postulated that the change is a capillary endothelial damage causing diversion of erythrocytes into tissue spaces and lymphatics, resulting in injury to some RBC. NSA 6-1598.

704
ROENTGEN EXPERIMENTS ON FROG HEARTS. L. Haberlandt and R. Sanders. *Strahlentherapie* 26, 607-9 (1927).

In case of some heart diseases roentgen irradiation of the heart muscle has favorable influence. Frog hearts were irradiated using certain controlled doses of roentgen rays.

705
IDENTIFICATION OF FERRITIN IN BLOOD OF DOGS SUBJECTED TO RADIATION FROM AN ATOMIC DETONATION. Thomas J. Haley, M. R. Andem, Richard F. Riley, and I. Williams. (Atomic Energy Project, Univ. of Calif., Los Angeles). Feb. 12, 1952. 10p. (UCLA-180). *Proc. Soc. Exptl. Biol. Med.* 79, 547-50 (1952).

Post-exposure plasma from eight dogs exposed to lethal dose of radiation from an atomic detonation contained a material which when injected intravenously, decreased both the rate of vasomotion and the epinephrine sensitivity of the mesoappendix capillary bed of normal rat. Material fits criteria established for ferritin. NSA 6-1600.

706
BIOLOGICAL EFFECTS OF THE β RADIATION OF P^{32} ON *B. COLI*. A. Deysine and B. Bonet-Maury. *Compt. rend. soc. biol.* 145, 1091-3 (1951). (French).

B. coli in media containing 0.1 mc of P^{32} /ml were carried through seven generations. The decrease in number of living cells was noted in each generation for 150 days. Later generations developed radioresistance. Increasing P^{32} to 1 mc/ml caused much more rapid decrease in viability. NSA 6-1603.

707
HISTOLOGICAL EFFECTS OF LONG-CONTINUED WHOLE-BODY GAMMA-IRRADIATION OF MICE. B. Spargo, J. R. Bloomfield, D. J. Glotzer, E. Leiter Gordon, and O. Nichols. *J. Natl. Cancer Inst.* 12, 615-56 (1951). NSA 6-1606.

708
THE 30-DAY LD-50 OF TWO RADIATIONS OF DIFFERENT ION DENSITY. Joanne Weikel Hollcroft and Egon Lorenz. *J. Natl. Cancer, Inst.* 12, 533-44 (1951).

The 30-day LD₅₀ x radiation was compared with that of α particles emanating from short-lived decay products of radon injected intravenously in strain A male mice. Integral dose of x radiation necessary to produce 50% mortality was found to be 1.42 times that of γ particles.

NSA 6-1607.

709
GROWTH OF TUMOR FRAGMENTS X-IRRADIATED IN VITRO FOLLOWING PRETREATMENT WITH CYSTEINE. B. Vincent Hall. (University of Illinois and Argonne National Lab.). Aug. 1951. 24p. (AECU-1866; UAC-500). *Cancer Research* 12, 787-92(1952).

Mouse tumor fragments treated with 0.008 M cysteine before being exposed to x rays in vitro were more resistant to radiation injury than untreated fragments. Dose of x rays necessary to prevent growth of 50% of the fragments after transplantation into host mice was 20% greater for cysteine treated fragments than for untreated fragments. NSA 6-1608.

710

PROTECTION EXPERIMENTS AGAINST RADIATION INJURY WITH LYMPHOCYTES. Ira L. Campbell and Mary H. Ross. (Oak Ridge National Lab.). Feb. 14, 1952. 7p. (ORNL-1193).

No protection against effects of radiation following injection of living lymphocytes into genetically compatible irradiated hosts. NSA 6-1612.

711

THE NUTRITIONAL VALUE OF INTRAVENOUS TAPIOCA DEXTRIN IN NORMAL AND IRRADIATED RABBITS.

Lawrence E. Detrick, Alvin E. Lewis, Thomas J. Haley, and Bonnie Rhodes. (California Univ., Los Angeles School of Medicine). Jan. 23, 1952. 16p. (UCLA-181). J. Am. Pharm. Assoc., Sci. Ed. 41, 614-17 (1952).

Acute whole body irradiation increased the sensitivity and mortality rate of rabbits fed intravenous tapioca dextrin. Orally fed irradiated rabbits survived longer than those receiving intravenous alimentation (tapioca dextrin amino acid hydrolysate and vitamins). NSA 6-1617.

712

1. GAMETE FACTOR ON CHROMOSOME 9. 2. THE EFFECT OF OXYGEN TENSION ON THE RADIOSENSITIVITY OF CHROMOSOMES (abstract). Drew Schwartz. (Oak Ridge National Lab.). (nd). 1p. (AECU-1876).

There is a 3.2-fold decrease in radiation induced chromosome aberrations in pollen when exposures are made on 100% N as compared with exposures in air. Results are interpreted as suggesting that the effect of oxygen tension during irradiation is on the recovery process of broken ends rather than on initial breakage. NSA 6-1946.

713

RECOVERY OF X-IRRADIATED BACTERIA AT SUB-OPTIMAL INCUBATION TEMPERATURES (abstract).

G. E. Stapleton, Daniel Billen, and Alexander Hollaender. (Oak Ridge National Lab.). (nd). 1p. (AECU-1873). J. Cell. Comp. Physiol. 41, 345 (1953).

At incubation temperatures of 12°-30° C, survival of cultures plated after irradiation is significantly increased over survival of cultures grown at 37° C. Incubation at 6° C does not increase survival. Ratio of survivors at 18° C over that at 37° C is an exponential function of x ray dose. Strain differences in optimal temperature for recovery and in extent of recovery have been observed. NSA 6-1947.

714

MECHANISM OF LETHAL AND MUTAGENIC ACTION OF IONIZING RADIATIONS ON *ASPERGILLUS TERREUS*. II. USE OF MODIFYING AGENTS AND CONDITIONS.

G. E. Stapleton and Alexander Hollaender. (Oak Ridge National Laboratory). (nd). 20p. (AECU-1892). J. Cellular Comp. Physiology 39, Suppl. 1, 101-13 (1952).

Authors found direct relationship between x ray sensitivity of spores and their relative water content. Lowering oxygen tension during irradiation inhibited both inactivation and production of mutations. NSA 6-1948.

715

RELATIONSHIPS BETWEEN IONIZING RADIATION, CHROMOSOME BREAKAGE AND CERTAIN OTHER NUCLEAR DISTURBANCES. A. H. Sparrow, M. J. Moses and Rosalind DuBow. (Brookhaven National Lab.). (nd). 39p. (BNL-1066). Exptl. Cell Research. Suppl. 2, 245-67 (1952).

Authors discuss relationship between relative radio-sensitivity of different stages of meiosis of *Trillium erectum* and the desoxypentose and pentose nucleic acid content of the cells at the various stages. Cytological effects of chronic irradiation of *Tradescantia paludosa* are described. NSA 6-1949.

716

THE SEQUENCE OF PATHOLOGIC CHANGES IN SWINE EXPOSED TO THE LD_{100/30} OF TOTAL BODY SUPER-VOLTAGE X-RADIATION. John L. Tullis. (Naval Medical Research Inst., Bethesda). Aug. 24, 1951. 17p. (NP-3600). NSA 6-1950.

717

IRRADIATION EFFECTS ON VIABILITY OF *DROSOPHILA MELANOGASTER* (abstract). John W. Gowen and Janice Stadler. Anat. Record 111, 497 (1951).

Physiological effects of various doses of x irradiation on day-old male and female imagoes were studied after repeated pair matings. Doses ranged from 0 to 10,000 r. Twenty-six different criteria for physiological effects are presented. NSA 6-1951.

718

CATARACT FORMATION AND RETINAL DAMAGE FOLLOWING X IRRADIATION OF THE HEADS OF NEW-BORN MICE (abstract). Howard H. Vogel, Jr. Anat. Record 111, 497 (1951).

Heads of newborn mice received a single exposure to x rays in doses varying from 50 r to 3000 r. No newborn mouse receiving 2000 r or more survived for more than 10 days. Forty-five percent of the 31 mice which died did so on 10th or 11th post-exposure day. Marked pathological changes in retina noted within 3 to 4 hours after 1000 r. NSA 6-1952.

719

SINGLE WHOLE-BODY X IRRADIATIONS OF GUINEA PIGS; PRINCIPAL BIOLOGICAL EFFECTS. Lucien Piguory and Pierre Nizza. Compt. rend. 234, 370-2 (1952).

Authors studied effects of single whole-body x-irradiation exposures to 100, 200, 400, 500, 800 and 1000 r on male guinea pigs. LD₅₀ was 200 r. Average survival was 21.5 days at 200 r, 13.1 days at 400 r, and 12.7 days at 500 r. Blood changes during the post-irradiation period are described. NSA 6-1953.

720

GENETIC DAMAGE BY ROENTGEN RADIATION? H. Chantraine. Röntgen Blätter 5, 1-10 (1952). (German).

Relative numbers of x ray-induced and spontaneous mutations in humans are discussed. Direct application of radiation-induced mutation rates in *Drosophila* to man is considered invalid. Genetic changes resulting from medical applications of x rays are considered to be no more numerous than those caused by many other circumstances of modern life. NSA 6-1954.

721

THE EFFECT OF IONIZING RADIATIONS ON THE BROAD BEAN ROOT. PART X. THE DEPENDENCE OF THE X-RAY SENSITIVITY ON DISSOLVED OXYGEN. John Read. Brit. J. Radiol. 25, 89-99 (1952).

Growth curves of groups of bean roots irradiated (1) in water containing 18 cc O per liter, (2) in water containing 6 cc O per liter, and (3) anerobically are presented in tabular form. NSA 6-1955.

722

ADRENAL ASCORBIC ACID IN MALE AND FEMALE RATS AFTER TOTAL BODY X-RAY IRRADIATION. B. C. Wexler, R. Pencharz, and S. F. Thomas. Proc. Soc. Exptl. Biol. Med. 79, 183-4 (1952).

Total body x-irradiation is associated with a marked depletion in adrenal ascorbic acid. Decrease is more marked in male rat than in female. NSA 6-1956.

723

EFFECT OF WHOLE-BODY X-RADIATION ON RAT INTESTINAL NUCLEOPROTEIN. Robert N. Feinstein and Carrie L. Butler. Proc. Soc. Exptl. Biol. Med. 79, 181-2 (1952).

After 800 r whole-body irradiation, a nucleoprotein-rich fraction of intestine is diminished in amount, total phosphorus, total nitrogen, dry weight and ash. Greatest loss of phosphorus is from nucleic acid fraction. Data are interpreted as indicating that one effect of whole-body irradiation is the degradation of nucleic acid. NSA 6-1957.

724
EXPOSURE TO X-RADIATION OF LOCALIZED AREAS OF MAMMALIAN SKIN CONDITIONED TO DIFFERENT LEVELS OF METABOLIC ACTIVITY (abstract). J. P. O'Brien, J. A. Belli, and J. W. Saunders, Jr. *Anat. Record* **111**, 496 (1951).

Preliminary experiments indicate that mammalian skin is less susceptible to the effects of x rays when the overall metabolic level is reduced. With a given dose of x radiation, lesions in chilled skin appeared earlier but were less extensive and healed more quickly. NSA 6-1958.

725
SODIUM PENTOBARBITAL ANESTHESIA AND MORTALITY FROM TOTAL BODY X-RADIATION IN C₅₇ (BLACK) MICE. H. Patterson Mack and Frank H. J. Figge. *Anat. Record*, **111**, 524 (1951).

Animals which were anesthetized during irradiation appeared to have lower mortality than unanesthetized animals. Other studies suggest that nembutal may reduce radiosensitivity by lowering metabolic rate and/or producing hypoxemia during anesthesia. NSA 6-1959.

726
A LIPO-PROTEIN-NUCLEIC ACID COMPLEX IN THE TREATMENT OF RADIATION INJURY (A PRELIMINARY REPORT). Ralph M. Thompson. *Military Surgeon* **110**, 51-9 (1952).

Results of preliminary experiments lead author to believe that the lipo-protein-nucleic acid complex, Reticulose, is of value in the treatment of radiation injury. NSA 6-1962.

727
MODIFICATION OF SENSITIVITY TO X RADIATION BY MORPHINE SULFATE. J. B. Kahn, Jr. *Proc. Soc. Exptl. Biol. Med.* **78**, 486-9 (1951).

Morphine sulfate injected intramuscularly into ZBC male mice 30 min. before exposure to total body x radiation raises the LD-50 of the radiation from 609 to 830 r. NSA 6-1963.

728
PROTHROMBIN UTILIZATION IN FATAL RADIATION INJURY. D. P. Jackson, E. P. Cronkite, G. J. Jacobs, and C. F. Behrens. (Naval Research Inst., Bethesda). June 26, 1951. 17p. (NP-3623; R5997). *Am. J. Physiol.* **169**, 208-17 (1952).

Eight dogs died between 9th and 15th post-exposure day after receiving 600 r whole body radiation. All dogs showed extensive hemorrhage prior to death, and the hematological changes characteristic of radiation injury. A slight terminal decrease in prothrombin concentration in 4 dogs indicated that prothrombin utilization approaches zero from 9th post-exposure day to death. NSA 6-1964.

729
EFFECT OF ACTH ON THE MORTALITY OF IRRADIATED MICE. H. Betz. *Compt. rend. soc. biol.* **145**, 1240-2 (1951). (French).

Daily injection of 0.5 mg of ACTH for 7 days before exposure to 700 r of 250 kvp x rays decreased the mortality rate of C₅₇ mice. Administration of ACTH after irradiation caused earlier mortality. Intraperitoneal injection of 0.05 mg of KCN immediately before exposure markedly decreased mortality, resulting in 75% survival. Pre-exposure KCN followed by post-exposure ACTH gave only 30% survival. NSA 6-1965.

730
RADIATION SICKNESS A CLINICAL INVESTIGATION. Frank Ellis and Basil A. Stoll. *J. Fac. Radiologists* **3**, 207-22 (1952).

Authors report of results of treating 225 patients complaining of radiation sickness. Various drugs were tried in a total of 296 drug trials. Results of study are presented graphically. NSA 6-1966.

731
RELATIONSHIP BETWEEN THE ADRENAL CORTEX AND RADIATION SICKNESS A REVIEW OF THE LITERATURE AND A PRESENTATION OF NEW DATA. Edward C. Porter. *Radiology* **58**, 246-58 (1952).

Thirty-six patients undergoing radiation therapy were studied by means of eosinophil counts. With few exceptions, an adrenal cortical response was noted in patients in whom radiation sickness developed. No such response was observed in patients without radiation sickness. NSA 6-1968.

732
THE RESPONSE OF HUMAN TISSUES TO RADIATION WITH SPECIAL REFERENCE TO DIFFERENTIATION. A. Glucksmann. *Brit. J. Radiology* **25**, 38-43 (1952).

Correlation of local histological prognosis with local clinical results of radiotherapy of tumors in approximately 200 patients for periods of 1-12 years following initial treatment are tabulated. NSA 6-1973.

733
EFFECTS OF BETA RAYS AND X-RAYS ON MITOTIC RATE OF LIVING GRASSHOPPER NEUROBLASTS (abstract). Mary Esther Gaulden, Marjorie Nix, and Edgar B. Darden, Jr. (Oak Ridge National Lab.). (nd). 1p. (AECU-1896).

Fourteen day old embryos were exposed to 8 r or 64 r of x rays or 8.8 rep or 70.4 rep of beta rays from P³². Hanging drop preparations of the embryos were maintained at 38° C and the number of cells in mid-mitosis recorded every 22 min. for 6 hours. X- and β -rays had similar effect on mitotic activity, but a greater number of cells recovered after exposure to beta rays. NSA 6-2249.

734
FRAGMENTATION OF CHROMOSOMES IN GRASSHOPPER NEUROBLASTS BY BETA RAYS AND X-RAYS (abstract). Mary Esther Gaulden, Katherine Loemker, and Edgar B. Darden, Jr. (Oak Ridge National Lab.). (nd). 1p. (AECU-1898).

Fourteen day old embryos were exposed to 64 r of 125 kvp x rays or to an equivalent dose of 1.7 Mev beta rays from P³², then incubated at 38° C for 44, 220, 264, or 352 minutes after which they were fixed and stained and cells examined for chromosome fragments. Total number of cells with fragments, and number of single-fragments were the same in both groups. There were more double fragments in β ray group at 352 minutes. NSA 6-2250.

735
RADIOSENSITIVE AND RADIORESISTANT PHASES IN THE ANTIBODY RESPONSE. Frank J. Dixon, David W. Talmage, and Paul H. Maurer. (Pittsburgh Univ.). (nd). 15p. (AECU-1919). *J. Immunol.* **68**, 693-7 (1952).

Whole body radiation given simultaneously with, or 6 hours after injection of I¹³¹ labeled bovine gamma globulin had little effect on antibody response in rabbits. Response decreased until none was detectable when radiation was given 48 hours before the antigen. NSA 6-2251.

736
SOME CYTOLOGIC AND HISTOCHEMICAL STUDIES OF RADIATION REACTION. Shields Warren, Margaret W. Holt and Sheldon C. Sommers. (Cancer Research Inst., New England Deaconess Hospital, Boston). (nd). 10p. (AECU-1902). *Am. J. Clin. Pathol.* **22**, 411-17 (1952).

A report of cytologic and histochemical investigations of frozen-dried dry-mounted animal tissues exposed to ionizing radiations. Radiosensitive cells developed intranuclear vacuoles, rupture of nuclear membranes after exposure. Desoxyribose nucleic acids showed post-irradiation decrease proportional to radiosensitivity of the cell. Colchicine, but not 4 other radiomimetic drugs, produced similar effects. NSA 6-2252.

737

A CRITICAL EVALUATION OF THE LITERATURE PERTAINING TO THE APPLICATION OF IONIZING RADIATIONS TO THE FOOD AND PHARMACEUTICAL FIELDS. Bernard E. Proctor and Samuel A. Goldblith. (Massachusetts Inst. of Tech.). Jan. 1, 1952. 242p. (NYO-3337; Technical Report No. 1). NSA 6-2253.

738

ORAL MANIFESTATIONS OF IONIZING RADIATION: 1. ORAL LESIONS AND EFFECT ON DEVELOPING TEETH OF SWINE EXPOSED TO 2000 K.V. TOTAL BODY X-RADIATION. James A. English and John L. Tullis. (Naval Medical Research Inst., Bethesda). Dec. 29, 1950. 38p. (NP-3162; U17518) Jour. Dental Res. 30(1), 33-52 (1951).

Total body exposure of 41 young swine to 250 to 800 r of x rays resulted in the following changes in oral mucosa: hemorrhage in 49%; marked ulceration in 9.8%; irregular erosions in about 30%; hemorrhage around developing teeth in 70%. Doses greater than 400 r caused hypoplasia of enamel of developing molars. NSA 6-2254.

739

THE PROTECTIVE EFFECT OF GLUTATHIONE AGAINST RADIATION INDUCED CHROMOSOME ABERRATIONS. Knut Mikaelson. (Brookhaven National Lab.). (nd). 8p. (BNL-1111). Science 116, 172-4 (1952).

1×10^{-8} to 3×10^{-4} M concentrations of reduced glutathione decreased the number of chromosome fragments in cuttings of *Tradescantia paludosa* grown in the glutathione-containing media during 48 hour exposure to continuous gamma radiation from 3-curie Co^{60} source at a dose of 25 r/day. NSA 6-2255.

740

THE PROGRESSION OF MORPHOLOGIC LESIONS IN SWISS MICE EXPOSED TO 625 r, 2000 KVP, TOTAL BODY X-RADIATION. Baldwin G. Lamson and John L. Tullis. (Naval Medical Research Inst., Bethesda). July 31, 1951. 27p. (NP-3667; R6089).

Microscopic studies of progressive changes in spleen, lymphoid tissue, bone marrow, intestines, liver and testes are reported. NSA 6-2256.

741

MYXEDEMA IN THE RADIOTHYROIDECTOMIZED DOG. R. C. Goldberg and I. L. Chaikoff. Endocrinology 50, 115-23 (1952).

In addition to typical myxedema, the following changes were noted: increase in acid polysaccharide content of skin; hyperkeratosis and epidermal atrophy of skin; anemia; increased liver fat; muscle degeneration; lymph node involution; atrophy of G-I tract. NSA 6-2257.

742

EFFECT OF ROENTGEN RADIATION ON THYROID FUNCTION IN RATS. John B. Hursh, Priscilla A. Van Valkenburg, and John B. Moheny. Radiology 56, 411-18 (1951).

Rats received x ray doses of 3000 r, 4500 r and 6000 r administered to thyroid area. Thyroid function was tested by injecting I^{131} after irradiation and analyzing gland for I^{131} uptake and % I^{131} bound in undialyzable complex. After 3000 r or 6000 r, I^{131} uptake was greater than in controls but no morphological changes were found. I^{131} uptake increased with increasing doses in this series. NSA 6-2258.

743

PHYSICAL ASPECTS OF THE BIOLOGICAL ACTION OF IONIZING RADIATIONS. John Read. Brit. J. Applied Phys. 2, 337-45 (1951). NSA 6-2259.

744

DETERMINATION OF THE SENSITIVE VOLUME BY IRRADIATION AND THE IONIZATION DENSITY 1. Opatowski. Bull. Math. Biophys. 13, 263-71 (1951).

Lea's formula for the determination of size of the sensitive volume is corrected and applied to experiments on inactivation of tobacco mosaic virus using three different wave lengths of x rays. Concept of transfer of energy around ionizing particles is discussed. NSA 6-2261.

745

AN ANALYSIS OF SEEDLING MUTANTS (SPONTANEOUS, ATOMIC BOMB RADIATION-, AND X-RAY INDUCED) IN BARLEY AND DURUM WHEAT. C. C. Moh and Luther Smith. Genetics 36, 629-40 (1951).

Progeny tests were made on 650 X_2 plants representing 397 independent mutants; and of 5,653 X_3 plants representing 581 mutants. Over 20% of mutants tested segregated in ratios that deviated significantly from the theoretical 3:1. Results could be accounted for if it were assumed that many of the mutations were in fact deficiencies rather than gene or "point" mutations. NSA 6-2262.

746

EFFECTS ON THE WHITE MOUSE OF A SINGLE WHOLE-BODY EXPOSURE TO 190 MEV DEUTERONS. Paul D. Rosahn, Cornelius A. Tobias, and John H. Lawrence. Am. J. Pathol. 28, 37-49 (1952).

White mice were exposed to single whole-body irradiation by deuteron beam of 184-inch cyclotron in doses of 3.8×10^6 , 7.5×10^6 , and 14.9×10^6 ergs/g. Blood and tissue changes after exposure were proportional to the roentgen equivalent doses, and similar to changes known to occur following exposure to other types of ionizing radiation. NSA 6-2263.

747

QUANTITATIVE AND QUALITATIVE ANALYSIS OF ROENTGEN RAY INJURY IN DROSOPHILA EXPERIMENTS. Hedi Fritz-Niggli. Fortschr. Gebiete Röntgenstrahlen 76, 218-54 (1952). (German).

Radiosensitivity of chrysalis diminishes with advancing age. Detailed studies on changes in body wall, bristle design, hypodermis, muscles, fat cells, gonads, cell differentiation etc., are reported. NSA 6-2265.

748

EFFECT OF ULTRAHARD RADIATION (31-MEV-BETATRON) ON THE EGGS OF DROSOPHILA MELANOGASTER. H. R. Schinz, Hedi Fritz-Niggli, and E. Frey. Experientia 8, 16-18 (1952). (German).

LD_{50} for *Drosophila melanogaster* eggs of various ages 3 hr. eggs, 200 r; 4 hr. eggs, 460 r; 7.5 hr. eggs, 825 r, for 180 kev radiation. For 3 Mev electrons, respective doses were 200 r, 1225 r and 1060 r. For 31-Mev x radiation, doses were 237 r, 117 r and 1167 r. Reasons for lower biological effectiveness of 31 Mev radiation are discussed. NSA 6-2266.

749

THE TOLERANCE OF EPIDERMAL CELLS OF MICE TO HEAVY DOSES OF EXTERNAL ALPHA-IRRADIATION. Finn Devik. Acta Path. Microbiol. Scand. Suppl. 91, 45-7 (1951).

Histological and cytological effects of known quantities of external α irradiation on skin of mice are compared with effects of local x irradiation. Concluded that epidermis contains a number of cells which can survive doses of the order of 100,000 r of α rays. Histological studies showed that x rays produced more pronounced changes than

those produced by α ray doses 1 to 2 orders of magnitude above x ray dose. NSA 6-2267.

750

THE VALUE OF GAMMA RADIATION DOSIMETRY IN ATOMIC WARFARE INCLUDING A DISCUSSION OF PRACTICAL DOSAGE RANGES. George V. Taplin. (Atomic Energy Project, Univ. of Calif., Los Angeles). Mar. 6, 1952. 20p. (UCLA-187).

Author presents data suggesting that few persons receiving external radiation exposures exceeding 400 r would warrant extensive medical treatment. Proposes that critical values used in personnel dosimeters be revised downward from 200-400-600 r to 100-250-400 r. A 50 r range would be helpful for monitors and rescue groups. NSA 6-2269.

751

FURTHER EFFORTS TO INFLUENCE X-RAY CATARACT BY CHEMICAL AGENTS. Ludwig Von Sallmann. Arch. Ophthalmol. (Chicago) 47, 21-2 (1952).

Review of studies of the effects of cysteine treatment for x ray cataract. NSA 6-2270.

752

CLINICAL AND PATHOLOGICAL CHARACTERISTICS OF RADIATION CATARACT. David G. Cogan, David D. Donaldson, and Algernon B. Reese. Arch. Ophthalmol. (Chicago) 47, 55-70 (1952). NSA 6-2271.

753

THE HAZARD INVOLVED IN THE USE OF CARBON-14. Howard E. Skipper. Nucleonics 10, No. 2, 40-4 (1952).

It is concluded that C^{14} is nonhazardous when used with caution at experimental levels. NSA 6-2272.

754

THE ACUTE RADIATION SYNDROME: A STUDY OF NINE CASES AND A REVIEW OF THE PROBLEM. Louis H. Hempelmann, Hermann Lisco, and Joseph G. Hoffman. Ann. Internal Med. 36, 279-510 (1952).

Case histories of 9 of 10 persons injured in two accidental nuclear reactions at Los Alamos several years previous are presented. Emphasis is on clinical, hematological and pathological aspects of the illnesses, and comparison is made with Japanese victims of A bomb in 1945. NSA 6-2273.

755

EFFECT OF COLLOIDAL Au^{198} ON THE GROWTH CYCLE OF LEUKEMIC CELLS AND ON THE SURVIVAL OF THEIR HOST. Horace Goldie, F. B. Watkins, Carl Powell, and Paul F. Hahn. Cancer Research 12, 92-9 (1952).

Intravenous colloidal gold prolonged the survival of leukemic mice and reduced the number of leukemic cells in the blood and organs. Therapeutic effect is attributed to direct cytotoxic action on leukemic cell, improvement of host's regulatory mechanism and stimulation of reticulo-endothelial elements. NSA 6-2277.

756

QUARTERLY TECHNICAL REPORT: OCTOBER 1, 1951 THRU DECEMBER 31, 1951. (Atomic Energy Project, Univ. of Rochester). February 11, 1952. 59p. (UR-200).

Includes data on bone marrow studies on spleen-shielded and non-shielded dogs exposed to LD_{50-400} dose of x radiation. NSA 6-2279.

757

ON THE EFFECT OF RADIOACTIVITY ON THE AUTOMATICITY OF FROG HEARTS WITH SPECIAL CONSIDERATION OF THE EFFECT OF LARGE RADIATION DOSES AND THE ANTAGONISTIC EFFECTS OF α and β RAYS. (German). E. Polak. Pflüger's Arch. ges. Physiol. 226, 659-75 (1931).

Confirms Zwaardemaker's observations on role of K in heart function (due to radioactivity of K). Equimolar

substitution of Rb for K or smaller concentrations of more radioactive elements permits normal activity and restores a heart which has stopped in absence of K. NSA 6-1134.

758

DISTRIBUTION AND EXCRETION OF ELECTROLYTES AFTER ACUTE WHOLE-BODY IRRADIATION INJURY. 1. STUDIES WITH RADIOPOTASSIUM. John Z. Bowers and Kenneth G. Scott. Proc. Soc. Exptl. Biol. Med. 78, 645-52 (1951).

Radiosensitive tissues show a variety of alterations in radiosodium concentration after total body irradiation above LD_{50} . Percent loss of dry weight per day is generally most pronounced in radiosensitive tissues. Urinary excretion of radiosodium shows complementary decrease in response to increased loss through G-I tract post-exposure. NSA 6-2292.

759

THE VIABILITY OF HETEROZYGOTES FOR LETHALS. C. Stern, G. Carson, M. Kinst, E. Novitski, and D. Uphoff. (Radiation Lab., Univ. of Calif.). Dec. 1951. 68p. (UCRL-1614). Genetics 37, 413-49 (1952).

Data on a total of 77 different x chromosome lethals indicate that the majority, if not all, so called recessive lethals in the x chromosome of *D. melanogaster* have a dominant effect on viability. NSA 6-2556.

760

(RESEARCH ON THE BIOLOGICAL AND MEDICAL ASPECTS OF ATOMIC ENERGY). QUARTERLY PROGRESS REPORT NO. 2. (Air Force Radiation Lab., Univ. of Chicago). Jan. 15, 1952. 81p. (COO-87; U21326).

Includes data relative to effect of partial shielding on mortality in x irradiated rats, cell division in x irradiated giant amoeba, failure of p-aminopropiophenone to reduce toxicity of nitrogen mustard in mice, preliminary tests of protective effects of various chemicals against x ray death in mice, effects of x rays on isolated mammalian heart and destruction of epinephrine solutions by x rays. NSA 6-2557.

761

EFFECT OF WHOLE BODY X-RADIATION AND OF INTRAPERITONEAL HYDROGEN PEROXIDE ON A NUCLEOPROTEIN-CONTAINING FRACTION OF RAT INTESTINE AND ON WHOLE RAT INTESTINE. Robert N. Feinstein and Carrie L. Butler. (Air Univ. School of Aviation Medicine). Nov. 1951. 7p. (NP-3642; U21021). Proc. Soc. Exptl. Biol. Med. 79, 179-81 (1952). NSA 6-2558.

762

MONTHLY PROGRESS REPORT JANUARY 1952. Hymer L. Friedell. (Atomic Energy Project, Western Reserve Univ.). 11p. (NYO-1643).

Includes data on effects of administration of antibiotics to rats irradiated with Au^{198} , effect of splenectomy on total body x irradiation of rats, tests of protective effects of various compounds in whole body x irradiated mice; effect of radiation on yeast growth, studies relative to the protection afforded the irradiated dog by perfusion of its blood through a donor spleen. NSA 6-2559.

763

EFFECT OF TOTAL BODY X-IRRADIATION ON THE PLASMIN INHIBITOR TITER IN THE BLOOD OF RATS. Walter Kocholaty, William W. Ellis and Hans F. Jensen. (Army Medical Research Lab.). Dec. 16, 1951. 6p. (AMRL-71).

Exposure of rats to 1000 r total body x irradiation produced a fall in plasmin inhibitor titer of plasma beginning on 2nd post-exposure day and gradually increasing there-

after. Starvation exerted similar effect. Total body irradiation with 1000 r caused weight loss nearly identical with that due to starvation. NSA 6-2561.

764

CHRONIC EXTERNAL IRRADIATION; NEUTRON TOXICITY, AND HEMATOLOGY. p.9-47 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH; QUARTERLY REPORT. (Argonne National Lab.). August, September, October, 1951. 39p. (ANL-4713 (p.9-47)).

Data on the effects of homologous and heterologous bone marrow injections on survival in mice following x irradiation are presented in tabular form. The addition of 0.025M K citrate to distilled water suspensions of Rous sarcoma virus gave a high degree of protection against an x-ray dose of 75,000 r. Studies on the mechanism of citrate protection are in progress. Data on the pattern of loss and recovery of weight of the testes of mice exposed to a single dose of x radiation and a single intravenous injection of Rn in equilibrium with its short-lived decay products are presented in tabular form. Results indicate that the α particle does not manifest as high a factor of biological effectiveness relative to x radiation as has been assumed. A summary is included of visible lens opacities 6 to 7 months after various doses of x radiation to the head of newborn mice. Histologic examination showed progressive destruction of the cells of the retina following 1000 r x irradiation, with obvious signs within 3 hr after irradiation. The effects of shielding of liver, intestine, or spleen, and of spleen shielding followed by splenectomy at 5 min and at 24 hr upon the hematocrit values, reticulocyte and leukocyte counts of mice exposed to 1025 r x irradiation are presented graphically. Data indicate that cysteine injected up to 4 days before sacrifice does not significantly alter the 24-hr uptake of P^{32} by rat and mouse tissues. Studies of the effects of spleen shielding and subsequent splenectomy upon antibody formation in rats receiving total-body x irradiation confirm previous observations concerning the protective effects of spleen shielding on antibody formation. NSA 6-2562.

765

PHYSIOLOGY, RADIUM TOXICITY, HISTOPATHOLOGY, AND RADIOCHEMISTRY. p.48-73 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH; QUARTERLY REPORT. (Argonne National Lab.). August, September, October, 1951. 26p. (ANL-4713 (p.48-73)).

Data from a study of the effects of cysteine and hypoxia on the survival of rabbit thymocytes irradiated in vitro with 200-r x rays, and data on the effects of chilling on the protection afforded x-irradiated thymic cells by cysteine are presented in tabular form. From results of the study it is concluded that the effect of cysteine on irradiated thymic-cell-serum suspensions can not be ascribed to a direct competition for the short-lived free radicals presumably formed in the aqueous phase, and also that the protection is not due simply to the removal of O and consequent decrease in the toxic breakdown products of water. Preliminary results suggest that cysteine binds O rapidly in the presence of thymic cells suspended in serum, and the effect of chilling suggests that other events, presumably related to the binding of O, must take place. Further work on this problem is in progress. Changes in body weight, food intake, and water intake were found to be related to x-ray dosage in rats, and cysteine pretreatment and a force-fed, semiliquid diet greatly decreased the characteristic postirradiation drop in body weight. A method of measurement of the γ activity in humans due to the nonemanating fraction of Ra present in the body is re-

ported and comparison is made of counting results in patients whose Ra burden was established by the absolute method of measurement, and with Rn exhaled in the breath by these patients. In the clinical study of persons exposed to radium, one 68-year-old male given radium chloride intramuscularly 25 years ago was found to have an estimated total-body radium of 13.9 ug, however, complete radiography indicates only minimal skeletal changes. A dosage of 800-r x radiation delivered to the tenotomized legs of rats did not appear to greatly disturb tendon regeneration although the regenerative process took a longer time in irradiated than in control rats. NSA 6-2563.

766

SPECIAL PROBLEMS, p.74-86 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH; QUARTERLY REPORT. August, September, October, 1951. Austin M. Brues, Ed. (Argonne National Lab.). 13p. (ANL-4713 (p.74-86)).

A method is described whereby data on tumor incidences may be put into such a form that comparison can be made according to standard statistical procedures for handling rare discrete events. In a study of the effects of pile-irradiated cholesterol on mice it was concluded that ionizing radiation does not produce appreciable carcinogenic activity in cholesterol and that direct action of ionizing radiation on cholesterol is not responsible for radiation carcinogenesis. Data on the mortality of cysteine-treated chicks following x irradiation are presented in tabular form. Preliminary data indicate that larger cysteine doses are required to protect against radiation toxicity in newly-hatched than in older chicks. Dog plasma was found to afford protection against radiation injuries to mice when administered intravenously just prior to exposure to 800-r x radiation. The toxicity of normal dog plasma to mice was found to be lost after 5 hr incubation or perfusion through the dog spleen. White's medium, a synthetic nutrient containing salts, amino acids, and vitamins, did not afford protection to mice after perfusion through dog spleen, but did give active protection if given intravenously after perfusion through the spleen that had been lead-protected during irradiation of the dog. Neither agent was protective when administered before x irradiation. NSA 6-2564.

767

INVERTEBRATE ZOOLOGY, PHYTORADIOBIOLOGY, AND MICROBIOLOGY, p.87-100 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH; QUARTERLY REPORT. August, September, October, 1951. Austin M. Brues, ed. (Argonne National Lab.). 14p. (ANL-4713 (p.87-100)). NSA 6-2565.

768

PHARMACOLOGY; THEORETICAL BIOLOGY, EXPERIMENTAL PATHOLOGY, AND TREATMENT OF POST-IRRADIATION INFECTION WITH ANTIBIOTICS, p.109-24 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH; QUARTERLY REPORT. August, September, October, 1951. Austin M. Brues, ed. (Argonne National Lab.). 16p. (ANL-4713 (p.109-24)).

Preliminary data from a study of the pharmacodynamics of compounds derived from ribonucleic acid and the effects of these compounds upon physiological changes following total-body irradiation showed that the blood pressure of rats is appreciably decreased by small amounts of adenosine and 3-adenylic acid, while other nucleic acid derivatives have much smaller effects. An approximate formula for the standard error of an absolute white cell count is used to show the dependence of the standard error on the blood count

parameters and sample sizes and to develop formulas for minimum error at fixed cost as well as for minimum cost at fixed relative error. Data on the survival and incidence of malignant bone tumors in mice that had received less than 22 uc per kg of U from 210 to 415 days previously, and experimental design and survival figures at 221 days of mice which had received injections of Ra²²⁶ and Pu²³⁹ are presented in tabular form. Biometric analysis of data on the effects of various patterns of antibiotic therapy on the survival of mice following a fixed dose of x rays showed streptomycin dosages ranging from about 3000 to 6000 units per day were protective to the same degree. Penicillin plus streptomycin appeared to be less protective than streptomycin alone. Aureomycin, chloramphenicol, and terramycin, all supplemented with streptomycin, conferred about equal degrees of protection. NSA 6-2567.

769
EFFECT OF IRRADIATION ON P³² UPTAKE BY BONE MARROW AND SPLEEN. I. NORMAL VALUES AND THE EFFECT OF SODIUM PENTOBARBITAL. W. A. Rambach, D. A. Moomaw, H. L. Alt, and J. A. D. Cooper. (Air Univ. School of Aviation Medicine). Apr. 1952. 6p. (NP-3690).

Normal values are given for DNA and RNA phosphorus as well as uptake of P³² and DNA in bone marrow and spleen of adult rats. Anesthetic doses of sodium pentobarbital were found to produce a decrease in relative rate of formation of DNA in bone marrow and spleen during period of 5 1/2 hours. NSA 6-2568.

770
THE LOCAL GREYING OF HAIR IN MICE TREATED WITH X-RAYS AND RADIOMIMETIC DRUGS. E. Boyland and S. Sargent. Brit. J. Cancer 5, 433-40 (1951).

Intradermal injection of nitrogen or sulfur mustard into colored mice exerts a radiomimetic effect as regards greying of hair. Numerous other carcinogenic and non-carcinogenic substances were tested by same criteria, and several were found to produce greying. Greying, a preferential lethal action on pigment-producing dendritic cells, is similar to vesication and induction of mutations and cancer. NSA 6-2570.

771
RADIATION HAZARDS TO THE EMBRYO AND FETUS. Liane Brauch Russell and W. L. Russell. Radiology 58, 369-77 (1952).

Susceptibility of developing embryo to induction of malformations by radiation, critical periods in development, dosages which may produce anomalies, direct radiation effects on the embryo, and indirect effects via maternal injury are discussed. Discussion based on review of literature. NSA 6-2572.

772
THE INFLUENCE OF VISIBLE LIGHT ON THE SULFHYDRYL CONTENT OF YEAST CELLS AFTER IONIZING AND ULTRAVIOLET IRRADIATION. Walter Kocholaty and Jack Denson. (Army Medical Research Lab.). Dec. 15, 1951. 11p. (AMRL-72).

Yeast cultures irradiated with ultraviolet light or soft x rays showed a decrease in sulfhydryl content and number of visible cells. Subsequent irradiation with strong visible light led to partial reversal of effect. Subsequent irradiation of soft x-ray treated cells with visible light had no effect on sulfhydryl content of cells, but did lead to slight increase in viable cell count. NSA 6-2605.

773
THE INFLUENCE OF ROENTGEN RAYS UPON THE INDOPHENOL OXIDASES WITHIN THE TISSUE AND IN THE LEUKOCYTES. (In German). S. Hallheimer and H. R. Schinz. Strahlentherapie 20, 331-341 (1925).

No changes occur because of roentgen irradiation in

the stable or labile oxydases of the leukocytes, skin, or of skeletal diaphragm or heart muscle.

774
BIOLOGICAL STUDIES OF RADIATION EFFECTS, AND HEALTH CHEMISTRY AND PHYSICS, p.39-113 OF MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT OCTOBER, NOVEMBER AND DECEMBER 1951. (Radiation Lab., Univ. of Calif.). Feb. 28, 1952. 75p. (UCRL-1694 (p.39-113)).

From a study of the role of the nucleus in x-ray-induced deferred death in yeast it was concluded that radiation-induced deferred death in both haploid and diploid yeast cells is the result of the inhibition of the nuclear division of the irradiated cell without inhibition of cell growth. Ferrokinetic abnormalities in diseases with anemia were studied by the Fe turnover method using Fe⁵⁹ globulin. Serial in vivo radioactivity measurements at marrow, liver, and spleen sites as well as sampling of plasma and cells were made subsequent to instantaneous labeling of the plasma globulin Fe. All measurements were made using high-efficiency fluorescence counters. Representative tissue volumes of liver, spleen, and marrow were serially followed using external directional detectors. Data from 22 cases are compared with normal controls. Techniques for the survey of slow neutrons, methods of measurement of fast neutrons, and methods for estimation of high-energy neutron flux densities are discussed. NSA 6-2810.

775
THE EFFECT OF TOTAL BODY X IRRADIATION ON THE SUSCEPTIBILITY OF MICE TO INFLUENZA A VIRUS INFECTION. Ernest Beutler and Horace M. Gezon. J. Immunol. 68, 227-42 (1952). NSA 6-2811.

776
EFFECT OF IRRADIATION ON THE UNIVERSAL REACTION IN CANCER. Reuben L. Kahn, Fred J. Hodges, Isadore Lampe, and Owen W. Doyle. Cancer Research 12, 170-5 (1952).

Patients whose universal reactions exhibited a rise in titer following irradiation were found to manifest clinically a normal post irradiation course; patients who developed no rise or a decrease in titer were found to be in a poor state clinically and did not manifest a normal post-irradiation course. NSA 6-2812.

777
EFFECT OF IRRADIATION ON THE UNIVERSAL REACTION IN POLYCYTHEMIA VERA. Reuben L. Kahn, William H. Bullock, and Frank H. Bethell. Cancer Research 12, 176-9 (1952).

In patients who developed a rise in precipitation (universal reactions) following irradiation, polycythemia was found to be under control. In patients in whom the universal reaction showed no rise in precipitation following irradiation, polycythemia was found to be in an active state, not under control. NSA 6-2813.

778
EFFECT OF BAL ON SURVIVAL OF RATS AFTER LETHAL DOSES OF POLONIUM. John B. Hursh. Proc. Soc. Exptl. Biol. Med. 79, 210-2 (1952).

Control rats injected with lethal dose of polonium (36 µg/kg) had median survival time of 22 days in contrast to BAL-treated group which had median survival time of 89 days. BAL-treated group also maintained good cell and platelet counts in peripheral blood; control rats showed typical picture of hemopoietic depression. NSA 6-2814.

779
EFFECTS OF HIGH-VOLTAGE CATHODE-RAY IRRADIATION ON COTTONSEED. M. G. Lambou, R. Y. Mayne, B. E. Proctor, and S. A. Goldblith. Science 115, 269-71 (1952).

Cotton seeds infected with molds and bacteria and exposed to 3 Mev cathode rays in doses up to 3,000,000 rep showed significant reduction of number of micro-organisms, no change in moisture or free fatty acid content, but increasing inhibition of germination and seedling growth with increasing cathode ray dose. Inactivation of one or more enzymes is suggested. NSA 6-2815.

780

EXPERIMENTAL STUDIES ON EARLY LENS CHANGES AFTER ROENTGEN IRRADIATION. III. EFFECT OF X-RADIATION ON MITOTIC ACTIVITY AND NUCLEAR FRAGMENTATION OF LENS EPITHELIUM IN NORMAL AND CYSTEINE-TREATED RABBITS. Ludwig Von Sallmann. Arch. Ophthalmol. (Chicago) 47, 305-20 (1952).

Pretreatment with cysteine afforded some protection evidenced by lower incidence of nuclear fragmentation in all zones of treated eyes, as compared with eyes of untreated or post-irradiation treated rabbits. NSA 6-2816.

781

PROTECTIVE EFFECT OF SMALL LEAD SHIELDS DURING REPEATED WHOLE-BODY X-RAY IRRADIATION OF RATS. J. Gershon-Cohen, M. B. Hermel, and I. O. Griffith, Jr. Radiology 58, 383-9 (1952).

Small lead shields over various surfaces of body during irradiation caused enhanced survival of rats exposed to whole body x irradiation. Protection resulted when as little as 15% of body surface was shielded. Second dose of 600 r (LD_{50}) given 34 days after first dose resulted in no decrease in survival although lower body weights were noted after the second exposure. NSA 6-2817.

782

FURTHER STUDIES ON THE NATURE OF THE HEMORRHAGIC STATE IN RADIATION INJURY. D. P. Jackson, E. P. Cronkite, G. V. Leroy and Bernard Halpern. J. Lab. Clin. Med. 39, 449-61 (1952).

Authors studied hemorrhagic state in ten dogs exposed to 600 r of whole body x radiation. No conclusive evidence found for presence of circulating anticoagulant detectable by Conley's test or heparin-protamine titration. Specific tests for antithromboplastins and antithrombins were not made. Clotting defect is attributed to decreased platelet count. NSA 6-2818.

783

LATE RADIATION NECROSIS OF THE JAW BONES. Thomas J. Cook. J. Oral Surg. 10, 118-37 (1952).

Late effects on normal mouth tissues of high voltage x rays used in treatment of cancer of oral cavity are discussed. Causative factors of irradiation osteonecrosis, as well as prophylaxis, treatment and case histories are reviewed. NSA 6-2819.

784

STUDIES ON X-RAY INDUCED RECIPROCAL TRANSLOCATIONS IN EINKORN WHEATS. IV. AUTOTRIPLOIDS. Kosuke Yamashita. Japan. J. Genetics 26, 69-72 (1951).

Cytogenetic behavior of x-ray induced reciprocal translocations in 3 cases of triploids from crosses in Einkorn wheat is described. NSA 6-2820.

785

BLOOD COAGULATION AND HEMOSTASIS BY SPLEEN IRRADIATION IN GYNECOLOGY. Helmut Wagner. Arch. Gynäkol. 181, 246-76 (1952). (German).

A detailed scheme of blood coagulation based on observations of 30 women treated for juvenile, pre-climacteric or cancerous chronic bleeding by x-irradiation of the spleen is presented. NSA 6-2821.

786

EFFECTS OF FAST NEUTRONS AND Co^{60} γ -IRRADIATION ON MOUSE SPLEEN. D. L. Jordan and W. Clark. Radiation Research 1, 501 (1954).

Splenic atrophy 5 days after single acute exposure of CF-1 female mice to fast neutrons and Co^{60} γ rays, and to mixtures of these two radiations, is found to vary as the log of the dose. An RBE of 4.4 (n/r) for splenic weight loss is indicated. Additivity of these two ionizing radiations in producing splenic atrophy is discussed.

787

SOME POTENTIAL HAZARDS OF THE WIDESPREAD USE OF ROENTGEN RAYS IN PEDIATRICS. Robert W. Miller. (Atomic Energy Project, Univ. of Rochester.) Mar. 13, 1952. 24p. (UR-191). Pediatrics 11, 294-303 (1953). NSA 6-2823.

788

PROTECTION OF MICE AGAINST X-IRRADIATION BY SPLEEN HOMOGENATES ADMINISTERED AFTER EXPOSURE. L. J. Cole, M. C. Fishler, M. E. Ellis, and V. P. Bond. (Naval Radiological Defense Lab.). Jan. 15, 1952. 18p. (USNRDL-339; U21254).

Administration of the equivalent of 1.3 spleens (from 1 to 3 week old mice) in the form of phosphate buffered homogenates, from 1 to 45 hrs. after total body exposure to 700 r or 800 r of x rays afforded protection of recipient mice against the lethal effects of irradiation. There may be a quantitative relationship between degree of protection and amount of spleen injected. NSA 6-2824.

789

FIXATION OF I^{131} IN THE HUMAN FETAL THYROID. CASE HISTORY. U. Marinoni. Folia Endocrinol. (Pisa) 4, 637-40 (1951). (Italian).

A living fetus born at 4th or 5th month of pregnancy was injected with 30 μ c of I^{131} . Significant uptake by thyroid was found. NSA 6-2830.

790

NECROSIS OF THE BRAIN FOLLOWING ROENTGEN IRRADIATION. G. S. Dugger, J. G. Stratford and J. Bouchard. Am. J. Roentgenol. 72, 953-60 (1954).

Authors describe brain necrosis following therapeutic irradiation of tumors of skin of the head. Brain damage is secondary to vascular damage.

791

AN INVESTIGATION INTO THE MECHANISM WHEREBY EXTREME HYPOTHERMIA INCREASES THE SURVIVAL OF INFANT MICE GIVEN A LETHAL DOSE OF X-RAYS. John B. Storer and Louis H. Hempelmann. (Los Alamos Scientific Lab.). (nd). 18p. (AECU-1961).

Survival of infant mice while in a state of extreme hypothermia is almost twice that of litter mates exposed to same doses of total body x rays at room temperature. Experimental results indicate that lowered tissue oxygen tension in chilled mice is an important factor in increasing the survival rate. NSA 6-3153.

792

MECHANISMS IN ACQUIRED RADIORESISTANCE OF CANCER. P. O'B. Montgomery and Shields Warren. (Cancer Research Inst., New England Deaconess Hospital, Boston). (nd). 10p. (AECU-1991). Radiology 60, 421-4 (1953).

Authors present transplant survival data obtained when Gardner lymphosarcoma is given increasing *in vitro* doses of x radiation. It is concluded that the mechanism of acquired radioresistance in the tumor is probably an alternation of the host-tumor relationship as a consequence of host's response to x radiation. NSA 6-3154.

793

CLEARANCE OF PRODIGIOSIN DUST FROM THE RESPIRATORY TRACT OF NORMAL AND X-IRRADIATED RABBITS. George V. Taplin, James S. Grevior, Camille Finnegan, and Arthur Dunn. (Atomic Energy Project, Univ. of Calif., Los Angeles). Apr. 10, 1952. 15p. (UCLA-191). Ann. Allergy 10, 397-403 (1952).

When rabbits are given whole body x ray dose of 800 r followed by single inhalation exposure to prodigiosin dust, removal of dye particles from nasal mucosa and lung is greatly accelerated and efficiency of its clearance definitely increased over that of controls, especially on 14th and 28th post-exposure days. NSA 6-3158.

794

THE DIMINUTION AND INCREASE OF RADIOSENSIBILITY OF ANIMAL TISSUE AND THEIR IMPORTANCE FOR RADIOTHERAPY. G. Schwarz. Munch. Med. Wochschr. 766-7(1921). (In German)

Roentgen irradiation therapy should be applied by a step-by-step system after the early reaction, at least 24-48 hour intervals.

795

MORTALITY OF MICE AFTER TOTAL BODY IRRADIATION AS INFLUENCED BY ALTERATIONS IN TOTAL DOSE, FRACTIONATION, AND PERIODICITY OF TREATMENT. Henry S. Kaplan and Mary B. Brown. J. Natl. Cancer Inst. 12, 765-75 (1952).

A mathematical model is presented which fits the experimental data for daily fractionation and provides a tentative framework for additional dose-response experiments. NSA 6-3162.

796

HISTOLOGICAL CHANGES INDUCED IN BARLEY PLANTS BY RADIATION FROM P^{32} . Ruth W. Mackie, James M. Blume, and C. E. Hagen. Am. J. Botany 39, 229-37 (1952). NSA 6-3164.

797

BIOLOGICAL ACTION OF RADIUM BETA RADIATION (THE CURTIS F. BURNAM TUBE). Jean Moulinard. J. radiol. électrol. 33, 156-61 (1952). (French).

Burnam tube contains 50 mg of Ra filtered by 0.3 mm of monel metal. Physical and biological evaluation of its feebly penetrating β rays is presented. Skin application of 5 min (1800 rep) causes an erythematous reaction of the second degree. A 50 min. exposure (18,000 rep) results in radioepithelitis with good cicatrization. NSA 6-3165.

798

ACTION OF X-RAYS ON THE CARDIAC FUNCTION OF BUFO VULGARIS. II. ELECTROCARDIOGRAPHIC OBSERVATIONS. Giancarlo Lischi and Alberto Pacciardi. Radioterapia radiobiol. e fis. med. 4, 308-14 (1952). (Italian).

Electrocardiographs of Bufo vulgaris following 200-300 or 1000 r x-ray irradiation are illustrated and discussed. NSA 6-3166.

799

SERIOUS ALTERATION OF SKELETAL GROWTH FOLLOWING THERAPEUTIC ROENTGEN IRRADIATION IN EARLY LIFE. Ruggero Camera. Radioterapia radiobiol. e fis. med. 4, 257-68 (1951). (Italian).

Author presents detailed observations on a 13 year old boy with extreme hypoplasia of right arm resulting from roentgen irradiation of an angioma in infancy. Review of literature on effects of radiation on bone development is included. NSA 6-3167.

800

EFFECT OF X-RAYS ON THE METABOLISM OF THE NUCLEIC ACIDS. Mario Paoletti. Radioterapia radiobiol. e fis. med. 4, 225-36 (1951). (Italian).

Effect of 100 to 200 r of x radiation on nuclear staining of epidermal cells of guinea pig investigated. A decrease in nucleic acids, particularly thymonucleic and ribonucleic acids, is suggested. NSA 6-3168.

801

NEW EXPERIMENTS ON THE EFFECTS OF ROENTGEN RADIATION AND FLUORESCENCE RADIATION OF

CALCIUM TUNGSTATE ON THE FORMATION AND EVOLUTION OF CALLUSES IN EXPERIMENTAL FRACTURES. Braggion Paolo and Ravazzolo Sinclair. Radioterapia radiobiol. e fis. med. 4, 300-7 (1951). (Italian).

Inserting $CaWO_4$ near fracture prior to x irradiation as well as x irradiation alone were studied relative to their effects on healing of fractures in rabbits. Neither x rays nor x rays plus fluorescence had any definite effect on healing. NSA 6-3169.

802

ON THE EFFECT OF LARGE DOSES OF X-RAYS ON TISSUE CULTURES. M. N. Meisel, T. M. Kondrat'eva, and K. H. Emel'yanov. Doklady Akad. Nauk, S.S.S.R. 81, 1047-50 (1951). (Russian).

Cultures of tumorous tissue from a mouse milk gland were exposed to 5000 to 500,000 r of 90 kv x rays at the rate of 8300 r/min. Effects on cells and nuclei are described briefly. NSA 6-3170.

803

CILIARY MOVEMENT AND ACETYLCHOLINE. Pamela Kordik, E. Bulbring, and J. H. Burn. Brit. J. Pharmacol. 7, 58-66 (1952).

Authors report studies of responses of isolated loops of intestine from irradiated rats to acetylcholine and histamine. Response of colon was increased 24 hrs post-exposure; response of duodenum jejunum and ileum after 48 hrs. No changes in response to histamine. Cholinesterase content of intestines of irradiated rats was also determined. No fall in "true" or "specific" cholinesterase was observed 48 hrs post-exposure. NSA 6-3171.

804

THE LIMIT OF RENAL TOLERANCE TO X-RAYS: AN INVESTIGATION INTO RENAL DAMAGE OCCURRING FOLLOWING THE TREATMENT OF TUMOURS OF THE TESTIS BY ABDOMINAL BATHS. P. B. Kunkler, R. F. Farr, and R. W. Luxton. Brit. J. Radiology 25, 190-201 (1952).

Clinical picture of renal failure associated with hypertension following x ray abdominal baths for seminoma testis is described. In cases developing renal failure, the whole of both kidneys received dose of 2300 r or more in 5 weeks. NSA 6-3172.

805

BODY WEIGHT, FASTING AND FORCED FEEDING AFTER WHOLE BODY X-IRRADIATION. Willie W. Smith, Isabelle B. Ackermann, and Flaconer Smith. Am. J. Physiol. 168, 382-90 (1952).

Weight pattern in rats, mice and guinea pigs following irradiation was characteristic of species rather than of dose or lethality. Fasting did not alter mortality. Forced feeding (rats) a partially digested diet by stomach tube was detrimental to rats when feedings were given first 3 post exposure days; not thereafter. NSA 6-3173.

806

RESULTS AND INTERPRETATIONS OF X IRRADIATION STUDIES WITH ESCHERICHIA COLI. C. R. Goucher, Ichiro Kamei and W. Kocholaty. (Army Medical Research Lab., Fort Knox, Ky.). Aug. 18, 1955. 17p. (AMRL-206).

Protection of *Escherichia coli* B/r from x irradiation by pre-incubation with metabolizable substrates, such as succinic acid and ethanol may occur only with dense bacterial suspensions, limiting equilibration with the surrounding oxygen, and may be abolished altogether by shaking the suspension a few seconds before irradiation. Irradiated suspensions of *E. coli* B/r showed no dilution effect; a given irradiation dose resulted in essentially the same percentage inactivation for suspensions ranging from 10^4 to 10^8 cells per ml. NSA 10-41.

807

EFFECTS OF X-RAYS AND RADIUM ON THE NUCLEI OF CANCEROUS CELLS. L. Cusmano. *Acta Unio Intern. contra Cancrum* 7, 822-23(1952). (French)

Radiation caused disappearance of proliferating cells and increase in number of resting cells. Hyperploid cells seemed to be more resistant and their number may explain radioresistance or recurrence of certain types of tumors. (Tumors studied: rat sarcoma exposed to 200 r x rays, and epithelial cancer of cervix treated with 20 mg Ra.). NSA 6-3175.

808

ANALYSIS OF DIFFERENT FACTORS RESPONSIBLE FOR THE DEATH OF MICE IRRADIATED IN TOTO. H. Betz. *Acta Unio Intern. contra Cancrum* 7, 814-17 (1952). (French).

The protective action of KCN against x irradiation is exerted only on those tissue lesions resulting from general metabolic disturbances, such as changes in lipid production of the adrenal cortex and the liver, and not on radiolesions. It is concluded that general alarm syndrome is cause of radiation death in the mouse. NSA 6-3176.

809

EXPERIMENTAL RADIATION INDUCED OVARIAN TUMORS: ADENOCARCINOMA WITH HYPERVOLEMIA. Jacob Furth and J. B. Kahn. *Acta Unio Intern. contra Cancrum* 7, 827-30 (1952).

Histological and physiological classification of ovarian tumors caused by irradiation. NSA 6-3177.

810

SYMPOSIUM ON CEREBRAL PALSY. PART II. SOME EFFECTS OF IONIZING RADIATION AND METABOLIC INHIBITION ON THE DEVELOPING MAMMALIAN NERVOUS SYSTEM. Samuel P. Hicks. *J. Pediat.* 40, 489-513 (1952). NSA 6-3178.

811

RADIATION-INDUCED LYMPHOID TUMORS OF MICE. Henry S. Kaplan. *Acta Unio Intern. contra Cancrum* 7, 849-59 (1952).

Paper presents results of current large scale experiments on effect of varying such factors as total x ray dosage, number of treatments and interval between treatments upon radiation mortality and the incidence of lymphoid tumors. NSA 6-3179.

812

NUCLEIC ACIDS IN THE CANCEROUS CELL AND RADIO-SENSITIVITY. L. Cornil and A. Stahl. *Acta Unio Intern. contra Cancrum* 7, 818-21 (1952). (French).

Observations on lymphosarcoma cells and orthoplastic epitheliomas during Ra therapy show that radiosensitivity of a cell is proportional to its nucleoprotein content and directly proportional to the thymonucleic acid/ribonucleic acid ratio. NSA 6-3180.

813

A STUDY OF THE X-IRRADIATION PROTECTION AFFORDED BY COBALT. W. H. Parr, T. O'Neill, and A. T. Krebs. (Army Medical Research Lab., Fort Knox). Feb. 4, 1952. 8p. (AMRL-74; U21459).

White mice maintained on a diet containing 3 to 4 mg Co/day for 5 to 8 days before and 15 days after 720 r whole body irradiation showed an increased resistance to radiation as compared to group fed only Purina chow. General appearance of the two groups was similar. NSA 6-3181.

814

THE EVALUATION OF WHITE-CELL COUNTING IN RADIATION PROTECTION. A. C. Chamberlain, F. M. Turner, and E. K. Williams. *Brit. J. Radiol.* 25, 169-76 (1952).

Reviews normal variations in leukocyte counts and reliability of leukocyte counts in detecting occupational radiation injury. Concludes that WBC counting does not give full measure of protection implied in Recommendations of British X-ray and Radium Protection Committee, but that there are detectable changes in large groups of workers even when levels are maintained as low as those which prevail at the British Atomic Energy Research Establishment. NSA 6-3184.

815

THERAPY OF THE X-IRRADIATION SYNDROME WITH TERRAMYCIN. Molly P. Coulter, Frank W. Furth and Joe W. Howland. (Atomic Energy Project, Univ. of Rochester). Apr. 2, 1952. 13p. (UR-195). *Am. J. Pathol.* 28, 875-81(1952). NSA 6-3187.

816

DISAPPEARANCE RATE OF TAGGED SUBSTANCES FROM THE CIRCULATION OF ROENTGEN IRRADIATED ANIMALS. Leon Wish, Jacob Furth, Charles W. Sheppard, and Robert H. Storey. *Am. J. Roentgenol.* 67, 628-40 (1952).

Disappearance rate of several labelled substances studied in mice and rabbits. All substances disappeared faster from blood stream of irradiated than of normal animals one day after exposure, presumably due to increased capillary permeability. NSA 6-3210.

817

THERAPY OF ACUTE RADIATION HYPOTENSION IN THE RAT. P. O'B. Montgomery and Shields Warren. (Cancer Research Inst., New England Deaconess Hospital, Boston). (nd). 7p. (AECU-1992).

Blood pressure of rats made hypotensive by 1500 r total body radiation is raised to normal by L-norepinephrine bitartrate and monohydrate. Transfusion has little or no effect on the blood pressure. NSA 6-3484.

818

EFFECTS OF ACUTE RADIATION ON THE ADULT MAMMALIAN CENTRAL NERVOUS SYSTEM. Samuel P. Hicks and Philip O'B. Montgomery. (Cancer Research Inst., New England Deaconess Hospital, Boston and Laboratory of Pathology, Harvard Cancer Commission). (nd). 15p. (AECU-1994). *Proc. Soc. Exptl. Biol. Med.* 80, 15-18 (1952).

Irradiation of rats and mice resulted in acute necrosis of scattered oligodendroglia cells, subependymal cells of young adult animals, retinal rod cells and neurons of pyramidal lobe and olfactory brain. Subependymal cells were radiosensitive (200 r) but the others were not destroyed below 1200 r. Findings are related to other data on concomitant changes in cell metabolism and radiosensitivity in the developing nervous system. NSA 6-3485.

819

STUDIES ON THE MECHANISM OF ACTION OF IONIZING RADIATIONS; VII. CELLULAR RESPIRATION, CELL DIVISION AND IONIZING RADIATIONS. E. S. Guzman Barron and S. Louise Seki. (Argonne National Lab.). Mar. 1952. 11p. (AECU-2000; UAC-547). *J. Gen. Physiol.* 35, 865-71 (1952).

X-irradiation of the eggs and sperm of *Arbacia punctulata* in relatively large doses inhibited respiration, while small doses increased it; dose required to increase it depending on the cell's sensitivity to radiation. Most sensitive were sperm, then fertilized eggs. Unfertilized eggs were least sensitive. NSA 6-3486.

820

THE EFFECT OF X RAYS ON THYMOCYTES AND ITS MODIFICATION BY CYSTEINE. H. M. Patt, M. E. Blackford and R. L. Straube. (Argonne National Lab.).

Mar. 1952. 17p. (AECU-2001; UAC-541). Proc. Soc. Exptl. Biol. Med. 80, 92-7 (1952).

Sensitivity of rabbit thymocytes to x irradiation in vitro is decreased by a constant factor over a wide dosage range when cysteine is added to the suspension. This effect on thymic cell suspensions may result from competition with cell substrates for O₂. NSA 6-3487.

821
BIOLOGICAL EFFECTS OF IONIZING RADIATION. M. Ingram, W. B. Mason, G. Hoyt Whipple, and Joe W. Howland. (Atomic Energy Project, Univ. of Rochester). Mar. 7, 1952. 76p. (UR-196).

A review of present knowledge and concepts of the biological effects of ionizing radiation. Among topics are: physical and chemical effects on biological systems, physiological changes in the intact animal, latent changes following exposure of biological systems, factors influencing the biological response to ionizing radiation, relative effects of various ionizing radiations, and biological dosimetry. NSA 6-3489.

822
PRESENT TENDENCIES IN INTERPRETATION OF CELLULAR RADIATION INJURIES. P. De Plaen. J. belge radiol. 35, 113-29 (1952). (French).

The nuclear-chemical, histological, and genetic changes produced in cells by ionizing radiation are discussed in terms of current explanations of radiation effects. NSA 6-3491.

823
SOME SUBSTANCES WITH REDUCING ACTION (CYSTEINE, THIOGLYCOLIC ACID, ASCORBIC ACID, COMBINED CYSTEINE AND ASCORBIC ACID) AS PROTECTIVE AGENTS IN BIOCHEMICAL X-RAY INJURIES. Enrico Caffaratti. Radioterapia radiobiol. e fis. med. 4, 378-84 (1951). (Italian).

Protective action of combined cysteine and ascorbic acid was marked, 94% of mice so treated being alive 3 weeks after irradiation, (800 r, 5 week LD₅₀ of 180-kv x-rays), in contrast to 48, 80, and 50% respectively, of control and cysteine-, thioglycolic acid-, and ascorbic-acid-treated mice. NSA 6-3495.

824
RECOVERY OF THE FUNCTION OF DENERVATED LIMBS OF AXOLOTL FOLLOWING X IRRADIATION. K. F. Galkovskaya. Doklady Akad. Nauk S.S.S.R. 81, 945-8 (1951). (Russian).

Limbs of live axolotls were denervated and exposed to 15,000 or 20,000 r of 160-kv x rays. Graphs of recovery in terms of reaction to acid, raising of limbs, and mobility are presented. Irradiation retarded recovery and did not stimulate nerve regeneration. NSA 6-3496.

825
CHANGES IN CELLULAR COMPOSITION OF THE LYMPH CAUSED BY IONIZING RADIATIONS. M. H. Ross, J. Furth and R. R. Bigelow. Blood 7, 417-28 (1952).

Large numbers of erythrocytes appear in lymph of rats and dogs after massive exposure to x rays, causing a relative anemia. Lymph and blood lymphocyte counts drop precipitously in 5 to 10 hours. During recovery, large lymphocytes in lymph increase greatly; blood smears show large abnormal lymphocytes, mitotic figures and tissue mast cells. Diversion of erythrocytes into lymph, if severe, is self-aggravating process leading to death. NSA 6-3497.

826
PRODUCTION AND CHARACTERISTICS OF HYPOPHYSEAL TUMORS FOLLOWING HIGH DOSAGES OF ¹³¹I IN MICE. Aubrey Gorbman. Acta Unio Intern. contra Cancrum 7, 831-3 (1952).

Mice of 3 inbred strains were given thyroid-lethal doses of radioiodine, or doses allowing survival of fragments of thyroid tissue. Of those surviving 8 months after 1 subcutaneous injection, 90% had pituitaries at least 5 times normal size. NSA 6-3498.

827
DECREASED X-RAY SENSITIVITY OF MICE FOLLOWING ADMINISTRATION OF ETHANOL. L. J. Cole and M. E. Ellis. (Naval Radiological Defense Lab.). (nd). 19p. (USNRDL-341). Am. J. Physiol. 170, 724-30 (1952).

Within the limits of ethanol dosage studies (1.25, 2.5 or 3.75 ml of 25% ethanol/100 g body weight of mice) degree of radiation protection at 750 r is a linear function of the amount of ethanol administered. Pretreatment of x-irradiated rats with ethanol did not elicit similar protection. NSA 6-3500.

828
THE PROTECTIVE ACTION OF FLAVONOIDS AGAINST RADIATION. I. Arons, B. Sokoloff, and R. Dutcher. Acta Unio Intern. contra Cancrum 7, 803-9 (1952).

A flavonoid compound identical to the original vitamin P of Szent-Gyorgyi gave considerable protection against injury to capillary system of rats subjected to a total-body near-lethal dose of x rays; and decreased reaction of skin to radiation in the case of 13 patients subjected to deep x ray therapy. NSA 6-3502.

829
CURRENT CONCEPTS OF THERAPY OF THE RADIATION SYNDROME. Joe W. Howland. J. Missouri State Med. Assoc. 49, 425-9 (1952).

Nature of the radiation syndrome discussed; signs and symptoms of definite importance in correct therapy noted. Procedures and agents effective in modifying the syndrome analyzed as to probable physiological effects. NSA 6-3503.

830
THYMIC AND SPLENIC WEIGHT CHANGES PRODUCED BY X-RAYS. R. F. Kallman and H. I. Kohn. Federation Proc. 13, 76-77 (1954).

Changes in weight of spleen and thymus following total and partial-body irradiation were studied in female mice. The direct effect of radiation upon the spleen and thymus is the major cause of weight loss in these organs. The spleen was less sensitive than the thymus. (from authors' summary).

831
THE COAGULOGRAM AFTER SPLEEN IRRADIATION. Helmut Wagner. Gynaecologia 133, 194-204 (1952). (German).

In 76.7% of cases, comparative studies of blood coagulation in x irradiation of the spleen (indication: gynecological hemorrhages) and of mastitis showed acceleration of coagulation after irradiation of the spleen. NSA 6-3906.

832
THOROTRAST DAMAGE IN BRONCHOGRAPHY, RETROGRADE PYELOGRAPHY, SALPINGOGRAPHY, AND ARTERIOGRAPHY. J. Vogtlin and W. Minder. Radiologia Clin. 21, 96-115 (1952). (German).

Clinical changes caused by thorotrast (colloidal ThO₂) in 4 patients are presented. Changes in lungs, kidneys, serosa, liver, spleen and mediastinal lymph glands are described. A squamous epithelioma was present in the lungs in one case in addition to typical thorotrast granulomas. NSA 6-3907.

833
NIL NOCERE! THE QUESTION OF PETEOSTHOR DAMAGE. Ernst L. Schäfer and Hans Greuel. Münch med. Wochschr. 94, 158-62 (1952). (German).

Patient with tuberculosis of knee joint was treated with intravenous injections of Peteosthor (eosin-stabilized, ThX(Ra²²⁴)-containing platinsol). Myeloid leukemia developed, and death occurred 1 year following conclusion of treatments. Possibility of radiation damage in therapeutic use of Peteosthor is discussed. NSA 6-3908.

834
BEHAVIOR OF OXYGEN CONSUMPTION BY THE HUMAN GASTRIC MUCOSA IRRADIATED IN VITRO WITH SMALL DOSES OF X RAYS. Marsili and Paoletti. *Radiologia Med.* 37, 948-9 (1951). (Italian).

Human gastric mucosa was irradiated with 1, 2, 5, or 10 r in vitro and O₂ consumption measured with Warburg manometer. The inhibiting, enhancing, variable, and time effects noted are outlined. NSA 6-3909.

835
EFFECT OF WHOLE-BODY X-IRRADIATION OF THE GUINEA PIG ON UTILIZATION OF GLUCOSE BY THE LIVER. M. Lourau and O. Lartigue. *J. physiol. et path. gen.* 43, 593-603 (1951). (French).

Male guinea pigs irradiated sublethally with 500 r of 180-kv x rays exhibited deficient hepatic glycogenesis. Authors hypothesize that irradiation does not affect direct synthesis of glycogen from alimentary glucides, but impedes synthesis from small molecules. NSA 6-3910.

836
THE CONCEPT OF A MAXIMUM PERMISSIBLE EXPOSURE. Robert S. Stone. *Radiology* 58, 539-61 (1952).

Biological effects of radiation are reviewed and a concept presented for establishing maximum permissible exposure limits. NSA 6-3914.

837
EFFECT OF SODIUM SALICYLATE ON RESISTANCE OF MICE IRRADIATED WITH X RAYS. H. Betz and H. van Cauwenberge. *Compt. rend. soc. biol.* 145, 1910-13 (1951). (French).

Mice injected with 12 daily doses of 400, 500, or 600 mg Na salicylate/kg prior to irradiation (700 r of 250 kv x rays) had survival rates of 25, 55, and 50%, respectively, (control-0%). Others injected with 500 mg/kg daily following 700 r died in 6 days, (controls lived 12 days.) Stimulation of adrenal cortex suggested as mechanism of salicylate effect. NSA 6-3915.

838
AMINOACIDURIA FOLLOWING TOTAL BODY IRRADIATION IN THE HUMAN BEING. E. J. Katz and R. J. Hasterlik. *J. Lab. Clin. Med.* 44, 816-17 (1954).

Total daily urinary amino acid excretion increased to ten times normal after exposure of four laboratory workers to total body gamma radiation. Increased above normal were excretion of glycine, taurine, cystine, glutamic acid, aspartic acid, and hydroxyproline. Increased protein breakdown is not the major factor in producing aminoaciduria.

839
THE HEMORRHAGIC PHASE OF THE ACUTE RADIATION SYNDROME DUE TO EXPOSURE OF THE WHOLE BODY TO PENETRATING IONIZING RADIATION. E. P. Cronkite, G. J. Jacobs, George Brecher, and George Dillard. *Am. J. Roentgenol. Radium Therapy* 67, 796-804 (1952). NSA 6-3918.

840
TREATMENT OF ROENTGEN SICKNESS WITH AVIL AND VITAMINS. C. Montag. *Therap. Gegenwart*, No. 4, 148-9 (1952). (German).

Clinical use in 250 patients of Avil, proprietary antihistamine (25 mg tablets 3 or 4 times daily), and large injections of vitamins C, B₁, B₆, B₁₂, and nicotinic acid

mixtures in treating radiation sickness are reported to have given good results, but no data are given. NSA 6-3919.

841
EXAMPLE OF THE ACUTE RADIATION SYNDROME IN MAN. L. H. Hempelmann. *New Engl. J. Med.* 206, 776-82 (1952).

Case histories of three persons receiving single total body exposures to radiation doses of varying magnitude (primarily neutrons and gamma rays) illustrate the lethal, sublethal, and asymptomatic forms of the acute radiation syndrome. NSA 6-3920.

842
FIRST CLINICAL TESTS OF A CHEMICAL PROTECTOR AGAINST X RADIATION. A. Herve. *Rev. Med. Liege* 7, 276-9 (1952). (French).

β -Mercaptoethylamine, HSCH₂CH₂NH₂, has low toxicity and high protective action against radiation. Twelve patients with typical radiation sickness symptoms from massive doses of radiation showed symptomatic improvement following treatment with a series of 200 mg intravenous doses of the drug. NSA 6-3921.

843
ROENTGEN IRRADIATION OF COBALT POLYCYTHEMIA AS A MODEL EXPERIMENT. R. Seyss. *Wien. Z. inn. Med.* 33, 107-11 (1952). (German).

Increased erythrocyte counts were induced in rats by subcutaneous injections of CoCl₂ prior to irradiation. Whole body exposures to doses of 5 r or 20 r depressed erythrocyte counts to a greater extent in these rats than did exposure of the head alone to the same doses. Two phases of reaction followed midbrain irradiations, viz (1) hormonal excitation and (2) depression. Treatment of polycythemia in man is discussed. NSA 6-3984.

844
COMPARATIVE CHRONIC TOXICITIES OF RADIUM AND PLUTONIUM. A. M. Brues. (Argonne National Lab.). *Apr.* 1951. 20p. (ANL-4799).

Results of preliminary quantitative survey of survival and gross pathologic changes in animals given Ra and Pu are reported. Significance of findings and their relation to human toxicity problem are discussed. NSA 6-3936.

845
THE EFFECT OF α AND β RAYS ON PROTOPLASM. Nora Feichtinger. *Naturwissenschaften* 8, 252-257 (1930). (German).

"Germ" roots (1-2 mm long) of *Crepis virens* were irradiated with equal doses of α and β rays from polonium and radium E, respectively. Alpha rays produced injury to a depth of 30 μ only. Beta rays damaged entire root. BA 6-6638.

846
MICROCHEMICAL AND CYTOLOGIC FINDINGS IN X-RAY IRRADIATED PLANT TISSUES. I. DEEPLY STAINED CYTOPLASMIC CELL-GROUPS IN THE APICAL ROOT TISSUE OF V. FABA. Ko Muro-Hideo. *Fortschr. Gebiete Rontgenstrahlen* 41, 948-9 (1930). (German). BA 6-6645.

847
SOME EFFECTS OF ROENTGEN RAYS ON SEEDLINGS. Sylvia B. Wigoder and Ruth Patten. *Proc. Roy. Irish Acad.* 39B, 146-55 (1929).

Dried seeds and soaked seeds of *V. faba*, barley, white mustard, timothy grass, and peas were not injured by x-irradiation. Seeds maintained in germinating condition for 5-7 days failed to develop root or shoot. Effect was greatest on actively dividing cells in last 4 mm of root tip. Mitosis decreased 3 hrs. after exposure, stopped after 3 days, often resumed after 5-8 days. Multinucleate cells noted at that time. BA 6-6647.

848

THE EFFECT OF X-RAYS ON BLOOD SUGAR REGULATION. A. Held. *Strahlentherapie* 38, 27-39 (1930). (German).

Distinction is drawn between general action of x-rays on blood sugar regulation and their direct action in the sphere of irradiation. Blood irradiated in vitro and injected into host from which it came causes hyperglycemia. In the absorption territory of the rays, hypoglycemia occurs. This is regarded as a direct reaction to the rays. BA 6-6674.

849

THE EFFECT OF ROENTGEN RAYS ON VARYING WAVE LENGTHS ON SERUM CHOLESTEROL. Hermann Hoehne. *Arch. Gynäkol.* 146, 41-61 (1931). (German).

Serum cholesterol usually increased in carcinoma-free patients after irradiation; decreased in carcinomatous patients. Composition of the diet appeared to be a contributing factor. BA 6-6676.

850

THE EFFECT OF RADIATION ON LEUKOCYTES, STUDIED BY MEANS OF TISSUE CULTURE. A. M. B. Lacassagne and G. Gricouff. *Arch. exp. Zellforsch. Gewebezucht* 6, 303-15(1928). (French).

Authors studied survival of irradiated (x-rays or radon) rabbit leukocytes in tissue culture. X-rays and γ rays did not affect motility, β rays killed cells promptly. Lymphocytes were most sensitive cells; monocytes became macrophages. Conclusion: leukopenia after irradiation represents damage to hematopoietic centers, not destruction of mature circulating leukocytes. BA 6-6680.

851

BIOLOGICAL EFFECTS OF RADIATION AS STUDIED IN TISSUE CULTURES. Hans Laser. *Strahlentherapie* 38, 391-437 (1930). (German).

Cultures of various tissues from various species were exposed to x-ray or radium, half of each culture being shielded to serve as control. Sensitivity and latency bore a definite relationship to rate of proliferation. Recovery eventually followed changes due to non-lethal doses. Cultures became refractory to repeated irradiation. Biological sensitivity corresponds to product of time and intensity of irradiation. BA 6-6681.

852

OBSERVATIONS ON THE ACTION OF COLLOIDAL LEAD ON AN IN VITRO CULTURE WITH REFERENCE TO SUPPLEMENTARY IRRADIATION. Warnford Moppett. *Med. J. Australia* 2, 690-92(1930).

Gamma rays from radium D reinforce the destructive action of colloidal lead on cultures of heart muscle from an 8-day chick embryo. Mixed x-rays have no effect. BA 6-6682.

853

SKIN REACTIONS FOLLOWING EXPOSURE TO ROENTGEN RAYS. I. A COMPARISON OF THE EFFECT OF TWO DIFFERENT WAVE LENGTHS ON THE SKIN OF RATS. Ernest A. Pohle and C. H. Bunting. *Radiology* 13, 496-503 (1929).

60 KV x-rays of an effective wave length of 60 Å produced slight ulceration between 10-14 days after exposure. Healing occurs, leaving smooth scar after 2 months. Seven KV x-rays with an effective wave length of 2.0 Å also produce a macroscopic reaction, but skin is in atrophic condition 2 months following exposure. (Doses = 4 times the human erythema dose in each instance). BA 6-6683.

854

THE BIOLOGICAL EFFECT OF ROENTGEN RAYS STUDIED BY TISSUE EXPLANT METHOD. Martin Schubert. *Strahlentherapie* 26, 425-71(1927). (German).

Heart of 9 day chick embryo grew for 3-4 days if explanted immediately after irradiation of embryo or if washed carefully in Ringers solution before explanting 2 hrs. after exposure; did not grow when explanted 4 hrs. after exposure. In vitro irradiation of explant did not inhibit growth. Dose delivered to eggs: 10 HED, no filter. NSA 6-6685.

855

THE EFFECT OF ROENTGEN RAYS ON THE DEVELOPING EMBRYO. N. M. Woskressensky. *Z. Wissenschaft. Biol. Abt. D. Wilhelm Roux' Arch. Entwicklungsmech. Organ.* 113, 447-61(1928). (German).

Author reports studies on the biological effect of various doses of x-rays on axolotl embryos and larvae of *D. melanogaster*. Conclusions: the radiosensitivity of the growing organism decreases with age according to a hyperbolic function. Decrease in sensitivity parallels decrease in rate of growth. BA 6-6688.

856

HEMATOLOGICAL EFFECTS OF IONIZING RADIATIONS. p.140-196 OF INDUSTRIAL MEDICINE ON THE PLUTONIUM PROJECT. L. O. Jacobson, Edna K. Marks, and Egon Lorenz. (NNS IV-20). Robert S. Stone, ed. New York. McGraw Hill Book Co., Inc. 1951.

Study of: effects of acute whole-body exposure to x rays and fast neutrons; rise in leucocyte and reticulocytes after exposure; effect of radiations on coagulation of blood; effect of irradiation on induced anemia; hematological effects in mammals after exposure to externally originating radiations; effects of radioactive elements. Studies on experimental animals and man.

857

HOMOTRANSPLANTS AND RETICULOENDOTHELIAL SYSTEM. B. E. Bruda and W. Kreiner. *Deutsch Z. Chir.* 222, 285-301 (1929). (German).

In 30% of x-rayed rats and rabbits, transplanted glands of internal secretion survived for longer period than in normal controls. This is attributed to decreased function of R-E system in irradiated animals. In contrast, x-radiation, injection of colloids and splenectomy had no effect on healing of homologous skin grafts. BA 6-8245.

858

CLINICAL AND HISTOLOGICAL CHANGES PRODUCED IN CARCINOMA OF THE CERVIX BY DIFFERENT AMOUNTS OF ROENTGEN RADIATION. A. N. Arneson and F. W. Stewart. *Arch. Surg.* 31, 542(1935).

859

CHRONIC EXTERNAL IRRADIATION AND NEUTRON RADIOBIOLOGY. p.13-32 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, FEBRUARY, MARCH, APRIL, 1952. Austin M. Brues, ed. (Argonne National Lab.). (ANL-4794(p.13-32)).

Guinea pigs given injections of bone marrow following 750 r total body x radiation survived and had normal blood pictures after 40 days. Controls died. Menkin's leukocytosis-promoting factor did not modify radiation injury in mice or guinea pigs. NSA 7-7.

860

HEMATOLOGY, p.33-51 OF DIVISION OF BIOLOGY AND MEDICAL RESEARCH QUARTERLY REPORT, FEBRUARY, MARCH, APRIL, 1952. Austin M. Brues, ed. (Argonne National Lab.). (ANL-4793(p.33-51)).

Studies on: lead shielded exteriorized Peyer's patches of rabbits exposed to 800 r total body radiation; spleen shielded irradiated mice; depression of Hgb formation, antibody formation in spleen shielded and non-shielded irradiated mice, effect (on survival) of post-irradiation surgery (mice). NSA 7-8.

861

PHYSIOLOGY AND RADIUM TOXICITY, p. 52-65 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, FEBRUARY, MARCH, APRIL, 1952. Austin M. Brues, ed. (Argonne National Lab.). (ANL-4794(p. 52-65)).

Protective effect of cysteine is enhanced in mice breathing 10% oxygen for several minutes prior to and during irradiation; also when animals are injected (pre-exposure) with 2, 4-dinitrophenol followed by cysteine. Data relative to hematological changes in irradiated bats are also presented. NSA 7-9.

862

EXPERIMENTAL CYTOLOGY AND EXPERIMENTAL PATHOLOGY AND EXPERIMENTAL SURGERY AND HISTOPATHOLOGY AND RADIOCHEMISTRY AND SPECIAL PROBLEMS. p. 66-100 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, FEBRUARY, MARCH, APRIL, 1952. Austin M. Brues. (Argonne National Lab.). (ANL-4794 (p. 66-100)).

Includes reports on: protective effects of dog plasma and dog spleen perfusates prior to exposure of mice to x rays; malignant bone changes in mice after injections of U^{233} , Ra^{226} , or Pu^{239} ; protective effect of pre-exposure epinephrine in irradiated chicks. NSA 7-10.

863

INVERTEBRATE ZOOLOGY AND PHYTORADIOBIOLOGY AND PLANT PHYSIOLOGY AND MICROBIOLOGY AND BIOCHEMISTRY. p. 101-37 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, FEBRUARY, MARCH, APRIL, 1952. (Argonne National Laboratory). (ANL-4794 (p. 101-37)).

Includes reports on: study of living grasshopper ovariole; radiosensitivity of auxin biosynthesis; effect of treatment with auxin on growth and development of the kidney bean; two types of x ray effects on reproduction in paramecia. NSA 7-11.

864

THE BIOLOGICAL EFFECTIVENESS OF THERMAL NEUTRONS ON MICE. James T. Brennan, Payne S. Harris, Robert Emerson Carter, and Wright H. Langham. (Los Alamos Scientific Lab.). Feb. 15, 1952. 101p. (LA-1408). Nucleonics 12, No. 2, 48-56; No. 4, 31-5 (1954).

Authors report experimental animal exposures to thermal neutron flux (nuclear reactor) accompanied by γ flux; mouse in slow neutron flux becomes a γ ray source; to some extent mice exposed together shield each other from neutron flux. Taking those factors into account, RBE of gamma contaminant in thermal column found to be low (0.53). NSA 7-13.

865

THE BIOCHEMICAL EFFECTIVENESS OF THERMAL NEUTRONS DETERMINED BY THE DECREASE IN WEIGHT OF THE SPLEEN AND THYMUS OF THE MOUSE. Payne S. Harris and James T. Brennan. (Los Alamos Scientific Lab.). May 6, 1952. 33p. (LA-1410). NSA 7-14.

866

INCIDENCE OF LENS OPACITIES IN MICE EXPOSED TO X-RAYS AND THERMAL NEUTRONS. John Storer and Payne Harris. (Los Alamos Scientific Lab.). July 1952. 27p. (LA-1455).

RBE of thermal neutrons calculated on basis of production of lens opacities was approximately 9 x RBE calculated on basis of production of lethality at 30 days. NSA 7-15.

867

EFFECT OF X RAYS ON LIVING TISSUES IN VITRO. R. I. Gassoul. Ann. Roentgenol. et Radiol. 2, 211-25 (1927). (In French).

Vibrations of ciliated epithelium first become stronger, then are weakened and finally cease with increasing x ray exposure. Results are in agreement with theory of Nadson and Nemenow who propose that x irradiated cells exhaust their vital energy more rapidly and grow old quicker than unirradiated cells. NSA 6-3734.

868

STUDIES ON THE MECHANISM OF ACTION OF IONIZING RADIATIONS; X. EFFECT OF HYDROGEN PEROXIDE ON CELL METABOLISM, ENZYMES, AND PROTEINS. E. S. Guzman Barron, Louise Seki, and Phyllis Johnson. (Argonne National Lab.). Mar. 1952. 25p. (AECU-2018; UAC-561). Arch. Biochem. and Biophys. 41, 212-32 (1952).

In acid solutions and presence of titanium sulfate, amount of H_2O_2 formed on x-irradiation of H_2O was proportional to dose and was depressed by adding electrolytes. Irradiation of Ringer bicarbonate solution gave half of amount formed on irradiation of distilled H_2O ; protein diminished it further. Role of H_2O_2 is considered small in action of ionizing radiation on biological systems. NSA 6-3738.

869

BIOLOGICAL EFFECTS OF IONIZING RADIATIONS FROM RADIUM AND POLONIUM ON FUNGI. PART III. THE PREVENTION OF MOLD GROWTH IN OPTICAL INSTRUMENTS SERIES. Sigmund Berk. (Pitman-Dunn Labs., Frankford Arsenal). July 1951. 89p. (NP-3798; FA Report R-1016).

Constant irradiation with 7.5 μ g sources of Ra inhibited sporulation of *Chaetomium globosum*. *Lenzites trabea*, *Aspergillus niger*, *A. flavus* and *Penicillium* and showed appreciable differences in radiosensitivity of species. Particulate radiation appears to be primarily responsible for effect. NSA 6-3739.

870

HYPOTHESIS OF THE BIOLOGICAL ACTION OF RADIATION. Kiga Masami. Science 115, 549-50 (1952).

A simple expression for survival curve of irradiated cells is derived for general case of n essential molecules in a cell able to survive if no more than r of the n are damaged; each molecule assumed damaged by one ionization. If $n = 1$ and $r = 0$, or if $n > 1$ and $r = 0$, survival curve is exponential. The case $n \geq 2$ and $r = n - 1$ corresponds to clumping and a sigmoid curve results. NSA 6-3740.

871

MONTHLY PROGRESS REPORT FEBRUARY, 1952. Hymer L. Fridell. (Atomic Energy Project, Western Reserve Univ.). 9p. (NYO-1644).

Study of 60 rats splenectomized 5 days before exposure to 458-655 r showed that radiation sensitivity of spleen is not markedly different from that of other hematopoietic tissues. Deposition of Au^{198} following subtotal hepatectomy and antibiotic therapy of these rats is described. Protective effects of propylene glycol against radiation injury in rats was not significant, but yeast afforded some protection. Survival of dogs given 700 r total body x radiation was not significantly increased by cross-circulation with donor dogs. NSA 6-3888.

872

QUARTERLY PROGRESS REPORT FOR PERIOD JANUARY 1, 1952 TO MARCH 31, 1952. Bernard E. Proctor and Samuel A. Goldblith. (Massachusetts Inst. of Tech.). Apr. 1, 1952. 29p. (NYO-3338).

Standard operating procedures for food sterilization experiments using Co^{60} source are reviewed. Calibration of the Co^{60} source and preliminary studies of Co^{60} radiation effect on *E. coli* are discussed, and comparative effects of Co^{60} and 3 Mev cathode rays on ascorbic acid solutions noted. NSA 6-3889.

873

EVIDENCE FOR SISTER-STRAND CROSSING OVER IN MAIZE (abstract). Drew Schwartz. (Oak Ridge National Lab.). (nd). 1p. (AECU-2031). *Genetics* 38, 351-60 (1953). NSA 6-3891.

874

THE ROLE OF EXTERNALLY PRODUCED HYDROGEN PEROXIDE IN THE ACTION OF X RAYS UPON PARAMECIUM AURELIA (abstract). R. F. Kimball and Nenita Garthen. (Oak Ridge National Lab.). (nd). 1p. (AECU-2032). *Proc. Soc. Exptl. Biol. Med.* 80, 525-9 (1952).

Nongenetic death and division delay were produced in Paramecium by 50-400 kr of x rays depending on medium and other conditions. Irradiation in medium where living bacteria and catalase prevented accumulation of H_2O_2 was less effective than in medium containing organic matter but no live bacteria or catalase. Large part of irradiated medium's action is attributed to H_2O_2 . Medium had no influence on mutagenic effect. NSA 6-3892

875

RADIATION REACTIONS IN PARABIOTIC RATS. Joshua L. Edwards and Sheldon C. Sommers. (Cancer Research Inst., New England Deaconess Hospital, Boston). (nd). 23p. (AECU-2056). *J. Lab. Clin. Med.* 40, 342-54 (1952).

Morphologic tissue changes and leukocyte counts of parabiotic rats were studied after x irradiation. One rat was lead-shielded, other given single dose of 400, 800, 1200, or 1600 r total body x radiation. Protected rats showed no radiation damage by circulating substances and appeared to bolster leucocytes of irradiated partner. NSA 6-3893.

876

THE PROTECTIVE EFFECT OF SHIELDED ECTOPIC BONE MARROW AGAINST TOTAL-BODY X-RADIATION. J. B. Storer, C. C. Lushbaugh, and J. E. Furchner. (Los Alamos Scientific Lab.). (nd). 28p. (AECU-2039). *J. Lab. Clin. Med.* 40, 355-66 (1952).

Lead shielding of small amounts of ectopic marrow induced in the tails of rats by abdominal implantation increased survival of rats exposed to 650 r total-body x radiation. Shielding of normal tails containing fatty marrow didn't increase survival indicating that marrow cells per se rather than other tissues unavoidably shielded are responsible for increased survival in bone shielding experiments. NSA 6-3894

877

PROGRESS REPORT FOR MARCH 1, 1951 - MARCH 1, 1952. Ernest C. Pollard. (Yale Univ.). March 28, 1952 120 p. (NYO-4004).

Research reports on biological action of ionizing radiation; ionizing particle evidence for molecular wt. of pneumococcus transforming principle; radiation sensitivity of catalase as function of temperature; determination of molecular wt. of insulin and alpha amylase; soft x-ray inactivation of bacteriophage and catalase; enzymes and enzyme inhibitors; x-ray effect on germinating spores of B. subtilis; low voltage electron bombardment of bacterial spores; inactivation of bovine albumin (bulk and monomolecular layers). NSA 6-3895

878

QUARTERLY PROGRESS AND WORK ACCOMPLISHMENT REPORT FOR QUARTER ENDING MARCH 31, 1952. (Tennessee Univ.). 30p. (ORO-68).

Research reports on fission product and Ca metabolism in animals, radiation effect on reproductive function in farm animals; behavior and fate of radioactive Ca after incorporation in soil; external radiation studies with large animals including burro (its lethal dose of whole-body Ta^{187} γ irradiation and its response to large external doses of whole-body gamma irradiation). NSA 6-3896.

879

THE HUMAN LEUKOCYTE COUNT FOLLOWING LOCALIZED X-RAY EXPOSURE. H. I. Kohn. *Intern. Physiol. Congress XIX*, 523 (1953).

880

GENES FROM RADIUM TREATMENT AFFECTING POLLEN-TUBE GROWTH IN DATURA. J. T. Buchholz and A. F. Blakeslee. *Genetics* 21, 731-51 (1936).

881

CHROMOSOME BEHAVIOR AND NUCLEAR DEVELOPMENT IN TRADESCANTIA. K. Sax. *Genetics* 22, 523-33 (1937).

882

MONOCYTIC LEUKOSIS FOLLOWING CHRONIC ROENTGEN-RADIUM INJURY. F. Leibetseder. *Med. Klin. (Munich)* 47, 46-8 (1952). (German).

A radiologist exposed for 20 yr to x rays and Ra developed acute leukoblastosis (monocytic leukemia of the Hittmair type), the illness beginning as panmyelopathy with megaloblastic anemia. Continual enlargement of monocytes was observed. Blood and bone-marrow picture is described. NSA 6-3901.

883

POT EXPERIMENTS WITH RADIOACTIVE FERTILIZER. H. Linser and W. Pelikan. *Bodenkultur* 5, 417-24 (1951). (German).

A possible beneficial effect of radiation on plant growth was sought by using fertilizer containing various amounts of Ra. No positive results were observed. NSA 6-3902.

884

KINETICS OF APPEARANCE OF NEUTROCYTES WITH KARYOSCHISIS AFTER WHOLE-BODY IRRADIATION WITH A SINGLE DOSE OF X RAYS. Jean-Francois Duplan. *Compt. rend.* 234, 2020-2 (1952). (French).

In adult male guinea pigs x irradiated with 10-1100 r, relative and absolute increases of polynuclear neutrophils exhibiting karyorrhexis of the nuclei were studied. Rate of increase was greater and maximum was obtained earlier the greater the x-ray dose. Minimum dose causing an increase was between 10 and 25 r for guinea pigs. NSA 6-3903.

885

EFFECTS OF X-RAY RADIATION ON PANCREATIC FUNCTION IN DOGS. Robert F. Rauch and K. Wilhelm Stenstrom. *Gastroenterology* 20, 595-603 (1952).

Volume of pancreatic secretion decreased temporarily in 5 dogs with pancreatic fistulas following irradiation, with subsequent secondary increase above normal in a few cases. In all cases 400 or 600 r had definite depressive effect on amylase, lipase and trypsin output, generally after 12-36 hr delay. Depression was limited to a few days. Second exposure gave similar findings, except for more persistent depression of trypsin. No histological changes were found in abdominal organs. NSA 6-3904.

886

ACTION OF WHOLE-BODY X IRRADIATION ON THE SYNTHESIS OF MUSCULAR GLYCOGEN IN THE GUINEA PIG. Lourau Marguerite and Odette Lartigue. *Compt. rend.* 234, 2022-4 (1952). (French).

Sublethal x irradiation did not modify glycogenesis in guinea pig muscles, provided the diet was normal. In fasted animals irradiation lowered muscle glycogen, but diminution was not so general nor so important as that observed under same conditions in liver. NSA 6-3905.

887

INFLUENCE OF X-RAYS ON ERYTHROCYTES. F. Krömele. *Strahlentherapie* 22, 608-652 (1926). (In German).

All powerful roentgen irradiations eventually have an injurious effect on the erythrocyte apparatus. The small and moderate doses increased regeneration. Effects of large doses are no longer reversible.

888
QUARTERLY PROGRESS REPORT NO. 3, APR. 15, 1952. (Air Force Radiation Lab., Univ. of Chicago). 99p. (NP-3881; Quarterly Progress Report No. 3).

Includes reports on phosphatase activity of irradiated ground squirrel tissues; blood cell carboxypeptidase inhibitors; concentration of mucoprotein from alkaline solutions of intestine; F_1 generation of hybrid mice from irradiated parents; x-ray destruction of epinephrine; quantitative K studies on x-irradiated isolated mammalian heart; and effect of incomplete abdominal shielding on mortality of x-irradiated rats. NSA 6-4352.

889
QUARTERLY PROGRESS REPORT FOOD IRRADIATION AND ASSOCIATED STUDIES. MAR. 1, 1952. (Columbia Univ.). 36p. (NYO-3318).

Progress report on modification of Co^{60} radiation source and its use; survival curve and sterilization dose for mixed microbiological population of raw whole milk; destruction of vitamins and phosphatase activity in whole and evaporated milk, and Vitamin A in butter; radiation effects on enzyme systems and fatty acids; catalase inactivation; degradation of riboflavin in defined systems. NSA 6-4353.

890
A FORMULATION OF THE INJURY, LIFE SPAN, DOSE RELATIONS FOR IONIZING RADIATIONS 1. APPLICATION TO THE MOUSE. H. A. Blair. (Atomic Energy Project, Univ. of Rochester). May 13, 1952. 37p. (UR-206).

Hypothesis that injury from penetrating radiation develops in proportion to dose rate and is repaired spontaneously at a rate proportional to its magnitude except for an irreparable portion proportional to total accumulated dose is tested by applying solutions of the equation $D\dot{I}/dt = A\gamma - \beta I - \alpha\gamma t$ in which I = injury γ dose rate, and A , β , and α are constants. NSA 6-4355.

891
MONTHLY PROGRESS REPORT. Hymer L. Friedell. (Atomic Energy Project, Western Reserve Univ.). Mar. 1952. 8p. (NYO-1645).

Red cells, tagged by incubation with Cr^{51} and injected into rats treated with 36 $\mu\text{C/g}$ of Au^{198} 7 weeks before, showed no hemolytic effect. Thiosorbitol, monothio-glycerol and glycerol give significant protection to mice against 600 r whole body radiation. Effect of pH on yeast survival after irradiation is reported. While 1000 r = LD_{100} for chick embryos, 500 r had no apparent effect. NSA 6-4357.

892
FURTHER EFFORTS TO INFLUENCE X-RAY CATARACT BY CHEMICAL AGENTS Ludwig von Sallmann. Trans. Am. Ophthalmol. Soc. 69, 391-418 (1951).

Intravenously administered cysteine gave marked protection against radiation damage to lens of rabbits when treatment preceded the exposure of the eye to 1500 r. Protective influence persisted for at least a year. Pre-treatment with glutathione and thiourea was less effective. Sodium thioglycollate, BAL, and other reducing agents had no protective effect. NSA 6-4358.

893
THE EFFECT OF IONIZING RADIATIONS ON SOME SYSTEMS OF BIOLOGICAL IMPORTANCE E. S. Guzman Barron. Chap. 12 in Symposium on Radiobiology. James J. Nickson, ed. New York, John Wiley and Sons, 1952. 25p. NSA 6-4359.

894

THE EFFECT OF RADIATION FROM RADIOACTIVE IODINE ON GASTRIC SECRETION. R. Armour Forse, J. B. R. McKendry, and D. R. Webster. Surgical Forum American College of Surgeons, 54-8 (1951). Nov. NSA 6-4360.

895

ANALYSIS OF MAMMALIAN RADIATION INJURY AND LETHALITY. Austin M. Brues and George A. Sacher. Chap. 23 in Symposium on Radiobiology. James J. Nickson, ed. New York, John Wiley and Sons, 1952 25p.

Radiation cumulant and impulse lethality functions for various mammals are presented. Linearity of response of physiological systems to radiation, aging problems, relation of chronic lethal pattern to life span, relation of dosage rate to effect, carcinogenic pattern and radiation-injury of mammals are discussed. NSA 6-4361.

896

THE SAFETY FACTOR IN ULTRASOFT ROENTGEN IRRADIATION Erik Ebbehøj. Acta Radiol. 37, 241-5 (1952).

Risk of radionecrosis is almost the same whether radiation produced at 130 kv, 60 kv or from contact x-ray tubes is used. Risk is reduced by using ultrasoft x rays. The softer the quality of the ultrasoft rays the smaller the risk of radionecrosis, the wider the range of therapeutic effect and the greater the safety factor. NSA 6-4362.

897

EFFECT OF THERMAL INJURY AND X-IRRADIATION ON SERUM IRON CONCENTRATION AND ON IRON CONTENTS OF LIVER, SPLEEN, AND KIDNEY OF RATS. Alfred Chanutin, Stephen Ludewig, and Elizabeth A. Lentz. Am. J. Physiol. 169, 203-7 (1952).

Mild thermal injury causes hypoferrremia and transient increases in iron contents of liver and spleen; additional injury by x rays causes transient hyperferrremia and prevents hypoferrremia. A marked, persistent increase in deposition of iron in spleen and liver is observed. NSA 6-4363.

898

RADIATION EFFECTS ON PLANTS GROWN IN SOIL TREATED WITH FERTILIZER CONTAINING P^{32} . James M. Blume. Soil Sci. 73, 299-303 (1952).

Barley and oats were grown in greenhouse soils that had received surface application of KH_2PO_4 solutions containing 0 to 12,500 $\mu\text{C/g}$ P^{32} . Differences in dry weight of tops, phosphorus content of tops, and percentage of phosphorus in tops derived from the fertilizer are analyzed statistically. NSA 6-4364.

899

MECHANISM OF LETHAL AND MUTAGENIC ACTION OF IONIZING RADIATION ON ASPERGILLUS TERREUS. 1. RELATIONSHIP OF RELATIVE BIOLOGICAL EFFICIENCY TO ION DENSITY. George E. Stapleton, Alexander Hollaender, and Frances L. Martin. J. Cellular Comp. Physiol. 39, Sup. 1, 87-100 (1952).

Densely ionizing α particles and protons were more efficient than x rays in inactivating spores of *A. terreus*. NSA 6-4365.

900

A COMPARISON OF SPONTANEOUS AND INDUCED MUTATIONS OF ESCHERICHIA COLI TO STREPTOMYCIN RESISTANCE AND DEPENDENCE. Howard B. Newcombe. J. Cellular Comp. Physiol. 39, 13-25 (1952). NSA 6-4366.

901

THE EFFECTS OF X-RAYS ON THE LIFE CYCLE AND MORPHOLOGY OF ASCARIDIA GALLI (Schrank, 1788). Bert B. Babero. Trans. Am. Microscop. Soc. 71, 114-19 (1952).

Development of *Ascaridia galli* eggs was retarded by 20,000 to 40,000 r, the dose preventing development lying somewhere in this range. Morphological abnormalities were observed in larvae from x-irradiated eggs. Abnormalities resulting from exposure to above dose were more varied and pronounced than those resulting from exposure to 5,000-10,000 r. NSA 6-4367.

902

THE EFFECT OF SUPPLEMENTARY FACTORS ON THE RADIATION-INDUCED FREQUENCY OF MUTATIONS IN *ASPERGILLUS TERREUS*. C. P. Swanson. J. Cellular Comp. Physiol. 39, 27-37 (1952).

Mutation frequencies induced by x rays and ultraviolet can be significantly modified by supplementary treatments. Since ultraviolet-induced mutation rate is altered by nitrogen mustard pretreatment, increased frequency of mutations is attributed to increased frequency of intra-rather than extra-genic (chromosomal) changes. This is less certain in case of modifications of x-ray-induced mutation rate. NSA 6-4368.

903

THE ANALYSIS OF THE EFFECT OF ROENTGEN RAYS ON THE EMBRYO AND FETAL TISSUE. A. A. Kronowski. Strahlentherapie 21, 12-30(1926). (In German).

Findings on the chicken embryo are discussed.

904

SOME ASPECTS OF THE BIOLOGICAL ACTION OF HIGH ENERGY RADIATIONS. Harvey M. Patt. Ann. Rev. Nuclear Sci. 1, 495, 524 (1952).

Mode of radiation's action, biological effectiveness of ionizing radiations, and effects on growth, enzymes, metabolism, blood, blood-forming tissues, immunity, infection, and general physiology are presented. NSA 6-4370.

905

GENETIC EFFECTS OF RADIATION. R. F. Kimball. Ann. Rev. Nuclear Sci. 1, 479-94 (1952).

Review presented of radiation genetics literature; essentially a survey of papers published in 1950. NSA 6-4371.

906

THE SURVIVAL OF IRRADIATED RATS DURING PROLONGED EXPOSURE TO ENVIRONMENTAL COLD. D. J. Kimeldorf and B. J. Newsom. (Naval Radiological Defense Lab.). May 22, 1952. 16p. (USNRDL-350). Am. J. Physiol. 171, 349-53 (1952).

Two groups of rats were irradiated simultaneously with 400-900 r of 250 kvp x rays. A portion of each group was maintained at 23° C (RH 65%) and the rest at 6° C (RH 65%) for 30 days post irradiation. This prolonged exposure to cold after lethal doses increased mortality. NSA 6-4372.

907

HEALTH PHYSICS DIVISION QUARTERLY PROGRESS REPORT FOR PERIOD ENDING JANUARY 20, 1952. (Oak Ridge National Lab.). June 12, 1952. 21p. (ORNL-1277).

Includes progress reports on seasonal differences in tissue radioactivity of certain aquatic animals. NSA 6-4373.

908

EVIDENCE FOR A HUMORAL FACTOR (OR FACTORS) CONCERNED IN RECOVERY FROM RADIATION INJURY: A REVIEW. Leon O. Jacobson. Cancer Research 12, 315-25 (1952).

Survival of animals exposed to single lethal dose of total-body x radiation can be increased by spleen-shielding, intraperitoneal implantation of splenic tissue or embryo suspension, injection of homologous bone marrow suspensions. Recovery may be due to humoral substance produced by living cells of the shielded, implanted or injected tissue. NSA 6-4375.

909

LEUKEMIA IN ATOM BOMB SURVIVORS. R. D. Lange, W. C. Moloney and T. Yamawaki. Blood 9, 574-85(1954).

A review of 75 established cases of leukemia in atomic bomb survivors in Hiroshima and Nagasaki reveals that the rate of occurrence of leukemia is greatly increased among survivors of a single massive dose of ionizing radiation among all age levels studied and in both sexes. The leukemias were predominantly myelogenous.

910

TEMPERATURE EFFECT ON IRRADIATION DAMAGE IN BACTERIOPHAGE. C. S. Bachofer. (Notre Dame Univ.). (nd). 2p. (AECU-2100). Proc. Indiana Acad. Sci. 61, 62 (1951).

Bacteriophage T1, specific for *E. coli*, strain B, was x-irradiated at temperatures from 77° to 310° K, in vacuo in chamber to prevent freezing, liquefaction of air, and interference of oxygen. Three series of experiments used: (1) phage in broth, lyophilized; (2) phage in broth, vacuum-dried; (3) phage in chemically defined medium, vacuum-dried. No inactivation due to temperature alone was observed. Inverse correlation was observed between radiation damage and temperature. NSA 6-4684.

911

DIRECT EFFECT OF X-RAYS ON BACTERIAL VIRUSES MODIFIED BY PHYSICAL STATE AND RELATED TO THE TARGET THEORY. C. S. Bachofer. (Notre Dame Univ.). (nd). 11p. (AECU-2101). Science 117, 280-2 (1953).

Author reports studies on effect of physical condition of dry bacteriophage particles on their resistance to x irradiation. Great differences were found in effectiveness of x rays on viruses dried by different methods but handled the same in other respects. Hypothesis is presented to explain difference of effectiveness of x rays on dried and lyophilized phage. Target theory of inactivation is discussed. NSA 6-4685.

912

PROTECTION OF BACTERIOPHAGE AGAINST X-RAYS BY HIGH CONCENTRATIONS OF A NEUTRAL SALT. C. S. Bachofer and M. Aelred Pottinger. (Notre Dame Univ.). (nd). 25p. (AECU-2101).

Protection of bacteriophage T1 against x rays was tested in presence of $(\text{NH}_4)_2\text{SO}_4$ concentrations ranging from 10^{-6} M to saturation (4.26 M). Survival in concentrations of 10^{-6} to 10^{-3} M did not differ significantly from that in distilled H_2O after irradiation; steep rise in survival was observed from 10^{-3} M to 10^{-1} M, with a leveling off as concentration approached saturation, giving over-all a two thousandfold increase. NSA 6-4686.

913

BIOLOGIC AND PHYSICAL ASPECT OF THE ACTION OF TWO RADIATIONS OF DIFFERENT SPECIFIC IONIZATION. Joanne W. Hollcroft and Egon Lorenz. (Argonne National Lab.). May 1952. 26p. (AECU-2109; UAC-580).

Authors compare the biological effects of x and α radiation on mice. No significant differences were seen in leukocyte count response, nor were effects of whole-body irradiation different (regression rate of a transplantable mouse lymphosarcoma was the same for the two). For corresponding energy dose, total-body response (measured by weight loss and recovery of testes) was also the same. NSA 6-4687.

914

CHRONIC EXTERNAL IRRADIATION AND NEUTRON RADIOBIOLOGY, p.14-42 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, NOVEMBER, DECEMBER, 1951, JANUARY, 1952. Austin M. Brues, ed. (Argonne National Lab.). (ANL-4745(p.14-42)).

Reports on: survival of irradiated mice given bone-marrow injections; survival patterns in tissue culture after 250-2000 r; effect of spleen protection on x-ray induced lymphoid tumors in mice; survival of mice with circulation to shielded spleen clamped off during ex-

posure; pre-treatment of mice with cysteine and post-irradiation spleen implantation (survival increased). NSA 6-4689.

915
PHYSIOLOGY, RADIUM TOXICOLOGY, AND EXPERIMENTAL PATHOLOGY. p.43-52 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, NOVEMBER, DECEMBER, 1951, JANUARY, 1952. Austin M. Brues, ed. (Argonne National Lab.). (ANL-4745(p.43-52)).

Report on radiation protection in mammals by cysteine; disappearance rate of RaSO_4 dust from human lung; study of C^{14} toxicity (2.5 $\mu\text{c/g}$ for rats and 20 $\mu\text{c/g}$ for mice had little effect on longevity and moribundity). NSA 6-4690.

916
EXPERIMENTAL SURGERY, CLINICAL INVESTIGATION, AND RADIOCHEMISTRY p.53-70 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, NOVEMBER, DECEMBER, 1951, JANUARY, 1952. Austin M. Brues, ed. (Argonne National Lab.). (ANL-4745(p.53-70)).

Includes reports on average ratios of pre- and post-irradiation amino acid N values in dogs; dextran metabolism; effective use of sodium salicylate for Be poisoning in mice. NSA 6-4691.

917
SPECIAL PROBLEMS, PLANT PHYSIOLOGY, MICROBIOLOGY, AND BIOCHEMISTRY. p.73-93 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, NOVEMBER, DECEMBER, 1951, JANUARY, 1952. Austin M. Brues, ed. (Argonne National Lab.). (ANL-4745(p.73-93)).

Progress is reported in studies of the effects of x rays and nitrogen mustard on growth of the ciliate, *Tetrahymena geleii*, changes in blood plasma of the chick following x irradiation, the effects of x irradiation on enzymogenesis in postdiapause grasshopper embryos, the purification of labeled indoleacetic acid, and the radiosensitivity of auxin biosynthesis in bean plants. In a study of x radiation toxicity in the chicken, the mature chicken showed no response to variation of x-radiation dose rate similar to that reported in newly-hatched birds. Survival data for chickens of different ages given 1000 r of x irradiation are presented in tabular form. Effects of photoperiod and temperature on the movement of the flowering stimulus, and light-dark relationships of *Xanthium* are summarized and the effect of photoperiod on floral and fruit development in the red kidney bean are discussed. Data on biological effects of exposure of *Paramecium aurelia* to a nitrogen mustard compound revealed that, over the period of a year during which the experiments were performed, at equivalent doses death after autogamy increased and suppression of division decreased, while the death rate before cell division remained about the same. An investigation of the mechanism of inactivation of yeast alcohol dehydrogenase by x irradiation indicates the -SH groups are oxidized by the OH and O_2H radicals produced after irradiation of H_2O . NSA 6-4692.

918
MONTHLY PROGRESS REPORT APRIL, 1952. Hymer L. Friedell. (Atomic Energy Project, Western Reserve Univ.). 6p. (NYO-1646).

Includes reports on thirty-day mortality of splenectomized rats exposed to 655 r of x rays = 45% (controls = 35%) indicating (1) widely different sensitivity of rats toward bartonellosis, and (2) radiation can reduce immunity of splenectomized rat to *Bartonella muris*; effect of sub-total hepatectomy on sensitivity of rat to colloidal Au^{198} ; study of N metabolism in rats given lethal dose of whole-body x rays; levels of irradiation best for study of inhibition of nucleic acid synthesis in chick embryos are 700-800 r and LD_{50} dose. NSA 6-4694.

919
PROTECTION OF THE X-IRRADIATED DOG WITH EXTERNAL ABDOMINAL SHIELDING, AND PRELIMINARY REPORT ON SOME CLINICAL FEATURES OF THE RADIATION SYNDROME COMPLICATED BY INDUCED INFECTION. R. W. Miller and M. P. Coulter p.31-47 OF QUARTERLY TECHNICAL REPORT, JANUARY 1, 1952 THRU MARCH 31, 1952. Henry A. Blair, ed. (Atomic Energy Project, Univ. of Rochester). May 14, 1952 17p. (UR-205(p.31-47)). NSA 6-4698.

920
STUDIES RELATIVE TO THE PHAGOCYTIC ACTIVITY OF LEUKOCYTES IN IRRADIATED DOGS, AND THE EFFECT OF RUTIN ON THE X-IRRADIATED DOG. M. Ingram and M. Adams. p 48-59 OF QUARTERLY TECHNICAL REPORT, JANUARY 1, 1952 THRU MARCH 31, 1952. Henry A. Blair, ed. (Atomic Energy Project, Univ. of Rochester). May 14, 1952. (UR-205(p.48-59)).

Decrease in phagocytic activity of controls (irradiated) not seen in Pyromen-treated dogs Activity returns to normal prior to start of hematopoietic recovery Rutin therapy gave no beneficial effect against x ray mortality in dogs. NSA 6-4699.

921
SERUM AND URINARY FIBRINOLYTIC ACTIVITY RELATED TO THE HEMORRHAGIC DIATHESIS IN IRRADIATED DOGS. J. Colgan, E. Gates, and L. L. Miller. (Atomic Energy Project, Univ. of Rochester). June 2, 1952. 26p. (UR-210). J. Exptl. Med. 95, 531-42 (1952).

Dogs dying of pulmonary hemorrhage showed precipitate rise in fibrinolytic activity in urine and serum 4-5 days before death. Fibrinolytic activity in surviving dogs approached control levels on the 24th day post irradiation. NSA 6-4701.

922
EFFECT OF BETA RAYS ON THE SKIN AS A FUNCTION OF THE ENERGY, INTENSITY AND DURATION OF RADIATION. I. PHYSICAL CONSIDERATIONS. PREPARATION AND CALIBRATION OF BETA-EMITTING PLAQUES. F. W. Henriques, Jr. Lab. Invest. 1, 153-66 (1952).

Isotopes used for investigation S^{35} (0.17 Mev), Co^{60} (0.31 Mev), Cs^{137} (0.55 Mev), Y^{91} (1.53 Mev) and Sr-Y^{90} (0.61 and 2.2 Mev). Radiation dosage of surface of skin and percentile reduction in dosage as β particles penetrated underlying tissue are computed for each isotope. NSA 6-4702.

923
EFFECT OF BETA RAYS ON THE SKIN AS A FUNCTION OF THE ENERGY, INTENSITY AND DURATION OF RADIATION. II. ANIMAL EXPERIMENTS A E. Moritz and F. W. Henriques, Jr. Lab. Invest. 1, 167-85 (1952)

Study of effects of β emitting plaques on porcine skin. NSA 6-4703.

924
THE INCORPORATION OF METHIONINE S^{35} INTO THE PROTEINS OF JENSEN RAT SARCOMA CELLS AFTER IRRADIATION OF THE TUMOUR Barbara E. Holmes and Lorna K. Mee. Brit. J. Radiology 25, 273-8 (1952)

Uptake of methionine S^{35} proteins is not affected in any regular manner by 2000 r x-ray dose. Effect of irradiation on protein formation does not correspond to its action on nucleic acid synthesis, as this dose causes 50% inhibition of the latter. NSA 6-4704.

925
REDUCTION OF THE X-RAY SENSITIVITY OF *ESCHERICHIA COLI* BY SODIUM HYDROSULFITE AND CERTAIN OTHER INORGANIC COMPOUNDS. William T. Burnett, Jr., M. Laurance Morse, Arthur W. Burke, Jr., and Alexander Hollaender. J. Bact. 63, 591-5 (1952).

Protection of *E. coli*, strain B/r, against radiation by $\text{Na}_2\text{S}_2\text{O}_4$ is due to removal of dissolved oxygen. Other in-

organic sulfur compounds with ability to remove oxygen from buffer solutions also increase survival of x-irradiated bacterial cells in suspensions. NSA 6-4705

926

EFFECTS OF WHOLE BODY EXPOSURE TO IRRADIATION UPON SUBSEQUENT FERTILITY OF MALE RABBITS. R. L. Murphree, W. M. Whitaker, J. L. Wilding, and J. H. Rust. *Science* 115, 709-11 (1952).

Deleterious effects on prenatal viability of off-spring occur when male parent received relatively low levels of exposure (100, 200, or 300 r). Extreme caution is suggested in voluntary exposure of humans to radiation of this order of magnitude until further experimental evidence is available. NSA 6-4706.

927

STRAIN SPECIFICITY OF THE THERAPEUTIC EFFECT OF SPLENIC TRANSPLANTS IN IRRADIATED MICE.

John B. Storer. (Los Alamos Scientific Lab.). (nd). 15p. (AECU-2095).

Donor tissues taken from (1) same strain, (2) unrelated strains, (3) rats and guinea pigs and transplanted into irradiated mice of 2 inbred and non-inbred strain. Implantation of adult spleens was effective only when donor belonged to same inbred strain as recipient. Adult spleens from (1) non-inbred, (2), or (3) were ineffective in reducing mortality. Marrow transplants were ineffective in reducing mortality in all animals tested. NSA 6-4709.

928

LACK OF EFFECT OF URINARY EXTRACTS FROM IRRADIATED SPLEEN-SHIELDED RATS ON SURVIVAL OF IRRADIATED MICE. J. B. Storer and J. E. Furchner. (Los Alamos Scientific Lab.). (nd). 8p. (AECU-2098).

Extracts prepared from urine of totally-irradiated and irradiated spleen-shielded rats, and injected into irradiated mice, did not increase survival. If a hormone is elaborated by the shielded spleen of irradiated rats it is either not excreted in urine or not extractable by this method. NSA 6-4710.

929

RELATIVE EFFECTS OF ALPHA, BETA, GAMMA, AND NEUTRON RADIATION. THE SIGNIFICANCE OF THESE DIFFERENCES IN RADIATION THERAPY. William F. Bale. (Atomic Energy Project, Univ. of Rochester). May 28, 1952. 21p. (UR-209).

Special attention paid to techniques based on localization of boron in tumor tissue and use of slow neutron beam to radiate selectively such tissue by means of protons produced by neutron-boron interaction. Use of tissue specific antibodies is suggested for concentrating boron in neoplastic tissues. NSA 6-4713.

930

WEIGHT CHANGES AND WATER CONSUMPTION OF RATS EXPOSED TO WHOLE BODY X-IRRADIATION. L. F. Nims and E. Sutton. (Brookhaven National Lab.). (nd). 14p. (BNL-1190). *Am. J. Physiol.* 171, 17-21 (1952).

Weight changes and H₂O consumption of rats after whole-body x irradiation were reexamined to see if they could serve as indices for biological dosimetry. Study concluded that x rays do not greatly alter over-all metabolism of animal or degree of tissue hydration. Weight loss of irradiated rats is proportional to dose received. Time required to regain pre-irradiation weight in 200 g rats is linear function of dose up to 600 r. NSA 6-5010.

931

THE USE OF RADIOCOBALT AS A SOURCE OF GAMMA RAYS AND SOME EFFECTS OF CHRONIC IRRADIATION ON GROWING PLANTS. Arnold H. Sparrow and W. Ralph Singleton. (Brookhaven National Lab.). (nd). 44p. (BNL-1188). *Am. Naturalist* 87, 29-48 (1953).

By placing plants in concentric circles around sources of 16-200 c at various distances, effects of a wide range of radiation intensities could be studied. Dose varied

from less than 0.1 r/day to 2000 r/day. Tolerance of different species found to vary widely. Preliminary tolerances given for 19 species. NSA 6-5009.

932

THE OCCURRENCE OF LYMPHOCYTES WITH BILOBED NUCLEI IN CYCLOTRON PERSONNEL. M. Ingram, M. Adams, L. Coonan, J. Jespersen, G. Nielson, D. Platt, and G. Yettewich. (Atomic Energy Project, Univ. of Rochester). June 16, 1952. 11p. (UR-211). *Science* 116, 706-8 (1952).

Increased incidence of lymphocytes with bilobed nuclei in peripheral blood of cyclotron workers occurred in group as a whole during first few months of cyclotron operation. After completion of an earth and concrete dike between cyclotron and cyclotron laboratory building, incidence of abnormal cells returned to approximately level of control group. NSA 6-5011.

933

EFFECT OF CASTRATION ON THYROID REACTIONS FOLLOWING WHOLE-BODY IRRADIATION OF THE ORGANISM. H. Betz. *Compt. rend. soc. biol.* 146, 325-7 (1952). (French).

Male and female rats were castrated and 5 or 15 days later were exposed to whole-body irradiation with 500 r of 250 kv x rays. Five or 15 days post irradiation, the thyroids were removed and examined. Without regard to sex or to time separating castration and irradiation, thyroids were found to be inactive. Hypothyroid state of rats receiving 800 r whole-body exposure appears not to be due solely to castration effect of irradiation. NSA 6-5012.

934

EFFECT OF SURGICAL AND CHEMICAL THYROIDECTOMY ON HEMATOPOIETIC REGENERATION IN THE IRRADIATED RAT. H. Betz. *Compt. rend. soc. biol.* 146, 318-20 (1952). (French).

Surgical thyroidectomy on rats 6 days prior to 500 r whole-body x irradiation did not change regeneration picture in soft bone and spleen. Extreme inhibition was noted in rats receiving thiourea (1% in feed) for 15 days prior to irradiation and during 6 or 16 days before histological examination. Direct effect on hematopoietic organs or perturbation of endocrine glands other than thyroid hypothesized to explain thiourea's action. NSA 6-5013.

935

STUDY OF THYROID MODIFICATION AFTER WHOLE-BODY IRRADIATION OF THE ORGANISM. H. Betz. *Compt. rend. soc. biol.* 146, 315-18 (1952). (French).

Thyroids of rats given sublethal dose (500 r, 250 kv x rays) and others given a lethal dose (800 r) are described. Hyperactivity in first case contrasted with hypoactivity in the second. Of rats irradiated with 6-11 LD₅₀ dose (650 r) those dying exhibited thyroid hypoactivity, those surviving, hyperactivity. Hypothesis under lethal irradiation, all secretory potential of pituitary is used up in liberating corticotrophic principle (ACTH) to detriment of thyrotrophic hormone. NSA 6-5014.

936

EFFECTS OF X RADIATION ON THE ORIGIN OF MALFORMATIONS IN HUMAN FETUSES. J. Pitter and J. Svejda. *Ophthalmologica* 123, 386-93 (1952). (German).

Case described of 2-year-old girl whose mother was examined with x rays in 4th, 5th, and 6th months of pregnancy for diagnostic purposes. Formation of various teratogenic peculiarities, microphthalmus, microcornea, syndactyly, brachydactyly, strabismus, hypermetropia and amelogenesis and odontogenesis imperfecta, occurred. General account of malformation development and similar cases quoted. NSA 6-5015.

937

ROLE OF THYMONUCLEIC ACID IN THERAPY OF RADIATION LEUKOPENIAS. René Saracino. *Semaine med.* (Paris) 28, 411-15 (1952). (French).

Injection of a sodium salt of thymonucleic acid during x-ray therapy of malign tumors avoids or considerably reduces leukopenia, and as a consequence permits uninterrupted local or general irradiation. Same considerations hold for teletherapy and radioisotope application. It appears possible to unite in a single syndrome appearance of leukopenia and radioresistance. NSA 6-5016.

938

X-RAY-INDUCED MUTATIONS IN MICE. W. L. Russell. Cold Spring Harbor Symposia Quant. Biol. 16, 327-36 (1951).

To obtain information useful in estimating genetic hazards of ionizing radiation in man, wild-type mice exposed to single x-ray dose were mated to stock homozygous for 7 autosomal recessive visible genes. Comparison with similar data from *Drosophila* shows a higher induced mutation rate in the mouse, indicating that estimates of human hazards based on *Drosophila* mutation rates may be too low. NSA 6-5017.

939

STUDIES ON THE MECHANISM OF REVERSION IN BIOCHEMICAL MUTANTS OF *NEUROSPORA CRASSA*. Norman H. Giles, Jr. Cold Spring Harbor Symposia Quant. Biol. 16, 283-313 (1951). (cf. NSA 1-229).

Initial comparative biochemical and genetic tests, experiments on x-ray-induced reverse-mutations, results of studies on spontaneous and induced reverse-mutability and studies of crossing-over between certain alleles of mutants carrying genetic markers on opposite sides of an inositolless locus reported for various nutritional mutants of *Neurospora crassa*. NSA 6-5018.

940

EFFECT OF DIETARY PROTEIN AND METHIONINE ON THE X-IRRADIATED RAT. Willie W. Smith, Isabelle B. Ackermann, and I. M. Alderman. Am. J. Physiol. 169, 491-98 (1952).

Rats kept on pre- and post-irradiation diets with 6% casein had slightly higher mortality after a 550 r dose than rats on diets with 18 and 35%. Reducing casein after exposure did not significantly alter 40-day mortality. Increasing casein to 60% gave somewhat reduced mortality but the difference was not statistically significant. Addition of methionine and cysteine to low casein diets did not affect mortality. Slight hematopoietic effect and moderate respiratory effect described. NSA 6-5019.

941

EFFECT OF EARLY CASTRATION AND OF X IRRADIATION ON THE DIFFERENTIATION OF SECONDARY SEXUAL CHARACTERISTICS IN XIPHOPORES. Jean Vivien. Compt. rend. 234, 2394-5 (1952). (cf. NSA 5-2339). (French).

Permanent sterilization of prepuberal xiphophores (king crab) was accomplished with 6000-8000 r of x rays. Ensuing sexual differentiation was slightly retarded but normal in both sexes. Comparison with effect of surgical castration and treatment with crude extracts of normal or sterile gonads proves that development of secondary sexual characteristics is controlled by interstitial gonad tissues. NSA 6-5020.

942

REFRACTORY ANEMIA OCCURRING IN SURVIVORS OF THE ATOMIC BOMBING IN NAGASAKI, JAPAN. R. D. Lange, S. W. Wright, M. Tomonaga, H. Kurasaki, S. Matsuo, and H. Matsunaga. Blood 10, 312-24 (1955).

Histories including autopsy findings are presented for six Nagasaki atomic bomb survivors who developed refractory anemia four to seven years after the bombing. Four of the six were exposed within a radius of 1500 meters from the hypocenter; two within 3800 meters.

943

EFFECT OF OXYGEN TENSION AND CERTAIN CHEM-

ICALS ON THE X-RAY SENSITIVITY OF MUTATION PRODUCTION AND SURVIVAL. Alexander Hollaender, W. K. Baker, and E. H. Anderson. Cold Spring Harbor Symposia Quant. Biol. 16, 315-26 (1951).

Effect of O₂ tension on x ray sensitivity is reviewed, as measured by lethal effects, chromosome changes and mutations produced in *E. coli*, *Drosophila* and *Tradescantia*. Compounds having protective effect against radiation damage strong reducing compounds, especially Na₂S₂O₄, glycerin, propylene glycol, triethylene glycol and alcohols (methanol, ethanol and propanol); carboxylic acids and sulfhydryl-containing compounds. NSA 6-5025.

944

EXPERIMENTAL STUDY OF ACUTE RADIATION SICKNESS IN THE DOG. Marqués, Puget, Bru, and Carriere. Rev. méd. vét. (new series) 15, 1-16 (1952). (French).

Symptomatology, blood picture, hemorrhagic syndrome and digestive disturbances of radiation sickness were induced in dogs of 6-15 kg weight and 1-10 year age by whole-body exposure to 450-500 r of x radiation NSA 6-5028.

945

THE USE OF SMALL LABORATORY ANIMALS IN MEDICAL RADIATION BIOLOGY. PART 1. APPLICATION OF A 200 K.V.P. X-RAY THERAPY UNIT TO LETHAL DOSE STUDIES. Friedrich Ellinger, Jasper E. Morgan, and Francis W. Chambers, Jr. (Naval Medical Research Inst., Bethesda). Apr. 30, 1952. 35p. (NP-4120; U23980). NSA 7-16.

946

QUARTERLY PROGRESS REPORT, APRIL, MAY, JUNE 1952. (Atomic Energy Project, Western Reserve Univ.). (nd). 5p. (NYO-1647).

Includes reports on effectiveness of LD₅₀ dose (rats) administered on 11th or 18th day following treatment with 0.2 mgm/kg of nitrogen mustard; a review of certain data indicating that spleen plays much more prominent role in survival of irradiated mice than of irradiated rats. NSA 7-17.

947

BIOLOGICAL STUDIES OF RADIATION EFFECTS, p.40-80 OF MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT, APRIL, MAY, AND JUNE, 1952. (Radiation Lab., Univ. of Calif.). Aug. 21, 1952. 41p. (UCRL-1922(p.40-80)).

Progress reports on studies relative to radiosensitivity of diploid and haploid *S. cerevisiae* under various experimental conditions. NSA 7-20.

948

HISTOPATHOLOGY OF ALPHA RADIATION FROM INTERNALLY ADMINISTERED POLONIUM. PART I. George W. Casarett. (Atomic Energy Project, Univ. of Rochester). Aug. 25, 1952. 267p. (UR-201(pt.I)). NSA 7-21.

949

HISTOPATHOLOGY OF ALPHA RADIATION FROM INTERNALLY ADMINISTERED POLONIUM. (PART III). George W. Casarett. (Atomic Energy Project, Univ. of Rochester). Aug. 25, 1952. 563p. (UR-201(pt.II)). NSA 7-22.

950

X-IRRADIATION INJURY AND REPAIR IN THE GERMINAL EPITHELIUM OF MALE RATS. I. INJURY AND REPAIR IN ADULT RATS. Samuel Lelus Shaver. (Rochester Univ. N. Y. Atomic Energy Project). Sept. 23, 1952. 47p. (UR-218).

Histological studies on various phases of injury and repair following total body exposure to 500 r x-ray radiation are reported. (adult rats). NSA 7-23.

951

X-IRRADIATION INJURY AND REPAIR IN THE GERMIN-

AL EPITHELIUM OF MALE RATS. II. INJURY AND REPAIR IN IMMATURE RATS. Samuel Lelus Shaver. (Atomic Energy Project, Univ. of Rochester). Sept. 23, 1952. 20p. (UR-219). *Am. J. Anat.* **92**, 433-49 (1953).

Histological studies of injury and repair following total body exposure to 500 r x-ray radiation (immature rats), are reported. Author emphasizes differences between changes in testes of mature and immature rats. NSA 7-24.

952
THE DIRECT EFFECTS OF RADIATION ON ERYTHROCYTES. C. W. Sheppard and Marian Stewart. *J. Cellular Comp. Physiol.* **39**, 189-215 (1952).

Preliminary studies on ability of irradiated erythrocytes to maintain concentration gradients of cations between the cell contents and surrounding medium are described. *In vitro* studies of K leakage (using K^{42} tracer technique in nonirradiated systems and in irradiated human RBC) are described. Loss of K selectivity indicative of erythrocyte radiation damage. NSA 7-25.

953
LOW-VOLTAGE ELECTRON BOMBARDMENT OF BACTERIAL SPORES. Marguerite Davis and Franklin Hutchinson. *Arch. Biochem. and Biophys.* **39**, 459-61 (1952).

Preliminary data from a study of survival of *B. subtilis* spores as a function of electron dose at various voltages are reported. NSA 7-26.

954
A STUDY OF THE SHORT-TIME EFFECTS ON THE MOUSE OVARY OF INTERNAL IRRADIATION WITH P^{32} . Erik Odeblad. *Acta Radiol.* **38**, 33-40 (1952).

Adult mice were given 0.1, 0.3, 1.0, 3, 10 and 30 μC^{32} /gm and killed after 48 or 96 hours. In ovary, granulosa tissue was most radiosensitive with changes appearing at 3 μC /gm. Interstitial tissue was least radiosensitive. NSA 7-27.

955
THE BIOLOGICAL ACTION OF X-RAYS AND FAST NEUTRONS ON BARLEY AND WHEAT. James MacKey. *Arkiv Botanik* **1**, 545-56 (1952).

Dry dormant seeds of barley and wheat and pre-soaked seed of high metabolic activity were irradiated with x rays and fast neutrons and followed through two generations. From genetic standpoint, neutrons were more effective than x rays. Author discusses interpretation of curves relating retardation of sprouting, survival, plant fertility and certain earlier observations. NSA 7-28.

956
MITOTIC RHYTHM IN CARCINOMAS OF HUMAN SKIN UNDER THE INFLUENCE OF CHAOL RADIATION. II. Roderich Helmke. *Strahlentherapie* **88**, 123-8 (1952). (German).

Author studied effect of daily doses of 300 or 500 r of Chaol radiation on mitotic rhythms of 10 prickle-cell and eight basal-cell carcinomas of human skin; noted gradual drop in number of mitotic figures in nearly all carcinomas. In some cases, one or two delayed waves appeared on graphs of mitosis numbers. NSA 7-32.

957
EFFECT OF ROENTGEN RAYS DURING VARIOUS PHASES OF THE HAIR CYCLES OF THE ALBINO RAT. John R. Geary, Jr. *Am. J. Anat.* **91**, 51-106 (1952).

Effects of low-voltage x rays on hair follicle of Sherman strain albino rat during various phases of hair cycle are discussed. 72 references. NSA 7-33.

958
THE LIMITS OF THE TARGET THEORY OF THE BIOLOGICAL ACTION OF RADIATION. B. Rajewsky. *Brit. J. Radiology* **25**, 550-52 (1952). NSA 7-34.

959
X-RAY ULCERS OF THE UPPER INTESTINAL SEGMENTS FOLLOWING IRRADIATION OF CERVICAL CARCINOMAS. W. Hinz and W. Mohnke. *Zentr. Gynäkol.* **74**, 734-48 (1952). (German).

Describes x-ray ulcers of upper intestine observed at autopsy of patient who had undergone extensive x-ray and Ra therapy for cancer of the cervix. NSA 7-35.

960
MAXILLARY SINUS CARCINOMA CAUSED BY RADIUM-CONTAINING CONTRAST AGENTS. O. Hofer. *Deut. Zahnärztl. Z.* **7**, 736-41 (1952). (German).

Complete retention of thorotrast and development of slightly cornified epithelioma were found in right maxillary sinus of 64 year old patient who had had the thorotrast injected 10 years previously for radiographic contrast studies. NSA 7-36.

961
THE EFFECTS OF BETA RAYS ON THE CONDUCTED ACTION POTENTIALS OF NERVES. Edgar Lionel Gasteiger, Jr. PhD. Thesis, Univ. of Minnesota (1952). NSA 7-38.

962
TETRAZOLIUM SALTS AS PROTECTORS AGAINST LETHAL EFFECTS OF X-RAYS. N. Puckett, S. Bellack, and A. T. Krebs. (Army Medical Research Lab., Fort Knox). Mar. 5, 1952. 9p. (AMRL-77). *Science* **117**, 155-6 (1953).

Administration of a tetrazolium compound before irradiation produced a definite protection against lethal effects of x rays in mice. NSA 7-39.

963
INABILITY OF FLAVONOIDS TO MODIFY ROENTGEN RAY IRRADIATION MORTALITY IN GUINEA PIGS. Thomas J. Haley and Samuel Mann. (Atomic Energy Project, Univ. of Calif., Los Angeles). Sept. 22, 1952. 9p. (UCLA-224). *Proc. Soc. Exptl. Biol. Med.* **81**, 665-7 (1952).

Female guinea pigs given pre- or post-irradiation injections of rutin (250 mg/kg), hesperidin (25 mg/kg), hesperidin methyl chalcone (100 mg/kg) or naringin (75 mg/kg) were not protected against effects of 200 r acute whole body x irradiation. Post-exposure administration of the flavonoids increased mortality rate, as did pre-exposure administration of hesperidin and naringin. NSA 7-40.

964
BONE MARROW CONDITIONS IN RHEUMATIC PATIENTS AND THEIR INFLUENCING BY THERMAL CAVITY TREATMENT IN THE BÖCKSTEIN AT BADGASTEIN. K. Inama. *Wien. Z. inn. Med.* **33**, 241-5 (1952). (German).

Treatment of rheumatic patients in the Bockstein caverns consists in resting for 1 hour at 40.8 to 41.6° C (95-98% RH) and 4×10^{-3} c/1 Rn concentration. Sternal marrow studies on 8 patients before and after 10 or more treatments indicated stimulation of marrow, especially erythroid hyperplasia and moderate lymphocyte increase at expense of granulocytes. Also noted regular appearance of basophil cells. NSA 7-49.

965
ATTEMPTS AT TREATMENT OF ACUTE LEUKOSIS BY REINJECTION OF THE PATIENT'S OWN BLOOD IRRADIATED WITH X RAYS. P. Croizat, L. Revol, J. Papillon, Pinet, and Bussy. *Sang. Le* **23**, 537-39 (1952). (French).

Attempts to treat acute leukemia by collection of 100-150 cc of blood in 10-15% Na citrate, x irradiation with 100-200 r, then reinjection revealed: 1) too large blood sample or too intense radiation may aggravate the disease, 2) correct dose may result in some amelioration, usually

limited to certain symptoms such as bone pain, chloromatous tumors and leukosis. NSA 7-50.

966

THE LATE EFFECTS OF INTERNALLY-DEPOSITED RADIOACTIVE MATERIALS IN MAN. Joseph C. Aub, Robley D. Evans, Louis H. Hempelmann, and Harrison S. Martland. *Medicine* 21, 221-329 (1952).

Case histories are given for 30 persons containing internally deposited Ra alone or with mesothorium; most exposures at least 25 years duration. Biological and physical properties of Ra and mesothorium are reviewed. NSA 7-52.

967

INVESTIGATIONS INTO THE PROBLEM OF RADIUM POISONING. VI. RESULTS ON ELIMINATION OF RADIOACTIVE SUBSTANCES FROM THE HUMAN BODY FOUND IN TWO RADIUM POISONING CASES. B. Rajewsky and H. Muth. *Strahlentherapie* 88, 261-75 (1952). (German).

Ra excretion in stool and urine were followed during first week after exposure in two cases of Ra poisoning, one due to inhalation of products of Ra-Be neutron source explosion, the other to intravenous injection of Ra solution in suicide attempt. NSA 7-53.

968

LETHAL EFFECTS ON MICE OF IRRADIATION IN THE ZOE PILE. Paul Bonet-Maury and André Ertaud. *Compt. rend.* 235, 828-30 (1952). (French).

Mean survival curve of mice exposed in Al cages in the interior of the Chatillon pile was determined, using 400 18-20 gm animals in lots of 10. Curve is contrasted with that for x and γ rays. Marked decrease in survival time was noted when animals were irradiated in Cd cages. NSA 7-383.

969

BRAIN METABOLISM IN THE EMBRYO, NEWBORN AND ADULT. THE EFFECTS OF CORTISONE, ASPHYXIA, RADIATION AND OTHER INHIBITORS. Samuel P. Hicks. (New England Deaconess Hospital, Boston and Harvard Cancer Commission and Harvard Medical School). (nd). 40p. (AECU-2292). *Arch. Pathol.* 55, 302-27 (1953). NSA 7-469

970

THE EFFECT OF X IRRADIATION ON THE METABOLISM OF PHOSPHORUS-CONTAINING COMPOUNDS IN MELANO-PLUS DIFFERENTIALIS EGGS. J. V. Passonneau. (Argonne National Lab.). Oct. 1952. 24p. (AECU-2304; UAC-663).

X-irradiation produces degradation and inhibits synthesis of nucleic acids in grasshopper eggs. Irradiated cell was unable to replace nucleic acids as they broke down, the inhibition of NA synthesis being most marked in postdiapause eggs. NSA 7-470.

971

CROSS-CIRCULATION EXPERIMENTS. PART A. RATE OF UTILIZATION OF CROSS CIRCULATED PLATELETS IN THE THROMBOPENIC CAT. p.104-15 OF BIOLOGICAL EFFECTS OF EXTERNAL RADIATION. (NNS VI-2). Henry A. Blair, ed. New York, McGraw-Hill Book Co., Inc. 1954. John S. Lawrence, and William N. Valentine.

Thrombopenic animals were cross-circulated by means of carotid-to-carotid anastomoses with normal animals. The highest platelet count was from a splenectomized animal. The platelet level was generally the same among normal cats. The average rate of platelet utilization was about 2500/cu/mm/hr. (from authors' summary).

972

RADIATION STERILIZATION: II. THE EFFECT OF HIGH ENERGY GAMMA RADIATION FROM KILOCURIE RADIO-ACTIVE SOURCES ON STEROID HORMONES. William Tarpley, Milton Yudie, Bernard Manowitz, Robert V.

Horrigan, and Jerome Weiss. (Brookhaven National Lab. and Schering Corp.). Aug. 1952. 32p. (BNL-1258).

Irradiation of cortisone acetate and pregnenolone acetate with 2-4 times the sterilization dose of γ radiation produced no detectable changes in the molecules. NSA 7-472.

973

SUPPRESSION OF GASTRIC ACIDITY BY RADIO KRYPTON. Winton Stienfield. (Brookhaven National Lab.). (nd). 4p. (BNL-1272). *Proc. Soc. Exptl. Biol. Med.* 81, 836-8 (1952).

Survey experiments on dogs utilizing A^{41} (used to inflate a balloon within the stomach) were followed by tests with Kr^{86} , preferred because it emits only β radiations. Changes in gastric pH and histological changes in stomach wall described. NSA 7-473.

974

RELATION OF X-IRRADIATION DOSAGE AND ELAPSED TIME TO THE DESTRUCTION OF HEMATOPOIETIC CELLS OF TADPOLES. Bennet M. Allen, Ole A. Schjeide, Mary J. Millard, and Ronald Piccirillo. (Atomic Energy Project, Univ. of Calif., Los Angeles). Oct. 27, 1952. 21p. (UCLA-232).

X rays in doses from 25 to 10,000 r produced destruction of hematopoietic cells of *Rana catesbiana*; degree of destruction varied with dose. Mitotic figures were seldom seen before 5th post-irradiation day following 250 to 750 r doses. Inhibition of mitosis was complete by 30th post-exposure day after 1000 r. NSA 7-475.

975

INDIRECT EFFECTS OF LOCALIZED DEUTERON IRRADIATION OF THE RAT. V. P. Bond, M. N. Swift, S. T. Taketa, G. P. Welch, and C. A. Tobias. (Naval Radiological Defense Lab.). Aug. 26, 1952. 22p. (USNRDL-366). *Am. J. Physiol.* 174, 259-63 (1953).

Doses of 3564 rep of 190 Mev deuterons applied selectively to head, liver, adrenals, intestine and hindquarters of intact, unanesthetized rats caused changes in weight of thymus, spleen and adrenals characteristic of pituitary--adrenal stimulation, the weight changes occurring only when the irradiation caused generalized stress. NSA 7-476.

976

SYNERGISTIC ACTION OF CORTISONE AND TOTAL-BODY IRRADIATION IN MICE. John H. Wentworth and John A. Billows. *Radiology* 59, 559-63 (1952). NSA 7-477.

977

APPLICATION OF SINGLE EXPOSURES OF SHORT DURATION AND GREAT INTENSITY FOR DYNAMIC INVESTIGATION OF RADIOBIOLOGICAL EFFECTS. G. A. Medvedeva, M. N. Meisell, and Ya. L. Shekhtman. *Zhur. Obshchei Biol.* 13, 243-5 (1952). (Russian).

Endomyces magnusii--(yeast) was x irradiated with 500,000 r or more at rate of 21,000 or 1400 r/min. Structural changes in nuclei, protoplasm and chondrosomes are described and their relation to target theory of radiation damage is discussed. NSA 7-478.

978

HISTOPATHOLOGICAL EFFECTS OF IMMEDIATE AND DELAYED RADIATION DEATH IN HAMSTERS PRODUCED BY TWO MILLION VOLT X-RAYS. I. THE LYMPHOCYTIC ORGANS: SPLEEN, LYMPH NODES, THYMUS AND BONE MARROW. Roberts Rugh, Barnet Levy, and Lottie Sapadin. *J. Morphol.* 91, 237-68 (1952).

Immediate histopathological effects observed in spleen, lymph nodes, thymus and bone marrow of hamsters following exposure to 1500 r of x radiation

are compared with effects observed in same tissues after continuous exposure to lethal dose of approximately 110,000 r. NSA 7-479.

979

PROTECTION OF THE SPLEEN IN RATS SUBMITTED TO A LETHAL DOSE OF X RAYS. M. Mandart and G. Lambert. *J. belge radiol.* 35, 337-48 (1952). (French). NSA 7-481.

980

OBSERVATIONS ON SERUM PROTHROMBIN CONVERSION ACCELERATOR IN RADIATION-INDUCED PANCYTOPENIA. George J. Jacobs, Eugene P. Cronkite and Sidney G. White. *Am. J. Physiol.* 170, 390-5 (1952).

Evolution of SPCA is impaired in irradiated dog but impairment is not due to deficiency of precursor. Prolonged clotting time during thrombocytopenia results in high residual prothrombin when blood is permitted to clot spontaneously and results in slow evolution of SPCA. Increased amounts of SPCA are evolved when prothrombin conversion is accelerated mechanically or chemically. NSA 7-483.

981

RESPONSE OF X-IRRADIATED MICE TO INTRAVENOUS INOCULATION OF INTESTINAL BACTERIA. M. H. Hatch, H. B. Chase, P. F. Fenton, W. Montagna, and J. W. Wilson. *Proc. Soc. Exptl. Biol. Med.* 80, 632-5 (1952).

Intravenous inoculation of mice with *Proteus* following moderate total body x irradiation caused increased mortality and shorter median death time compared with saline injected controls. Non-irradiated, *Proteus*-inoculated mice all survived. NSA 7-484.

982

EFFECT OF ALTITUDE-INDUCED POLYCYTHEMIA AND RETICULOCYTOSIS ON TOLERANCE OF RATS TO RADIATION. Willie W. Smith, Walter S. Cool, Falconer Smith, and Paul D. Altland. *Am. J. Physiol.* 170, 396-400 (1952).

Rats with altitude-induced polycythemia showed only relative anemia following irradiation but had lower tolerance than did ground-level controls. Rats with slight polycythemia and reticulocytosis also had lowered radiation tolerance. Authors conclude that decreased tolerance to radiation is associated with marrow hyperplasia at time of exposure. NSA 7-485.

983

THE EFFECT OF THYROIDECTOMY ON THE MORTALITY AND PERIPHERAL BLOOD CHANGES OF THE RAT SUBJECTED TO WHOLE BODY X-IRRADIATION. A. L. Kretchmar, H. J. Gombert, D. E. Weyant, and F. H. Bethell. *Endocrinology* 51, 59-65 (1952).

Irradiation leukopenia and anemia were found to be more severe and prolonged in thyroparvitic than in euthyroid animals, and probability of surviving total body irradiation was decreased by hypothyroidism. NSA 7-486.

984

THE MEDICAL EXAMINATION OF HIROSHIMA PATIENTS WITH RADIATION CATARACTS. Paul G. Fillmore. *Science* 116, 322-3 (1952).

This report is a summary of physical findings in a group of patients with radiation cataracts examined approximately 5 years after exposure within 1094 yards to radiation from A-bomb at Hiroshima. NSA 7-487.

985

THERAPEUTIC EFFECTS IN HYPERTHYROIDISM FROM REPEATED DIAGNOSTIC DOSES OF I^{131} . Sidney C. Werner, Howard B. Hamilton, and Martha R. Nemeth. *Radiology* 59, 720-28 (1952).

Remission of hyperthyroidism resulted in 6 of 24 patients given several tracer doses of I^{131} at weekly intervals, with total doses as low as 240 μ c. In 5 of 6 cases the remissions were not sustained beyond two or three months. Changes in laboratory studies were noted in 15 patients failing to develop remissions. NSA 7-488.

986

BIOLOGICAL ANALYSIS OF THE RADIATION DAMAGE TO DROSOPHILA EGGS DURING 180-KV X RADIATION AND ULTRAHARD 31-MEV RADIATION. Hedi Fritz-Neggli. *Naturwissenschaften* 39, 485-6 (1952). (German). NSA 7-489.

987

COURSE OF TESTICULAR INJURY FOLLOWING ACCIDENTAL EXPOSURE TO NUCLEAR RADIATIONS REPORT OF A CASE. William R. Oakes and Clarence C. Lushbaugh. *Radiology* 59, 737-43 (1952).

A case of testicular atrophy in man following accidental exposure to nuclear radiations is presented along with studies of regeneration based on sperm counts and testicular biopsies done over a 5 year period. Regeneration was found to be slow but similar to that studied in irradiated experimental animals. NSA 7-490.

988

X-IRRADIATION AND BACTEREMIA STUDIES ON ROENTGEN DEATH IN MICE. IV. J. W. Osborne, H. S. Bryan, H. Quastler, and H. E. Rhoades. *Am. J. Physiol.* 170, 414-17 (1952).

Authors report a study of bacteremia in partial-body irradiated mice in which no intestinal damage found. Authors conclude that irradiation of head and thorax is sufficient to elicit death due to bacteremia, the bacteria entering the blood stream via the oropharynx. NSA 7-491.

989

CHOLINESTERASE ACTIVITY, WEIGHT, WATER CONTENT AND PATHOLOGY OF SMALL INTESTINE OF RATS SUBJECTED TO X-RADIATION. Robert A. Conrad. *Am. J. Physiol.* 170, 418-25 (1952).

Cholinesterase activity of small intestine showed significant depression 15-20 hours after 500 r x irradiation, with maximum (60%) depression by 4th day. Recovery was slow, with near-normal values by 20-24 days. Gross appearance of small intestine paralleled cholinesterase activity more closely than did histological appearance. NSA 7-493.

990

FURTHER STUDIES ON POST-IRRADIATION PROTECTION BY SPLEEN HOMOGENATES AGE, STRAIN, AND SPECIES FACTORS. Leonard J. Cole and Marie E. Ellis. (Naval Radiological Defense Lab.). Sept. 15, 1952. 21p. (USNRDL-370).

Age, Strain and species modify protective effect of spleen homogenates against radiation damage. Spleen homogenates from 1 week old mice have greater protective activity than do homogenates from adult mice. Homogenate preventing death in 80% of adult mice exposed to 750 r does not protect 5 week old mice after similar exposure. NSA 7-494.

991

SKIN DECONTAMINATION A LITERATURE SEARCH. Frances Sachs. (Carbon and Carbide Chemicals Co. (Y-12)). Oct. 22, 1952. 26p. (Y-914). NSA 7-495.

992

RADIATION HAZARDS IN HIGH ALTITUDE AVIATION. Cornelius A. Tobias. *J. Aviation Med.* 23, 345-72 (1952).

Distribution of types of radiations in the cosmic radiation; dosimetry, and expected biological effects are reviewed. 70 references. NSA 7-496.

993

HEMATOLOGICAL INVESTIGATIONS ON THE ACTION OF CYSTEINE. W. Lorenz. *Strahlentherapie* 88, 190-7 (1952). (German).

Intracardial injection of cysteine prior to an 800 r total body exposure (x ray) increased survival rate of rats from 10 to 75%. Cysteine-treated survivors showed the same degree of hematological damage as untreated irradiated controls. After adrenalectomy, radiosensitivity increased and protective effect of cysteine decreased. NSA 7-497.

994

A RADIOCHEMICAL AND AUTOGRAPHIC STUDY OF THE DISTRIBUTION OF POLONIUM IN RATS AFTER INTRA-VEINOUS ADMINISTRATION. John C. Gallimore, Jr. (Atomic Energy Project, Univ. of Rochester and Oak Ridge Inst. of Nuclear Studies). Oct. 6, 1952. (UR-220).

Immediately after injection, Po in blood exists as (1) a system of Po aggregates, and (2) singly dispersed atoms or molecules. Aggregates (1) are removed from blood stream over an approximately 2 hour period, deposited in liver and spleen. Proximal convoluted tubules of kidney concentrated most of (2). NSA 7-511.

995

THE INACTIVATION OF BACTERIOPHAGE AND CATALASE BY SOFT X-RAYS. W. R. Guild. *Arch. Biochem. Biophys.* 40, 402-15 (1952).

An x ray tube was constructed so that bacteriophage and catalase samples could be irradiated inside the vacuum system. Voltage dependence of T-1 phage and catalase was studied in region of 1500 to 4100 V to find effect as K absorption edge of P was passed. Found that to within factor of 4, absorption of photon by P atom in nucleic acid is no more effective for T-1 inactivation than absorption in any other atom. NSA 7-546.

996

THE ULTRAVIOLET MICROSCOPY OF THE LIVING CELL'S RESPONSE TO LETHAL X-RADIATION. P. O'B. Montgomery and Shields Warren. (Cancer Research Inst., New England Deaconess Hospital, Boston). (nd). 9p. (AECU-2294). *Science* 117, 589-91 (1953).

Authors report of effects of 47,000 to 60,000 r of x radiation on Walker rat carcinoma 256 cells in tissue culture as recorded by Polaroid color-translating ultraviolet microscope. Marked and constant change was produced in irradiated cultures from 48 through 120 hours. NSA 7-715.

997

MODIFICATION, THROUGH THE USE OF SUPPLEMENTARY ENVIRONMENTAL FACTORS, OF THE FREQUENCY AND TYPES OF GENE AND CHROMOSOME CHANGES INDUCED BY X-RAYS, ULTRAVIOLET LIGHT, AND NITROGEN MUSTARD. W. D. McElroy and C. P. Swanson. (Johns Hopkins Univ.). Nov. 15, 1951. 9p. (AECU-2295).

Evidence is presented indicating that delayed effects of mutagenic agents on frequency and types of gene and chromosome changes are due to presence of metastable states formed in various parts of chromosome. NSA 7-716.

998

VARIATIONS IN THE FLORAL MORPHOLOGY OF NORMAL AND IRRADIATED PLANTS OF *TRADESCANTIA PALUDOSA*. James E. Gunkel, Ielene B. Morrow, Arnold H. Sparrow, and Eric Christensen. (Brookhaven National Lab.). (nd). 21p. (BNL-1285). *Bull. Torrey Botan. Club* 80, 445-8 (1953).

Cross aspects of flower development in both γ irradiated and non-irradiated plants of *Tradescantia paludosa* are described. NSA 7-717.

999

THE EFFECT OF IONIZING RADIATIONS UPON THE RESPIRATION AND OXIDASES OF THE POTATO TUBER. Alfred S. Sussman. (Michigan Univ. and Brookhaven National Lab.). (nd). 25p. (BNL-1299). *J. Cellular Comp. Physiol.* 42, 273-83 (1953).

CO₂ of potato tubers was increased up to 60% by γ irradiation over wide range of doses. CO₂ evolution also increased, reaching peak about 24 hours after peak of O₂ uptake. Cytochrome oxidase and tyrosinase activities were not affected by dosages used except that tyrosinase lost half its activity at 3,200,000 r.

1000

EFFECT OF DIET EXPOSED TO CAPACITRON IRRADIATION ON THE GROWTH AND FERTILITY OF THE ALBINO RAT. Esther DaCosta and Stanley Levenson. (Medical Nutrition Lab., Chicago). Dec. 14, 1951. 10p. (NP-4122; Report No. 89).

Growth was maintained in four generations of rats fed diet normally adequate but irradiated by high intensity β rays for 1×10^6 seconds. Fertility was somewhat impaired, especially in male. Mortality per litter markedly increased. NSA 7-719.

1001

PARTIAL-BODY IRRADIATION OF THE RAT WITH 190-MEV DEUTERONS. (Naval Radiological Defense Lab.). Aug. 26, 1952. 20p. (USNRDL-365).

Various anatomical regions (not more than 5% of total body) of intact, unanesthetized rat were exposed to 190 Mev deuteron beam. Etiology of the syndrome resulting from exposure of relatively small portions of abdomen are contrasted with that following irradiation of large portions or all of abdomen. NSA 7-720.

1002

EFFECTS OF TOTAL BODY X-RADIATION ON SALIVARY COMPONENTS OF DOGS. R. S. Leopold, J. L. Nemes, and M. G. Wheatcroft. *J. Dental Research* 31, 603-8 (1952). NSA 7-721.

1003

EFFECT OF RADIATION ON THE BLOOD. Margaret D. Stelling. *Radiography* 18, 221-31 (1952).

A review of changes in blood and blood forming tissues in patients undergoing radiation therapy. NSA 7-722.

1004

EFFECTS OF X IRRADIATION ON CONNECTIVE TISSUE BASOPHIL GRANULAR CELLS (MAST CELLS) OF HUMAN SKIN. Alessandro Novaro. *Radioterapie radiobiol. e fis. med.* 8, 69-72 (1952). (Italian).

Normal human skin exposed to 1500-3000 r of x rays, then fixed in alcohol and basic Pb acetate. Changes in mast cells described and illustrated. NSA 7-723.

1005

ON DISTANCE EFFECTS IN THE ANIMAL ORGANISM FOLLOWING LOCAL X IRRADIATION. H. Langendorff and W. Lorenz. *Strahlentherapie* 88, 177-89 (1952). (German).

Local x irradiation (3000 r over 1-3 cm) of pituitary, testicles or thigh produces changes in lipids and plasmas of suprarenal cortex, as well as variations of nuclear volumes and concomitant decrease of lymphocytes. NSA 7-724.

1006

THE COMPONENTS WITH LETHAL EFFECT ON MICE OF THE TOTAL RADIATION OF A URANIUM PILE. André Ertaud and Paul Bonét-Maury. *Compt. rend.* 235, 909-11 (1952). (French).

Calculations of various components of pile radiation leads to a value of lethal dose in good agreement with that evaluated biologically from mean survival of mice irradiated in Al or Cd cages. NSA 7-725.

1007

ULTRAFRACTIONATION. II. ADDITIONAL EXPERIMENTAL STUDIES OF THE BIOLOGICAL EFFECT OF AN INTERMITTENT X IRRADIATION. E. Witte and R. Sigmund. *Strahlentherapie* 88, 384-94 (1952). (German).

Authors report additional investigations on intermittent x irradiation of *Drosophila* eggs and pupae. If ultrafractionation effect exists for eggs it must appear at irradiation times shorter than 4×10^{-5} sec. Significance of results discussed. NSA 7-726.

1008

RADIOACTIVITY INDUCED IN TISSUES BY BETATRON RADIATION. G. Joyet. *Oncologia* 5, 1-12 (1952). (German).

Bremsstrahlung of 31 Mev betatron induces radioisotopes in tissues, most important being O^{15} , C^{11} , N^{13} , P^{30} , I^{128} , I^{126} , and those from irradiation of Ca. Specific induced activity at 100 cm from target with 20 min exposure (730 r) is about 0.1 mg/gram-element for C^{11} and N^{13} , 0.26 mc for O^{15} , 0.2 for P^{30} , and 0.006 mc for I^{128} . Dose due to artificial radioactivity is of order of 0.0005 of dose of direct radiation measured at maximum of transition curve. NSA 7-727.

1009

PROBLEM OF THE PHYSICAL EXPLANATION OF DIFFERENT TIME-FACTOR EFFECTS IN BIOLOGICAL OBJECTS. Richard Kurt Kepp and Kurt Müller. *Strahlentherapie* 88, 139-49 (1952). (German).

Time factor in radiation biology is shown to depend on mean ionization density of the radiation. The time necessary for a certain degree of resitutation after a number of hits is dependent upon the number of ionizations of which each hit consists. NSA 7-728.

1010

A QUANTITATIVE STUDY OF THE EFFECTS OF X RADIATION ON CELLS IN VITRO. Thomas R. Reid and Margaret P. Gifford. *J. Natl. Cancer Inst.* 12, 431-39 (1952).

Quantitative method for determining cell population in tissue cultures was applied to studies of dose-response patterns following x irradiation. Response to 250, 500, 750, 1000 and 2000 r is described. Recovery occurs following 250 and 500 r; 1000 and 2000 r being lethal. The 750 r dose was found to be partially lethal. NSA 7-731.

1011

RADIATION-INDUCED MUTATIONS IN WHEAT AND BARLEY. T. J. Arnason, C. O. Person, and J. M. Naylor. *Can. J. Botany* 30, 743-54 (1952).

A study of mutagenic effect of absorbed radiophosphorus in wheat and barley. NSA 7-732.

1012

MAXIMUM PERMISSIBLE NEUTRON FLUX FOR FAST AND THERMAL NEUTRONS. W. S. Snyder and J. Neufeld. (Oak Ridge National Lab.). (nd). 1p. (AECU-2328).

Collision density resulting from irradiation of a 30 cm tissue slab by normally directed beam ($1 \text{ n/cm}^2/\text{sec}$) of thermal neutrons and fast neutrons (10, 5, 2.5, 0.005 Mev) is calculated. Maximum permissible flux (mpf) for 40 hr week is found to be about $1800 \text{ n/cm}^2/\text{sec}$ for thermal neutrons: about 25, 24, 38, 82 and $1640 \text{ n/cm}^2/\text{sec}$ for 10, 5, 2.5, 0.5 and 0.005 Mev neutrons, respectively. Report includes assumptions made to calculate mpf. NSA 7-734.

1013

THE BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION: IV. THE EFFECT OF FOLINIC ACID, S. F., ON HEMATOPOIESIS FOLLOWING X-RADIATION. K. H. Burdick and G. O. Ballengee. (School of Aviation Medicine). Oct. 1952. 7p. (NP-4271; Report No. 4).

Folinic acid is found to be ineffective as hematopoietic stimulus in rats following irradiation with 570 r of x rays. NSA 7-736.

1014

EFFECT OF POTENTIATION OF INHIBITION OF ACETYLCHOLINE ON INTESTINAL DAMAGE, MORTALITY AND RECOVERY AFTER ACUTE ABDOMINAL X-RADIATION IN THE RAT. Lawrence E. Detrick, Bonnie Rhodes, Virginia Debley, and Thomas J. Haley. (Atomic Energy Project, Univ. of Calif., Los Angeles). Nov. 20, 1952. 14p. (UCLA-236). *J. Am. Pharm. Assoc., Sci. Ed.* 42, 296-300 (1953).

Autonomic drug medication of various kinds failed to prolong survival or decrease mortality of rats following x irradiation of abdomen. Atropine increased rate of and total mortality. NSA 7-737.

1015

A NEW PROTECTIVE AGENT AGAINST X RADIATION. Z. M. Bacq and A. Herve. *Schweiz. med. Wochschr.* 82, 1018-20 (1952). (French).

Mice were injected intraperitoneally with various amines or amino acids or various salts of histamine before 700 r x irradiation. Frequent superior protective effect of an amine over the corresponding amino acid was noted, suggesting that cysteinamine may have important value in therapy of human radiation sickness. NSA 7-739.

1016

COMPARATIVE ACTION OF CORTISONE, DESOXY-CORTICOSTERONE, AND PROMETHAZINE ON THE RESISTANCE OF ADRENALECTOMIZED ANIMALS TO X RAYS. B. N. Halpern, A. Cuendet, and J. P. May. *Schweiz. med. Wochschr.* 82, 1020-3 (1952). (French).

Adrenalectomy triples sensitivity of rats to x rays. Cortisone exerts protective effect during cytotoxic phase (1st 8 days post exposure) but increases mortality from infections after first week. Desoxy-corticosterone has similar but weaker effect; anti-histamines aggravate radiation injuries in adrenalectomized animals. NSA 7-740.

1017

THE ROLE OF THE ADRENAL IN THE GENERAL RESISTANCE OF THE ORGANISM TO RADIATION. H. Betz. *J. belge radiol.* 35, 380-92 (1952). (French). NSA 7-742.

1018

SURVIVAL AFTER RADIATION EXPOSURE-INFLUENCE OF A DISTURBED ENVIRONMENT. Willie W. Smith. *Nucleonics* 10, No. 11, 80-3 (1952).

Moderate exercise, moderate degrees of stress and no food or poor diet for a short time can be tolerated under laboratory conditions by irradiated mice and rats. Extremes of exercise or cold are tolerated less well. High degree of susceptibility to infection appears within few days and may last several weeks. NSA 7-744.

1019

DOSIMETRIC CONSIDERATIONS IN DETERMINING HEMATOPOIETIC DAMAGE FROM RADIOACTIVE IODINE. J. E. Rall, Charles G. Foster, Jacob Robbins, R. Lázerson, Lee E. Farr, and Rulon W. Rawson. (Brookhaven National Lab. and Sloan Kettering Inst. for Cancer Research and Memorial Center, New York). (nd). 21p. (BNL-1278). *Am. J. Roentgenol.* 70, 274-82 (1953).

Lymphocyte count was found to be most sensitive and reliable index of degree of radiation damage in 33 patients receiving tracer and large therapeutic doses of I^{131} . NSA 7-747.

1020

EXPERIMENTAL RADIOTHERAPY OF ABDOMINAL

CANCER. II. EFFECT OF A FLAVONONE (RUTIN) ON RADIATION REACTIONS. Annabelle Cohen and Lionel Cohen. *Brit. J. Radiology* 25, 601-5 (1952). NSA 7-748.

1021
FUNDAMENTALS OF INTRAUTERINE BETA RADIATION THERAPY WITH ARTIFICIAL RADIOACTIVE ISOTOPES. H. A. Kunkel, H. J. Schmermund, and G. Schubert. *Geburtshilfe u. Frauenheilk.* 12, 695-708 (1952). (German).

Includes description of histological effects of P^{32} on the endometrium as observed in 3 patients. NSA 7-749.

1022
EXPERIMENTAL STUDIES IN METAL CANCERIGENESIS. II. EXPERIMENTAL URANIUM CANCERS IN RATS. W. C. Hueper, J. H. Zuefle, A. M. Link and M. G. Johnson. *J. Nat. Cancer Inst.* 13, 291-305 (1952).

Localized U deposits in tissues of rats, creating high concentration of U in circumscribed areas, and prolonged action of U in "non-toxic" or low-toxic quantities on cells in immediated vicinity of such foci, exert a definite carcinogenic effect (production of sarcomas.) NSA 7-760.

1023
THE BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION: THE INFLUENCE OF NITROGEN MUSTARDS ON CITRIC ACID SYNTHESIS IN VIVO. Kenneth P. Dubois, Jere Deroin, and Kenneth W. Cochran. (Air Force Radiation Lab., Univ. of Chicago). Nov. 1952. 5p. (NP-4270; Report No. 1).

In certain tissues nitrogen mustards produce alterations in citrate synthesis which are qualitatively similar to those produced by x ray. Decreased citrate synthesis was observed in spleen and thymus of N-mustard treated rats; increased citrate content of liver of male rats. NSA 7-795.

1024
THE BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATIONS: III. THE IMMEDIATE EFFECTS OF X-RADIATION ON ISOLATED STRIATED FROG MUSCLE. Herbert B. Gerstner, Charles P. Powell, and Everett O. Richey. (School of Aviation Medicine). Oct. 1952. 8p. (NP-4278; Report No. 3). *Am. J. Physiol.* 176, 9-14 (1954).

No effect was detectable following 0-30 kr. After 30-150 kr: muscle function was depressed and color and length of isolated muscle were changed. Doses greater than 150 kr caused immediate total loss of function and pronounced morphological change. NSA 7-1037.

1025
THE ANTIBODY RESPONSE OF ANIMALS EXPOSED TO X-RADIATION. IV. THE LEVELS OF X-RADIATION EXPOSURE REQUIRED TO DESTROY AN IMMUNITY TO *SALMONELLA TYPHIMURIUM*. John D. Fulton and Roland B. Mitchell. (School of Aviation Medicine). Dec. 1952. 10p. (NP-4279; Report No. 4).

200 r or more of 260 kvp 18 ma x radiation (whole body exposure) administered 6 days after immunization with heat killed *S. typhimurium* antigen, was sufficient to destroy the resistance to *S. typhimurium*. (mice). NSA 7-1038.

1026
QUARTERLY PROGRESS AND WORK ACCOMPLISHMENT REPORT FOR QUARTER ENDING SEPTEMBER 30, 1952. (Tennessee Univ.). 91p. (ORO-84).

Blood chemistry values for normal burros and burros after exposure to 400 r of γ radiation/day (Co^{60} source) are given. Observations on abnormal blood clotting in whole-body irradiated dogs, observations on sexual cycle of female burrows one year after irradiation, and observations on eyes of burros and swine after irradiation are included. NSA 7-1039.

1027
VARIATION OF X-RADIATION-INDUCED LIPEMIA IN RABBITS WITH DOSAGE ADMINISTRATION OF INSULIN OR AMMONIUM CHLORIDE, AND THE INCIDENCE OF TETANY. L. T. Steadman and A. J. Grimaldi. (Atomic Energy Project, Univ. of Rochester). Nov. 7, 1952. 20p. (UR-227).

Post-exposure increase in plasma total lipids is maximal following doses of 1000-1500 r. Insulin or NH_4Cl reduce lipemia following 1000 r but not following 2000 r. NH_4Cl increases mortality, insulin has no effect on it. Incidence of deaths due to hypocalcemic tetany is about 19% at 1000 r, 50% at 2000 r. NSA 7-1040.

1028
FREQUENCY OF DICENTRIC BRIDGES IN MEIOSIS IN THE GRASSHOPPER *GESONIA PUNCTIFRONS*, PRODUCED BY DIFFERENT DOSAGES OF X-RAYS. S. P. Ray-Chaudhuri and Ira Sarkar. *Science* 116, 479-82 (1952).

Quantitative data were obtained by direct cytological examination. Dicentric bridges detected at first anaphase of meiosis after irradiating testes of *Gesonia punctifrons*. NSA 7-1041.

1029
IMPAIRMENT OF ANTIMICROBIAL DEFENSES FOLLOWING TOTAL BODY IRRADIATION OF MICE. H. S. Kaplan, R. S. Speck, and E. Jawetz. *J. Lab. Clin. Med.* 40, 682-91 (1952).

A standard subacute streptococcal infection spread more rapidly in C_{57} black mice subjected to single total body x ray exposures in LD_{50} range than in nonirradiated controls. Cumulative mortality curves in the two groups were parallel but average survival time was significantly reduced by irradiation. Impaired resistance was apparent within 24 hours after irradiation. NSA 7-1042.

1030
ATOMIC ENERGY AND THE PLANT SCIENCES. Edward N. Tolbert and Paul B. Pearson. *Advances in Agron.* 4, 279-303 (1952).

A review of Atomic Energy Commission research program in plant sciences. NSA 7-1043.

1031
THE EFFECT OF LOCAL X-RAY IRRADIATION UPON THE TEETH AND SURROUNDING TISSUES IN YOUNG AXOLOTLIS. V. V. Brunst, E. A. Sheremetieva-Brunst, and Frank H. J. Figge. *J. Dental Research* 31, 609-19 (1952).

The mechanisms of tooth formation and tooth maintenance are permanently destroyed by 2000 to 4000 r doses of x irradiation. NSA 7-1044.

1032
THE EFFECT OF FAT LEVEL OF THE DIET ON GENERAL NUTRITION. IX. THE RELATIONSHIP OF RADIATION INJURY IN THE RAT TO FAT CONTENT OF THE DIET. Amber L. S. Cheng, George K. Kryder, Lois Bergquist, and Harry J. Deuel, Jr. *J. Nutrition* 48, 161-82 (1952).

Fat content of diet did not alter susceptibility of rats to large (650-850 r) single doses of x rays, but rats receiving fat in diet showed increased resistance to x radiation administered in sub-lethal doses at weekly intervals. NSA 7-1046.

1033
THE TREATMENT OF THE ACUTE RADIATION SYNDROME WITH AUREOMYCIN AND WHOLE BLOOD. F. W. Furth, Molly P. Coulter, R. W. Miller, J. W. Howland, and S. Swisher. (Atomic Energy Project, Univ. of Rochester). Nov. 8, 1952. 48p. (UR-221). *J. Lab. Clin. Med.* 41, 918-28 (1953). NSA 7-1047.

1034

THE PATHOLOGIC EFFECTS OF I^{131} ON THE NORMAL THYROID GLAND OF MAN. A. Stone Freeberg, George S. Kurland, and Herrman L. Blumgart. *J. Clin. Endocrinol. and Metab.* 12, 1315-48 (1952).

Post mortem pathological findings in 16 euthyroid patients who received therapeutic doses of I^{131} because of intractable angina pectoris or congestive failure are described. NSA 7-1049.

1035

ACTIVATION OF PSEUDOTUBERCULOSIS IN MICE EXPOSED TO SUBLETHAL TOTAL BODY RADIATION. I. L. Shechmeister and F. L. Adler. (Washington Univ., St. Louis, School of Medicine). (nd). 26p. (AECU-2350). *J. Infectious Diseases* 92, 228-39 (1953).

After sublethal doses of radiation mice developed generalized pseudotuberculous lesions with high mortality rate; non-irradiated controls developed no infection or subclinical pseudotuberculosis. Sublethal x irradiation of subclinically infected animals caused an epidemic of the infection. Role of radiation in the activation of latent infections is discussed. NSA 7-1326.

1036

COLD STERILIZATION OF FOOD BY GAMMA RAYS. L. E. Brownell, C. A. Lawrence and J. T. Graikoski. (Michigan Univ.). (nd). 13p. (AECU-2355). *Refriger. Eng.* 61, 55-7, 104 (1953).

Includes data on effect of dosage of γ radiation on bacterial count, effect of γ radiation on various molds and viruses and effect of γ sterilization on the flavor of various foods. NSA 7-1327.

1037

CHRONIC EXTERNAL IRRADIATION, NEUTRON RADIOBIOLOGY, HEMATOLOGY, PHYSIOLOGY, HISTOPATHOLOGY, AND RADIUM TOXICITY, p.10-56 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT FOR MAY, JUNE, JULY, 1952. Austin M. Brues, ed. (Argonne National Lab.). (ANL-4840(p.10-56)).

Includes progress reports on: factors influencing radiation therapy of experimental lymphoid tumors; effect of bone marrow or other tissue originating from hemopoietic organs on various types of radiation injury in several species; effect of fast neutron and γ irradiation of mice; effects of irradiation of mast cells. NSA 7-1329.

1038

EXPERIMENTAL PATHOLOGY, SPECIAL PROBLEMS, INVERTEBRATE ZOOLOGY, MICROBIOLOGY, PHYCOTRADIOBIOLOGY, PHYSIOLOGICAL CHEMISTRY, ORGANIC CHEMISTRY, PHARMACOLOGY, THEORETICAL BIOLOGY, AND BIOPHYSICS. p.57-108 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT FOR MAY, JUNE, JULY, 1952. Austin M. Brues, ed. (Argonne National Lab.). (ANL-4840(p.57-108)).

Includes reports on: Sr^{89} toxicity (mice); effects of implanted Pu metal (rabbits, rats); blood pressure changes in x-irradiated chicks; effect of high energy neutron irradiation on metabolism in egg nuclei of grasshopper nymphs; antibiotic and radiation sensitivity of auxin biosynthesis; hormonal influences on response of rat liver tryptophane peroxidase-oxidase to total-body x radiation. NSA 7-1330.

1039

(Pages 1-17 of) QUARTERLY PROGRESS REPORT NO. 5. (Air Force Radiation Lab., Univ. of Chicago). Oct. 15, 1952. (NP-4247(p.1-17)).

Blood cell carboxypeptidase inhibitor is reduced after about LD_{50} (man); also reduced in certain other pathological conditions. Assays on blood of 328 patients are reported. Related findings on reduced carboxypeptidase activity in rats and guinea pigs are reviewed. NSA 7-1332.

1040

(Pages 18-82 of) QUARTERLY PROGRESS REPORT NO. 5. (Air Force Radiation Lab., Univ. of Chicago). Oct. 15, 1952. (NP-4247(p.18-82)).

Following topics included: thymus and bone marrow homogenates stimulate O_2 consumption of liver homogenates; spleen homogenates inhibit liver tissue oxidative phosphorylation (pyruvate plus fumarate); human central nervous system stimulants have no effect on radiosensitivity of rats; x ray effects on 5-nucleotidase and ATP from rat and ground squirrel tissue; increased reproductive recovery of x rayed amoeba after fusion with 1/3 of normal amoeba; serum Na and K changes (irradiated dogs); correlation of x ray and histamine sensitivities (mice). NSA 7-1333.

1041

QUARTERLY TECHNICAL REPORT, JULY 1, 1952 THROUGH SEPTEMBER 30, 1952. (Atomic Energy Project, Univ. of Rochester). Nov. 3, 1952. 57p. (UR-222).

Includes progress reports on: effects of radiation on reticuloendothelial system; therapeutic trials of blood transfusion in irradiated dogs; stimulation of leukocyte phagocytic activity by Piromen. NSA 7-1334.

1042

BIOLOGICAL INTERFERENCES BETWEEN X RAYS AND CERTAIN RADIOISOTOPES. J. Maisin and G. Lambert. *J. belge radiol.* 35, 329-36 (1952). (French).

Neither whole-body nor spleen irradiations protected rats against a lethal dose of x rays. Small doses of radioisotopes, but not large doses, injected prior to lethal irradiation resulted in increased survival as compared to non-injected controls. NSA 7-1335.

1043

CYTOLOGICAL VARIATIONS OF NORMAL VAGINAL EPITHELIUM AND NEOPLASTIC TISSUES OF THE CERVIX UNDER THE INFLUENCE OF RADIUM THERAPY. Andre Ghilain and W. F. Bouwer. *Gynecol. et obstet.* 51, 309-23 (1952). (French).

Descriptions and microphotographs of changes in various vaginal and neoplasm cells during the course of Ra therapy of epitheliomas and adenocarcinomas in 19 patients. NSA 7-1336.

1044

MECHANISM OF X-RAY EFFECTS ON REFLEX EXCITABILITY. Ya. L. Geinisman and E. A. Zhirmunskaya. *Fiziol. Zhur. S.S.S.R.* 38, 312-18 (1952). (Russian).

The authors observed immediate depression of the acid reflex of frogs after 7000 r whole-body x irradiation, and immediate diminution (smaller number of pulses) of electrical activity of skin receptors. Partial x irradiation of region of sympathetic nervous system (5400 r) altered electrical activity of skin receptors, changes depending upon state of excitation of receptors before exposure. NSA 7-1337.

1045

EFFECTS OF BETA-RADIATING ISOTOPES IN FRUIT TREES. Lars Ehrenberg and Ingvar Granhall. *Hereditas* 38, 385-419 (1952). NSA 7-1338.

1046

CHEMICAL AND BIOLOGICAL EFFECTS OF NEUTRONS AND X-RAYS. Lars Ehrenberg and Nils Nybom. *Hereditas* 38, 481-501 (1952).

Fast neutrons were at least 20 times more effective than x rays as regards production of lethality, growth, retardation, chromosome rearrangements, sterility, and gene mutations whether radiation was applied to dormant or germinating barley seeds. Doses were measured chemically by means of an indicator reaction occurring in a solution of the same atomic composition as the tissue. NSA 7-1339.

1047

THE EFFECTS OF RADIATION ON THE CHICK

EMBRYO. Frank J. Dixon. *Ann. N. Y. Acad. Sci.* 55, 216-20 (1952).

Includes data on lethal x ray doses for 2-18 day chick embryos and on effects of intrayolk injections of P^{32} at different days of incubation. Also describes morphological changes due to P^{32} injection as well as over-all effects of radiation on growth rate, gonads, bone marrow, peripheral blood and lymphoid tissue. NSA 7-1340.

1048

EFFECT OF IRRADIATION ON LYMPHOID TISSUE

NUCLEIC ACIDS IN C57BL MICE. Patricia P. Weymouth and Henry S. Kaplan. *Cancer Research* 12, 680-3 (1952)

Desoxyribonucleic acid P (DNAP) increased with age in thymus and lymph nodes of normal C57BL mice to maximum level at 90 days, with subsequent decrease. Concentration of P in ribonucleic acid fraction did not change with age, and was the same in thymus as in lymph nodes. Thymic DNAP decreased 40% 4 days after exposure; remained low 142 days after 4 doses of 168 r of x rays at 8 day intervals. Most thymuses contained lymphomas 142 days post exposure. NSA 7-1341.

1049

FINGER RIDGE CHANGES IN MONKEYS FOLLOWING X-RADIATION.

p.140-152 IN BIOLOGICAL EFFECTS OF EXTERNAL RADIATION (NNS VI-2). Henry A. Blair, ed. New York. McGraw-Hill Book Co., Inc. 1954. Roger A. Harvey.

Acute x-ray exposures up to 800 r cause no changes in finger ridges of monkeys; 800 to 1100 r result in temporary atrophy of ridges. Chronic x-ray exposures of 10/r day cause no change. Exposure of 20 r or more cause weakening. There is less complete regeneration with chronic than with acute exposure, and slightly more secondary weakening with chronic exposure. (from authors' conclusions).

1050

INFLUENCE OF CYSTEINE ASSOCIATED WITH ASCORBIC ACID ON RADIATION-INDUCED VARIATIONS IN THE PLASMA PROTEIN FRACTIONS. Enrico Caffaratti. *Radioterapie radiobiol. e fis. med.* 8, 144-52 (1952). (Italian).

Male guinea pigs (450 g) were injected intramuscularly with 750 mg of cysteine and 150 mg of ascorbic acid, then whole-body irradiated with 800 r of 180 kv x rays. Variations in albumin and globulin fractions and total protein were determined and compared with changes in injected or irradiated controls. Treatment reduced the post-exposure elevation of γ globulin. NSA 7-1344.

1051

STUDIES ON THE SECOND LINKAGE GROUP IN THE SILKWORM, *BOMBYX MORI* L. II. PALE STRIPED (p^{st}) AND SECOND STRIPED (S^2) INDUCED BY X-RAYS. Tsuneo Takasaki. *Bull. Sericult. Expt. Sta. (Tokyo)* 14, 10-21 (1952). (Japanese with English Summary).

Two F_1 mutants and their genetic origin are described in detail. NSA 7-1345.

1052

COMPARATIVE INVESTIGATIONS ON THE PRIMARY EFFECT FOLLOWING ACTION OF FAST ELECTRONS AND X RAYS ON TISSUE CULTURES. Henni Gärtner. *Strahlentherapie* 89, 26-51 (1952). (German).

Author compares quantitative and qualitative differences in effects of 500 and 4000 r doses of (1) fast electrons (6 Mev betatron) and (2) 90 kv x rays on cultures of chicken heart fibroblasts. Suggests differences may be due to different ionization density of the two radiations. NSA 7-1346.

1053

THE NON-RECUPERABLE FRACTION OF X-RAY IRRADIATION INJURY AS THE BASIS FOR EXPERIMENTAL APPROACH TO THE PROBLEM OF DELAYED EFFECTS OF IONIZING RADIATION. p. 396-402 OF PROGRESS IN RADIOBIOLOGY. F. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas, Publisher. 1955. R. W. Brauer, F. S. Krebs, and R. Pressotti.

1054

MODE OF ACTION OF AGENTS GIVING PROTECTION FROM RADIATION. P. Alexander and M. Fox. *Nature* 170, 1022-3 (1952).

Authors suggest that compounds which give protection against radiation do so *in vivo* by competitively removing perhydroxyl radicals formed in the presence of oxygen. NSA 7-1352.

1055

SENSITIZATION OF MALIGNANT TUMORS BY SHORT WAVES Georg Fuchs. *Strahlentherapie* 88, 647-53 (1952). (German).

Author describes sensitization of malignant tumors (particularly intrathoracic tumors) to x rays by means of short wave (6 m) treatment for 10-15 minutes immediately before x irradiation. NSA 7-1356.

1056

THE DISTRIBUTION OF EXCRETION OF THORIUM SULFATE. J. K. Scott, W. F. Neuman, and J. F. Bonner. *J. Pharmacol. Exptl. Therap.* 106, 286-90 (1952).

Intravenously administered soluble thorium compound was removed slowly from blood of experimental animals; most thorium found in liver, spleen, bone marrow. Intramuscularly administered thorium remained in the injected muscle; intratracheally injected thorium in lung. No absorption demonstrated when compound given by gavage. NSA 7-1363

1057

RADIATION SHIELDS AND SHIELDING A BIBLIOGRAPHY OF UNCLASSIFIED AEC REPORT LITERATURE. Charles J. Engberg, comp. (Technical Information Service, AEC). Sept. 1952. 26p. (TID-3032). NSA 7-1539.

1058

THE OCCURRENCE OF GENERALIZED INFECTION OF ENTERIC ORIGIN IN MICE POISONED WITH NITROGEN MUSTARD. Carolyn W. Hammond, Marianne Tompkins, and C. Phillip Miller. (Institute of Radiobiology and Biophysics, Univ. of Chicago). (nd). 12p. (AECU-2363). *Proc. Soc. Exptl. Biol. Med.* 82, 137-40 (1953).

Generalized infection of enteric origin seems to play a less important role as cause of death in mice poisoned with nitrogen mustard than in mice subjected to moderate doses of total body x radiation. NSA 7-1574.

1059

THE EFFECT OF X-RAYS ON THE UPTAKE AND LOSS OF IONS BY POTATO TUBER TISSUE. Robert E. Winthrow, Edward S. Mika and Noe Higinbotham. (Argonne National Lab.). Dec. 1952. 14p. (AECU-2368; UAC-683).

X irradiation was found to depress the rate of accumulation of Rb^{86} by excised discs of potato tuber tissue, to increase rate of loss of ions from excised discs in distilled H_2O and to decrease conductivity in intact tubers. Theory of a transfer mechanism which would probably be damaged by x radiation is discussed. NSA 7-1579.

1060

GAMMA-NEUTRON RADIATION CHAMBER OF RADIO-BIOLOGICAL STUDIES. Howard H. Vogel, Jr., Roland A. Blomgren, and Wils J. G. Bohlin. (Argonne National

Lab.). Nov. 1952. 33p. (AECU-2369; UAC-668).
Nucleonics 11, No. 3, 29-31 (1953). NSA 7-1580.

1061
THE EFFECTS OF TOTAL-BODY X IRRADIATION ON THE TISSUE MAST CELL. Douglas E. Smith and Yvette S. Lewis. (Argonne National Lab.). Dec. 1952. 10p. (AECU-2377; UAC-674). *Proc. Soc. Exptl. Biol. Med.* 82, 208-12 (1953).

Total body x irradiation (mouse, hamster) caused series of striking changes in tissue mast cells in the cheek pouch and/or mesentery resulting in disruption of cell and dispersion of its contents into surrounding tissues. Possible relationship of the observed phenomena to hemorrhage and clotting defect of radiation syndrome discussed. NSA 7-1581.

1062
THE INFLUENCE OF TEMPERATURE UPON THE ACTIVATION OF A BACTERIAL VIRUS BY X-RAYS. C. S. Bachofer, C. F. Ehrer, S. D. Mayer, and E. L. Powers. (Argonne National Lab. and Notre Dame Univ.) Nov. 1952. 15p. (AECU-2381; UAC-669). *Proc. Natl. Acad. Sci. U. S.* 39, 744-50 (1953).

Data are presented for relation (1) between survival of dried T-1 bacteriophage of *E. coli* and relative dosage of x rays at temperatures ranging from 77-310 °K, (2) between dose-inactivation constant and temperature and (3) between estimated temperature-dependent component of the dose-inactivation constant and the reciprocal of the temperature. NSA 7-1582.

1063
THE BIOLOGICAL EFFECTIVENESS OF THERMAL NEUTRONS IN INHIBITING MITOSIS OF MICE. John Storer. (Los Alamos Scientific Lab.). Nov. 1952. 25p. (LA-1400).

Author determined mitotic index of ear epithelium of mice at intervals after exposure to (1) x rays and (2) thermal column radiation (thermal neutrons plus γ contaminant). With dose of exposure to (2) expressed in rem, dose-response regression line did not differ significantly from line for x-irradiated animals. Assuming γ contaminant was also equally effective, relative effectiveness of thermal neutrons is estimated at about 1.7. NSA 7-1583.

1064
EFFECTS OF TOTAL BODY X-RADIATION ON SALIVARY COMPONENTS OF DOGS. J. L. Nemes, M. G. Wheatcroft and R. S. Leopold. (Naval Medical Research Inst., Bethesda and Maryland Univ.). July 29, 1952. 9p. (NM-008-012.04.02).

Study of salivary components of 14 dogs exposed to total body x ray doses of 200, 400 and 600 r revealed: decreased (average) P and N content post exposure; increased lysozyme activity and increased acidity. NSA 7-1584.

1065
THE METABOLIC PROPERTIES OF VARIOUS MATERIALS AND THE PATHOLOGICAL EFFECTS OF ASTATINE. p. 84-104 OF MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT FOR JULY, AUGUST, AND SEPTEMBER, 1952. (Radiation Lab., Univ. of Calif.). Nov. 10, 1952. 21p. (UCRL-2001(p.84-104)).

Includes progress reports on experimental attempts to remove Pu from rats by use of Ca salt of Versene. Data are included on effects of Versene on tissue distribution and excretion of Pu²³⁸ following intravenous injection. NSA 7-1585.

1066
THE EFFECT OF A LARGE SINGLE DOSE OF PHOSPHORUS³² ON THE BONE MARROW OF THE COTTON RAT, *SIGMODON HISPIDUS TEXIANUS*. Georgine

Phillips, A. Bryon Leonard, and Charles A. Leone. (Kansas Univ.). (nd). 29p. (AECU-2157).

Single 4.3 μ g/g-intraperitoneal P³² injection lowered WBC counts in sternal marrow of the rat. Distinct aplasia was noted in WBC foci at 7 days; in 7-9 days recovery began; after 57 days normal cell count found. RBC foci were relatively unaffected. Initial destruction of hematopoietic tissue was seen 1-12 hr after P³² dose. Start of bone marrow regeneration was seen 7-9 days with significant amount seen at 57 days. NSA 6-5260.

1067
A SEMI-QUANTITATIVE STUDY OF THE EFFECTS OF RADIOPHOSPHORUS ON THE SPLEEN OF THE COTTON RAT, *SIGMODON HISPIDUS TEXIANUS*. Donald S. Overend, A. Bryon Leonard and Charles A. Leone. (Kansas Univ.). (nd). 44p. (AECU-2156).

Rats were injected with 50 μ g of P³²; spleens examined microscopically at intervals of 1-63 days, and quantitative counts of cellular constituents made. Changes observed: thinning of stroma, occasional nuclear disorganization, and shifts in relative quantities of various cells. Changes in cellular balance are transient, with normal values restored in 63 days or less. NSA 6-5259.

1068
THE EFFECT OF COBALT⁶⁰ GAMMA RADIATION ON SUSCEPTIBILITY AND IMMUNITY TO TRICHINOSIS. Richard D. Stoner and William M. Hale. (Brookhaven National Lab.). (nd). 11p. (BNL-1193). *Proc. Soc. Exptl. Biol. Med.* 80, 510-12 (1952).

Whole-body Co⁶⁰ γ irradiation (55-650 rep) increased susceptibility of mice to *Trichinella spiralis* infection. Exposure of *Trichinella*-immune mice to 600 rep before administering challenge (infection), destroyed immunity to reinfection. A 680-rep irradiation sharply reduced the number of circulating leukocytes in peripheral blood, perhaps indicating that the role of cellular immunity should be emphasized more in acquired immunity to such infection. NSA 6-5261.

1069
A COMPARISON OF THE EFFECTS OF X-RAYS AND THERMAL NEUTRONS ON DORMANT SEEDS OF BARLEY. Richard S. Caldecott, E. F. Frolik, and Rosalind Morris. (Brookhaven National Lab. and Univ. of Nebraska). (nd). 13p. (BNL-1195). *Proc. Natl. Acad. Sci. U.S.* 38, 804-9 (1952).

Dormant seeds of Himalaya barley were given various doses of (1) x rays or (2) thermal neutrons. Seeds treated with (1) gave seedlings with wide range in height distributions at 14 days; those from (2) had narrow range. Differential killing was characteristic of seeds given 3 highest doses of (1): if any survived (2), essentially all did. For similar chromosomal aberration frequencies, less injury resulted from (2) than (1). Apparently (1) has proportionately more effect on extra-chromosomal elements of cell. NSA 6-5262.

1070
STERILITY AND RECESSIVE LETHAL MUTATION FOLLOWING X-IRRADIATION OF FEMALE *DROSOPHILA MELANOGASTER*. R. C. King. (Brookhaven National Lab.). (nd). 14p. (BNL-1198). *Am. Naturalist* 86, 391-8 (1952). NSA 6-5263.

1071
NITROGEN BALANCE IN WHOLE BODY X-RADIATION. Gordon E. Gustafson and Simon Koletsky. (Western Reserve Univ. School of Medicine). June 15, 1952. 13p. (NYO-1649).

To learn whether post-irradiation weight loss is due to starvation or altered metabolism. N balance of rats given 660 r whole-body x-ray dose was compared with that of controls given same amount of food. For 6 days after

dose, rats were in negative N balance, a 2nd such period occurring in irradiated rats during 2nd or 3rd week. H_2O intake and urinary output of those irradiated fell on 2nd or 3rd day after dose; same functions in controls increased. For 3 days after 660 r, greater N excretion and more negative N balance seen than after 1000 r. NSA 6-5265.

1072

LIVER DAMAGE IN RATS FROM RADIOACTIVE COLLOID-AL GOLD. Simon Koletsky, Gordon Gustafson, Phyllis Goldston, Eileen Goodman, and Vera Milanich. (Western Reserve Univ. School of Medicine). June 15, 1952. 17p. (NYO-1650). Lab. Invest. 1, 312-23 (1952).

Internal radiation of rat liver with single dose of colloidal Au^{198} gave profound hepatic cell necrosis, distorted architecture and conversion of much parenchyma to atypical giant cells. Lesion was not accompanied by substantial fibrosis. Kupffer cells, biliary epithelium and blood vessels were not significantly injured; jaundice and ascites occurred frequently. NSA 6-5266.

1073

A FORMULATION OF THE INJURY, LIFE SPAN, DOSE RELATIONS FOR IONIZING RADIATIONS: II, APPLICATION TO THE GUINEA PIG, RAT AND DOG. H. A. Blair. (Atomic Energy Project, Univ. of Rochester). July 3, 1952. 37p. (UR-207).

An hypothesis of radiation injury and recovery is tested by applying $dI/dt = A\gamma - \beta(I - \alpha\gamma t)$, in which I is injury, γ the dose rate and A , β , and α are constants. Data are given on chronic irradiation of rats with x rays, guinea pigs with γ rays, dogs with x rays and rats with fast neutrons. NSA 6-5267.

1074

CLINICAL OBSERVATIONS UPON THE RESPONSE OF THE BURRO TO LARGE DOSES OF EXTERNAL WHOLE BODY GAMMA IRRADIATION. Bernard F. Trum, John H. Rust, and James L. Wilding. Auburn Vet., 131-6 (Spring, 1952).

When 123 burros were given LD_0 to LD_{100} doses of whole-body γ radiation, symptoms included apathy, malaise, dullness, restlessness and anorexia. Locomotion, pulse, respiration, temperature, eyes, gastro-intestinal tract, genito-urinary system, blood and neuro-motor symptoms were observed. After 14th day, heavily irradiated animals died with increasingly severe symptoms. NSA 6-5268.

1075

EFFECT OF ROENTGEN IRRADIATION UPON GROWTH AND PERIPHERAL BLOOD CELL LEVELS OF THE ALBINO RAT. Thomas R. Noonan and Ann M. Noonan. Federation Proc. 11, (1952) Mar.

100 r/week, (1 dose or 5 equal doses), for 4 weeks produced significant decrease in growth and absolute lymphocytes in both sexes of rats. No significant change seen in hemoglobin level or absolute neutrophils in 10 weeks of exposure. 10 r/day 5 times a week caused significant weight decrease in males but not females. Normal rats between 3rd and 13th week of life show an increase in hemoglobin concentration and absolute lymphocytes, and little change in absolute neutrophils. NSA 6-5272.

1076

EFFECT OF AUREOMYCIN AND WHOLE BLOOD SEPARATELY AND IN COMBINATION ON X-IRRADIATED DOG. F. W. Furth, M. P. Coulter, R. W. Miller, J. W. Howland, and S. N. Swisher. Federation Proc. 11, (1952) Mar.

No significant difference seen in mortality rate or 28-day mortality between controls or irradiated dogs (575 r) given either aureomycin (50 mg/kg/24 hr), whole-blood transfusions (125 cc when hematocrit fell to 80% normal), or both. NSA 6-5273.

1077

INDIRECT EFFECTS OF X-RADIATION ON THE WALL

OF THE DEVELOPING MESENCEPHALON OF THE CHICK EMBRYO. M. J. Tobin and J. P. O'Brien. Wasmann J. Biol. 10, 1-6 (1952).

Indirect effects of x rays on the wall of developing chick mesencephalon were more delayed and less severe than direct effects. Importance of indirect effects in studies involving interaction of ionizing radiations and protoplasmic systems is discussed. NSA 6-5274.

1078

A COMPARISON OF THE EFFECT OF LOW (124 KV) AND OF HIGH (50 MEV) X IRRADIATION ON THE INCIDENCE OF LENS OPACITIES IN MICE. Leonard B. Clark and Peter Sykowski. Am. J. Ophthalmol. 35, 848-50 (1952).

Low- and high-voltage x irradiation increases incidence of lens opacities. Difference in incidence with different voltages is not significant. Neutron damage in 50-Mev betatron radiation appears negligible compared with that attributable to x-ray dosage. NSA 6-5275.

1079

INFLUENCE OF PERIPHERAL CHOLINERGIC BLOCKING DRUGS ON SURVIVAL TIME IN ROENTGEN RAY IRRADIATED MICE. Thomas J. Haley and Bonnie M. Rhodes. (Atomic Energy Project, Univ. of Calif., Los Angeles). July 13, 1952. 8p. (UCLA-207). Science 117, 139-40 (1953).

Mice subjected to 550 r acute whole body x ray dose were treated with 4 cholinergic blocking drugs. None of the antispasmodics tested significantly decreased total mortality. NSA 6-5277.

1080

STUDIES ON THE TREATMENT OF INTERNAL RADIOACTIVE CONTAMINATION. I. REMOVAL OF A BONE-DEPOSITED FISSION PRODUCT BY THE SALTS OF ETHYLENE DIAMINE TETRA-ACETIC ACID. S. H. Cohn, J. K. Gong, and M. C. Fishler. (Naval Radiological Defense Lab.). June 4, 1952. 16p. (USNRDL-352). Nucleonics 11, No. 1, 56-61 (1953).

Administration of Na EDTA followed by Ca EDTA showed it possible to remove substantial amounts of fission product Y^{91} fixed by rat skeleton. Doubling the daily frequency of this administration gave no significant increase in removal of isotope from bone. NSA 6-5278.

1081

THE ROLE OF ENZYMATIC OXYGEN REMOVAL IN CHEMICAL PROTECTION AGAINST X-RAY INACTIVATION OF BACTERIA. G. E. Stapleton, Daniel Billen, and Alexander Hollaender. J. Bact. 63, 805-11 (1952).

Compounds protecting against lethal action of x rays on bacterial cells are divided into 2 classes on basis of whether or not preincubation with cells is required for protection. Data are presented consistent with hypothesis that O_2 removal rather than H_2 donation is major mode of protection afforded by chemical protective agents. NSA 6-5280.

1082

CROWN GALL SUPPRESSION BY IONIZING RADIATION. Paul E. Waggoner and A. E. Dimond. (Connecticut Agricultural Experiment Station). (nd). 18p. (AECU-2145). Am. J. Botany 39, 679-84 (1952).

Suppression of crown galls caused by *Agrobacterium tumefaciens* in tomato and kalanchoe occurred whether plants were inoculated with bacteria before or after irradiation. Since pathogens *in vitro* and *in vivo* survived doses causing gall suppression, it is concluded that radiation gives suppression by affecting host, not the pathogen directly, and mechanism of suppression affects growth of host in general. Possible role of suppression of auxin production by radiation in gall formation is discussed. NSA 6-5284.

1083

THE POSSIBLE USE OF NEUTRON-CAPTURING ISOTOPES SUCH AS BORON¹⁰ IN THE TREATMENT OF NEOPLASMS. II. COMPUTATION OF THE RADIATION ENERGIES AND ESTIMATES OF EFFECTS OF NORMAL AND NEOPLASTIC BRAIN. Manucher Javid, Gordon L. Brownell, and William H. Sweet. *J. Clin. Invest.* 31, 604-10 (1952). NSA 6-5287.

1084

THE ENERGY DEPOSITION BY FAST NEUTRONS IN BONE MARROW. J. H. Tait. (Atomic Energy Research Establishment, Harwell, Berks (England). Feb. 1952. 10p. (AERE-T/R-871).

Calculations are made to determine whether bone increases energy flux of fast neutrons at points adjacent to bone marrow by scattering neutrons without degrading their energy. Effect is found to be small and for purposes of dosimetry calculations, bone may be replaced by equal volume of soft tissue. NSA 6-5426.

1085

QUARTERLY TECHNICAL REPORT, APRIL 1, 1952 THRU JUNE 30, 1952. Henry A. Blair, ed. (Atomic Energy Project, Univ. of Rochester). July 31, 1952. 71p. (UR-213).

After 750 r of total-body x irradiation, Aldinamide, Rimifon and Marsilid gave no changes in mortality rate, food consumption, weight gain, red or white blood cell count compared with radiated untreated controls. Dogs (groups of 4) given 700 r x ray dose with abdomens shielded and then injected with *Staphylococcus aureus* on 2, 6, and 9 days post irradiation all died, while only 2 controls died. NSA 6-5541.

1086

THE ROLE OF THE INTESTINAL FLORA IN RADIATION INJURY: PROGRESS REPORT FOR MAY 1, 1951 TO DECEMBER 31, 1951. H. B. Chase, P. F. Fenton, M. H. Hatch, W. Montagna and J. W. Wilson. (Brown Univ.). 6p. (AECU-2165).

Lesions of intestinal mucosa in mice after 1000-550 r x ray dose are described. Data indicate gastric emptying rate of solutions is inhibited, but intestinal absorption unaffected by 500 r. Bacteriological studies of intestinal flora of mice and of tissues they invade after irradiation are reported. NSA 6-5545.

1087

THE GRAM-NEGATIVE FLORA OF THE UPPER INTESTINAL TRACT AND ITS INFLUENCE ON POST-RADIATION BACTEREMIA IN MICE. Phillip C. Miller, Marianne Tompkins, Margaret Colling, Marjorie Bohnhoff and Carolyn W. Hammond. (Chicago Univ.). (nd). 7p. (AECU-2187).

Intestinal flora of mice given 550 r total body x-ray dose shows an increase in all Gram-negative bacilli in upper half of small bowel after 1 week. Administration of *10⁷ Pseudomonas aeruginosa* gives effect which increases with time after exposure. Highest mortality from *Pseudomonas* bacteremia occurred on 11th post-irradiation day. NSA 6-5547.

1088

DURATION OF POST-IRRADIATION BACTEREMIA IN MICE. Carolyn W. Hammond, C. Phillip Miller, Marianne Tompkins, Margaret Colling, and Marjorie Bohnhoff. (Chicago Univ.). (nd). 8p. (AECU-2195).

Data show that bacterial invasion of the blood stream of irradiated mice causes septicemia (2nd week after moderate x-ray dose) which invariably proves fatal. Length of time bacteremia can be tolerated varies from less than 18 hours with *Pseudomonas* to 5 days with *Paracolobactrum*. NSA 6-5548.

1089

QUARTERLY PROGRESS REPORT NO. 4. (Air Force

Radiation Lab., Univ. of Chicago). July 15, 1952. 99p. (NP-4011; Quarterly Progress Report No. 4).

Data presented on: recovery in cell division rates of irradiated amoeba treated with fractions of non-irradiated centrifuged amoebae; effect of spleen homogenates on intermediary carbohydrate metabolism; effect of radiation on tissue enzymes, respiration, glycolysis and oxidative enzymes in normal and hibernating ground squirrels; effect of some chemical agents on mortality of mice poisoned with nitrogen mustard; effect of x rays, applied to dog heart in situ, on K concentration in coronary venous blood. NSA 6-5550.

1090

BEHAVIORAL CHANGES FOLLOWING RADIATION. II. MATERNAL BEHAVIOR AND MAZE PERFORMANCE. C. Downing Tait, Jr., Patrick D. Wall, Muriel Balmuth, and Sylvan J. Kaplan. (Air Univ. School of Aviation Medicine). July 1952. 14p. (NP-4026).

White rats in final week of pregnancy were exposed to single doses of 30, 90, 180 or 360 r (in air). Only the last caused apparent deterioration in maternal behavior. Growth disturbances in offspring correlated positively with size of dose. Both 90 r and 180 r offspring made significantly more errors than controls. NSA 6-5551.

1091

FURTHER STUDIES ON THE MECHANISM OF PULMONARY CLEARANCE OF PRODIGIOSIN IN NORMAL AND X-IRRADIATED RABBITS. George V. Taplin, James S. Grevior, Camille Finnegan, Arthur Dunn, and Philip Noyes. (Atomic Energy Project, Univ. of Calif., Los Angeles). Aug. 12, 1952. 17p. (UCLA-216). *Ann. Allergy* 11, 1-11 (1953).

In rabbits 800 r whole-body x irradiation increases rate of efficiency of major mechanisms by which lungs clear themselves of insoluble foreign particles after acute inhalation exposures. Ciliary action and/or increased mucous secretion play greater role than phagocytosis. Both mechanisms are more effective in γ -irradiated than in non-irradiated animals. NSA 6-5552.

1092

RADIATION DOSE REDUCTION BY CYSTEINE. H. M. Patt, S. H. Mayer, R. L. Straube, and E. M. Jackson. (Argonne National Lab.). July 1952. 24p. (AECU-2177; UAC-610). *J. Cellular Comp. Physiol.* 42, 326-39 (1953).

Cysteine is shown to afford relatively uniform protection against a number of x-radiation sequelae in mice (lethality, splenic atrophy, leucopenia, lymphopenia and granulocytopenia) implying that protective action occurs at an early stage in chain of events induced by irradiation. NSA 6-5553.

1093

OBSERVATIONS ON THE PATHOGENESIS OF POST-IRRADIATION BACTEREMIA. Lee E. Gordon and C. Phillip Miller. (Chicago Univ.). (nd). 6p. (AECU-2194).

Observations are presented on mechanism by which intestinal bacteria enter blood stream and long interval between dose and onset of bacteremia. Mice were fed *Serratia marcescens* in drinking water for 2 days before irradiation and until sacrificed. Authors concluded that bacteria leave intestine and are localized normally in mesenteric lymph nodes. Those escaping are removed by normal defense mechanisms which are adequate until they become ineffective during post exposure period. NSA 6-5715.

1094

ANNUAL REPORT ON RESEARCH PROJECT. G. Failla and H. H. Rossi. (Radiological Research Lab., Columbia Univ.). June 1, 1952. 128p. (NYO-4008).

Research report on: exposure of hamsters to 2-Mv x rays under conditions of "death under beam" and "delayed

death"; H_2O content of adrenals and intestine of mice given lethal x-ray dose; in vitro respiration studies on kidneys of x-rayed mice; increase due to x rays in absorption rate of subcutaneously injected solutions; pretreatment with cysteine confirmed as protective to lens of eye. Data show such treatment prolongs inhibitory effect of x rays on mitosis in eye. NSA 6-5716.

1095

MAMMALIAN RADIATION GENETICS. W. L. Russell. (Oak Ridge National Lab.). Aug. 11, 1952. 16p. (ORNL-1337).

General features of genetic hazards of radiation are reviewed and studies on gene mutations and chromosome aberrations compared with data obtained on Drosophila and mice. Published calculations of genetic hazards of radiation in man are evaluated. NSA 6-5717.

1096

RELEASE OF HEPARIN IN ANAPHYLACTIC SHOCK IN IRRADIATED AND NON-IRRADIATED ANIMALS.

Frank C. Monkhouse, Edward Fidler, and John C. D. Barlow. Am. J. Physiol. **169**, 712-20(1952).

Irradiated rats, guinea pigs, rabbits and dogs were tested for presence of heparin in blood before and after shock, and, when present, for its effect on clotting time. NSA 6-5718.

1097

DELAYED RADIATION EFFECTS AT HIROSHIMA AND NAGASAKI. John C. Bugher. Nucleonics **10**, No. 9, 18-21 (1952).

Present facilities available to Atomic Bomb Casualty Commission are described, and work in progress on frequency of leukemia, cataracts and genetic changes summarized. Sociological and psychological changes in inhabitants of Hiroshima and Nagasaki are noted, and post-treaty relations of the commission with the Japanese government and Atomic Energy Commission are discussed. NSA 6-5719.

1098

THE RELATIVE BIOLOGIC EFFECTIVENESS OF 200 KV AND 23.5 MEV (BETATRON) X-RADIATION. I. PRODUCTION OF LEUKOPENIA IN MICE. T. P. Tung, H. E. Johns, and L. B. Jaques. Blood **7**, 826-35 (1952).

Maximum leukocyte depression is used as basis for comparing biologic effectiveness of (1) betatron radiation and (2) 200-kv x radiation. (1) (2) ratio of effectiveness in producing 70% leukocyte reduction was 0.65 for 3 strains of mice. Recovery from leukopenia began earlier in animals given (1) than those given similar dose of (2). Data on other aspects of comparison are included. NSA 6-5722.

1099

RADIOBIOLOGICAL SURVEY OF BIKINI, ENIWETOK AND LIKIEP ATOLLS. JULY-AUGUST 1949. (Applied Fisheries Laboratory, Univ. of Washington). July 12, 1950. Decl. Sept. 15, 1952. 146p. (AECD-3446; UWFL-23).

Specimens of fish, marine invertebrates, algae, plankton, land plants, land vertebrates and water samples were collected for radioassay and identification from 3 atolls. NSA 6-5934.

1100

RADIATION STERILIZATION. I. THE EFFECT OF HIGH ENERGY GAMMA RADIATION FROM KILOCURIE RADIOACTIVE SOURCES ON BACTERIA. William Tarpley, Jan Ilavsky, Bernard Manowitz and Robert V. Horrigan. (Brookhaven National Lab. and Schering Corp.). (nd). 14p. (BNL-1227). J. Bacteriol. **65**, 505-9(1953).

Successful sterilization of steroid suspensions, heavily contaminated with bacteria, by γ -rays (from kc sources of Co^{60} and Ta^{182}) was accomplished with doses of $2.7-3.2 \times 10^6$ rep. NSA 6-5935.

1101

VEGETATIVE AND FLORAL DEVELOPMENT OF IRRADIATED PLANTS OF TRADESCANTIA PALUDOSA. James E. Gunckel, Arnold H. Sparrow, Ielene B. Morrow, and Eric Christensen. (Brookhaven National Lab.). (nd). 45p. (BNL-1228). Am. J. Botany **40**, 317-32 (1953).

Plants of Tradescantia paludosa were exposed to chronic γ irradiation from Co^{60} source for periods up to 4 months. Gross aspects of vegetative and floral growth and development described. Evidence suggests auxin or mechanism of auxin synthesis is prime site of radiation effect. NSA 6-5936.

1102

THE ROLE OF IONIZING RADIATION IN ELICITING TUMORS OF THE PITUITARY GLAND IN MICE. Aubrey Gorbman and Abraham Edelmann. (Brookhaven National Lab. and Columbia Univ.). (nd). 5p. (BNL-1232). Proc. Soc. Exptl. Biol. Med. **81**, 348-50(1952).

Pituitary tumors do not form after radiothyroidectomy of C_{57} mice by small amounts of I^{131} but result when such treatment is followed by whole-body x irradiation, or by larger amounts of I^{131} . Similar doses of x rays do not lead to growth of tumors. Ionizing radiation appears to induce atypical growths in pituitaries physiologically altered by radiothyroidectomy. NSA 6-5938.

1103

STUDIES WITH RADIOPHOSPHORUS IN DROSOPHILA. I. THE MUTAGENIC EFFECTIVENESS OF RADIOACTIVE PHOSPHORUS IN ADULT MALE DROSOPHILA MELANOGASTER. Robert C. King. (nd). 36p. (BNL-1237). J. Exptl. Zool. **122**, 541-75 (1953). NSA 6-5939.

1104

AGRICULTURAL RESEARCH PROGRAM QUARTERLY PROGRESS AND WORK ACCOMPLISHMENT REPORT FOR QUARTER ENDING JUNE 30, 1952. (Tennessee Univ.). 156p. (ORO-77).

Includes data on lowest dose of whole body radiation which, delivered to male rabbit, produces demonstrable increase in fetal mortality among his offspring. Also includes data on survival and blood chemistry in burros after whole body exposure to large doses of γ radiation. NSA 6-5940.

1105

EFFECT OF PERIPHERAL SHIELDING ON LYMPHOID TISSUE RESPONSE TO IRRADIATION IN C_{57} BLACK MICE. Henry S. Kaplan and Mary B. Brown. Science **116**, 195-6 (1952).

C_{57} mice with Pb shields over the right thigh were given 4 exposures to 168 r of x rays at 8-day intervals. Injury to thymus was unaffected by shielding, but thymic recovery was accelerated. Lymph node recovery was also accelerated, but to lesser degree. Relation between effects of thigh shielding on thymic recovery and on inhibition of thymic lymphomas suggested. NSA 6-5941.

1106

THE EFFECT OF OXYGEN CONCENTRATION ON X-RAY INDUCED CHROMOSOME BREAKAGE IN MAIZE. Drew Schwartz. Proc. Natl. Acad. Sci. U.S.A. **28**, 490-4 (1952).

Observations on pollen irradiated in air and 100% nitrogen atmospheres demonstrate effect of low oxygen concentration on radiosensitivity of maize chromosomes. Low O_2 tension protects differentially against interstitial and terminal deletions, suggesting O_2 effect is exerted on recovery process rather than on initial breakage mechanism. NSA 6-5942.

1107

REGENERATION OF X-RAY-IRRADIATED EXTREMITY OF AXOLOTL ON TRANSPLANTATION OF UNSPECIFIC

TISSUES. V. F. Sidorova. Doklady Akad. Nauk S.S.S.R. 81, 297-9 (1951). (Russian).

Right hind leg of axolotl was amputated after both hind legs received x-ray dose. Regenerative capacity, normally inhibited entirely by prior x irradiation, was restored by implanting near the wound pieces of internal organs of the axolotl or muscle tissue of frogs. NSA 6-5943.

1108
FETAL X-IRRADIATION AND FERTILITY. Roberts Rugh. Proc. Soc. Exptl. Biol. Med. 80, 388-95 (1952).

Author describes effect of sub-lethal x ray exposures on subsequent fertility of mice exposed in utero. Animals showed various degrees of sterility at 6 months of age. Data indicate that precursors of Sertoli cells, interstitial tissue and ovarian stroma are radioresistant, while primordialia of maturation stages and ovarian germinal nests are definitely radioresistant. NSA 6-5947.

1109
PROTECTIVE EFFECT OF SEROTONIN AND OF PARAAMINOPROPIOPHENONE AGAINST LETHAL DOSES OF X-RADIATION. John L. Gray, John T. Tew and H. Jensen. (Army Medical Research Lab., Fort Knox.). May 12, 1952. 10p. (AMRL-82; U-22905). Proc. Soc. Exptl. Biol. Med. 80, 604-7 (1952).

Survival rate of rats exposed to lethal x-ray dose is significantly increased after pretreatment with serotonin creatinine sulfate (20 mg/kg) or p-aminopropiophenone (32 or 16 mg/kg). Protective effect of those agents is assumed to be due to their property of producing temporary tissue anoxia. NSA 6-5948.

1110
RADIOLOGICAL HEALTH HANDBOOK. Simon Kinsman, Donald J. Nelson, Jr., Robert P. Christman, Morton I. Goldman, Henry J. L. Rechev, Richard F. Valentine, Arthur H. Wolff and Mitchell R. Zavon, comps. and eds. (Environmental Health Center, Cincinnati). Sept. 1952. 261p. (NP-4071). NSA 6-5949.

1111
X-RAY DOSAGE TO PATIENTS UNDERGOING ORAL ROENTGENOGRAPHY. W. E. Nolan. (Radiation Lab., Univ. of Calif.). July 16, 1952. 10p. (UCRL-1882). NSA 6-5950.

1112
QUANTITY OF ENERGY ABSORBED BY THE ORGANISM IN X-RAY DIAGNOSTIC STUDIES. Carlo Picchio and Carlo Martinenghi. Radiologia Med. 38, 665-669 (1952). (Italian).

Total energy received during x-ray diagnosis is compared with that administered during x-ray therapy. Most advantageous conditions for reducing radiation damage to humans is discussed. NSA 6-5952.

1113
RADIATION GENETICS. I. GENETIC ASPECTS OF RADIATION RISKS. Alma Howard. Brit. J. Radiol. 25, 177-19 (1952).

Need for policy with regard to radiation dose permissible to man based on genetic grounds is stressed. Effects of mutant genes are summarized. Studies made of radiation-induced mutations in animals are reviewed. NSA 6-5955.

1114
CHROMOSOME REJOINING CAPACITY WITH RESPECT TO BREAKAGE SENSITIVITY TO X-RAYS AND THERMAL NEUTRONS. Eleanor Deschner and A. H. Sparrow. Genetics 40, 460-75 (1955).

Various stages of microsporogenesis in *Trillium erectum* L. were irradiated with 50 r of x rays and ten minutes of thermal neutrons at $4-7 \times 10^5$ thermal neutrons per cm^2 per sec. First meiotic metaphase was highly sensitive to x rays and to thermal neutrons. Microspore interphase had low sensitivity to x rays and thermal

neutrons. With both neutron and x irradiation the amount of rejoining in cells exposed at diplotene state depended on number of fragments induced. Neutron and x ray irradiation differed with respect to production of chromosome fragmentation, regardless of stage irradiated. (From author's summary).

1115
WHITE NONSPORING MUTANTS OF *PENICILLIUM NOTATUM* CHRYSOGENUM INDUCED BY RADIOACTIVITY. M. L. Gattani. Current Sci. (India) 21, 167-8 (1952).

Monosporous cultures of *P. notatum* chrysogenum were grown on potato dextrose agar containing 0.5 and 1.0 g U nitrate/l, then transferred to media with higher U nitrate content. This promotes production of white mycelial non-sporing mutants which produce less penicillin than their parents. NSA 7-1586.

1116
THE SENSITIVITY OF LYMPHOCYTES TO IONIZING RADIATION. O. A. Trowell. J. Path. Bact. 64, 687-704 (1952).

In vitro radiosensitivity of lymphocytes of lymphoid tissue is compared with in vivo sensitivity. Dose producing 50% pyknosis in 5 hours (ED_{50}) was 275 r in vitro; 150 r in vivo. High sensitivity of lymph node lymphocytes considered to be property of cells per se. Reticular cells, monocytes and plasma cells were unaffected by doses up to 800 r. ED_{50} for lymphocytes of whole blood in vitro was 1600 r. After 400 r, whole body doses, considerable numbers of pyknotic lymphocytes are present in peripheral blood. NSA 7-1587.

1117
THERMAL-NEUTRON INDUCED EFFECTS IN *F1* MAIZE PLANTS. John Wesley Schmidt. Ph. D. Thesis, Univ. of Nebraska 1952.

An investigation of the comparative effects of exposing maize seed and maize pollen in Argonne heavy-water reactor in order to determine the effective radiations obtained from the reactor. NSA 7-1588.

1118
HYPOTHERMIA AND INCREASED SURVIVAL RATE OF INFANT MICE IRRADIATED WITH X-RAYS. John B. Storer and Louis H. Hempelmann. Am. J. Physiol. 171, 341-8 (1952).

Survival of infant mice irradiated while in state of extreme hypothermia (about 5° C) is almost twice that of litter mates exposed to same doses of total body x rays at room temperature. On basis of several series of studies designed to elucidate protective effect of hypothermia, authors conclude that lowered tissue O_2 level played important, perhaps crucial role. NSA 7-1589.

1119
NATURE OF MOUSE HOST DEFENSES IN DISEASE FOLLOWING WHOLE-BODY IRRADIATION. S. Marcus and D. M. Donaldson. Federation Proc. 13, 504 (1954).

It has been found that loss of bactericidal power after whole body radiation is not positively correlated with bacteremia. Mice are unique among mammals with regard to serum bactericidal action since their serum is devoid of such activity against a variety of saprophytic and pathogenic bacteria. (from authors' summary).

1120
NITROGEN METABOLISM FOLLOWING WHOLE BODY X-RADIATION. Gordon E. Gustafson and Simon Koletsky. Am. J. Physiol. 171, 319-24 (1952).

Authors observed marked negative N balance in rats for the first 6 days after whole-body exposure to 660 r x rays. Could not account for negative balance on basis of decreased food intake alone. Second period of negative N balance occurred during 2nd or 3rd post-exposure week, perhaps related in part to blood loss and infection. For

1st 3 days post-exposure, there was greater N excretion and more negative N balance in rats receiving 660 r than in animals receiving 1000 r. NSA 7-1591.

1121
ANOMALIES OCCURRING IN CHILDREN EXPOSED IN UTERO TO THE ATOMIC BOMB IN HIROSHIMA. George Plummer. *Pediatrics* 10, 687-93 (1952).

Observations are presented on 205 4-1/2 year old children exposed to A-bomb blast during first half of uterine life. Data indicate that central nervous system defects can be produced in the fetus by atomic bomb radiation if exposure occurs within approximately 1200 m of hypocenter, with no effective shielding. NSA 7-1592.

1122
INDIRECT INACTIVATION OF BACTERIOPHAGE DURING AND AFTER EXPOSURE TO IONIZING RADIATION. Tikvah Alper. *Discussions Faraday Soc.*, No. 12, 234-43 (1952).

Studies of variation of inactivation dose with concentration, shape of survival curves, inactivating effect of H_2O_2 and after-effect of radiation in systems composed of bacteriophages S_{13} and T_6 in varying concentrations in buffer solution after exposure to x rays, γ rays and ultraviolet light. NSA 7-1593.

1123
DIVISION DELAY BY RADIATION AND NITROGEN MUSTARD IN PARAMECIUM. R. F. Kimball, R. P. Geckler, and Nenita Gaither. *J. Cellular Comp. Physiol.* 40, 427-59 (1953).

Division delay by ultraviolet, x rays or nitrogen mustard in Paramecium involves retardation not only in first post-exposure interval but also in later intervals. Division delay varies with treatment and individual organism or individual lines of descent from same treated organism. Recovery of normal rate is usually almost complete by 6th division. NSA 7-1594.

1124
CYTOLOGICAL CHANGES FOLLOWING ROENTGEN IRRADIATION OF MOUSE LIVER. Margaret E. Wilson and Robert E. Stowell. (Kansas Univ. School of Medicine). (nd). 21p. (AECU-2390). *J. Natl. Cancer Inst.* 13, 1123-38 (1953).

Cytological changes of variable degree are observed in mouse liver 1-3 days after selective exposure of liver to x-rays in amounts to 12,000 r. Also studied effect of fasting on changes. NSA 7-1867.

1125
RADIATION EFFECTS ON CERTAIN CONSTITUENTS OF THE LIVER AND KIDNEY IN THE RAT. Jack R. Densin, Elizabeth J. Gray, John L. Gray, Frank J. Herbert, John T. Tew, and H. Jensen. (Army Medical Research Lab., Fort Knox). Nov. 20, 1952. 14p. (AMRL-104).

Liver inorganic phosphate and ATP were depressed on the 1st post-exposure day: both increased on 4th day: only ATP exceeded control level before death. Increased liver glycogen in irradiated fasting animals was not affected by adrenalectomy. Irradiation augments decrease in liver sulfhydryl content of fasting, adrenalectomized animals. NSA 7-1868.

1126
THE INCIDENCE OF ABNORMAL LYMPHOCYTES IN THE PERIPHERAL BLOOD OF RABBITS DURING AND AFTER CHRONIC X-RADIATION. F. C. V. Worman and R. E. Carter. (Los Alamos Scientific Lab.). Nov. 1952. 16p. (LA-1494).

Total exposure of 12-15 r was required to inaugurate production of abnormal lymphocytes in New Zealand white female rabbits receiving 3 r/week of 250 KVP x-rays. NSA 7-1869.

1127
ADDITIVITY OF THERMAL NEUTRONS AND X-RAYS IN

THEIR ACUTE LETHAL ACTION ON MICE. John B. Storer and Payne S. Harris. (Los Alamos Scientific Lab.). Nov. 1952. 13p. (LA-1502).

Using 30-day lethality in CF_1 mice as end effect, the radiations from the thermal column of the Los Alamos Homogeneous Reactor and a 250 KVP x-ray machine were found to be completely additive over ranges of total dose and dose ratios used. NSA 7-1870.

1128
PHARMACOLOGICAL STUDIES ON IRRADIATED ANIMALS. III. EFFECT OF SALINE ON RADIATION-INDUCED MORTALITY AND WEIGHT CHANGES. Friedrich Ellinger. (Naval Medical Research Inst., Bethesda). Nov. 17, 1952. 8p. (NM-006-012.05.09).

Daily injections of 0.3 ml. 0.9% NaCl into mice (22 g) for 6 days after $LD_{50}/14$ days exposure resulted in a statistically significant decrease in mortality rate; no effect with $LD_{50}/14$ days exposure or with saline administration for 14 days. Saline administration also influences weight curves. NSA 7-1871.

1129
THE EFFECT OF X-IRRADIATION ON THE CIRCULATING BLOOD CELLS OF THE TADPOLE OF *RANA CATESBIANA*. Ole Arne Schjeide, Mary Jane Millard and Bennet M. Allen. (Atomic Energy Project, Univ. of Calif., Los Angeles). Jan. 30, 1953. 19p. (UCLA-241).

100, 250, 500 and 1000 r of x rays markedly decreased the number of circulating blood cells. Decrease was fastest for lymphocytes and slowest for thrombocytes. No restoration noted during 25 day post irradiation period. NSA 7-1872.

1130
POST-IRRADIATION PROTECTION ACTIVITY ASSOCIATED WITH SPLEEN SUBCELLULAR COMPOUNDS. L. J. Cole, M. C. Fishler and V. P. Bond. (Naval Radiological Defense Lab.). Dec. 15, 1952. 28p. (USNRDL-378).

LAF_1 mice receiving 750 r x ray exposure are all living after 30 days if each is injected after exposure with nuclei fraction from 280 mg of mouse spleen tissue. No protection associated with mitochondria, microsome or soluble supernatant fraction. Crude nucleic acid extracts from nuclei are also inactive. Protective factor is suggested to be a nucleo-protein. NSA 7-1873.

1131
STUDIES ON THE MECHANISM OF ACTION OF IONIZING RADIATIONS: VIII. EFFECT OF HYDROGEN PEROXIDE ON CELL METABOLISM, ENZYMES AND PROTEINS. E. S. Guzman Barron, Louise Seki and Phyllis Johnson. *Arch. Biochem. and Biophys.* 41, 188-202 (1952).

Although H_2O_2 is formed in water subjected to x-irradiation, the concentration is insufficient to produce metabolic or biochemical changes of consequence. Electrolytes and protein in irradiated solutions diminished H_2O_2 formation. H_2O_2 production is proportional to x-ray exposure. NSA 7-1874.

1132
TEMPERATURE, X-RAY AND NEUTRON STUDIES ON NEUROSPORA. T. H. Goodspeed and W. S. Malloch. *Genetics* 23, 148 (1938).

1133
EFFECT OF SUB-LETHAL TOTAL BODY X-RADIATION ON SUSCEPTIBILITY OF MICE TO *CLOSTRIDIUM SEPTICUM* TOXIN. F. L. Adler and I. L. Schechmeister. (Washington Univ., St. Louis, School of Medicine). (nd). 12p. (AECU-2221). *Proc. Soc. Exptl. Biol. Med.* 80, 660-4 (1952).

Mice injected 7 days post irradiation (250 and 350 r) succumbed to about half the amount of *C. septicum* toxin required to kill non-irradiated controls. Anti-toxin given 6 days post irradiation, and 1 day before challenge with

toxin, protected both irradiated and control mice, the former requiring 1.1-2.2 times more. Severe x-ray exposure does not significantly raise amount of anti-body required for antitoxic prophylaxis. NSA 6-6240.

1134

AN ANALYSIS OF THE ROLE OF ELECTROMAGNETIC RADIATIONS IN THE MATING REACTION OF PARAMECIUM BURSARIA. Charles F Ehret. (Argonne National Lab. and Notre Dame Univ.). Aug. 1952 60p. (AECU-2232; UAC-631). *Physiol. Zool.* 26, 274-300(1953).

Increase in reactivity follows ultraviolet and x radiation. Differences in exposure time required as well as in reaction magnitude suggest that change is mediated through an indirect mechanism. Higher doses of both types (also intense flashes of visible light) induce autoagglutination. NSA 6-6241.

1135

NUCLEOPROTEIN CHANGES IN THE GASTROINTESTINAL TRACT FOLLOWING TOTAL BODY X-RADIATION. Frederick W. Tillotson and Shields Warren. (Cancer Research Inst., New England Deaconess Hospital, Boston). (nd). 24p. (AECU-2247). *Radiology* 61, 249-60 (1953).

Cytochemical alterations of DNA, RNA and alkaline phosphatase occur in epithelium of gastrointestinal tract of rat after total-body x radiation. Cells of crypts of small intestine are most sensitive and show distinctive cytochemical modifications during destructive and reparative phases. NSA 6-6242.

1136

EFFECT OF TOTAL BODY X IRRADIATION ON RATS. II. EFFECT OF SINGLE AND PERIODIC DOSES ON WEIGHT. A. THE GROWTH OF RATS EXPOSED TO SMALL DAILY DOSES OF X RAYS. George A. Sacher. (Metallurgical Lab., Univ. of Chicago). July 1952. 20p. (CH-3902).

Rats were exposed daily to 4, 8, or 16 r (x ray) for 146 days and weighed daily. Effect on growth was studied by comparing growth curves. Effect of treatment on weight of selected organs also reported. NSA 6-6243.

1137

CELL DIVISION IN THE GIANT AMOEBA PELOMYXA CAROLINENSIS, FOLLOWING X-IRRADIATION. A. THERAPEUTIC EFFECTS AFTER FUSION WITH EITHER NON-IRRADIATED LIGHT OR HEAVY HALVES OF CENTRIFUGED AMOEBAE IMMEDIATELY FOLLOWING EXPOSURE. Edward W. Daniels. Sept. 1952. 11p. (NP-4124; Report No. 5). NSA 6-6244.

1138

PLASMA ANTIHEMOPHILIC ACTIVITY FOLLOWING TOTAL BODY IRRADIATION. G. D. Penick, E. P. Cronkite, L. D. Godwin, and K. M. Brinkhous. *Proc. Soc. Exptl. Biol. Med.* 78, 732-4 (1951).

Plasma antihemophilic activity of dogs subjected to total-body irradiation remained at normal levels. Whole hemophilic blood with full complement of platelets accelerated clotting of irradiated dog's blood, while platelet-poor hemophilic plasma did not. NSA 6-6245.

1139

THE EFFECT OF COBALT⁶⁰ GAMMA RADIATION ON ANTIBODY FORMATION AND IMMUNITY. William M. Hale and Richard D. Stoner. *Record Med. Gen. Practice Clinics* 165, No. 6, 358-60 (1952).

Studies of doses of about 600 rep/hr γ radiation (Co⁶⁰ source) on antibody production and on immunity in mice exposed to influenza virus, tetanus toxin, pneumococcus and *Trichinella* show significant effect on immune mechanisms. NSA 6-6246.

1140

EFFECT OF X-IRRADIATION UPON THE ENZYME SYSTEMS OF THE MOUSE SPLEEN. Gilbert Ashwell and

Jean Hickman. *Proc. Soc. Exptl. Biol. Med.* 80, 407-10 (1952).

Total-body irradiation of mice with 640 r (LD₅₀ dose) reveals the following changes in metabolism of spleen homogenates (1) no effect on activity of succinoxidase system (2) marked increase in activity of alkaline phosphatase (especially marked with ATP as substrate) (3) decreased ability to synthesize or maintain high energy phosphorus compounds coupled with oxidation of succinate. NSA 6-6247.

1141

FACTORS INFLUENCING DEVELOPMENT OF HYPOPHYSEAL TUMORS IN MICE AFTER TREATMENT WITH RADIOACTIVE IODINE. Aubrey Gorbman. *Proc. Soc. Exptl. Biol. Med.* 80, 538-40 (1952).

Radiation thyroidectomy with I¹³¹ is followed by pituitary tumors in C₅₇ mice only after treatment with larger doses of I¹³¹. Thyroid implants or adequate thyroxine dosages prevent pituitary tumors after suitable I¹³¹ treatment, but implantation of pituitary, ovarian or adrenal tissue does not. Radiation thyroidectomy is a necessary but not the sole factor in growth of these tumors. NSA 6-6249.

1142

BLOOD-CLOTTING STUDIES ON DOGS INTERNALLY IRRADIATED WITH RADIO-GOLD. John H. Ferguson, G. A. Andrews, and Marshall Brucer. *Proc. Soc. Exptl. Biol. Med.* 80, 541-5 (1952).

Internal irradiation with Au¹⁹⁸ induces a blood coagulation defect of which prothrombin consumption test is a sensitive index. By using the test during course of irradiation, 2-stage values seem to reflect severity and probable outcome of radiation injury. NSA 6-6250.

1143

EXPERIMENTAL INVESTIGATION OF X-RAY INDUCED CHANGES IN NORMAL TISSUES. III. CHANGES IN THE LENS, RETINA AND OPTIC NERVE. (German). Wilhelm Rohrschneider. *Graefe's Arch. Ophthalmol.* 122, 282-298 (1929).

X irradiation of the rabbit eye has no effect on uvea, retina or optic nerve but does affect conjunctiva, cornea, and lens, the effects depending upon dose. BA 6-3942.

1144

A CLINICAL TRIAL OF CYSTEINAMINE (BETA-MERCAPTOETHYLAMINE) IN RADIATION SICKNESS. W. M. Court Brown. *Brit. J. Radiol.* 28, 325-6 (1955).

Cysteamine was administered i.v. to 12 patients within 3 min of commencement or 1 hr of termination of radiation (therapeutic for post-operative carcinoma). The cysteamine had no significant effect on time at which symptoms of radiation sickness developed. NSA 9-5234.

1145

BIOLOGICAL STUDIES ON THE EFFECT OF HARD X-RAYS AND RADIUM PREPARATIONS ON THE SKIN. (German). A. Reisner. *Strahlentherapie* 38, 19-26 (1930).

Concept of skin-bearable dose (HED) involves comparison of effects of hard x rays and radium rays on skin. BA 6-6684.

1146

EXPERIMENTS ON THE VALIDITY OF THE LINEAR RELATION OF MUTATION FREQUENCY TO X-RAY DOSE IN DROSOPHILA MELANOGASTER. p.153-193 OF BIOLOGICAL EFFECTS OF EXTERNAL RADIATION. (NNES VI-2). Henry A. Blair, ed. New York, McGraw-Hill Book Co., Inc. Warren P. Spencer and Curt Stern.

A stock of 200,801 X chromosomes of mature sperm were tested for the origin of new lethal mutations. For X-ray dosages as low as 50 and 25 r, the linear relation of dose to mutation frequency holds. Control mutation rate was doubled at 50 r. The relation to exposure of human

beings to low dosages of x-rays is discussed. (from authors' summary).

1147

RADIOACTIVE DUST FROM NUCLEAR DETONATIONS. Merrill Eisenbud and John H. Harley. *Science* 117, 141-7 (1953). Feb. 13.

The Atomic Energy Commission monitoring program to measure changes in radioactivity levels throughout the United States caused by nuclear detonations is described. NSA 7-2453

1148

A DESCRIPTION OF TUMORS ON IPOMOEA TUBA FROM THE A-BOMB TEST SITES ON ENIWETOK ATOLL APPENDIX TO RADIOBIOLOGICAL SURVEY OF BIKINI ENIWETOK, AND LIKIEP ATOLLS, JULY-AUGUST, 1949. Susann F. Biddulph and Orlin Biddulph. (1952). 24p. (AECD-3446(app): UWFL-23(app.).

Plant tumors are described, and it is concluded that they were radioinduced. NSA 7-2461.

1149

EFFECT OF PROLONGED ADMINISTRATION OF RADIOACTIVE ZINC⁶⁵ ON THE PANCREAS James W. Sherrill and Arne N. Wick. *J. Lab. Clin. Med.* 41, 40-2 (1953). Jan.

Radioactive Zn⁶⁵ acetate administered weekly to rats for 6-month period caused no diabetic symptoms (weight loss, glycosuria, high blood sugar). NSA 7-2462.

1150

EFFECTS OF IRRADIATION ON EMBRYONIC DEVELOPMENT. II. X-RAYS ON THE NINTH DAY GESTATION IN THE RAT. James G. Wilson, H. Charles Jordan, and Robert L. Brent. *Am. J. Anat.* 92, 153-87 (1953). Jan.

Rat embryos on the 9th day of gestation were exposed to doses of 25-400 r of x rays directly through an abdominal incision in the mother. Over-all effects of irradiation on this day were more severe than those after treatment on 10th day, owing presumably to greater susceptibility of less-differentiated 9th day embryo to mitotic delay and genic alterations. NSA 7-2463.

1151

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF 200 KV AND 23.5 MEV X-RADIATION. II. COMPARISON OF THE LETHAL EFFECT FOR YEAST. T. P. Ting, H. F. Chinn, and H. E. Johns. *Rev. can. biol.* 11, 389-400 (1952). Dec.

Results indicate biological effectiveness is dependent upon formation of intermediate products in the neighborhood of the genes. NSA 7-2465.

1152

HISTOCHEMICAL CHANGES IN IRRADIATED OVARIES. I. SUCCINIC DEHYDROGENASE ACTIVITY. Alvan G. Foraker, Sam W. Denham, and M. Harlan Johnston. *Arch. Path.* 55, 147-53 (1953). Feb.

Left ovaries of 12 rabbits were exposed to external 200-kvp irradiation for a single dose of 400 r. Four weeks later 6 were used in negative and 6 in positive Friedman tests. Little damage to stromal cells was seen either in general pattern or in succinic dehydrogenase activity, as manifested by formazan deposition in irradiated and non-irradiated ovaries. NSA 7-2466.

1153

THE RADIATION TOLERANCE OF AN ADULT WASP. Robert L. Sullivan and Daniel S. Grosch. *Nucleonics* 11, No. 3, 21-3 (1953). Mar.

Effects of various x-ray dosages and ingested P³² on the parasitic wasp *Habrobracon* were studied. Less than 108,150 r produced no visible effects and 144,200 to 180,250 r caused sluggishness from which recovery was noted in about 30 min. Life span of males and females increased after irradiation, but were not demonstrably affected by P³² ingestions of 100 and 250 µc/cc. NSA 7-2467.

1154

RADIATION INJURY OF THE KIDNEY. P. W. Davey, J. D. Hamilton, and H. D. Steele. *Can. Med. Assoc. J.* 67, 648-50 (1952). Dec.

A renal lesion consisting of marked tubular degeneration, vascular injury and interstitial scarring with slight glomerular hyalinization is presented as an example of chronic radiation injury in one of the deeply seated so-called radio-resistant organs. It is stressed that heavy exposure of abdomen or spine in kidney region may damage renal structure and function. NSA 7-2468.

1155

COMPARISON OF LOCAL AND SYSTEMIC EXPOSURES IN PRODUCTION OF RADIATION CATARACT. A. C. Upton, K. W. Christenberry, and J. Furth. *Arch. Ophthalmol.* (Chicago) 49, 164-7 (1953). Feb.

Lens opacities can be induced in mice by x rays, threshold dose being less than 15 r. Cataract did not occur if head was shielded, although body received up to 405 r. Induction time, progression, configuration and severity of opacities are about the same after exposure of head alone as after total-body irradiation, indicating protection of eyes against cataract is not afforded by shielding body. NSA 7-2470.

1156

HISTOLOGICAL CHANGES IN THE TISSUES OF THE HIBERNATING MARMOT FOLLOWING WHOLE BODY IRRADIATION. Kirkland C. Brace. *Science* 116, 570-1 (1952). Nov. 21.

Studies of the thymus, testes, spleen, and bone marrow after whole-body irradiation are summarized. Comparison with data from histological studies of non-irradiated hibernating and irradiated non-hibernating controls indicates a retardation in development of radiation damage in the hibernating animal. Relationship of rate of cell division to appearance of radiation injuries is discussed. NSA 7-2471.

1157

EFFECT OF X-RAYS ON MICRONUCLEAR NUMBER IN PARAMECIUM AURELIA. R. P. Geckler and R. F. Kimball. *Science* 117, 80-1 (1953). Jan. 23.

After x irradiation of *P. aurelia*, the fraction with less than 2 micronuclei was found to increase with increasing dose, fraction with 2 micronuclei decreased and no unequivocal change was observed in group with more than 2 micronuclei. Effect of such variation of results in genetic studies with *P. aurelia* is discussed. NSA 7-2472.

1158

PRELIMINARY REPORT ON ANEMIA IN MICE RESULTING FROM IRRADIATION OF THE EXTERIORIZED SPLEEN. Bruce Allen. *Nucleonics* 11, No. 3, 44-5 (1953). Mar. NSA 7-2473.

1159

RESEARCH ON THE VARIATIONS OF RADIOSENSITIVITY INDUCED BY CHEMICAL SUBSTANCES. QUANTITATIVE ASPECTS OF THE PROTECTIVE ACTION OF CYSTEINE ON THE LETHAL EFFECTS OF X RAYS IN *E. COLI*. Carissimo Biagini and Vinci Grossi. *Rev. Biol.* (Perugia) 44, 493-510 (1952). Oct.-Dec. (In Italian).

In all cases a very significant inverse correlation was found between log surviving fraction and x-ray dose. About 87% of lethal effect is attributed to indirect action and about 13% to direct action of x rays. NSA 7-2475.

1160

EXTENSION TO MAN OF EXPERIMENTAL WHOLE-BODY IRRADIATION STUDIES. SOME MILITARY AND CIVIL DEFENSE CONSIDERATIONS. Franklin C. McLean, John H. Rust, and Ann M. Budy. *Military Surgeon* 112, 174-82 (1953). NSA 7-2476.

1161

RADIATION EXPOSURE IN THE UNITED STATES. Dade W. Moeller, James G. Terrill, Jr., and Samuel C. Ingraham. Public Health Repts. 69, 57-65 (1953). Jan.

Sources of radiation to which the average person living in United States may be exposed during an average lifetime are reviewed, and hazards of exposure to radioactive materials and radiation-generating units in commerce, industry and research are discussed. NSA 7-2477.

1162

THE PRODUCTION OF HOMOZYGONS DEFICIENT TISSUES WITH MUTANT CHARACTERISTICS BY MEANS OF THE ABERRANT MITOTIC BEHAVIOR OF RING-SHAPED CHROMOSOMES. B. McClintock. Genetics 23, 315-76 (1938).

1163

PHARMACOLOGICAL STUDIES ON IRRADIATED ANIMALS. IV. WATER INTAKE OF GUINEA PIGS AS A PARAMETER OF ORAL DRUG ADMINISTRATION IN EXPERIMENTAL RADIATION THERAPY. Friedrich Ellinger. (Naval Medical Research Inst., Bethesda, Md.). Nov. 8, 1955. 8p. (NM-006-012.05.15).

Although irradiated animals which succumb reduce their H₂O intake prior to death, intake during the critical period for drug administration prior to death is not significantly different from controls. Oral administration of H₂O-soluble drugs is considered feasible. NSA 10-5484.

1164

USE OF CALCIUM ETHYLENEDIAMINETETRAACETATE IN TREATING HEAVY-METAL POISONING. Arch. Ind. Hyg. Occupational Med. 7, 137-47 (1953). Feb.

Conference report on research and clinical problems associated with use of this substance in accelerating excretion of lead and other heavy metals in treating metal poisoning. NSA 7-2485.

1165

PROTECTIVE MECHANISMS IN IONIZING RADIATION INJURY. Harvey M. Patt. Physiol. Revs. 33, 35-76 (1953). Jan.

Comprehensive review of present concepts. NSA 7-2478.

1166

POTENTIALITIES OF UTILIZING RADIATION FROM FISSION MATERIALS FOR THE PRODUCTION OF CANNED MEAT PRODUCTS. L. E. Brownell, L. L. Kemps, and J. T. Graikoski. (Michigan Univ.). (1952). 12p. (AECU-2450).

Problems associated with sterilizing canned meats and other foods by ionizing radiation are reviewed. Also discussed: radiation dosage required to destroy various microorganisms; animal-feeding experiments with food exposed to γ radiation: flavor and texture changes in irradiated foods. Steps necessary before food can be preserved by γ radiation on commercial basis are summarized. NSA 7-2721.

1167

CALCULATIONS OF TOLERANCE FLUX OF FAST NEUTRONS TAKING INTO ACCOUNT THE EFFECT OF ENERGY LOSS DUE TO NON-HYDROGENOUS NUCLEI IN THE TISSUE. M. B. Biram. (Atomic Energy Research Establishment, Harwell, Berks (England). 1952. 7p. (AERE-T/R-1062). NSA 7-2723.

1168

A STUDY OF COMBINED THERMAL RADIATION BURN AND X-IRRADIATION EFFECTS ON MICE. W. H. Parr, V. M. Daggs, T. A. O'Neill, and S. G. Bush. (Army Medical Research Lab., Fort Knox). Sept. 4, 1952. 11p. (AMRL-94).

Mice exposed to both total-body x rays (720 r) and thermal radiation burns (non-lethal) succumb more rapidly

than those receiving x irradiation only. Mice were burned either immediately before or after irradiation with overall result being about the same. Possible reasons for earlier and higher mortality of mice receiving both treatments is discussed. NSA 7-2724.

1169

NEUTRON RADIOBIOLOGY, RADIUM TOXICITY, EXPERIMENTAL PATHOLOGY, AND CLINICAL INVESTIGATION. Howard H. Vogel, Jr., John W. Clark, Donn L. Jordan, Robert J. Hasterlik, Mariam P. Finkel, Hermann Lisco, Austin B. Brues, Asher J. Finkel, Earl A. Hathaway, and Elaine J. Katz. (Argonne National Lab.). p.8-25 of Quarterly Report for August, September, and October, 1952; Division of Biological and Medical Research. Austin M. Brues, ed. 18p. (ANL-4932(p.8-25)).

Studied: production of cataracts in mice with fast neutrons, γ rays from Co⁶⁰ source and a mixture of both; response of mouse spleen and thymus to 90-min exposure to fast neutrons; survival and gross pathological changes in rats after dose of Pu²³⁹; protection against and treatment of NaK burns; aminoaciduria as indicator of radiation exposure. NSA 7-2726.

1170

DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT. Austin M. Brues, Ed. (1952). (ANL-4932).

Includes reports on: effect of partial-body shielding on radiation induced hypotension in chicks; growth delay in Paramecium due to irradiated media; effect of β rays of Sr⁹⁰ and Y⁹⁰ on rats; administration of human plasma fractions to mice 6 min. before exposure to 800 r of x rays; effect of weekly x radiation on organ weights of growing mice. NSA 7-2727.

1171

RADIOBIOLOGY EXPERIMENT STATION, RADIO-CHEMISTRY, PHYSICAL CHEMISTRY, PHARMACOLOGY, THEORETICAL BIOLOGY, AND BIO-PHYSICS. John F. Thomson, E. T. Mikuta, George A. Sacher, Robert E. Rowland, and Herbert E. Kubitschek. (Argonne National Lab.). p.41-71 of Quarterly Report for August, September, and October, 1952; Division of Biological and Medical Research. Austin M. Brues, ed. 31p. (ANL-4932(p.41-71)).

Studied: biosynthesis of C¹⁴-labeled sucrose and rutin; plant growth response to enriched levels of N¹⁵; excretion and tissue distribution of radioberyllium after injection of salicylic or sulfosalicylic acid; x ray effect on capacity of rats to acetylate p-amino-benzoic acid; response of rat liver tryptophane peroxidase-oxidase to total-body irradiation; x-ray effect on respiration of *E. coli*. NSA 7-2728.

1172

QUARTERLY PROGRESS REPORT NO. 6. (Air Force Radiation Lab., Univ. of Chicago). Jan. 15, 1953. 70p. (NP-4447).

Studied: ATP activity of mouse spleen and thymus after 25 r; intestinal cholinesterase in rats, mice and ground squirrels after x irradiation; effect of central nervous stimulants on response of rats to x rays; 5-nucleotidase activity of rat spleen and thymus after 100-400 r total body dose; protective effect of swine liver catalase; abdominal shielding in rats; blood catalase activity as index of susceptibility of mice to x rays at 800 r, 250 kv. NSA 7-2729.

1173

QUARTERLY PROGRESS REPORT (FOR) JULY, AUGUST, (AND) SEPTEMBER, 1952. (Atomic Energy Project, Western Reserve Univ.). 9p. (NYO-4027).

Studied: effect of nembatal on cysteine's protection against radiation damage in rats and mice; toxicity of

intravenously and intraperitoneally administered Au¹⁹⁸; effect of CaCl₂, MgCl₂, formate, tetraethyl ammonium, thiosorbitol and sorbitol on post-exposure mortality in mice; spleen-shielding in mice; effect of cysteine on Murphy sarcoma-bearing rats; thyroid uptake of radio-iodine in rats given food and water after dose; x ray effect on nucleic acid synthesis in chick embryos; cross-transfusion of irradiated and control dogs. NSA 7-2730.

1174

QUARTERLY PROGRESS AND WORK ACCOMPLISHMENT REPORT FOR QUARTER ENDING DECEMBER 31, 1952; AGRICULTURAL RESEARCH PROGRAM. (Tennessee Univ.). 152p. (ORO-90).

Studied: properties and action of Po²³³; effects of estrogen on Ca behavior in blood and bone; Ca and P blood levels and bone histology in cattle; LD_{50/30} dose for burros, swine and rabbits. NSA 7-2731.

1175

THE EFFECT OF X-IRRADIATION ON SERUM POTASSIUM AND SODIUM LEVELS IN RABBITS.

Raymond D. Goodman and Marcus Vogel. Mar. 10, 1953. 14p. (UCLA-248). Am. J. Physiol. 175, 29-32 (1953).

Rabbits were exposed to 600 to 850 r whole-body x rays; serial determinations of serum K and Na concentrations were made. No deaths from radiation shock or sickness could be attributed to significant change in these serum electrolytes. In several instances high serum K was noted at death in rabbits dying from radiation shock. This appeared to be a terminal event rather than etiologically related phenomenon. NSA 7-2733.

1176

SYMPTOMATIC DISTURBANCE AFTER SINGLE THERAPEUTIC DOSE OF X RAYS; ITS RELATIONSHIP TO THE GENERAL RADIATION SYNDROME. W. M. Court Brown. Brit. Med. J. 1, 802-5 (1953). Apr. 11.

Pattern of symptoms in a group of 50 patients consisted of latent period, acute disturbance period, and recovery period. Possibility suggested of using such clinical studies to interpret what may occur when much higher doses are received. NSA 7-2734.

1177

BIOCHEMICAL ASPECTS OF THE PLANT INJURY CAUSED BY IONIZING RADIATIONS. L. Ehrenberg, A. Gustafsson, and N. Nybom. Acta Chem. Scand. 6, 1554-5 (1952).

Seeds are 20 to 30 times more sensitive to fast neutrons than to x rays when equal doses are given. Difference between radiation sensitivities to neutrons of dormant and germinating seed is a half to a third of corresponding difference in case of x rays. Differences in behavior are probably related to difference in ionizing densities produced in tissue by neutrons and x rays. NSA 7-2735.

1178

TRANSBRONCHIAL INSTILLATION OF RADIOACTIVE GOLD COLLOID IN THE LUNG OF THE DOG; DISTRIBUTION STUDIES, SURVIVAL AND PATHOLOGY. George R. Meneely, Stewart H. Auerbach, Clarence C. Woodcock, Ross C. Kory, and Paul F. Hahn. Am. J. Med. Sci. 225, 172-7 (1953). Feb. NSA 7-2736.

1179

STUDIES ON THE PROTECTIVE ACTION OF SULFHYDRYL COMPOUNDS AGAINST X-IRRADIATION. W. H. Parr, N. Puckett, R. Ransom, S. Spradling, and A. Krebs. (Army Medical Research Lab., Fort Knox). Nov. 12, 1952. 19p. (AMRL-102).

Inhibiting effect of x rays on nucleic acid synthesis in intestinal mucosa of the rat is influenced by pretreatment of rat with cysteine indicating that the protective action of the compound involves the nucleic acid cycle. If cysteine

affords protection by other means than a shielding effect, mechanism of the effect must be an indirect one.

NSA 7-2737.

1180

MECHANISMS OF PROTECTION AGAINST MAMMALIAN RADIATION INJURY. Austin M. Brues and Harvey M. Patt. Physiol. Revs. 33, 85-9 (1953). Jan. NSA 7-2739.

1181

NATURALLY OCCURRING INFECTIONS IN UNTREATED AND STREPTOMYCIN-TREATED X-IRRADIATED MICE. Leon Gonshery, Robert Q. Marston, and Willie W. Smith. Am. J. Physiol. 172, 359-64 (1953). Feb.

With streptomycin treatment, although there was not always a significant reduction in mortality, there was always a reduction in number showing positive blood cultures and an increase in those showing negative cultures at death. This treatment also resulted in prolonged survival time independent of presence of organisms in blood at death. NSA 7-2740.

1182

PROPHYLACTIC ANTIBIOTIC THERAPY IN X-IRRADIATED ANIMALS. Wille W. Smith, Falconer Smith, H. Jeanette Ruth, Harry Y. Canter, and Marie M. Grenan. Am. J. Physiol. 172, 351-8 (1953).

Streptomycin treatment after irradiation in mice gave favorable survival results in about half the weaning batches studied over a period of 16 months, while treatments with other antibiotics and results with rats and guinea pigs were less favorable. Streptomycin blood levels and LD₅₀ were about the same in irradiated and control mice. NSA 7-2741.

1183

EXPERIMENTAL INFECTION AND STREPTOMYCIN TREATMENT IN IRRADIATED MICE. Robert Q. Marston, Leon Gonshery, Ilo M. Alderman, and Willie W. Smith. Am. J. Physiol. 172, 365-71 (1953).

Of 8 organisms tested, all but 2 strains of α -streptococcus increased mortality in mice x-irradiated with 475 r. Streptomycin was effective against *Staph. Aureus*, *Paracolon*, *E. coli* and *Proteus*; ineffective against *Pseudomonas* infections. NSA 7-2742.

1184

RADIUM AS A FOREIGN BODY. (In German). R. Mende. Ztschr. Laryng. 29(4), 170-1 (1950).

1185

METABOLISM OF CESIUM 137 IN LABORATORY AND DOMESTIC ANIMALS. S. L. Hood and C. L. Comar. (1953). 31p. (ORO-91).

Uptake, distribution, excretion, and placental transfer of tracer amounts of Cs¹³⁷ in rats, cattle, sheep, swine, and chickens were studied. High absorption of ingested Cs¹³⁷, long-term retention, non-logarithmic excretion, and species difference in excretory route and quantity observed. Tissue concentration patterns constant for species and tissues. Muscles had highest concentration; plasma lowest. Lower tissue-concentrating ability in young animals; fetuses. NSA 7-2943.

1186

LATENT CARCINOGENIC ACTION OF BETA IRRADIATION ON MOUSE EPIDERMIS. Philippe Shubik, A. Robert Goldfarb, A. C. Ritchie, and Hermann Lisco. (Chicago Medical School). (1952). 3p. (AECU-2471; Nature 171, 934-5 (1953)).

Mice irradiated on small skin area with 800 rep β radiation from a Ti²⁰⁴ source showed no tumors after 8 months, while mice similarly exposed and subsequently treated on exposed skin area with bi-weekly applications of 5% croton oil solution showed 6 animals bearing 13 tumors out of 17 survivors. NSA 7-2950.

1187

EFFECTS OF IONIZING RADIATION ON THE ADULT AND EMBRYONIC NERVOUS SYSTEM. Samuel P. Hicks. (New England Deaconess Hospital and Harvard Medical School, Boston, and Pondville State Hospital, Walpole, Mass.). (1953). 37p. (AECU-2480), Research Pubs. Assoc. Research Nervous Mental Disease 32, 439-62 (1953).

Damage to adult system is a secondary late effect resulting from slowly developing vascular damage; developing system is radiosensitive and serious malformations may follow irradiation of fetus in utero. Neuroblast is one of cells most easily destroyed by x rays. Production of ions and ionizing substances that alter enzyme function are considered as fundamental causes of radiation damage to cells. NSA 7-2951.

1188

THE RELATION BETWEEN MORPHOLOGIC AND IMMUNOLOGIC CHANGES CAUSED BY RADIATION. Frank J. Dixon and David W. Talmage. (Pittsburgh Univ., School of Medicine). (nd). 2p. (AECU-2489).

Initial phase of antibody response appears dependent on some extremely radiosensitive process, the site of which cannot be determined histologically as it is destroyed by amounts of radiation too small to produce persistent, significant morphologic change. Second phase involving actual synthesis of antibody protein is not dependent on any radio-sensitive cells or tissues. NSA 7-2952.

1189

STUDIES ON THE MECHANISM OF ACTION OF IONIZING RADIATIONS. X. EFFECT OF X-RAYS ON SOME PHYSICO-CHEMICAL PROPERTIES OF PROTEINS. E. S. Guzman Barron and P. Finkelstein. Arch. Biochem. and Biophys. 41, 212-32 (1952). Nov.

Results of x irradiation of aqueous solutions of serum albumin, serum globulin and egg albumin are described. NSA 7-1876.

1190

EFFECTS OF RADIOPHOSPHORUS P^{32} ON THE GONADS OF VIVIPAROUS CYPRINODONTES. Jean Vivien. Compt. rend. 236, 535-8 (1953). Feb. 2. (French).

Male and female *Xiphophorus helleri* H. and *Lebistes reticulatus* H. were kept for 40 days in aquarium to which had been added initially 200 μ c of P^{32} /liter. Autopsy showed gonads of all had undergone profound structural modifications. NSA 7-1877.

1191

THE EFFECT OF OXYGEN ON THE PRODUCTION BY FAST NEUTRONS OF CHROMOSOMAL ABERRATIONS IN *TRADESCANTIA MICROSPORES*. Norman H. Giles, Jr., Alvin V. Beatty, and Herbert Parkes Riley. Genetics 37, 641-9 (1952). Nov.

Results indicate that in absence of O_2 , frequencies of all types of aberrations are reduced when equal dosages of fast neutrons are compared. NSA 7-1878.

1192

EFFECTS OF DAILY IRRADIATION BY FAST NEUTRONS ON MALE FERTILITY. G. J. Neary, R. J. Munson, and R. H. Mole. Nature 171, 256 (1953). Feb. 7.

A dose of 70 rep at weekly dose rate of 8.3 rep reduced fertility of male mice to half that of controls. An accumulated dose of 100 rep halved the average weight of testis, with no recovery of fertility. With females, an accumulated dose of 140 rep in 17 weeks did not seem to affect ability to conceive or produce young. NSA 7-1880.

1193

SOME OBSERVATIONS ON THE EFFECT OF GAMMA IRRADIATION ON THE BIOCHEMISTRY OF RABBIT BONE MARROW. John F. Thompson, Wallace W. Tourtellotte, Magdalene S. Carttar, and John B. Storer. Arch. Biochem. and Biophys. 42, 185-96 (1953). Jan.

Exposure of one leg of rabbits to 310 or 620 r from a γ -ray source produced marked decrease in concentration of RNA and DNA in exposed marrow in comparison with control leg. NSA 7-1881.

1194

ENERGY ABSORPTION IN HUMAN TISSUE BY NUCLEAR PROCESSES WITH HIGH-ENERGY X-RAYS. R. J. Horsley, H. E. Johns, and R. N. H. Haslam. Nucleonics 11, No. 2, 28-31 (1953).

Energy absorption in tissue due to nuclear reactions amounts to at most 0.6% of energy absorbed in conventional manner, and probably, therefore, is of no appreciable biological significance. NSA 7-1882.

1195

THE INDUCTION OF TRANSLOCATIONS AND RECESSIVE LETHALS IN *DROSOPHILA* UNDER VARIOUS OXYGEN CONCENTRATIONS. William K. Baker and Charles W. Edington. Genetics 37, 665-77 (1952). Nov.

Translocations were induced in *Drosophila virilis* sperm by irradiating (200 r x rays) males maintained in various O_2 concentrations during treatment. Less than one-fourth as many translocations were induced in absence of O_2 as in presence of 100% O_2 . NSA 7-1883.

1196

RECOVERY IN BIOLOGY. Paul Lamarque. Presse med. 60, 1039-41 (1952). July 12. (French).

Bombyx mori silkworm eggs were exposed to single and fractionated instantaneous doses of x rays to 2000 r. Effects on recovery (measured by % of hatching), of placing eggs in incubator or refrigerator during interval between irradiations, of varying length of the interval, and of varying initial dose, were studied. Existence of a critical radiation dose for optimum recovery is discussed. NSA 7-1884.

1197

PULMONARY RADIOLESIONS SUBSEQUENT TO TREATMENT OF THORACIC LOCALIZATIONS IN HODGKIN'S DISEASE. M. Pierre-Lehman. Sang. Le. 23, 700-8 (1952). (In French).

To sterilize completely a thoracic center of Hodgkin's disease, a total x ray dose of 6500 to 7000 r must be applied to mediastinum through two fields over 15 to 25 days. Radiograms demonstrate extensive radiolesions of lungs sometimes resulting from treatment. NSA 7-1885.

1198

INFLUENCE OF THE ALIMENTARY REGIMEN ON THE RADIOSENSITIVITY OF THE GUINEA PIG. Jean Francois Duplan. Compt. rend. 236, 424-6 (1953). Jan. 26. (In French).

Guinea pigs receiving a supplement of cabbage in addition to necessary proteins were less sensitive to effects of whole-body x irradiation than those whose diet was completed with carrots. NSA 7-1888.

1199

IMMEDIATE EFFECT OF AN IRRADIATION WITH X RAYS ON THE THYROID FUNCTION IN THE RAT. Pierre Landau, Jeanne Leschi, and Maurice Tubiana. Compt. rend. 236, 240-2 (1953). Jan. 12. (In French). NSA 7-1889.

1200

THE EFFECT OF OXYGEN ON THE INDUCTION OF CHROMATID ABERRATIONS IN *TRADESCANTIA MICROSPORES* BY X-IRRADIATION. Herbert Parkes Riley, Norman H. Giles, Jr., and Alvin V. Beatty. Am. J. Botany 39, 592-7 (1952). Oct. NSA 7-1890.

1201

EFFECT OF SOFT ROENTGEN RAYS ON THE RABBIT SKIN. William R. Christensen, Sheldon C. Sommers, and Charles K. Spalding. Am. J. Roentgenol. Radium Therapy Nuclear Med. 68, 801-8 (1952). Nov.

Unfiltered 100-kv x rays produced superficial cytological effects in the skin of rabbits. At moderate dosage, effects were limited to epidermis. Single doses of 7000 to 15,000 r produced permanent pathological effects at levels extending as far as muscular layer of cutis. NSA 7-1891.

1202
SECONDARY GLAUCOMA, CATARACT AND RETINAL DEGENERATION FOLLOWING RADIATION. W. E. Fry. Trans. Am. Acad. Ophthalmol. Otol. 56, 888-9 (1952). Nov.-Dec. NSA 7-1892.

1203
MODIFICATION BY WHOLE-BODY X IRRADIATION OF GLYCOGEN UTILIZATION BY THE LIVER DURING FASTING. Marguerite Lourau. Compt. rend. 236, 422-4 (1953). Jan. 26. (In French).

Strong (2000 r) and average (1000 r) x ray doses, all lethal, had immediate effects on mice and guinea pigs, resulting in increased liver glycogen. Strong doses acted by preserving existing reserves and favoring gluconeogenesis. Average doses maintained second mechanism only. Sublethal doses (500 r) had no immediate effect. NSA 7-1893.

1204
AN INVESTIGATION INTO THE REMOVAL OF RADIOACTIVE CONTAMINATION FROM THE HANDS. James Gregory. Brit. J. Ind. Med. 10, 32-40 (1953). Jan.

Ten cleansing agents compared of these white Windsor soap and a mixture of equal parts of soap-powder and wood-flour were found most effective for cleansing hands of contamination with substances containing U and Ra. NSA 7-1894.

1205
RESULTS OF EXAMINATIONS OF IMPAIRED HEALTH OF RADIUM AND X-RAY WORKERS. Marie Rejsková. Pracovní Lékařství 4, 200-7 (1952). June 15. (In Czech).

Analysis made of 1685 examinations of 442 persons working with Ra and x rays followed over a number of years, including medical personnel and industrial x ray workers. Since absolute exposures were not known, relative exposure (length of time individuals worked with one or the other) is used. Changes in skin and blood counts are described. NSA 7-1896.

1206
PROTECTIVE EFFECT OF SUCCINONITRILE AGAINST A LETHAL WHOLE-BODY IRRADIATION IN THE RAT. L. Mazzanri and M. Franchi. Arch. ital. sci. farmacol., 261-2 (1952). July. (In Italian).

Three groups of rats were given 500 r whole-body x irradiation. Control group, given no medication, all died in 10 days. Second lot, given 8 mg/g intraperitoneal injection of succinonitrile before exposure, all died in 7 days. Of third group, given equal injection subcutaneously for 3 days before exposure, 33% died in 15 days, while 67% survived indefinitely in good health. Mean survival times, respectively 148 hr, 104 hr, and 289 hr. NSA 7-1897.

1207
DECREASE IN RADIOSENSITIVITY OF THE RAT AND GUINEA PIG BY THE ANTERIOR PITUITARY GROWTH HORMONE. Antoine Lacassagne and Herbert Tuchmann-Duplessis. Compt. rend. 236, 440-3 (1953). Feb. 2. (In French).

Somatotropic hormone, injected daily in almost lethal 1 mg doses for 6 days before or after whole-body x irradiation (guinea pigs-150 r, rats-250, 300, 500 or 900 r), decreased radiosensitivity of animals. In guinea pig, only protective effect exerted; in rat, both protective and curative action noted. Increased radioresistance therefore not due to hyperglycemia. NSA 7-1898.

1208
MODIFICATION OF ACUTE IRRADIATION INJURY IN MICE AND GUINEA PIGS BY BONE MARROW INJECTIONS. Egon Lorenz, Charles Congdon, and Delta Uphoff. Radiology 58, 863-77 (1952). June.

Action of heterologous bone marrow injections in reducing irradiation induced mortality of mice and guinea pigs suggests a humoral (non-cellular) factor. Superior protective action of homologous bone marrow, however, may indicate a cellular factor in addition. NSA 7-1899.

1209
EFFECT OF LEUKOCYTE-PROMOTING FACTOR (LPF) ON SURVIVAL OF X-IRRADIATED MICE. J. B. Storer, P. Sanders, and C. C. Lushbaugh. Proc. Soc. Exptl. Biol. Med. 81, 541-2 (1952). Nov.

Treatment of irradiated mice with leukocytosis-promoting factor did not significantly increase their 30-day survival, suggesting that if survival of irradiated mice with normal-spleen implants is due to humoral factor released by spleen, such factor is unrelated to specific leukocyte-promoting factor obtained from sterile exudates. NSA 7-1900.

1210
ATOM BOMB RADIATION SICKNESS REPORT FROM HIROSHIMA. Koichi Ishibachi. Merck Rept. 62, 18-20 (1953). Jan.

Summary of clinical observations made on 108 patients with clear case record of radiation sickness, from time of atom bombing (August 6, 1945) until January, 1946, and an additional 62 patients admitted to Kusatsu Hospital in 1946. Study deals only with those who suffered directly or indirectly from radiation at time of atom bomb explosion. NSA 7-1901.

1211
AN EXPERIMENTAL STUDY OF THE DIRECT AND INDIRECT EFFECTS PRODUCED BY X-RAY IRRADIATION AND BY RADIOACTIVE ISOTOPES, WITH SPECIAL REFERENCE TO THE PROTECTIVE ROLE OF THE SPLEEN: FINAL REPORT. (Stanford Research Inst.). Nov. 1, 1952. 23p. (AECU-2491).

Spleen's protective role in mouse not confirmed in rat. NSA 7-2953.

1212
ENDOCRINE CHANGES AFTER TOTAL BODY IRRADIATION IN PARABIOTIC RATS. Sheldon C. Sommers. (1952). 18p. (AECU-2493); J. Lab. Clin. Med. 42, 396-407 (1953).

Morphologic study of endocrine alterations in parabiotic rats during short intervals post-irradiation is reported. Aside from radiosensitive gonadal tissue, few endocrine gland changes were observed, except after prior hemi-adrenalectomy. NSA 7-2954.

1213
A QUANTITATIVE COMPARISON OF THE ANTIBODY PRODUCED BY X-RADIATED AND NORMAL RABBITS. Paul H. Maurer, Frank J. Dixon, and David W. Talmadge. (Pittsburgh Univ., School of Medicine). (1953). 10p. (AECU-2498); Proc. Soc. Exptl. Biol. Med. 83, 163-6 (1953).

Antibody formed by rabbits irradiated with 400 r of whole body x radiation prior to, simultaneously with, or after immunization, and by rabbits radiated with 800 r after immunization, although often reduced in amount was indistinguishable from that formed by nonradiated rabbits. NSA 7-2955.

1214
COMPARISON OF PATHOLOGIC EFFECTS OF RADIATION IN WEANLING AND ADULT RATS. George W. Casarett.

(Atomic Energy Project, Univ. of Rochester). Feb. 17, 1953. 25p. (UR-239); Arch. Pathol. 55, 393-402 (1953).

Presented are histopathologic, hematologic and clinical data on adult and 4-week-old rats given single total-body dose of 800 r of x rays (250 kv, unfiltered; HVL equivalent to 0.34 mm Cu). Weanling rats exhibited greater degree of acute illness than did adults, presented shock-like picture, and suffered high mortality between 3rd and 4th post-radiation day. NSA 7-2959.

1215
QUARTERLY TECHNICAL REPORT (FOR) OCTOBER 1, 1952 THROUGH DECEMBER 31, 1952. (Atomic Energy Project, Univ. of Rochester). Feb. 26, 1953. 41p. (UR-242).

Reports on: ultrafiltration apparatus for clearing various ions in biological work; Rn damage to lungs; preparation of iodine free Cr(VI) for use with H₂SO₄ in protein-bound I determination; variable factors affecting degree of I¹³¹ binding in in vitro iodination of rabbit serum proteins. NSA 7-2960.

1216
RADON INHALATION STUDIES IN RATS. S. H. Cohn, R. K. Skow, and J. K. Gong. (Naval Radiological Defense Lab.). Nov. 17, 1952. 17p. (USNRDL-380); Arch. Ind. Hyg. and Occupational Med. 71, 508-15 (1953).

In calculating the relative amount of radiation received by lungs of animals exposed to a radon atmosphere, decay products of Rn also present in this atmosphere are of primary importance. NSA 7-2961.

1217
THE EFFECT ON THE THYROID GLAND AND THE GONADS FOLLOWING CHRONIC TREATMENT OF MICE WITH LOW DOSES OF RADIOIODINE (I¹³¹). Roberts Rugh. J. Exptl. Zool. 122, 151-68 (1953). Feb.

Pathological effects of weekly injections of graded doses of I¹³¹ for 6 months on thyroids and gonads of mice are described in detail. NSA 7-2963.

1218
EFFECT OF ROENTGEN RAYS ON MICROSPORUM AUDOUINI. AN IN VITRO STUDY. Kurt Loewenthal. Arch. Dermatol. and Syphilol. 67, 191-3 (1953). Feb.

Two strains of Microsporum audouini received 1 exposure each of 340 r (unfiltered) x rays. Neither irradiated colonies nor descendants showed gross or microscopic changes attributable to exposure. Microsporum canis under same conditions showed acceleration and intensification of pleomorphism and degradation of fuseaux formation. NSA 7-2964.

1219
THE EFFECT OF X RADIATION ON THE RESPIRATION OF ESCHERICHIA COLI. Daniel Billen, G. E. Stapleton, and Alexander Hollaender. J. Bacteriol. 65, 131-5 (1953). Feb. NSA 7-2965.

1220
URINARY EXCRETION OF DESOXYRIBONUCLEASE IN X-RADIATED RATS. O. D. Kowlessar, K. I. Altman, and L. H. Hempelmann. Arch. Biochem. and Biophys. 43, 240-1 (1953). Mar.

Progressive increase in urinary DNA-ase activity up to 5th day was observed in x-irradiated rats. NSA 7-2966.

1221
POSTIRRADIATION RELEASE OF ADENOSINE TRIPHOSPHATE FROM ESCHERICHIA COLI B/r. D. Billen, B. L. Strehler, G. E. Stapleton, and E. Brigham. Arch. Biochem. and Biophys. 43, 1-10 (1953). Jan. NSA 7-2967.

1222
EFFECT OF X RAYS, CYANIDE, AND VARIOUS RADIATION-PROTECTIVE AGENTS ON THE INFUSORIA. Z. M. Bacq, H. Mugard, and A. Herve. Acta. Radiol. 38, 489-505 (1952). Dec. (In French).

Close parallelism exists between resistance to x rays and to cyanide of 4 species of histophagous infusoria (Ophrioglenidae). Histochemical studies on irradiated infusoria show carbohydrate changes only. Cysteine mixed with NaCN protects Ophrioglenidae against lethal threshold dose of x rays. Cysteine or cyanide alone, Na pyruvate and β , β -aminoethyl disulfide have weaker action and on certain species only. NSA 7-2968.

1223
SMALL-SCALE ANATOMICAL PECULIARITIES OF THE BACK OF THE HAND AND THEIR SIGNIFICANCE FOR X IRRADIATION OF MALIGN NEOPLASMS IN THIS REGION. Franz Aichinger. Strahlentherapie 89, 257-64 (1952). (In German). NSA 7-2969.

1224
HAZARD DUE TO BETA RADIATION FROM FISSION PRODUCTS DEPOSITED ON THE GROUND AFTER AN ATOMIC EXPLOSION. F. S. Goulding and G. Cowper. (Chalk River Project (Canada). Jan. 1953. 14p. (CREL-529). NSA 7-2970.

1225
THE ORIGIN OF PERICHONDritis IN IRRADIATION OF TUMORS OF THE LARYNX. Z. Hlasivec. Casopis Lekaru Ceskych 87, 680-82(1948). NSA 4-1847.

1226
POLONIUM INDUCED ANEMIA IN RATS AS STUDIED WITH ALPHA-C¹⁴-GLYCINE. R. G. Thomas, K. I. Altman, J. N. Stannard, and K. Salomon. (Atomic Energy Project, Univ. of Rochester). Dec. 9, 1952. 13p. (UR-224); Radiation Research 1, 180-8 (1954). NSA 7-2982.

1227
X-RAY AND ULTRAVIOLET INDUCED MUTATIONS IN NEUROSPORA. C. C. Lindergen, and G. Lindergen. Genetics 27, 154 (1942).

1228
THE EFFECTS OF RADIATION IN VITRO ON OXIDATIVE PHOSPHORYLATION AND ADENOSINE TRIPHOSPHATASE. Margery G. Ord and L. A. Stocken. Brit. J. Radiol. 28, 279-82 (1955).

Neither oxidative phosphorylation nor ATPase was affected by in vitro γ radiation (300-700 r from radium and iridium sources) of rat spleen mitochondria or spleen homogenates although doses administered have been found effective in uncoupling oxidative phosphorylation when applied to spleen in vivo. Possible explanation for negative results considered. NSA 9-4674.

1229
FATE OF ASCORBIC ACID IN EARLY RADIATION DAMAGE. Peter D. Klein, Dorothy T. Handa and Robert W. Swick. Proc. Soc. Exptl. Biol. Med. 90, 204-8 (1955). NSA 10-523.

1230
PROTEIN CHEMISTRY, IMMUNOCHEMISTRY, AND CLINICAL INVESTIGATION. p. 52-95 OF SEMI-ANNUAL REPORT. (Sloan-Kettering Inst. for Cancer Research). Feb. 1, 1952. 44p. (AECU-2463(p.52-95)).

Studied: organic and physicochemical aspects of nucleic acids and related compounds; capacity of thyroid cancers to collect I¹³¹; optimal dose of I¹³¹ for hyperthyroidism; post-irradiation changes in physiology of man; quantitative comparison of effects of equal doses of various ionizing radiations on alkaline phosphatase activity of mouse bone. NSA 7-3297.

1231
EFFECT OF SUBLETHAL TOTAL BODY X-RADIATION ON SUSCEPTIBILITY OF MICE TO SALMONELLA ENTERITIDIS AND ESCHERICHIA COLI. I. L. Shechmeister, L. J. Paulissen, and M. Fishman. (Washington Univ., School of Medicine, St. Louis). (1953).

14p. (AECU-2520); Proc. Soc. Exptl. Biol. Med. 83, 205-9 (1953).

Mice were challenged intraperitoneally with *S. enteritidis* over 30-day period after whole-body dose of 50-350 r. Susceptibility to infection was higher 8 hr after 250-350 r, but not after 50 r. Susceptibility to *E. coli* increased 1 day after 200-450 r; declined but was not absent 60 days after 450 r and 11 days after 200-350 r. Susceptibility to *E. coli* was maximal 11 days after 50 r. NSA 7-3301.

1232

THE EFFECTS OF IONIZING RADIATION, CERTAIN HORMONES, AND RADIOMIMETIC DRUGS ON THE DEVELOPING NERVOUS SYSTEM. Samuel P. Hicks. (New England Deaconess Hospital, Boston and Harvard Medical School, Boston). (1953). 31p. (AECU-2521); J. Cellular Comp. Physiol. 43, Suppl. 1, 151-78(1954).

Metabolic machinery for differential growth is seen as intimately related to certain sulphydryl enzymes, and these may be the common meeting ground for effects produced by such diverse agents as radiation, triethylene melamine and certain steroids. NSA 7-3302.

1233

EFFECT OF BETA RADIATION UPON BIOCHEMICAL OXIDATION IN POLLUTED WATER. Rolf T. Skrinde and Clair N. Sawyer. (Sedgewick Labs. of Sanitary Science, Mass. Inst. of Tech.). Sept. 30, 1952. 55p. (NYO-4438).

Inhibitory effects of P^{32} on waste purification by biochemical oxidation in natural and synthetic sewage are reported. In full strength substrates, P^{32} effect on oxidation appears rather erratic, being distinctly inhibitory to oxidation in synthetic sewage at concentrations of 60 and 80 mc/l while failing to show effect in undiluted domestic sewage. NSA 7-3303.

1234

AN ELECTROPHYSIOLOGICAL STUDY OF SOME PROPERTIES OF THE VERTEBRATE RETINA (thesis). Leo E. Lipetz. (Radiation Lab., Univ. of Calif., Berkeley). Jan. 1953. 147p. (UCRL-2056).

Comparison of responses to light and to x radiation indicate that they both excite the same retinal processes; x rays exert desensitizing action on some retinal photochemical processes. Radiation may be useful for study of vision as it affects processes essential to vision but unaffected by light. NSA 7-3304.

1235

THE CAUSE OF INCREASED SUSCEPTIBILITY TO AVIRULENT PASTEURELLA PESTIS AFTER EXPOSURE TO A SUBLETHAL DOSE OF X IRRADIATION. M. S. Silverman, P. H. Chin, V. Greenman, and J. C. Young. (Naval Radiological Defense Lab.). Jan. 4, 1953. 17p. (USNRDL-389).

Increased mortality in mice due to increased susceptibility to plague endotoxin rather than to lowered resistance permitted avirulent organisms to multiply and invade host. NSA 7-3305.

1236

EFFECT OF X-IRRADIATION ON FAT BALANCE AND ON LIPID AND VITAMIN A CONTENT OF THE LIVER. John G. Coniglio, William J. Darby, Mary Catlet Wilkerson, Richard Stewart, Ann Stockell, and Granville W. Hudson. Am. J. Physiol. 172, 86-92 (1953).

Fat absorption in rats given single dose of 500 or 650 r was studied over a 28-day period. There was no significant difference in amount of fat excreted in post-irradiation period in irradiated and pair fed controls nor was there significant post-irradiation change in total lipids, phospholipid, total cholesterol, or in liver vitamin-A concentrations due to irradiation. NSA 7-3307.

1237

ROENTGEN-RAY CATARACT. EFFECTS OF SHIELDING OF THE LENS AND CILIARY BODY. A. J. Alter and P. J. Leinfelder. Arch. Ophthalmol. (Chicago) 49, 257-60 (1953). Mar.

Cataract is not caused by x ray exposure when lens is protected by 2 mm lead shield. Equatorial portion of lens is most sensitive to x ray injury; pupillary zone least sensitive. Exposure of one quadrant of lens results in opacities limited to that quadrant. NSA 7-3308.

1238

A HISTOCHEMICAL STUDY OF NORMAL AND IRRADIATED SALIVARY GLAND TISSUE IN THE MOUSE. M. S. Burstone. Anat. Record 115, 543-57 (1953). Mar.

Irradiation from P^{32} decreases stainability of submaxillary gland alveoli as compared with sublingual gland, and increases water solubility of periodic acid-Schiff positive components of both glands. On basis of this study submaxillary exhibits greater radiosensitivity than sublingual gland. NSA 7-3309.

1239

ABERRANT GROWTH IN PLANTS INDUCED BY IONIZING RADIATION. J. E. Gunckel and A. H. Sparrow. Brookhaven Symposia in Biol. 6, 252-79 (1954).

1240

THE BEHAVIOR OF AN X-RAY-INDUCED CHROMOSOME IN MAIZE. Drew Schwartz. Am. Naturalist 87, 19-25 (1953). Jan.-Feb.

By crossing over in ring-rod heterozygotes and breakage of resultant anaphase bridges, ring is frequently converted into rod chromosome. Some rods carry duplication and are transformed back to rings in subsequent meiosis. Inclusion of nucleolar organizer in anaphase bridge results in high frequency of aberrant spore quartet types. NSA 7-3311.

1241

HISTOCHEMICAL INVESTIGATION OF ALKALINE PHOSPHATASE BEHAVIOR IN KIDNEY AND DUODENUM IN ADRENALECTOMIZED AND IRRADIATED RATS. Duccio Palazzi. Arch. "E. Maragliano" patol. e clin. 7, 821-36 (1952). Sept.-Oct. (In Italian).

Renal and duodenal alkaline phosphatase diminished slightly in adrenalectomized female rats; increased in proportion to dose in rats whole-body irradiated with 750, 1500, or 3000 r of 170-kv x rays; and decreased sharply in rats both adrenalectomized and 750 r whole-body irradiated. NSA 7-3313.

1242

CONTRIBUTION TO THE PROBLEM OF PROTECTIVE AGENTS AGAINST RADIATION EFFECTS. Kurt Erdmann. Naturwissenschaften 40, 147 (1953). Feb. (In German).

Euglobulin solutions, with and without cysteine, ascorbic acid, NaN_3 , glutathione, or Na thioglycolate were irradiated with ultraviolet or x rays. Protective agents prevented turbidity even at 56° C. Application of effect tested on Unio mussel eggs. Na thioglycolate prevented coagulation, while cysteine, thioglycolic and ascorbic acids had no effect, perhaps due to non-penetration of nuclear membrane. NSA 7-3314.

1243

DEVELOPMENT OF BACTERIOPHAGE IN X-RAY INACTIVATED BACTERIA. Louis W. Labaw, Vernon M. Mosley, and Ralph W. G. Wyckoff. J. Bacteriol. 65, 330-36 (1953). Mar.

Better growth of bacteriophage on x irradiated bacteria (*E. coli*) than on ultraviolet irradiated bacteria was observed. Effect of two irradiations on metabolism is discussed. NSA 7-3315.

1244

HEMATOLOGICAL DISTURBANCES IN GUINEA PIGS

BEARING A MALIGNANT TUMOR. P. Mendeleeff. *Compt. rend. soc. biol.* 146, 1432-4 (1952). Sept. (In French).

400 r Ra irradiation applied to right flank of guinea pigs, and 2 cg methylcholanthrene injected. Resultant reticulum sarcoma at point of injection causes changes in cellular composition of blood, general anemia with intraperitoneal hemorrhages and stimulation of hemopoiesis of spleen. Successive grafts of tumor to healthy guinea pigs have same effects. NSA 7-3316.

1245

INFLUENCE OF THE SUPRARENAL HORMONES UPON THE HEMATOPOIETIC REGENERATION OF THE IRRADIATED RAT. H. Betz. *Compt. rend. soc. biol.* 146, 1423-6 (1952). Sept. (In French).

Daily injections of desoxycorticosterone acetate did not modify lymphoid regeneration in irradiated rats, but stimulated myeloid regeneration on 6th and 7th day post irradiation. Centers of erythropoiesis appeared in the liver. Cortisone (5 mg daily) did not affect lymphoid and myeloid regeneration, but 10 mg daily blocked both almost entirely. Thymus regeneration was stopped by the 5 mg cortisone dose. NSA 7-3317.

1246

NATURE OF THORIUM-X ACTION ON HUMAN SKIN. Victor H. Witten and Marion B. Sulzberger. *Hautarzt*, Der 3, 521-7 (1952). Nov. (In German).

Besides direct effect of ThX (Ra²²⁴) and its decay products on skin, internal effects result from penetration of radioactive atoms in 4 ways: diffusion of thoron, penetration of vehicle in which it is incorporated, penetration of ThX-bearing H₂O separated from vehicle, and penetration by means of sweat and sebaceous matter. NSA 7-3318.

1247

THE EFFECT OF HIGH INTENSITY ELECTRON BURSTS ON ANTIBODIES. Frederick Bl Traub, Arno Brasch, and Wolfgang Huber. *J. Immunol.* 70, 366-71 (1953). Apr.

Observed changes in antibodies could not be correlated with molecular weight, state of purification and concentration of antibody in serum. Dose-temperature dependence was demonstrated, and explanation discussed. Effect of dilution on radiation-inactivation of antibodies was studied and significance evaluated. Results discussed in relation to target theory. NSA 7-3319.

1248

THE EFFECTS OF SPLEEN SHIELDING AND SUBSEQUENT SPLENECTOMY UPON ANTIBODY FORMATION IN RATS RECEIVING TOTAL-BODY X-IRRADIATION. R. W. Wissler, M. J. Robson, F. Fitch, W. Nelson, and L. O. Jacobson. *J. Immunol.* 70, 379-85 (1953).

Spleen-shielding abolished depressant effect of x rays on circulating antibody formation in rat whether antigen was given intravenously or peritoneally. Splenectomy alone suppressed antibody regardless of time antigen was given with respect to removal. No effect when antigen was given intraperitoneally. NSA 7-3320.

1249

EFFECTS OF X-RAYS ON THE FORMATION OF LACTASE IN A LYSOGENIC STRAIN AND SENSITIVE STRAIN OF *ESCHERICHIA COLI*. Charles Yanofsky. *J. Bacteriol.* 65, 383-7 (1953). Apr.

X ray doses affecting viability of the 2 strains have only slight effect on ability to form lactase adaptively. K-12 releases lactase when incubated with lactose, post-irradiation due to lysis of cells in which phage production was induced by irradiation. Release of lactase and phage from cells upholds view that formation of the two can occur simultaneously. NSA 7-3321.

1250

DIFFERENTIATION AS A DETERMINANT OF THE

REACTION OF RAT EMBRYOS TO X-IRRADIATION.

James G. Wilson, Robert L. Brent, and H. Charles Jordon. *Proc. Soc. Exptl. Biol. Med.* 82, 67-70 (1953). Jan.

X irradiation of rat embryos on 8th day of gestation has more limited effect on subsequent development than does similar treatment on 9th or 10th days. Difference in reactivity appears dependent on whether cellular differentiation within embryos has begun at time of irradiation. NSA 7-3322.

1251

THE RADIOACTIVITY OF THE NORMAL HUMAN BODY. A CONTRIBUTION TO THE PRESENT SITUATION. A. T. Krebs. (Army Medical Lab., Fort Knox). Jan. 12, 1953. 14p. (AMRL-109).

Latest value for basal radioactivity of human body according to Sievert is 1.03×10^{-8} g of γ radiation Ra equivalent. Problem of basal radioactivity is more complicated than anticipated. Intensity x time law used to estimate permissible total-body exposure. NSA 7-3323.

1252

STUDIES ON THE MECHANISM OF ACTION OF THERMAL NEUTRONS IN PRODUCING BIOLOGICAL EFFECTS. I. LACK OF EFFECT OF HYPOXIA AND GLUTATHIONE IN ALTERING MORTALITY IN MICE. John B. Storer, L. Edward Ellinwood, Wright H. Langham, and Phyllis Sanders. (Los Alamos Scientific Lab.). Mar. 1953. 24p. (LA-1527).

Pretreatment with p-aminopropiophenone or glutathione protected mice against total-body x radiation but not against thermal column radiation. Data suggest that tissue O₂ tension may be a factor in difference in effectiveness of neutrons and x rays in various tissues. NSA 7-3324.

1253

PROTECTIVE ACTION OF β -MERCAPTOETHYLAMINE IN THE CASE OF RATS IRRADIATED IN TOTO. G. Lambert, J. Maisin, and M. Mandart. *Compt. rend. soc. biol.* 146, 1434-5 (1952). Sept. (In French).

Rats were given 15 mg intraperitoneal dose of 2-mercaptoethylamine immediately prior to 700 r of x rays. This dose lowered mortality rate, delayed death and raised lethal dose. NSA 7-3328.

1254

BONE MARROW IMPLANTS IN THE TREATMENT OF RADIATION SICKNESS. John M. Talbot, and Herbert B. Gerstner. (School of Aviation Medicine, Randolph Air Force Base, Texas). Sept. 1951. 16p. (ATI-116834). NSA 7-3329.

1255

RADIATION SICKNESS; A MEDICAL SURVEY OF THE IMMEDIATE EFFECTS ON THE VICTIMS OF THE NAGASAKI A-BOMBING. Masao Shiotsuki. *Oriental Economist* 21, 30-4 (1953). Jan.

Account of the atomic bombing of Nagasaki; immediate clinical symptoms and anatomical observations on survivors. Pathological observations on 2000 patients treated during 1st month after explosion are summarized. NSA 7-3330.

1256

PATHOLOGICAL CHANGES FOLLOWING INTRACAVITARY THERAPY WITH COLLOIDAL Au¹⁹⁸. Ralph M. Kniseley and Gould A. Andrews. *Cancer* 6, 303-12 (1953). Mar.

Twelve patients with advanced cancer treated with Au¹⁹⁸ were studied at autopsy. Au¹⁹⁸ absorbed on cavity surface, precipitates in relatively large aggregates and is phagocytosed. Frequent fibrous thickening of pleura or peritoneum found, usually without extensive adhesions. Radiation damage to tumor was not prominent; limited to

very superficial zones. Morphologic evidence of whole-body radiation was minimal. NSA 7-3334.

1257

EXPERIENCES IN THE CLINICAL APPLICATION OF RADIOACTIVE PHOSPHORUS. F. Odenthal and K. Philipp. *Munch. med. Wochschr.* **47**, 2363-70 (1952). Nov. 21. (In German).

Therapy of several cases of polycythemia vera and chronic myeloid leukemia with P^{32} are reviewed. Changes in blood picture are presented graphically. NSA 7-3335.

1258

A GENE FOR LONG CHROMOSOMES IN BARLEY. G. R. Burnham. *Genetics* **31**, 121-3 (1946).

1259

DESTRUCTION OF THE BRAIN OF MOUSE EMBRYOS ON THE 13TH DAY OF GESTATION BY X-RAY IRRADIATION. A. Raynaud and M. Frilley. *C. R. Soc. Biol.* **141**, 658 (1947). (In French).

1260

PATHOLOGICAL CHANGES EXHIBITED BY ANIMALS EXPOSED TO SINGLE DOSES OF X-RADIATION. Roger G. Metcalf, Richard J. Blandau, and Thomas B. Barnett. p.11-57. BIOLOGICAL EFFECTS OF EXTERNAL RADIATION. (National Nuclear Energy Series VI-2). Henry A. Blair, ed. New York, McGraw Hill Book Co., Inc., 1954.

Albino rats were exposed to a single dose of 550 r of whole-body radiation. Degeneration was observed in lymph nodes, spleen, bone marrow, spermatogonia, ovarian follicles, and the gastrointestinal tract. Lymphocytes were affected and anemia occurred. Megakaryocytes were reduced. Deaths were attributed to septicemia. (from authors' abstract).

1261

THE EXPERIMENTAL PRODUCTION OF RADIATION CATARACTS BY FAST NEUTRONS. Campbell Moses, Jay G. Linn, Jr., and Alexander J. Allen. (Addison H. Gibson Lab., Univ. of Pittsburgh School of Medicine and Sarah Mellon Scaife Radiation Lab., Univ. of Pittsburgh School of Medicine). (Mar. 10, 1953). 9p. (AECU-2527). *Arch. Ophthalmology* **50**, 609-12 (1953). NSA 7-3682.

1262

REPORT OF THE MEDICAL EXAMINATION ON THE 78 HIROSHIMA PATIENTS WITH RADIATION CATARACTS. Paul G. Filmore. (Atomic Bomb Casualty Commission). July 20, 1951. 13p. (NP-4451; NP-4560).

Cataracts are the only late effects observed that are attributable to radiation exposure 5 yrs after bombing. Fifty percent or more of patients received near-lethal whole-body radiation exposure. NSA 7-3683.

1263

MEDICAL SURVEY OF ATOMIC BOMB CASUALTIES. Rausuke Shirabe. (Nagasaki Medical School, Nagasaki (Japan)). (nd). 32p. (NP-4556; NP-4561). NSA 7-3684.

1264

SYMPOSIUM OF EXPOSED SURVIVORS HELD (in) HIROSHIMA (on) MARCH 28, 1952. (Hiroshima Communications Hospital (Japan)). 25p. (NP-4557; NP-4562).

Summary of experiences of 19 staff members of Hiroshima Communications Hospital at time of atomic explosion and during period following. NSA 7-3685.

1265

BIBLIOGRAPHY OF A-BOMB MATERIAL COLLECTED THROUGH APRIL 17, 1952. (Atomic Bomb Casualty Commission). 27p. (NP-4552; NP-4563).

Published and unpublished material on effects of atomic bombing at Hiroshima and Nagasaki are listed. Field observations on radioactivity and clinical data on survivors are included. NSA 7-3686.

1266

FOOD IRRADIATION AND ASSOCIATED STUDIES; PROGRESS REPORT DEC. 1, 1952. (Columbia Univ.). 69p. (NYO-3319; Progress Report 3).

Studied mechanism of γ -induced oxidation of ferrous sulfate; effect of γ radiation on vitamin A in butter, cheese, cream and margarine; on tocopherols and peroxides in wheat germ oil; on *A. javanicus* and oleic acid; animal feeding tests with foods exposed to high-energy radiations; mechanism of riboflavin destruction; induced resistance to γ radiation in *E. coli*. NSA 7-3687.

1267

THE CAPACITY OF THE ANTERIOR PITUITARY GLAND TO FUNCTION AFTER HEAVY IRRADIATION. Bennet M. Allen, Ole A. Schjeide, Ronald T. Piccirillo, and Gerald Kowitz. (Atomic Energy Project, Univ. of Calif., Los Angeles). Apr. 28, 1953. 25p. (UCLA-254) *J. Exptl. Zool.* **124**, 131-45 (1953).

Pituitary glands of heavily irradiated recently metamorphosed donor toads were transplanted into immature tadpoles. Stimulation was measured by growth of hind limbs and shedding of larval teeth. X rays to 20,000 r reduced activity of transplants, while 50,000 to 200,000 r γ radiation permitted slight but significant growth; caused gross injury to transplants. NSA 7-3688.

1268

BLOOD RETENTION OF INTRAVENOUSLY INJECTED COLLOIDAL PRODIGIOSIN IN NORMAL AND X-IRRADIATED RABBITS. AN INDEX OF PHAGOCYTIC FUNCTION IN THE RE SYSTEM. George V. Taplin, Camille Finnegan, Philip Noyes, and Gerald Sprague. (Atomic Energy Project, Univ. of Calif., Los Angeles). May 1, 1953. 24p. (UCLA-255); *Am. J. Roentgenol Radium Therapy Nuclear Med.* **71**, 294-305 (1954). NSA 7-3689.

1269

PERFORMANCE STUDIES ON ANIMALS EXPOSED TO EXTERNAL RADIATION. PART 3. FURTHER STUDIES OF THE EFFECTS OF X IRRADIATION UPON THE PERFORMANCE OF RATS IN A DAILY EXHAUSTIVE EXERCISE TEST. PART 4. THE RELATIONSHIP BETWEEN THE NUMBER OF POST-IRRADIATION EXERCISE TRIALS AND LETHALITY IN ANIMALS EXPOSED TO ROENTGEN RAYS. D. J. Kimeldorf, D. C. Jones, and T. J. Castanera. (Naval Radiological Defense Lab.). Feb. 6, 1953. 25p. (USNRDL-390). NSA 7-3690.

1270

ACTION OF RADIATION OF RADIOACTIVE PHOSPHORUS (P^{32}) ON RABBIT SKIN. V. S. Menasov. *Vestnic Venerol. i Dermatol.*, 16-20 (1953). Jan. - Feb. (In Russian).

Skin of rabbits was exposed to varying doses of β radiation from P^{32} . Dermal layer swelled rapidly; showed much infiltration by histocytes and polynuclears. With 800 r epidermis had slight protuberance, and monotropic changes occurred in coarse nerve trunks and in capillary nerve fibrils. Hair falls out and there is atrophy of capillary follicles after 600 r. Deep ulcers and extensive scarring are produced by 3000 r. NSA 7-3691.

1271

THE LETHAL DOSE OF WHOLE-BODY TANTALUM¹⁸² GAMMA IRRADIATION FOR THE BURRO (*EQUUS ASINUS ASINUS*). John H. Rust, James L. Wilding, Bernard F. Trum, C. S. Simons, A. W. Kimball, Jr., and Cyril L. Comar. *Radiology* **60**, 579-82 (1953). Apr.

$LD_{50/30}$ value estimated to be 651 r, with a 95% confidence interval of 621 to 683 r. Mean survival time of all animals dying of acute whole-body irradiation was 26.5 days. Range of survival time was 20-41 days. NSA 7-3692.

1272

WHOLE BODY IRRADIATION OF LARGE ANIMALS.

Bernard F. Trum. *Military Surgeon* 112, 333-41 (1953). May.

Observations reported on 150 burros irradiated on exposure field activated by Ta^{182} and Co^{60} and designed to produce a near-constant flux of γ radiation on any part of field. Comparison made with findings in radiation studies on other animals. NSA 7-3693.

1273

THE BASIS OF THE OXYGEN EFFECT ON X-IRRADIATED DROSOPHILA SPERM. William K. Baker and Elizabeth S. Von Halle. *Proc. Natl. Acad. Sci. U.S.* 39, 152-61 (1953). Mar.

Data interpreted on basis that O_2 concentration affects amount of restitution of chromosome breaks taking place in sperm. Low concentration during irradiation makes restitution more likely, and broken ends apparently rejoin more quickly. Results lend support to differential reunion hypothesis of O_2 action rather than to differential breakage hypothesis. NSA 7-3694.

1274

THE EFFECT OF BORON ENRICHMENT OF SLOW NEUTRON-IRRADIATED TISSUES. Alan D. Conger. *Genetics* 38, 128-33 (1953). Mar.

An increase in chromatid aberrations in *Tradescantia* produced by a unit dose of thermal neutrons has been caused by enrichment of the tissue's B content. Increase in effect due to α rays from $B^{10}(n,\alpha)Li^7$ reaction. For same neutron dose, enriched plants showed 4-5 times as many aberrations as nonenriched normal plants. NSA 7-3695.

1275

FURTHER INVESTIGATIONS INTO THE PROBLEM OF THE WHOLE-BODY IRRADIATION OF THE WHITE MOUSE. INSTANTANEOUS DEATH BY RADIATION. B. Rajewsky, O. Heuse, and K. Aurrand. *Z. Naturforsch.* 8b, 157-9 (1953). Mar. (In German).

Subjection of white mice to radiation from Ra and x rays of 250 r to 190,000 r resulted in shortening of life span, and proved dependent upon amount and rate of dose. NSA 7-3696.

1276

SENSITIZATION AND REACTIVATION OF X-IRRADIATED COLON-BACTERIA THROUGH HEAT. H. Langendorff, M. Langendorff, and K. Sommermeyer. *Z. Naturforsch.* 8b, 117-22 (1953). Mar. (In German). NSA 7-3697.

1277

INFLUENCE OF BETAMERCAPTOETHYLAMINE AND THYMUS EXTRACT ON THE NUMBER OF GUINEA PIGS SURVIVING IRRADIATION WITH X RAYS. Charles M. Gros and Jean Comsa. *Compt. rend.* 236, 1611-13 (1953). Apr. 20. (In French).

Four groups of 15 guinea pigs each treated thus: (1) was injected intraperitoneally with 20 mg of β -mercaptoethylamine immediately post irradiation; (2) received subcutaneous injections of thymus extract 1 day post irradiation; (3) received both treatment; (4) had no treatment. After 5 months 7 of (1) survived, 6 of (2), 12 of (3), and 3 of (4). NSA 7-3698.

1278

THE INABILITY OF CROSS TRANSFUSION OR SPLEEN PERFUSION TO AFFECT THE SURVIVAL OF X-IRRADIATED DOGS. Jack R. Leonards, Charles R. Heisler, G. Warren Buckaloo, Paul S. Lavik, and Hymer L. Friedell. (Atomic Energy Project, Western Reserve Univ.). Apr. 10, 1953. 16p. (NYO-4012). NSA 7-3699.

1279

CONTRIBUTION OF RADIOCHEMISTRY TO RADIO-BIOLOGY. C. Piffault, J. Duhamel, and D. Longuet. *Acta Radiol.* 39, 64-72 (1953). Jan. (In French).

Certain lipids protect unicellular organisms against irradiation; modification of suprarenal emission of lipids protects against radiation in higher organisms. Spectrophotometric study was made of protective effect of glycerol upon several colored oxidation-reduction tests. Mechanism of effect is associated with presence of O_2 in environment, confirming recent results. NSA 7-3700.

1280

EFFECT OF ANTIHISTAMINE SALVE ON X-IRRADIATED SKIN. A. Stolz. *Deut. med. J.* 3, 582-4 (1952). Dec. 15. (In German).

Skin phenomena directly produced by x rays are related to liberation of histaminic substances. Skin reactions show good response to antihistamine salve, skin tolerance being raised at same time. Author reports objective and subjective results of self-experimentation by means of 200 to 1400 r irradiations on thigh. NSA 7-3702.

1281

INFLUENCE OF HOMOLOGOUS TISSUE FACTORS ON DNA TURNOVER AND RADIATION PROTECTION. Lola S. Kelly, and Hardin B. Jones. *Am. J. Physiol.* 172, 575-8 (1953). Mar.

Substances which stimulate DNA formation derived from rapidly growing tissues, may offer some protection against radiation effects. NSA 7-3703.

1282

EFFECT OF ACTH, CORTISONE, AND DCA ON THE RADIATION SYNDROME. Erik Odeblad. *Svenska Lakartidn.* 49, 2835-9 (1952). Nov. 14. (In Swedish).

Mice were injected with ACTH, cortisone or DCA either 1 hr before or 1 hr after 650 r whole-body x irradiation. Weight changes and mortality date are tabulated. NSA 7-3704.

1283

SYMPOSIUM ON BURNS. J. W. Brooks. National Academy of Sciences (U.S.) National Research Council Nov. 2-4, 1950. Washington, D. C. (1951).

If dogs with standardized 20% second degree thermal burn also received 100 r x ray exposure, the death rate increased from 12% to 75%. Even 25 r raised death rate (to 20%). Increased mortality is attributed to β hemolytic streptococcal infections; could be prevented by administration of penicillin.

1284

SOME EFFECTS OF X-IRRADIATION ON BLOOD. II. HEMATOLOGICAL OBSERVATIONS. A. Piney and W. V. Mayneord. *Brit. J. Radiol.* 1, 263-272 (1928).

Experiments on the results of irradiation of blood from rabbits' ears are described. Large doses of x rays cause irreparable injury to lymph adenoid tissue, but have less effect on myeloid leucocytes, while red corpuscles are little affected. Monocytosis following irradiation is characteristic of intense injury, and when persistent, is indicative of approaching death. Bone marrow is almost uninjured.

1285

EFFECT OF ROENTGEN RAYS ON THE HEART. A. S. Warthinin, and E. A. Pohle. *Arch. intern. med. exptl.* 43, 15-34 (1929).

Microscopic changes in heart muscle of rats, and of rabbits following a series of exposures were studied.

1286

THE ACTION OF RADIUM EMANATION ON DIURESIS. R. Agnoli. *J. physiol. et pathol. gen.* 26, 28-33 (1928). (French). BA 5-19618.

1287

A FACTOR OF IMPORTANCE IN THE RADIO SENSITIVITY OF TUMOURS. J. C. Mottram. *Brit. J. Radiol.* 9, 606 (1936).

Author studied changes in tar warts in mice after γ irradiation (radium); found cells at margin of carcinomas more sensitive than central cells; suggests difference may be due to difference in oxygen supply. Problem of tumor radiosensitivity in general is considered. It is suggested that therapeutic radiation should be spaced to catch tumor in radiosensitive (i.e. growing) state.

1288

THE EFFECTS OF EXTERNAL IRRADIATION WITH BETA RAYS ON THE PERIPHERAL BLOOD OF RABBITS. J. R. Raper and K. K. Barnes. National Nuclear Energy Series IV. Vol. 22E, Paper No. 10. p.179-84 (1951).

Contents: Results of experiments in which rabbits received total surface irradiation with beta rays, in doses ranging from 1500 rep to 59,000 rep; no direct effect on the cellular constituents of peripheral blood was observed.

1289

THE EFFECT OF RADIATION FROM INTRAPERITONEALLY INJECTED RADIUM CHLORIDE UPON THE HEMOPOIETIC ACTIVITY OF THE BONE MARROW IN ALBINO RATS. P. G. Rooft, and H. G. Bingham. Univ. Kansas Sci. Bull. 35, 945-60(1953).

1290

ON RADIATION INDUCED CARCINOMA, HEREDITARY TISSUE DEGENERATION, IN ANTIRRHINUM (LÖWENMAUL). (German). Emmy Stein. Strahlentherapie 37, 137-141 (1930).

The mutations produced are extremely variable and always harmful. Phytocarcinoma induced by radiation represent alterations in the hereditary substances in the chromosomes. BA 5-22832.

1291

CYTOGENETIC EFFECTS OF RADIATIONS ON BACTERIA; FINAL PROGRESS REPORT (FOR) MARCH 1, 1952-FEBRUARY 28, 1953. Joshua Lederberg. (Wisconsin Univ.). Mar. 1, 1953. 6p. (AECU-2544).

Transducing elements in lysates from bacteriophages of *E. coli* and *S. typhimurium* were studied. NSA 7-3994.

1292

THE EFFECT OF SOMATOTROPIC HORMONE AND STREPTOMYCIN ON MICE EXPOSED TO TOTAL BODY X-IRRADIATION. Lee E. Gordon, C. Philip Miller, and Helen Jo Hahne. (Institute of Radiobiology and Biophysics, Univ. of Chicago). (1952). 11p. (AECU-2553). Proc. Soc. Exptl. Biol. Med. 83, 85-8 (1953).

Treatment with somatotrophic hormone and/or streptomycin failed to reduce mortality of mice exposed to 550 r total-body x rays. Mice receiving both drugs maintained body weight, while those receiving either drug alone lost weight. NSA 7-4003.

1293

INTRANUCLEAR CHANGES RESULTING FROM EXPOSURE TO IONIZING RADIATION AS DETECTED IN FROZEN-DRIED PREPARATIONS. Margaret W. Holt, Sheldon C. Sommers, and Shields Warren. (Cancer Research Inst., New England Deaconess Hospital, Boston). (1952). 9p. (AECU-2569).

Authors describe vacuoles observed within chromosomes of mitotically dividing cells and within nuclei in frozen-dried, Feulgen-stained preparations of liver, kidney and spleen from irradiated mice and rats, and in preparations of irradiated Ehrlich mouse ascites tumor. NSA 7-4004.

1294

THE EFFECT OF COBALT-60 GAMMA RADIATION ON PASSIVE IMMUNITY. William M. Hale and Richard D. Stoner. (Brookhaven National Lab.). (1952). 17p. (BNL-1368); Yale J. Biol. and Med. 25, 326-33 (1953).

Co⁶⁰ γ whole-body irradiation effectively destroys immunity to pneumococcus infection even when abundant

specific antibody is present. When sufficient specific antibody is present at time of exposure, immunity to tetanus toxin is not destroyed by whole-body irradiation. Active immunity to influenza Type A virus is unaltered by this irradiation. NSA 7-4005.

1295

INDUSTRIAL APPLICATION OF GROSS FISSION PRODUCTS; QUARTERLY PROGRESS REPORT (FOR) OCTOBER 1, 1952-DECEMBER 31, 1952. Job 24. (Vitro Corp. of America). Feb. 2, 1953. 44p. (KLX-1385).

Most likely applications of fission product sources to industrial sterilization of foods and drugs will be for products which have good market and profit margin and for which no satisfactory alternative method exists. NSA 7-4006.

1296

SOME EXPERIMENTAL APPROACHES TO THE THERAPY OF WHOLE BODY IRRADIATION. Henry A. Schlang, Eugene P. Cronkite, and George Brecher. (Naval Medical Research Inst., Bethesda). Feb. 20, 1953. 8p. (NP-4575; Lecture and Review Series).

Symptomatic, hematological and pathological effects of whole-body x rays on dogs are reviewed. Injections of blood platelets, intradermal bacteria filtrate, subcutaneous turpentine and pus failed to produce real therapeutic benefit in modifying radiation damage to hematopoietic system. NSA 7-4007.

1297

EFFECT OF PHENYLHYDRAZINE AND X-IRRADIATION ON THE SERUM IRON CONCENTRATION IN INTACT AND SPLENECTOMIZED RATS. Alfred Chanutin, Stephan Ludwig, Elizabeth A. Lentz, Edward R. Shissler, Paul Osborne, Arthur Gooch, and Richard Wesley. (Biochemical Lab., Univ. of Va., Medical School). (1952). 13p. (ORO-96); Am. J. Physiol. 173, 474-80 (1953). NSA 7-4008.

1298

STIMULATING EFFECT OF X RAYS ON THE PROCESS OF REGENERATION OF PERIPHERAL NERVES. K. F. Galkovskaya. Doklady Akad. Nauk S.S.S.R. 87, 677-9 (1952). Dec. 1. (In Russian).

Recovery, in terms of reaction to acid, raising of limbs and mobility of denervated limbs, of axolotls was studied after x ray doses of 1500 r at rate of 300 r/wk. Irradiated animals showed improved recovery in relation to denervated controls. NSA 7-4009.

1299

INFLUENCE OF OXYGEN UPON GENETIC AND NON-GENETIC EFFECTS OF IONIZING RADIATION ON *PARAMECIUM AURELIA*. R. G. Kimball and Nenita Gaither. Proc. Soc. Exptl. Biol. Med. 82, 471-7 (1953). Mar. NSA 7-4010.

1300

THE DETERMINATION OF THE LETHAL DOSE 50/30 OF TOTAL BODY X-RADIATION FOR DOGS. Chester A. Gleiser. Am. J. Vet. Research 14, 284-6 (1953). Apr.

Dogs of Walker Foxhound variety were exposed to doses of bilateral total-body x rays varying from 3000 to 200 r from 2000 kvp x-ray generator. $D_{50/30}$ found to be 315.6 r. Mortality data included. NSA 7-4011.

1301

THE SEQUENCE OF PATHOLOGICAL EVENTS IN DOGS EXPOSED TO A LETHAL DOSE 100/30 OF TOTAL BODY X-RADIATION. Chester A. Gleiser. Am. J. Vet. Research 14, 287-97 (1953). Apr. NSA 7-4012.

1302

RELATIVE BIOLOGICAL EFFECTIVENESS OF 17

MEV ELECTRONS. Austin M. Keller, J. S. Laughlin, and H. Quastler. *Brit. J. Radiol.* 26, 152-3 (1953). May.

Biological effectiveness of 170 Mev electrons accelerated by betatron was compared with that of graded doses of 150-kvp x rays. Test reaction used was greying of hair in mice. For particular test reaction, high-energy electrons are quantitatively equivalent to high-energy x rays. NSA 7-4013.

1303

THE COMBINED EFFECTS OF CORTISONE AND ROENT-GEN RADIATION UPON NATURAL AND INDUCED RESISTANCE TO HOMOTRANSPLANTATION OF MOUSE LEUKEMIA, LINE L₁. A. A. Werder, Jack Friedman, E. E. MacDowell, and J. T. Syverton. *Cancer Research* 13, 158-64 (1953). Feb. NSA 7-4014.

1304

EFFECT OF β -MERCAPTOETHYLAMINE ON THE SECRETION OF NUCLEIC ACIDS BY THE SPLEEN FOLLOWING WHOLE-BODY X IRRADIATION. Charles Gros, Paul Mandel, and Jean Rodesch. *Compt. rend.* 236, 2010-12 (1953). May 18. (In French).

Injection of β -mercaptoethylamine before exposure to 700 r of 180-kv x rays reduced destruction, observed between 4th and 14th day post irradiation, of pentose and desoxypentose nucleic acids in spleens of rats. Protective effect was exerted on both cytoplasm and nuclei of this radiosensitive organ. NSA 7-4015.

1305

HEMATOLOGIC STUDIES ON DOGS RECEIVING LOW DOSES OF TOTAL BODY IRRADIATION. Florian J. Ragaz and Hans J. van Baaren. *Proc. Soc. Exptl. Biol. Med.* 82, 419-24 (1953). Mar.

Qualitative differences in peripheral blood and bone marrow of dogs after single or divided doses of 100 r total body x irradiation are presented. NSA 7-4016.

1306

EFFECT OF REPEATED DOSES OF EXTERNAL AND INTERNAL IRRADIATION ON STRUCTURE OF THE SPLEEN. Horace Goldie, Gadson J. Tarleton, Jr., Barbara R. Jeffries, and Paul F. Hahn. *Proc. Soc. Exptl. Biol. Med.* 82, 395-9 (1953). Mar.

Changes in spleen structure of mice exposed to various doses of internal radiation from injected colloidal Au¹⁹⁸ and to external x radiation are summarized. NSA 7-4017.

1307

EFFECT OF X RAYS UPON THE EVOLUTION OF THE TESTICLE AND THE APPEARANCE OF SECONDARY SEXUAL CHARACTERISTICS IN *LEBISTES RETICULATUS*. E. Follenius. *Compt. rend. soc. biol.* 146, 1774-6 (1952). Nov. (In French).

Young fish were irradiated with 4 to 6000 r in 2 doses at 2- or 3-day intervals. Autopsies done 6-11 months after irradiation and after complete sexual differentiation showed sterilization of testicles, but development of secondary sexual characteristics was not prevented. NSA 7-4018.

1308

PROGRESS OF DEGENERATION OF THE GERMINAL CELLS IN THE ADULT MALE *LEBISTES RETICULATUS* AFTER X IRRADIATION. E. Follenius. *Compt. rend. soc. biol.* 146, 1776-8 (1952). Nov. (In French).

Fish were irradiated with single dose of 6000 r x rays, which produced progressive degeneration of germinal elements in the testicle. Degeneration, which continued to sterility, described in detail. NSA 7-4019.

1309

RADIATION EXPOSURE SURVEY OF X-RAY AND ISOTOPE PERSONNEL, PART 2. Charles K. Spalding, Egilda DeAmicis, and Russel F. Cowing. (Cancer Research Inst., New England Deaconess Hospital, Boston and Laboratory of Pathology, Harvard Cancer Commission).

(1952). 13p. (AECU-2570); *Nucleonics* 11, No. 9, 46-7 (1953).

Data presented for groups using radioisotopes for diagnosis and therapy show x-ray workers receive considerably more radiation exposure than isotope workers. Importance of personnel monitoring and safety education is stressed. NSA 7-4020.

1310

RADIOBIOLOGY: IRRADIATION LETHALITY AND PROTECTION. Roberts Rugh. *Military Surgeon* 112, 395-413 (1953). June.

Problems associated with radiation dosage determinations in biological systems, meaning of LD/50-30 days, factors contributing to radiation death and methods of protection against radiation injury are reviewed. NSA 7-4021.

1311

SAFE DISPOSAL OF CONTAMINATED AIR FROM RADIO-CHEMICAL LABORATORIES. J. W. J. Fay. *Chem. and Process Eng.* 34, 133-6 (1953). May. NSA 7-4022.

1312

ASSOCIATED ACTION OF STREPTOMYCIN AND HEMATOPOIETIN ON MICE SUBJECTED TO A LETHAL X IRRADIATION. Paul-Edouard Genaud and Robert Meot. *Compt. rend.* 236, 2004-6 (1953). May 18. (In French).

Hematopoietin, hematopoiesis hormone was injected in the form of serum of twice-bled horse at rate of 1 cc/day into mice after whole-body irradiation of 700 r of 190 kv x rays. Streptomycin was also injected in doses of 6 mg/day, both injections starting on 4th day post-irradiation. Survival rates at 30 days post-irradiation: control-0%, hematopoietin alone-0%, streptomycin alone-70%, and hematopoietin plus streptomycin-100%. NSA 7-4023.

1313

TREATMENT OF RADIATION INTOXICATION WITH "ROKAN." J. Lackner. *Strahlentherapie* 89, 283-7 (1952). (In German).

Administration of Rokan (combination of nux vomica and extract from oats and other grains with special vitamin-rich-ingredient) to 80 patients proved beneficial with no detrimental side effects in treating radiation intoxication. Preparation proved superior to conventional remedies for this condition. Electrophoretic spot checks revealed no evidence of changes in known alterations of protein fraction of blood during course of radiation intoxication. NSA 7-4024.

1314

OVARIAN IRRADIATION AND THE HEALTH OF THE SUBSEQUENT CHILD. V. P. Murphy. *Surg. Gynecol., Obstet.* 48, 766-779 (1929).

1315

THE STAGES IN CALCIFICATION OF THE RAT KIDNEY AFTER THE ADMINISTRATION OF URANIUM NITRATE. Lewis K. Dahl. *J. Exptl. Med.* 97, 681-93 (1953). May.

Histological effects produced by this agent over wide range of dose levels were nearly identical in character and differed principally in speed of evolution. Deposition of Ca always began at foci in cytoplasm of cells of the proximal convoluted tubules of inner cortex and remained intracellular until cell boundaries were destroyed. NSA 7-4031.

1316

THE EFFECT OF THE ROENTGEN RAYS ON HEART CULTURE IN VITRO. (In German). A. H. Roffo. *Strahlentherapie* 19, 745-58 (1952).

The artificially cultured heart cell is radioresistant. (Based on author's summary).

1317

RESEARCH ON THE BIOLOGICAL ACTIONS OF X

RAYs. (in French). J. Sabrazes and P. Riviere. *Compt. rend. acad. sci.* 124, 979 (1897).

1318

ON DELAYED REACTIONS IN ROENTGEN IRRADIATED TISSUES. M. A. Magath. *Strahlentherapie* 32, 534-49 (1929).

After x irradiation, pH of chick embryo tissues decreased. When chick embryos were exposed *in ovo*, the pH change was observed in skin mesenchyme and muscle but not in liver or brain. The effect on pH was absent in mouse liver and in cancer tissue.

1319

THE EFFECT OF X-IRRADIATION ON NUCLEASE ACTIVITY AND RESPIRATION OF *TETRAHYMENA GELEII*. Herbert J. Eichel and Jay S. Roth. *Biol. Bull.* 104, 351-8 (1953). June.

The enzymes RNase and DNase and respiration were studied in *T. geleii* exposed to 6300 r/min. Respiration decreased 30% after 300,000 r and 40% after 500,000 r. Addition of cysteine prior to irradiation gave 50% protection as measured by O₂ consumption. Homocystine and pyruvate activities were not changed in homogenates after either 300,000 or 500,000 r although activity of both enzymes was reduced 50% when homogenates *per se* irradiated with 500,000 r. NSA 7-4268.

1320

MITOTIC EFFECTS OF PROLONGED IRRADIATION WITH LOW-INTENSITY GAMMA RAYS ON THE CHOROTOPHAGA NEUROBLAST. J. Gordon Carlson, Nyra G. Harrington, and Mary Esther Gauden. *Biol. Bull.* 104, 313-22 (1953). June.

Prolonged treatment of neuroblasts with low-intensity γ radiation reduces mitotic activity much less than a comparable dose given at high intensity. NSA 7-4269.

1321

X-RAY SENSITIVITY OF HUMAN RETINA. H. Bornschein, R. Pape, and J. Zakovsky. *Naturwissenschaften* 40, 251 (1953). Apr. (In German).

Quantitative data on ability of dark-adapted human eye to see x rays were obtained from 6 experimental subjects, of which 4 were normal, 1 suffered from congenital hemeralopia and 1 had retinitis pigmentosa. NSA 7-4270.

1322

EFFECT OF LARGE DOSES OF X RAYS ON PROTHALLIUM OF FERN (*DRYOPTERIS SPINULOSUM*). L. P. Breslavets. *Doklady Akad. Nauk S.S.S.R.* 87, 143-6 (1952). Nov. 1. (In Russian).

Modifications in plastids of fern prothallium exposed to 1,000,000 r of 90 kv x rays are described. NSA 7-4271.

1323

THE FORMATION OF TETANUS ANTITOXIN BY SPLEEN AND LYMPH NODE INTRAOCULAR TRANSPLANTS. William M. Hale and Richard D. Stoner. (Brookhaven National Lab.). (1953). 23p. (BNL-1409).

Lymph node and spleen tissue from immunized donor mice produce tetanus antitoxin when transplanted to anterior chamber of eye of γ -irradiated recipients. More antitoxin is formed by transplants from immunized donors when recipients are injected intravenously with fluid tetanus toxoid. NSA 7-4304.

1324

STUDIES ON CELL DIVISION. 1. ALPHA RADIATION AS A DIVISION INHIBITING AGENT. E. S. Spoerl and R. J. Balske. April 28, 1953. Dec. June 1, 1953. 35p. (AECD-3528; MLM-820).

Yeast cell division was stopped by alpha radiation but growth in size and weight continued. *E. coli* cell division was also stopped. Cells became elongated and developed cross walls. NSA 7-4306.

1325

STUDIES WITH RADIOPHOSPHORUS IN *DROSOPHILA*. 2. THE EFFECT OF P³² TREATMENT UPON DEVELOPMENT. Robert C. King. (Brookhaven National Lab.). (1953). 13p. (BNL-1406).

Exposure of developmental stages of *D. melanogaster* to media of activities over 5 μ c/g kills embryo, larvae and pupas, retards development and produces sterile adults. Females are more resistant to P³² than are males. External radiation from medium is relatively unimportant in killing insects. NSA 7-4307.

1326

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF TRITIUM IN DEPRESSING IRON UPTAKE IN RATS. John Furchner, John Storer, and Virginia Lotz. (Los Alamos Scientific Lab.). Mar. 1953. 19p. (LA-1544).

Rats were exposed to total-body β radiation by intravenous injections of tritium oxide, and injected with Fe⁵⁹Cl₃ on 2nd day post irradiation. Bone marrow damage was measured by comparing Fe⁵⁹ uptake by red blood cells in exposed and control animals. Tritium β radiation has relative biological effectiveness of 1.59 as compared with that of Co⁶⁰ γ radiation in parallel experiment. NSA 7-4308.

1327

BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION. THE EFFECT OF X-RADIATION ON THE ISOLATED FROG HEART. Eugene B. Konecni and Herbert B. Gerstner. (School of Aviation Medicine). May 1953. 10p. (NP-4594; Report 3).

Isolated frog hearts treated with 3000 r/min had no ventricular contractions during a 40 minute exposure; ventricle was in extreme dilation. Such marked disturbance of cardiac rhythm makes isolated heart suitable for screening agents protective against ionizing radiation. NSA 7-4309.

1328

THERAPEUTIC ACTION OF GLUTATHIONE AND MERCAPTOETHYLAMINE AGAINST A LETHAL DOSE OF X-RAYS. J. H. Maisin, G. Lambert, M. Mandart, and H. Maisin. *Nature* 171, 971 (1953). May 30.

Reduced glutathione and β -mercaptoethylamine have therapeutic action when injected into liver-shielded rats exposed to lethal total-body x-ray dose. NSA 7-4311.

1329

THE X-IRRADIATION OF MARINE GAMETES. A STUDY OF THE EFFECTS OF X-IRRADIATION AT DIFFERENT LEVELS ON THE GERM CELLS OF THE CLAM, *SPISULA* (FORMERLY *MACTRA*). Roberts Rugh. *Biol. Bull.* 104, 197-209 (1953). Apr.

Clam spermatozoa were found to be more radioresistant than eggs (as measured by ability to cleave and develop). No protection against radiation injury of gametes and early-developing forms was conferred by cysteine hydrochloride or by β -mercaptoethylamine. NSA 7-4312.

1330

HEPATIC GLYCOGEN IN ACUTE RADIATION DEATH. Barnett Levy and Roberts Rugh. *Proc. Soc. Exptl. Biol. Med.* 82, 223-5 (1953). Feb.

Drastic depletion in liver glycogen was demonstrated in warm-blooded animals and amphibia after exposure to lethal x ray dose. Use of liver response as a diagnostic aid in determining extent of radiation damage is discussed. NSA 7-4313.

1331

EFFECTS OF FRACTIONATED DOSES OF X-RADIATION ON NORMAL AND TUMOR TISSUE. L. C. Fogg and R. F. Cowing. *Cancer Research* 13, 321-6 (1953). Apr.-May.

Fractionated doses of 294 r produce a greater effect on spermatogonia and spermatocytes in partially shielded mice

than does an equivalent acute (single) dose. Induced resistance apparently is not achieved by repeated doses. NSA 7-4314.

1332
THE PROTECTIVE EFFECT OF INTRAOCULAR TRANSPLANTS UPON COBALT-60 GAMMA IRRADIATED MICE. Richard D. Stoner and William M. Hale. (Brookhaven National Lab.). (1952). 20p. (BNL-1401). NSA 7-4316.

1333
CHEMICAL PROTECTION AGAINST X RAYS; THERAPEUTIC TESTS. A. Hervé and Z. M. Bacq. J. radio. et électrol. 33, 651-5 (1952). (In French).

Therapeutic effects of amine derivatives and β -mercaptoethylamine are discussed. Results obtained with injections of the latter in 30 cases of radiation sickness are tabulated. NSA 7-4318.

1334
THE ACUTE INHALATION TOXICITY OF CARNOTITE ORE DUST: A THIRTY-DAY STUDY. H. B. Wilson, H. E. Stokinger, and G. E. Sylvester. (Atomic Energy Project, Univ. of Rochester). Mar. 31, 1953. 22p. (UR-229).

Rabbits, rats and a goat were exposed to inhalation of a carnotite ore dust assaying 20% U and 5% V. Toxicity evidenced in rabbits by (1) high mortality, (2) weight loss, (3) sharp increase of blood nonprotein N, (4) incidence of urinary protein, (5) histologic evidence of renal tubule damage and (6) basophilic stippling of blood cells in two animals; in rats by gross lung damage, (2) and (5); in goats by (5). NSA 7-4320.

1335
STUDIES ON THE TREATMENT OF INTERNAL RADIOACTIVE CONTAMINATION. 3. EFFECT OF CHEMICAL AGENTS ON THE SKELETAL CONTENT AND EXCRETION OF INJECTED STRONTIUM-89. S. H. Cohn and J. K. Gong. (Naval Radiological Defense Lab.). Feb. 25, 1953. 17p. (USNRDL-393).

Salts of EDTA alone or combined with Zr citrate or BAL had no effect on skeletal distribution of Sr^{89} . The observed level of Sr^{89} in skeleton 40% lower than that in controls at 5 days results from pre-injection administration of the therapeutic agents. NSA 7-4322.

1336
THE ABSORPTION AND TRANSLOCATION BY PLANTS OF RADIOACTIVE ELEMENTS FROM "JANGLE" SOIL. A. A. Selders, J. H. Rediske, and R. F. Palmer. Feb. 16, 1953. 12p. (HW-27620).

Uptake of radioactive elements from Jangle test-site soil by 4 species was increased by addition of nutrients to soil. In no case was uptake over 2.8% of the activity in soil on a concentration basis. NSA 7-4326.

1337
THE INFLUENCE OF X-IRRADIATION ON THE DISAPPEARANCE OF RADIOACTIVE TRACERS FROM CIRCULATING BLOOD. William J. MacIntyre, H. L. Friedell, and M. Berg. (Atomic Energy Project, Western Reserve Univ.). May 25, 1953. 21p. (NYO-4014).

No change in disappearance rate of ^{131}I -tagged serum albumin or ^{32}P -tagged red blood cells was detected for 6 hr. after 1000 r dose of x rays. NSA 7-4327.

1338
THE EFFECTS OF X-RAYS ON RABBITS. PART III. EFFECTS ON THE LEUCOCYTES. G. A. Sacher, and N. Perlman. National Nuclear Energy Series IV, 22B, p.290-316. Raymond E. Zirkle, ed. New York, McGraw-Hill Book Co., Inc. 1954.

Changes in the number of circulating heterophils and lymphocytes of rabbits exposed to single x-ray doses was investigated.

1339
MULTIPLICATION OF COXSACKIE VIRUS IN ADULT MICE EXPOSED TO ROENTGEN RADIATION. F. S. Cheever. (Pittsburgh Univ., Graduate School of Public Health). (1953). 21p. (AECU-2584); J. Immunol. 71, 431-5 (1953).

Mice received a whole-body x ray dose 24 to 120 hr before intraperitoneal inoculation of Powers strain of Cocksackie virus. Mice from each group were sacrificed and viral content of selected organs determined. Virus could be demonstrated longer in organs of irradiated mice as compared to non-irradiated controls. Former gave consistently higher viral titer. NSA 7-4535.

1340
INFRARED SPECTROSCOPY OF LIVER GLYCOGEN. STUDIES OF FETAL LIVER BEFORE AND AFTER X-RAY IRRADIATION. H. P. Schwarz, H. E. Riggs, C. Glick, J. McGrath, R. Childs, E. Bew, Jr., and F. Stone. (Philadelphia General Hospital). (1953). 19p. (AECU-2585).

Infrared absorption band found at 9.70 to 9.60 μ is definitely assigned to glycogen. Location and band differs in adult and fetal liver. After x irradiation there are acute and delayed effects, the former decreasing and the latter increasing liver glycogen. NSA 7-4536.

1341
SOME EFFECTS OF ACUTE IRRADIATION INJURY IN DOGS. Roy E. McDonald, Ross E. Jensen, Herbert C. Urry, Vern S. Bolin, and Philip B. Price. (1951). 16p. (AECU-2587).

More than 100 dogs were given single mid-tissue doses of x rays ranging from 450 to 550 r. Data are given on fluid and electrolyte balance, effect on circulating red cell mass, plasma volume, blood volume and capillary permeability. Aside from tissue destruction, altered hematopoiesis and fever and infection, changes differ only in degree from those in non-irradiated dogs on restricted food intake. NSA 7-4537.

1342
EFFECT OF X-IRRADIATION ON WEIGHT AND CONTENTS OF THE RAT STOMACH, SMALL INTESTINE AND CECUM-COLON. Robert A. Conrad. (Naval Medical Research Inst., Bethesda). Jan. 19, 1953. 11p. (NM-006-012.04.58). NSA 7-4538.

1343
DEFECTS IN HEMOSTASIS PRODUCED BY WHOLE BODY IRRADIATION. E. P. Cronkite. (Naval Medical Research Inst., Bethesda and George Brecher, National Inst. of Arthritis and Metabolic Diseases, National Institutes of Health). Dec. 31, 1952. 34p. (NM-006-012.05).

Factors contributing to the bleeding state in irradiated animals are summarized. Data are presented on effects of various radiation doses on per cent mortality, survival time, blood clotting time, platelet count, prothrombin level and granulocyte count and on effects of treatment with antibiotics and platelet transfusions on bleeding state. NSA 7-4539.

1344
(PHYSIOLOGICAL EFFECTS OF RADIATION.) p.1-61 OF QUARTERLY PROGRESS REPORT NO. 7. (Air Force Radiation Lab., Univ. of Chicago). Apr. 15, 1953. (NP-4602(p.1-61)).

Studied: ATP-ase and 5-nucleotidase activity of spleen and thymus glands of rats and mice after whole-body x rays; effect of central nervous system stimulants on survival and weight loss of x-rayed rats; effect of pre-radiation Na azide injections; role of catalase formation on effects produced by H_2O_2 formation in radiation injury; injected hemin and radiation injury; carboxypeptidase

inhibitor level relative to survival time in rats. NSA 7-4541.

1345

(RADIATION EFFECTS.) p.62-114 OF QUARTERLY PROGRESS REPORT NO. 7. (Air Force Radiation Lab., Univ. of Chicago). Apr. 15, 1953. (NP-4602(p.62-114)).

Studied effect of x rays on action of analgesic agents that double reaction time of rats and mice to heat stimuli; effect of fatty acid esters as solvents for para-amino-propiophenone on survival of x-rayed mice; recovery in rate of cell division in x-rayed amoebae; LD₅₀ of rats as affected by anesthetization pre- or post-irradiation; effect of 200 r on frequency of pregnancy, sterility, and litter sizes of female mice; estimation of blood catalase activity. NSA 7-4542.

1346

IRRADIATION SARCOMA. Arthur Jones. Brit. J. Radiol. 26, 273-84 (1953).

Clinical aspects of irradiation-induced sarcoma are reviewed and 2 new cases are reported. One arose in an area of chronic radiodermatitis over sacrum 7 yrs after million-volt x-ray therapy for papilloma of the bladder. The other, an osteogenic sarcoma, occurred in the mandible 7 yrs after deep x-ray therapy for facio-cervical actinomycosis. NSA 7-4543.

1347

ALPHA-RAY DOSAGE IN BONE CONTAINING RADIUM. F. W. Spiers. Brit. J. Radiol. 26, 296-301 (1953). June.

Calculations are made of dose rates to soft tissue structures within bone containing Ra and its decay products. Accepted maximum permissible Ra burden is considered in light of these dose rates and the biological efficiency of α radiation is discussed in relation to carcinogenesis. NSA 7-4544.

1348

INFLUENCE OF SEVERAL NUTRITIONAL FACTORS ON THE MORTALITY OF THE MOUSE DUE TO X-RADIATION. R. Paris and J. Vevasseur. Therapie 8, 57-61 (1953). (In French).

Fodder beets, turnips, green cabbage, spinach, and carrots increased the radiosensitivity of rabbits, whereas red beets, red cabbage and lettuce decreased it. Diets rich in glucides and several proteins increased radiosensitivity while glucose decreased this effect. NSA 7-4545.

1349

ADDITIVITY OF RADIATION PROTECTION BY CYSTEINE AND SODIUM NITRITE IN MICE. L. J. Cole and M. E. Ellis. (Naval Radiological Defense Lab.). Apr. 3, 1953. 24p. (USNRDL-395).

Combination of cysteine and Na nitrite gives more pre-protection against supralethal irradiation than does either alone. Mortality of mice is not significantly affected by pretreatment with Na nitrite and ethanol. Level of methemoglobinemia is not prime factor in radiation pre-protection by means of Na nitrite. NSA 7-4546.

1350

PROTECTION AGAINST X-RAYS AND THERAPY OF RADIATION SICKNESS WITH β -MERCAPTOETHYLAMINE. Z. M. Bacq, G. Dechamps, P. Fischer, A. Herve, H. Le Bihan, J. Lecomte, M. Pirotte, and P. Rayet. Science 127, 633-6 (1953). June 5.

Good results following β -mercaptoethylamine injections are reported in 4 of 11 cases of leukemia, and in cases of radiation sickness in cancerous patients treated with ionizing radiation. Possible mechanisms are discussed. NSA 7-4548.

1351

THE RADIUM CONTENT OF PUBLIC WATER SUPPLIES. John B. Hursh. (Atomic Energy Project, Univ. of

Rochester). May 4, 1953. 27p. (UR-257); J. Am. Water Works Assn. 46, 43-54 (1954).

Ra concentration of raw-water sources used by 41 U. S. cities found to range from 0 to 65×10^{-16} g Ra/ml water. NSA 7-4709.

1352

X-RAY INACTIVATION OF POLYPLOID SACCHAROMYCES. W. H. Lucke and A. Sarachek. Nature 171, 1014-15 (1953). June 6.

Comparison of average post-irradiation survival curves for haploid, diploid, triploid, and tetraploid yeast indicates clearly a 1 to 1 correspondence between degree of ploidy and number of targets per cell. Interpretation of survival curves on multi-target basis is discussed. NSA 7-4712.

1353

TOTAL STERILIZATION OF THE GONADS AFTER TREATMENT WITH RADIOACTIVE PHOSPHORUS IN THE CYPRINODONTS LEBISTES AND XIPHAPHORES.

Jean Vivien. Compt. rend. 236, 2172-4 (1953). June 1. (In French).

Secondary sex characteristics developed at normal age in young fish despite complete sterilization. NSA 7-4713.

1354

EFFECT OF WHOLE BODY X-IRRADIATION ON NATURAL INHIBITOR OF CARBOXYPEPTIDASE. Robert N. Feinstein and John C. Ballin. Proc. Soc. Exptl. Biol. Med. 83, 8-10 (1953). May.

Whole-body x irradiation of mice, rats and rabbits at the LD₅₀ range increases activity of certain tissue cathepsins, apparently because of destruction of an enzyme inhibitor. Possible source of the inhibitor is the leucocyte, which may serve as an indicator of radiation exposure. NSA 7-4714.

1355

SUPPRESSION OF NORMAL BACTERICIDAL ACTION OF RABBIT SERUM FOLLOWING WHOLE BODY X-IRRADIATION. Stanley Marcus and David M. Donaldson. Proc. Soc. Exptl. Biol. Med. 83, 184-7 (1953). May.

First day after 650 to 725 r the bactericidal action of rabbit serum is normal; it is depressed by the 5th day and normal again by the 20th day. A 2nd dose of 650 r causes a longer depression of activity than the 1st. NSA 7-4715.

1356

CONTRIBUTIONS TO THE ENZYMOLOGY OF THE NORMAL AND CATARACTOUS LENS. III. ON THE CATALASE OF THE CRYSTALLINE LENS. E. A. Zeller. Am. J. Ophthalmol. 36, 51-3 (1953). June.

In the lens of 3 species a definite but small amount of H₂O₂-decomposing capacity was found. Agent responsible for reaction is heatlabile, does not dialyze through membranes and is blocked by typical catalase inhibitors. Thus, if H₂O₂ is produced in lens during irradiation, little protection is afforded this organ by its catalase. NSA 7-4720.

1357

PRESENT STATUS OF POLONIUM TOLERANCE ESTIMATIONS. J. B. Hursh and J. N. Stannard. (Atomic Energy Project, Univ. of Rochester). Oct. 14, 1948. Decl. with Deletions June 1, 1953. 33p. (AECD-3539; UR-44).

Summary of available information on distribution, excretion and toxicity of Po in biological systems. NSA 7-4722.

1358

EXPERIMENTAL DEMONSTRATION OF THE BACTERICIDAL EFFECT OF THORIUM X IN SOLUTION AND IN SALVE ON BACTERIA PATHOGENIC FOR THE EYE.

(German). Charalambos Spyropoulos. Arch. Augenheilk. 100/101, 418-438 (1929).

Authors tested action of thorium x on cultures of various organisms and concluded that there is little likelihood of favorable action on eye infections since radiation effect is very superficial and in vivo the organisms are enveloped in secretions and enclosed within cells. BA 6-7156.

1359

FRACTIONAL TOTAL BODY IRRADIATION AND THYROID FUNCTION IN THE BURRO. J. C. Schoolar, J. J. Lane, R. A. Monroe, J. H. Rust, and B. F. Trum. Science 120, 1032-3 (1954).

Thyroids of burros exposed to acute or fractional total-body irradiation have shown histological evidence of extreme stimulation, viz. hyperplasia of the epithelial cells and marked colloid depletion. After 600 to 800 r some animals began to concentrate iodine-131 to a marked degree; in others this function was depressed.

1360

THE EFFECT OF CHRONIC GAMMA RADIATION ON MUTATIONS IN MAIZE. 1. ENDOSPERM MUTATIONS. 2. EFFECTS ON POLLEN. W. Ralph Singleton. (Brookhaven National Lab.). (1953). 59p. (BNL-1419). NSA 7-4989.

1361

CYTOGENETIC EFFECTS OF X-RAYS AND THERMAL NEUTRON IRRADIATION ON SEEDS OF BARLEY. Richard S. Caldecott, B. H. Beard, and C. O. Gardner. (Nebraska Univ. and Brookhaven National Lab.). (1953). 37p. (BNL-1425); Genetics 39, 240-59 (1954).

A comparison made between effects of irradiating dormant seeds of barley with x rays and thermal neutrons, as measured by survival and frequency of chromosomal aberrations and mutations, shows that about 3.0×10^8 thermal neutrons/cm² are equivalent to 1 r from x radiation. NSA 7-4990.

1362

THE EFFECT OF SURGERY ON DOGS FOLLOWING WHOLE BODY X-IRRADIATION. Gordon E. Gustafson and Frank A. Cebul. (Atomic Energy Project, Western Reserve Univ.). Jan. 25, 1953. 22p. (NYO-4017). Surg. Gynecol. obstet. 98, 49-54 (1954).

Resection of a segment of ileum was well tolerated in dogs given 200 or 300 r whole-body x irradiation 20 hours earlier. Mortality in 18 pairs of dogs was 39% for animals receiving irradiation alone and 44% for those receiving irradiation and surgery. Most common pathological finding in dogs dying after irradiation was a profound bacterial pneumonitis. NSA 7-4991

1363

QUARTERLY TECHNICAL REPORT (FOR) JAN. 1, 1953 THROUGH MARCH 31, 1953. (Atomic Energy Project, Univ. of Rochester). May 29, 1953. 68p. (UR-260).

Studied urinary excretion of adrenal cortical steroids in pigs after 1000 r; effect of abdominal shielding on mortality of dogs following total-body and subtotal x irradiation; effect of intravenous injections of Piromen on dogs given LD₅₀ x ray dose; antibiotic therapy of radiation injury (dogs); use of whole blood in treating acute radiation syndrome (dogs); metabolic turnover of stroma of circulating red cells (rabbit); renal excretion of Ca (dogs). NSA 7-4992.

1364

EXPERIMENTAL ACUTE RADIODERMATITIS FOLLOWING BETA IRRADIATION. V. HISTOPATHOLOGICAL STUDY OF THE MODE OF ACTION OF THERAPY WITH ALOE VERA. C. C. Lushbaugh and D. B. Hale. Cancer 6, 690-9 (1953). July.

Rabbits were exposed locally on back to 14,000 and 28,000 rep of β radiation from Sr⁹⁰ and treated with fresh whole leaf Aloe vera and ointment made from these leaves. Treatment hastened both degenerative and reparative phases of the lesion. Treated ulcers healed in 2 mo., untreated ones were still incompletely healed 4 mo. post-irradiation. NSA 7-4994

1365

THE OCCURRENCE OF PLASMA CELLS AFTER IONIZING IRRADIATION IN DOGS. Frederick J. Wohlwill and Walter W. Jetter. Am. J. Pathol. 29, 721-9 (1953). July-Aug.

Histopathologic examination of dogs given chronic whole-body x ray dose demonstrated replacement of lymphocytes in lymphoid tissue by cells of a type that meets some or all of morphological criteria of plasma cells. NSA 7-4995.

1366

COMPARATIVE EFFECTS OF TOTAL BODY RADIATION, NITROGEN MUSTARD, AND TRIETHYLENE MELAMINE ON THE HEMATOPOIETIC SYSTEM OF TERMINAL CANCER PATIENTS. R. Kenneth Loeffler, Vincet P. Collins, and George A. Hyman. Science 118, 161-3 (1953). Aug. 7.

Comparative effects of total-body x radiation, nitrogen mustard, and triethylene melamine on the hematopoietic system were studied in 10 terminal cancer patients. Data indicate tolerance to doses of total-body x rays of 100 to 150 r. NSA 7-4996.

1367

EXPERIMENTAL ACUTE RADIODERMATITIS FOLLOWING BETA IRRADIATION. 1. ITS PATHOGENESIS AND REPAIR. C. C. Lushbaugh, J. B. Storer, and D. B. Hale. Cancer 6, 671-7 (1953). July.

Pathogenesis and repair of ulcerative radiodermatitis after exposure of abdominal skin of rats to β particles from Sr⁹⁰ and P³² are described. NSA 7-4997.

1368

CELLULAR CHANGES ACCOMPANYING ACUTE AND SUB-ACUTE X-IRRADIATION DEATH OF THE HAMSTER. II. THE ENDOCRINES. Roberts Rugh, Barnett Levy, and Lottie Sapadin. J. Cellular Comp. Physiol. 41, 359-74 (1953). June.

Endocrine glands are relatively radioresistant, although parts of some are radiosensitive. NSA 7-4998.

1369

EXPERIMENTAL ACUTE RADIODERMATITIS FOLLOWING BETA IRRADIATION. IV. CHANGES IN RESPIRATION AND GLYCOLYSIS. C. C. Lushbaugh and D. B. Hale. Cancer 6, 686-9 (1953). July.

O₂ uptake and anaerobic glycolysis were studied using skin of rats killed after local exposure to 14,000 and 28,000 rep of radiation from Sr⁹⁰. After an immediate transitory depression there was marked stimulation of O₂ uptake and glycolysis, most rapid rates occurring on 2nd post-irradiation day. Rates fell to normal by 4th to 6th days and, as necrosis developed, fell far below normal. On 10th day healing began and glycolytic rate rose. NSA 7-4999.

1370

EXPERIMENTAL ACUTE RADIODERMATITIS FOLLOWING BETA IRRADIATION. II. THE INHIBITION OF FIBROPLASIA. C. C. Lushbaugh and J. B. Storer. Cancer 6, 678-82 (1953). July.

Failure of fibroplasia to occur throughout skin damaged by irradiation and failure of subsequent ulcer healing by usual method of granulation-tissue production were studied in rats irradiated locally with β radiation. Results show cellular exudate develops promptly but fibroblasts fail to appear and proliferate in irradiated area. NSA 7-5000.

1371

EXPERIMENTAL ACUTE RADIODERMATITIS FOLLOWING BETA IRRADIATION. III. THE CHANGES IN WATER, FAT, AND PROTEIN CONTENT. C. C. Lushbaugh and D. B. Hale. *Cancer* 6, 683-5 (1953). July. NSA 7-5001.

1372

EFFECTS OF OXYGEN CONCENTRATION ON X-RAY-INDUCED MITOTIC INHIBITION IN LIVING CHORTOPHAGE NEUROBLASTS. Mary Esther Gauden, Marjorie Nix, and Jack Moshman. *J. Cellular Comp. Physiol.* 41, 451-70 (1953). June.

Neuroblast mitosis *in vivo* was unaffected by O tension in absence of radiation under conditions used. Depth to which mitosis was depressed by x rays was affected only slightly by O present during irradiation. Influence of O tension on response of these cells to radiation involves more than merely a change in amount of injury produced by radiation. NSA 7-5002.

1373

EFFECT OF PITUITARY EXTRACTS ON RADIATION-INDUCED TESTICULAR ATROPHY IN RATS. John B. Storer and Phyllis Sanders. *Proc. Soc. Exptl. Biol. Med.* 83, 259-62 (1953). June.

Adult and immature male rats were given single exposures of 500 r total-body x radiation and 800 r of x radiation to testes only in 3 fractionated doses. Gonadophysin injected twice weekly for 1st 4-6 weeks or from 8th-16th week after irradiation increased slightly the degree of testicular atrophy and inhibited testicular regeneration. NSA 7-5004.

1374

EFFECT OF ANTIBIOTIC DOSAGE ON MORTALITY FROM WHOLE BODY X-IRRADIATION. Gordon E. Gustafson and Simon Koletsky. (Atomic Energy Project, Western Reserve Univ.). June 25, 1953. 10p. (NYO-4016). *Proc. Soc. Exptl. Biol. and Med.* 84, 266-9 (1953).

Rats were given varying doses of terramycin hydrochloride beginning 72 hr and ending 1-4 hr prior to x irradiation. Highest dosage level (200 mg/rat/day) was most effective in lowering mortality. Probably larger doses of antibiotics are required in x irradiation syndrome than for treatment of other diseases. NSA 7-5005.

1375

CONTROL OF THE POSTIRRADIATION HEMORRHAGIC STATE BY PLATELET TRANSFUSIONS. M. C. Wood, Frances N. Gamble, J. Furth, and R. R. Bigelow. *Blood* 8, 545-53 (1953). June.

Appearance of large numbers of erythrocytes in lymph of dogs and rats exposed to massive x-ray doses was partially or completely prevented by transfusion of concentrated suspensions of intact, homologous blood platelets. Passage of erythrocytes from blood to lymph was retarded almost immediately after transfusion and numbers of erythrocytes in lymph were markedly reduced. NSA 7-5006.

1376

THE ACUTE RADIATION SYNDROME. L. H. Hempelmann. *Med. Radiography Phot.* 29, No. 2 and 3, 42-6 (1953).

Author presents a case history of acute radiation syndrome developing after exposure to a large dose of mixed neutron and γ radiation from an uncontrolled nuclear reaction. (cf NSA 6-2273). NSA 7-5007.

1377

CELLULAR CHANGES IN EFFUSIONS FOLLOWING INTRACAVITARY ADMINISTRATION OF COLLOIDAL Au¹⁹⁸ IN HUMAN BEINGS. Vernie A. Stembridge, Ralph M. Kniseley, and Gould A. Andrews. *J. Lab. Clin. Med.* 41, 760-6 (1953). May. NSA 7-5008.

1378

INVESTIGATION OF THE BIOLOGICAL EFFECT OF COSMIC RADIATION. Jakob Eugster. *Naturw. Rundschau* 6, 281-3 (1953). July. (In German).

Quality and intensity of cosmic radiation and its biological effects were investigated at various altitudes. Results indicate that radiation has a predominantly stimulating rather than harmful effect on life processes. Harmful effects occur chiefly at high altitudes, caused by heavy particles of cosmic radiation. NSA 7-5096.

1379

THE EFFECT OF WHOLE BLOOD TRANSFUSION ON DOGS RECEIVING A MAXIMAL SUBLETHAL (LD₅₀) EXPOSURE TO IONIZING RADIATION. R. W. Miller, W. K. Cotton and S. N. Swisher. *Science* 118, 111-2 (1953). July 24.

None of 20 irradiated, transfused dogs used died during 28-day observation period, and it was concluded that the irradiated dog is no more susceptible than normal one to transfusion reactions when compatible blood is administered. NSA 7-5281.

1380

LOCALIZATION OF RADIOACTIVITY IN REGIONAL LYMPH NODES. Harold F. Berg, William M. Christophersen, Avrom M. Isaacs, and J. Ray Bryant. *Arch. Surg.* 67, 228-43 (1953). NSA 7-5283.

1381

THE USE OF RADIOISOTOPES IN THE STUDY OF REPRODUCTION. FINAL REPORT, PART 1. Clyde Biddulph. (Utah State Agricultural Coll.). July 1, 1953. 26p. (AECU-2611).

Experiment is described in which female rats injected with P³² were bred to normal males, and injected males were bred to normal females. NSA 7-5466.

1382

THE EFFECTS OF LARGE DOSES OF PARATHYROID EXTRACT, VITAMIN D, AND DIHYDROTACHYSTEROL ON MICE AND RATS FOLLOWING ADMINISTRATION OF RADIOACTIVE CALCIUM AND STRONTIUM. W. A. D. Anderson and Gloria E. Zander. (Marquette Univ., School of Medicine). (nd). 29p. (AECU-2623).

No pathological effect on soft tissue of mice or rats was noted when vitamin D and parathyroid extract were administered. Thickening of the end of the femur occurred in all cases in rats. Dihydrotachysterol produced calcification in both soft and bone tissue. NSA 7-5467.

1383

THE PATHOLOGIC EFFECTS OF RADIOACTIVE CALCIUM AND STRONTIUM ON THE BONES OF CF₁ MICE. W. A. D. Anderson and Gloria E. Zander. (Marquette Univ., School of Medicine). (nd). 11p. (AECU-2624).

Ca⁴⁵ injected intraperitoneally as single doses of 3.5 or 5 μ c/g, or weekly doses of 0.6 or 2.1 μ c for 1 year resulted in production of bone tumors in mice, while smaller doses did not. Tumors also found in mice receiving weekly doses of 1.5 or 2.1 μ c Sr⁸⁹ for 6 months. Autoradiographs demonstrated less radioactivity in tumor tissue than in intact bone. NSA 7-5468.

1384

CALCULATION OF I¹³¹ BETA RADIATION DOSE TO THE BONE MARROW. James S. Robertson and John T. Godwin. (Brookhaven National Lab.). (nd). 7p. (BNL-1528); *Brit. J. Radiol.* 27, 241-2 (1954). NSA 7-5470.

1385

INTRA-PROSTATIC INJECTIONS OF RADIOACTIVE COLLOIDS. 2. DISTRIBUTION WITHIN THE PROSTATE AND TISSUE CHANGES FOLLOWING INJECTION IN THE DOG. George J. Bulkley, John A. Cooper, and Vincent

J. O'Connor. (Northwestern Univ., School of Medicine). (1952). 10p. (AECU-2628).

Acute radiation reaction to P^{32} in dog's prostate differs from reaction to Au^{198} but long term result is about the same following injection of either material. NSA 7-5469.

1386

ANNUAL REPORT ON RESEARCH PROJECT. G. Failla and H. H. Rossi. (Radiological Research Lab., Columbia Univ.). June 1, 1953. 89p. (NYO-4523).

Studied result of exposing exteriorized spleens of mice and rabbits to x rays; ultraviolet sensitivity and photoreactivity of bacteriophage; effect of x rays on hamster tissues; x ray effect on hepatic glycogen of mice, hamsters, and salamanders; protective effect of thiouracil against I^{131} -produced damage; protective effect of cysteamine; effects of various radiations on rabbit lens. NSA 7-5471

1387

EFFECT OF MID-LETHAL WHOLE BODY X-RAY EXPOSURE OF MICE ON THE PRODUCTION OF ACUTE PULMONARY EDEMA BY AIR BLAST INJURY. B. Cassen and K. Kistler. (Atomic Energy Project, Univ. of Calif., Los Angeles). Aug. 19, 1953. 10p. (UCLA-266). NSA 7-5472.

1388

THE APPLICATION OF INFRARED SPECTROPHOTOMETRY TO THE DETECTION OF POSSIBLE PROTEOSES AND PEPTONES IN THE BLOOD OF IRRADIATED ANIMALS. David S. Smith. (Atomic Energy Project, Univ. of Rochester). May 18, 1953. 61p. (UR-251). NSA 7-5473.

1389

THE EFFECT OF X IRRADIATION UPON THE PERFORMANCE OF VOLITIONAL ACTIVITY BY THE ADULT MALE RAT. D. C. Jones, D. J. Kimeldorf, D. O. Rubadeau, G. K. Osborn, and T. J. Castanera. (Naval Radiological Defense Lab.). Apr. 17, 1953. 22p. (USNRDL-400).

At all doses studied there was an abrupt significant depression of activity followed by a period of recovery NSA 7-5474.

1390

FURTHER STUDIES ON THE EFFECTS OF CARBON DIOXIDE AND OXYGEN ON THE FREQUENCY OF X-RAY INDUCED CHROMOSOME ABERRATIONS IN *TRADESCANTIA*. Howard A. Schneiderman and Edward D. King. Proc. Natl. Acad. Sci. U.S. 39, 834-8 (1953). Aug.

Exposure to CO_2 during irradiation markedly increases radiosensitivity of cells. O_2 concentration profoundly affects radiosensitivity. Interaction of these 2 gases is examined, and mode of action of CO_2 in increasing radiosensitivity is defined. NSA 7-5476.

1391

EFFECT OF 400 R FRACTIONAL WHOLE BODY γ -IRRADIATION IN THE BURRO (*EQUUS ASINUS ASINUS*). Bernard F. Trum, Thomas J. Haley, Murray Bassin, John Heglin, and John H. Rust. Am. J. Physiol. 174, 57-60 (1953). July.

A pronounced hyperferremia which is observed in the burro 1 hr after 400 r exposure increases up to the 6th post-irradiation day. Plasma-Fe values were significantly elevated in most animals prior to exitus. NSA 7-5480.

1392

STUDIES ON THE DOSIMETRY AND BACTERICIDAL EFFECTS OF GAMMA RADIATIONS FROM A COBALT⁶⁰ SOURCE. Samuel A. Goldblith, Bernard E. Proctor, Sol Davidson, David A. Lang, Billy Kan, Charles J. Bates, and Marcus Karel. Radiology 60, 732-5 (1953). May. NSA 7-5481

1393

PROTECTION AGAINST RADIATION LETHALITY EFFECT OF β -MERCAPTOETHYLAMINE. R. Rugb and S. C. Wang. Proc. Soc. Exptl. Biol. Med. 83, 411-14 (1953). June.

Injection of this compound prior to irradiation definitely affords radiation protection to mice. Injection after x irradiation, whether single or multiple, adversely affects survival. NSA 7-5484.

1394

SHOCK, TOXEMIA IN RADIATION LETHALITY. Roberts Rugb, Josephine Suess, and John Scudder. Nucleonics 11, No. 8, 52-4 (1953). Aug.

Polyvinyl pyrrolidone, whether in combination with Macroose or Dextrose, does not have any protective value for mice if administered either before or after exposure to 700 r x rays. NSA 7-5486.

1395

EFFECT OF X-RAYS AND HORMONES ON RESORPTION RATE OF INJECTED $NaHC^{14}O_3$. Arne G. Forssberg and George Hevesy. Am. J. Physiol. 180, 325-30 (1955).

After intra-peritoneal, -venous or subcutaneous injection of 10-50 mg of $NaHC^{14}O_3$ (in saline) into mice, $C^{14}O_2$ exhalation was measured. X irradiation (2000 r, 155 kv, 1 mm Al, 140 r or 1350 r/min) before injection markedly decreased bicarbonate resorption rate and $C^{14}O_2$ exhalation. Radiation effect found not to be due to release of adrenalin (which also slows $C^{14}O_2$ output).

1396

THE EFFECTS OF ULTRAVIOLET AND X RADIATIONS UPON THE HETEROCHROMATIN OF *SACCHAROMYCES*. G. Fred Townsend, Alvin Sarachek, and Carl C. Lindgren. (Biological Research Lab., Southern Ill. Univ.). (1953). 7p. (AECU-2622).

Tetraploid culture of known resistance to the two radiations used. In interphase cells given lethal x-ray doses, crescent formation was normal; in cells exposed to sublethal ultraviolet irradiation, crescent formation was delayed 2-3 hr, but effect was temporary. Cells eventually formed crescents. NSA 7-5682.

1397

EFFECT OF RADIOACTIVE PHOSPHORUS (P^{32}) ON THE FORMED ELEMENTS IN THE BLOOD AND UPON OTHER TISSUES OF THE COTTON RAT *SIGMODON HISPIDUS TEXIANUS* (AUDUBON AND BACHMAN). Robert M. Hankins, A. Bryon Leonard, and Charles A. Leone. (Kansas Univ.). (1953). 49p. (AECU-2642).

Four groups of rats were injected with 1.1, 4.0, 4.3, and 5.0 μ c/g P^{32} . Hematocrit, sedimentation rate, hemoglobin, total red and white cells, and differential leukocyte count changes were studied. NSA 7-5683.

1398

THE LETHAL EFFECT OF INTRAGASTRIC IRRADIATION IN THE DOG. Armand Littman, Benum W. Fox, Harold M. Schoolman, and A. C. Ivy. (Illinois Univ. Coll. of Medicine). (nd). 15p. (AECU-2644); Am. J. Physiology 174, 347-5 (1953).

Lethal doses of intragastric radiation from Ra, Sr^{90} , or Ru^{106} -Rh¹⁰⁶ caused dehydration, weight loss, hemocentration, leukocytosis with eosinopenia and lymphopenia and death in 2 months, when administered to fistula dogs. Irradiation of isolated stomach caused death in 3 days-1 month. Gastrectomy performed after exposure appeared to prevent death, indicating damage to stomach itself is partly responsible for death. NSA 7-5684.

1399

STUDIES ON THE PATHOGENESIS OF POST-IRRADIATION INFECTION. C. Phillip Miller. (Chicago Univ.). (nd) 15p. (AECU-2646).

Data are presented on the incidence of generalized infection in mice exposed to 450 or 600 r of total-body x

radiation. Cultures of blood or spleen from mice exposed to doses of 600 r showed a high incidence of bacteremia during the second week post-irradiation, which coincided with the period of greatest mortality. Data are included on the onset and duration of bacteremia caused by various organisms and the effect of subcutaneously administered streptomycin on mortality of the mice. (C.H.) NSA 7-5685.

1400

EFFECTS OF INTRAGASTRIC IRRADIATION ON GASTRIC ACIDITY IN THE DOG. Benum W. Fox, Armand Littman, M. I. Grossman, and A. C. Ivy. Feb. 12, 1953. 19p. (AECU-2675) *Gastroenterology* 24, 517-34 (1953).

Ra needles, Ru^{106} - Rh^{106} and Sr^{90} were used as sources of radiation. Dosages ranged from ineffective to lethal. Possible therapeutic applications in gastric ulcer are discussed. NSA 7-5687.

1401

X-IRRADIATION SENSITIVITY OF ESCHERICHIA COLI B IN RELATION TO TERMINAL RESPIRATION AND OXIDATIVE ASSIMILATION. Charles R. Goucher, Eugene E. Woodside, and Walter F. Kocholaty. (Army Medical Research Lab., Fort Knox). Mar. 10, 1953. 10p. (AMRL-112) *Arch. Biochem. and Biophys.* 50, 25-33 (1954).

Regardless of vast differences in oxidative and assimilatory abilities, the sensitivity of these organisms to x irradiation was essentially unchanged. NSA 7-5688.

1402

A COMPARISON OF X-RAY INDUCED DOMINANT AND RECESSIVE LETHALS IN FIRST MEIOTIC METAPHASE EGGS AND IN SPERM OF HABROBRACON. Gertrude Heidenthal. (Brookhaven National Lab.). (nd). 1p. (BNL-1565).

Metaphase eggs were found to be more radiosensitive than sperm. Effect of dose rate on induction of dominant and recessive lethal factors is discussed. NSA 7-5689.

1403

MICROBIOLOGICAL INVESTIGATIONS OF THE LETHAL EFFECTS OF VARIOUS TYPES OF IONIZING RADIATIONS. PROGRESS REPORT FOR THE PERIOD SEPTEMBER 1, 1952 TO JUNE 30, 1953. Bernard E. Proctor and Samuel A. Goldblith. (Massachusetts Inst. of Tech.). June 30, 1953. 90p. (NYO-3340; Technical Report 4).

Effects of γ radiation from Co^{60} on various species of bacteria was determined and evaluated. Sterilization efficiency of Co^{60} γ radiation is compared with efficiency of cathode rays and x rays. NSA 7-5690.

1404

THE COMBINED EFFECTS OF THERMAL BURNS AND WHOLE-BODY X RADIATION ON SURVIVAL TIME AND MORTALITY. E. L. Alpen and G. E. Shelne. (Naval Radiological Defense Lab.). May 18, 1953. 18p. (USNRDL-402; AFSWP-470).

Animals subjected to burns only die predominantly during 1st 48-hr period following the trauma. Addition of x irradiation decreases the LA_{50} (median lethal burn area) for the initial 48-hr period. This effect is function of radiation dose; the larger the dose, the smaller the 48-hr LA_{50} . NSA 7-5691.

1405

FURTHER INVESTIGATIONS INTO THE MODIFICATION OF RADIATION SENSITIVITY AFFORDED BY COBALT. W. H. Parr, T. O'Neill, S. G. Bush, and A. T. Krebs. (Army Medical Research Lab., Fort Knox). Apr. 10, 1953. 12p. (AMRL-114; Science 119, 415-16 (1954)).

Co diet for 5 and 8 days before and for 15 days after x irradiation increased tolerance of mice to 720 r total-

body x rays. Events produced by administration of Co, rather than events at later time intervals, are decisive for the observed increase in radioresistance.

NSA 7-5692.

1406

THE INTERVENTION OF OXYGEN IN RADIOBIOLOGY. J. Loiseleur. *Ann. inst. Pasteur* 84, 1001-9 (1953). June. (In French).

For radiation to have its maximum effect, O must be present. Radio-oxidation is prevented by presence of an O acceptor such as $COCl_2$, $NaNO_2$, or $FeSO_4$. Mechanism of biological action of x rays is briefly discussed and it is concluded that organisms can be protected against external radiation by injecting them with O acceptors. NSA 7-5694.

1407

OCCURRENCE OF NONEQUILIBRIUM ATMOSPHERIC MIXTURES OF RADON AND ITS DAUGHTERS. E. C. Tsvoglou, H. E. Ayer, and D. A. Holaday. *Nucleonics* 11, No. 9, 40-5 (1953). Sept.

Analysis of Rn-daughter decay curves permits determination of atmospheric concentrations of daughters. With this data, effectiveness of ventilation in protecting U-mine workers can be more accurately evaluated. NSA 7-5695.

1408

QUARTERLY PROGRESS REPORT, APRIL 1-JUNE 30, 1953 UNCLASSIFIED SECTION. (Brookhaven National Lab.). 58p. (BNL-243).

Abstracts are given for activities concurrently published in the journals covering medicine and biology. Additional progress is reported on study of comparative sensitivity of chromosomes to thermal neutron and x radiation. NSA 7-5893.

1409

STRAY RADIATION LEVELS IN THE VICINITY OF BETA-TRONS. Stanley H. Clark. *Nucleonics* 11, No. 9, 38-9 (1953). Sept.

Betatrons of 100, 50 and 15 Mev were surveyed to determine γ -ray and neutron levels in surrounding areas. Much of the radiation hazard arises from secondary targets, such as accelerator "donut" or objects in beam path. NSA 7-5696.

1410

EFFECT OF REGIONALLY FRACTIONATED X-IRRADIATION EQUIVALENT IN DOSE TO ACUTELY LETHAL TOTAL BODY EXPOSURE. M. N. Swift, S. T. Taketa, and V. P. Bond. (Naval Radiological Defense Lab.). Mar. 27, 1953. 21p. (USNRDL-405).

Mortality after exposure of entire body to acute lethal doses of x radiation was considerably reduced in mice, and to a lesser degree in rats, by irradiating abdomen before or after the remainder of the body. Decreased mortality was also obtained in mice by shielding exteriorized spleen during exposure, even though spleen alone had received same dose previously. NSA 7-5898.

1411

EVIDENCE OF TWO DIFFERENT TYPES OF X-RAY DAMAGE REVEALED BY ANALYSIS OF RETARDATION OF BUDDING IN SACCHAROMYCES. Alvin Sarachek, Ernest Shult, and Carl C. Lindegren. (Biological Research Lab., Southern Ill. Univ.). (1953). 15p. (AECU-2647).

Two different and independent types of damage are caused by x rays. One increases exponentially throughout entire exposure period, whereas the other accumulates exponentially until dose characteristic for cell is received, after which all cells are protected from further injury of this type. NSA 7-5899.

1412

STUDIES ON LOW DOSE X-IRRADIATIONS AND ITS EFFECT UPON THE BIOCHEMISTRY AND PATHOLOGY

OF THE DOG. PROGRESS REPORT. P. H. Phillips. (Wisconsin Univ.). (1953). 8p. (AECU-2680).

Studied life expectancy of splenectomized dogs; erythrocyte fragility of splenectomized rats; effects of low-dose, intermittent x irradiation on dogs; effect of local irradiation of femur on bone marrow of rats; fatty acid metabolism by rats; use of fluid milk as medium for administering prophylactic substances to rats. NSA 7-5900.

1413

THE INFLUENCE OF IONIZING RADIATION ON MITOSIS IN THE CORNEAL EPITHELIUM OF THE RAT. 1. MORPHOLOGICAL CHANGES INDUCED BY X-IRRADIATION AND THE EFFECTIVENESS OF BAL AND CYSTEINE IN REDUCING THE FREQUENCY OF THESE CHANGES. Robert S. Ransom. (Army Medical Research Lab., Fort Knox). Jan. 12, 1953. 15p. (AMRL-110).

Cysteine installation reduced structural effects, but BAL was ineffective. NSA 7-5901.

1414

CHRONIC EXTERNAL IRRADIATION, NEUTRON RADIOBIOLOGY, PHYSIOLOGY, HISTOPATHOLOGY, AND RADIOCHEMISTRY. p.11-55 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT FOR NOVEMBER AND DECEMBER 1952, AND JANUARY 1953. Austin M. Brues, ed. (Argonne National Lab.). (ANL-4948(p.11-55)).

Studied spleen-shielding in mice; treatment of leukemic guinea pigs; treatment of x-rayed mice with organ homogenates; radiation cataracts; tumor physiology and growth. NSA 7-5903.

1415

RADIUM TOXICITY, EXPERIMENTAL PATHOLOGY, SPECIAL PROBLEMS, INVERTEBRATE ZOOLOGY, AND MICROBIOLOGY. p.56-79 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT FOR NOVEMBER AND DECEMBER 1952, AND JANUARY 1953. Austin M. Brues, ed. (Argonne National Lab.). (ANL-4948(p.56-79)).

Studied mouse survival; x-ray effect on clones of *Paramecium*; x-ray effect on blood pressure of roosters; morphology of germ cells of *Helix*; role of spleen in immunity of mice to *T. duttoni*. NSA 7-5904.

1416

MODIFICATION OF THE FRAGILITY OF ERYTHROCYTES IN THE WHOLE-BODY-IRRADIATED GUINEA PIG. Odette Lartigue and Jean-Francois Duplan. *Compt. rend.* 237, 359-60(1953). July 27. (In French)

Guinea pigs were irradiated with 500 r of x rays. Fragility of red cells heated to 54°C in hypotonic glucose medium increased progressively from 6th to 12th post-exposure day. Morphological modification of the red cells appeared concurrently. NSA 7-5906.

1417

THE SHORTENING OF LIFE SPAN BY INJECTED RADIUM, POLONIUM AND PLUTONIUM. H. A. Blair. (Atomic Energy Project, Univ. of Rochester). Sept. 8, 1953. 24p. (UR-274).

Apparent biological effectiveness of Po α radiation is about 3 compared to x rays for acute effects, about 60 for chronic effects. Injury is 80% irreversible with Po compared to 4% with x rays. Chronic toxicities of Po and Pu are each about 5 as compared to Ra. NSA 7-5910.

1418

THE EFFECTS OF IRRADIATION FROM ATOMIC BOMB FALL-OUT UPON A GROUP OF HEREFORD CATTLE. (Thesis). James Merrill Bird. (Tennessee Univ., Coll. of Agriculture). Mar. 1952. 78p. (AECU-2695).

General health, growth, breeding efficiency and relative fertility of exposed cattle were studied. No gross

differences between irradiated and control cattle were found. Effects were confined to hair and skin. NSA 7-6327.

1419

EFFECTS OF IONIZING RADIATIONS (AND OTHER AGENTS) ON THE DEVELOPING MAMMAL. Samuel P. Hicks. (New England Deaconess Hospital, Boston and Harvard Medical School and Pondville Hospital, Walpole, Mass.). 1953. 6p. (AECU-2697).

Timetable is given for malformations of fetal rats and mice exposed to 150-400 r in utero. Neuroblast is cell most easily destroyed; therefore developing brain may be damaged without harm to mother or to more mature fetal tissues. NSA 7-6328.

1420

HISTOPATHOLOGY OF THE RAT PITUITARY FOLLOWING TOTAL BODY X-IRRADIATION. Roy Korson and Albert L. Botkin. (Army Medical Research Lab., Fort Knox). July 9, 1953. 11p. (AMRL-119); *Endocrinology* 54, 225-6 (1954).

Rat pituitary showed a depletion of basophilic granules and decreased number of chromophobe cells after exposure. Marked increase in pituitary acidophiles started 24 hours post irradiation. Gradual water loss from gland and slight cell shrinkage were also noted. NSA 7-6329.

1421

(PAGES 8-97 OF) ANNUAL REPORT (ON) BIOLOGY RESEARCH (FOR) 1952. (Hanford Works). July 7, 1953. (HW-28636(p.8-97)).

Studied radioactivity of Columbia River organisms; removal of P³² by plankton and algae; effect of reactor effluent on trout; metabolism of T and D in plants and animals; absorption of Pu by rats; Zr citrate effect on removal of Pu (IV and VI) in dogs. NSA 7-6331.

1422

(PAGES 98-185 OF) ANNUAL REPORT (ON) BIOLOGY RESEARCH (FOR) 1952. (Hanford Works). July 7, 1953. (HW-28636(p.98-185)).

Studied comparison of β particles from T and from P³²; algae growth in β -emitting medium; toxicity of I¹³¹ in sheep; wild life thyroid activity; absorption of P, S, Ca, Mn, Zn, Cu and Sr by *Chlorella*. NSA 7-6332.

1423

NEW STUDIES ON THE ROLE OF THE ADRENALS IN HEMATOPOIETIC REGENERATION AFTER IRRADIATION. H. Betz. *Compt. rend. soc. biol.* 147, 168-70 (1953). Jan. (In French).

Adrenalectomized rats were given 500 r of 250-kv x rays. Study of liver and bone marrow showed that adrenalectomy stimulated hematopoietic regeneration. No regeneration occurred in rats given 800 r lethal dose, whether adrenalectomized or normal. NSA 7-6334.

1424

ACTION OF IRRADIATED CYTOPLASM ON UNTREATED CHROMOSOMES OF THE SILKWORM. Yoshio Nakao. *Nature* 172, 625-6 (1953). Oct. 3.

Genetic effects on untreated introduced chromosomes is shown by appearance of mosaic eggs in progeny of x rayed females of genotype *pe re/pe re*, mated to wild-type unirradiated males. NSA 7-6335.

1425

EFFECT OF X-RADIATION ON MIGRATION OF LEUCOCYTES IN VITRO. I. L. Shechmeister, M. Fishman and R. Yunker. *Federation Proc.* 13, 511 (1954).

Migration of leucocytes from rats exposed to 600 r total body radiation was not altered 24 hours after irradiation, but was markedly impaired after 5 days. Three groups of rabbits were exposed to 100, 500, and 800 r total body radiation respectively; the rate and extent of

migration of their leucocytes and total and differential WBC counts were determined. (from authors' summary).

1426

PRODUCTION OF HEPATIC STEATOSIS BY X RADIATION IN THE RAT. André Chevallier, C. Burg, and H. Spehler. *Compt. rend. soc. biol.* 147, 497-500 (1953). Mar. (In French).

Rats were irradiated daily until death with 50-500 r of 180-kv x rays. Aureomycin was added to food to control infection. Fatty degeneration was observed in all cases but not in controls, and most notably in animals receiving 50 r/day. NSA 7-6337.

1427

CURATIVE ACTION OF β -MERCAPTOETHYLAMINE IN THE RAT IRRADIATED WITH LIVER PROTECTED. J. Maisin, M. Mandart, G. Lambert, and H. Maisin. *Compt. rend. soc. biol.* 147, 362-4 (1953). Feb. (In French). NSA 7-6338.

1428

EFFECT OF SOMATOTROPIC HORMONE ON HEMATOPOIETIC REGENERATION IN THE IRRADIATED RAT. H. Betz. *Compt. rend. soc. biol.* 147, 171-3 (1953). Jan. (In French).

Daily injections of growth hormone prior to 800 r of 250 kv x rays failed to stimulate lymphoid or myeloid regeneration. Repetition of experiment with adrenalectomized rats injected with cortisone showed definite stimulation of hematopoietic regeneration. NSA 7-6339.

1429

PHENOMENA OBSERVED IN THE REPRODUCTION OF ASPERGILLUS FUMIGATUS FRESENIUS, UNDER THE INFLUENCE OF RADIUM. (In French). A. Sartory, R. Sartory and J. Meyer. *Compt. rend. soc. biol.* 96, 276-8 (1927).

Radium causes the conidia to remain dormant, it initiates sexual reproduction, and prevents new growth. CA 21-1290.

1430

EFFECTS OF X-IRRADIATION ON AMOUNT AND COMPOSITION OF NUCLEIC ACIDS IN LIVER. Kenneth Paigen and Berwind N. Kaufmann. *J. Cellular Comp. Physiol.* 42, 163-76 (1953).

After 600 r qualitative changes in levels of DNA and PNA in mouse liver were identical; they rose and fell together. NSA 7-6341.

1431

EFFECT OF X-IRRADIATION ON CONNECTIVE TISSUE GROUND SUBSTANCE. Robert H. Edgerley. *Am. J. Physiol.* 174, 341-6 (1953). Sept. NSA 7-6342.

1432

CHOLINE STUDIES IN RATS FOLLOWING WHOLE-BODY X-IRRADIATION. Dorothy J. Buchanan, William J. Darby, E. B. Bridgforth, Granville W. Hudson, and J. Ann Efner. *Am. J. Physiol.* 174, 336-40 (1953).

None of the irradiation effects observed were usable as indicators of early irradiation injury. NSA 7-6343.

1433

EFFECT OF X-IRRADIATION UPON THE PERFORMANCE OF DAILY EXHAUSTIVE EXERCISE BY THE RAT. D. J. Kimeldorf, D. C. Jones, and T. J. Castanera. *Am. J. Physiol.* 174, 331-5 (1953). Sept.

Exposure to x-ray doses of 300 to 1,000 r depressed ability of rats to perform a standard exhaustive exercise test. Magnitude of depression in performance was dependent upon size of x-ray dose. NSA 7-6344.

1434

A COMPARISON OF THE REACTIONS OF THE IRRADIATED PARTS OF THE BODIES OF TWO DAY OLD MICE AND URODELE AMPHIBIANS TO ROENTGEN TREATMENT.

V. V. Brunst, E. A. Sheremetieva-Brunst, and Frank H. J. Figge. *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 70, 283-93 (1953). Aug.

Effects of irradiation on the 2 forms were found to be similar. NSA 7-6345.

1435

EFFECT OF X RAYS IN WHOLE-BODY IRRADIATION ON THE THYROID GLAND OF WHITE RATS. J. Tusques, M. Berger, and R. Moret. *Compt. rend. soc. biol.* 147, 337-9 (1953). Feb. (In French).

Rats were whole-body irradiated with single 600 r dose of 200 kv x rays and sacrificed 2, 4, 24 and 48 hr later. Examination of the thyroids revealed lesions attributed to direct destructive x ray action, a conclusion contrary to that of previous studies. NSA 7-6346.

1436

RESPONSE OF IRRADIATED CANCER PATIENTS TO VIBRIO METSCHNIKOVII. E. Staten Wynne, David B. Hinds, Cora L. Gott, W. O. Russell, and G. H. Fletcher. *Science* 118, 442-3 (1953). Oct. 16.

Agglutinin formation toward this fowl pathogen was unimpaired in patients subjected to irradiation. NSA 7-6347.

1437

DETERMINATION OF SYSTEMICALLY DEPOSITED PLUTONIUM IN LABORATORY PERSONNEL AND A SIMPLE QUALITATIVE TEST FOR EXPOSURE TO AIRBORNE RADIOACTIVE MATERIAL. Louis H. Hempelmann and Wright H. Langham. (Los Alamos Scientific Lab. and Rochester Univ., School of Medicine). (1953). 14p. (AECU-2633).

Alpha counts of nose swabs is proposed as a simple test to supplement urine assays and to detect potential respiratory exposure to airborne radioactive material and the practice of faulty laboratory procedure. NSA 7-6348.

1438

ROLE OF HOST DEFENSES IN STREPTOMYCIN TREATMENT OF X-IRRADIATED MICE. Robert Q. Marston, H. Jeanette Ruth, and Willie W. Smith. *Proc. Soc. Exptl. Biol. Med.* 83, 289-91 (1953). June.

Intravenous injection of a homogenate of immature spleen increased resistance of sub-lethally irradiated mice to Proteus infection and significantly complemented action of streptomycin. NSA 7-6353.

1439

EFFECT OF SOYBEAN PHOSPHATIDE ON BLOOD COAGULATION DEFECT FOLLOWING TOTAL BODY X-IRRADIATION IN THE DOG. Sidney G. White, John B. Lagen, Paul M. Aggeler, and Robert P. Geyer. *Proc. Soc. Exptl. Biol. Med.* 83, 384-7 (1953). June.

Thrombocytopenia, prolonged clotting time, impaired clot retraction and prothrombin utilization were induced in dogs by 150 r total-body x irradiation. Temporary decrease in clotting time, increase in prothrombin utilization without change in platelet count or clot retraction were induced by intravenous injection of soybean phosphatide. NSA 7-6354.

1440

TOLERANCE TO WHOLE BODY IRRADIATION OF PATIENTS WITH ADVANCED CANCER. p.485-498 OF INDUSTRIAL MEDICINE ON THE PLUTONIUM PROJECT. L. F. Craver. (NNES IV-20). Robert S. Stone, ed. New York, McGraw-Hill Book Co., Inc. 1951.

Eight patients having advanced metastatic cancer were exposed to heavily filtered 180 kv x-rays at hourly intensities of 0.85 or 1.65 r and for daily doses of 10 to 15 r up to the projected total doses of 150-300 r. No deterioration was observed in blood count or general health that could not be attributed to progress of neoplastic disease. (from authors' summary).

1441

WHOLE BODY X-IRRADIATION OF OBESE MICE. Willie W. Smith, W. H. Chapman, and F. M. Alderman. *Am. J. Physiol.* **169**, 511-14 (1952). June.

Mice made fat by gold thioglucose injection and mice with hereditary adiposity had same mortality rate after whole-body x ray dose as did normal-sized litter-mate controls. Post-irradiation survival time and weight loss was the same in fat and control mice. NSA 6-6251.

1442

EFFECTS OF RADIATIONS OF RADIOACTIVE PHOSPHORUS ON CELL DIVISION IN ROOT MERISTEM. R. G. Trudova. *Doklady Akad. Nauk. S.S.S.R.* **85**, 219-20 (1952). July 1. (In Russian).

Number of cell divisions in root meristem of 48-hr wheat seedlings after transfer to aqueous P^{32} solutions of specific activities up to 20 $\mu\text{C}/\text{ml}$ is plotted for exposures of 24, 48, and 72 hr. NSA 6-6252.

1443

EFFECTS OF FAST NEUTRONS UPON FOREST TREE SEEDS. II. RELATIONS BETWEEN THE INTENSITIES OF IRRADIATIONS AND THE GERMINATIONS OF SEEDS, THE GROWTH OF SEEDLINGS OF *PINUS DENSIFLORA*. Keiji Sato and Yoshio Nishina. *Sci. Bull. Faculty Agr. Kyushu Univ.* **13**, 238-42 (1951). Nov. (In English).

Germination, growth and survival were found to be better in classes exposed to certain doses than in controls; at higher levels, germination, growth and survival were inversely proportional to dose. NSA 6-6253.

1444

ROENTGEN RAY CANCER OF THE HANDS IN DENTISTS. Frederic E. Mohs. *J. Am. Dental Assoc.* **45**, 160-4 (1952). Aug.

Exposure of the thumb and first 2 fingers of dentists from repeated holding of dental films in patients' mouths may lead to radiation damage which may be manifested by dryness, scaliness, fissuring, ulceration, telangiectasis, atrophy, keratoses and squamous cell carcinoma. Treatment of these is described. NSA 6-6254.

1445

THE RELEASE AND IDENTIFICATION OF BLOOD BORNE VASOTROPIC SUBSTANCES AFTER WHOLE BODY IRRADIATION. Thomas K. Haley. *Trans. N.Y. Acad. Sci.* **14**, 303-5 (1952). June.

After whole-body irradiation of rats and dogs a circulating toxic substance causing profound peripheral vascular depression is released. It fits criteria set up for ferritin (involved in irreversible phase of shock) and appears during first post-irradiation week. Vasoexcitator material in blood of x-rayed rats 2 weeks post irradiation fits criteria set up for vasoexcitator material which appears in reversible phase of shock. NSA 6-6255.

1446

FURTHER STUDIES ON METASTASIS OF A TRANS-PLANTABLE MOUSE MAMMARY CARCINOMA AFTER ROENTGEN IRRADIATION. Carl F. Von Essen and Henry S. Kaplan. *J. Natl. Cancer Inst.* **12**, 883-92 (1952). Feb.

Frequency of pulmonary metastasis in strain C57 mice bearing Bagg-Jackson mouse mammary carcinoma 755 is reported. Effect of irradiation on metastasis of this tumor seems to involve a transient local disturbance of the host-tumor relationship, probably concerned with facilitating entry of tumor cells into blood vessels. NSA 6-6256.

1447

SCARS REMAINING IN ATOM BOMB SURVIVORS: A FOUR YEAR FOLLOW-UP STUDY. Warner Wells and Neal Tsukifuji. *Surg. Gynecol. Obstet.* **95**, 129-41 (1952). Aug.

From results of survey made in Hiroshima and Nagasaki, authors conclude that clinical course of burns and other injuries in 28 patients giving history of acute radiation ill-

ness after atom bomb detonations does not differ significantly from the clinical course of 35 injured at same time but without history of radiation illness. No case was discovered resembling a cutaneous radiation injury. NSA 6-6257.

1448

GENETIC IMPLICATIONS OF MUTATIONS IN *S. TYPHIMURIUM*. H. H. Plough. In *Heterosis*. John W. Gowen, ed. Ames, Iowa State College Press. 1952. (Chapter 17).

Study of effects of x rays on 2 strains of *Salmonella typhimurium*, and the isolation of strains with specific nutritive requirements shows relation between dosage and percentage of recovered auxotrophic mutants, and also between dosage and number of different mutants. Tests to determine if antigenic specificity is altered by radiation were negative. NSA 6-6258.

1449

THE EFFECT OF X-RAYS, ADRENAL CORTEX HORMONES AND OTHER REAGENTS ON NORMAL AND MALIGNANT LYMPHOCYTES IN VITRO. Robert Schrek. *Acta Unio Intern. Contra Cancrum* **7**, 868-73 (1952).

Suspensions of living cells from rat lymphosarcoma, reticulum cell sarcoma, and Walker tumor 256; from rat and rabbit thymus; from blood of normal persons and patients with lymphatic leukemia and myelogenous leukemia; and from rabbit bone marrow and rat testis were compared for their in vitro reactions to incubation, 1000 r x ray dose, 2,6-dichlorophenol iodophenol, and adrenal cortex hormones. Results are presented in tabular form. NSA 6-6259.

1450

THIRD GENERATION FOLLOW-UP IN WOMAN RECEIVING PELVIC IRRADIATION. I. C. Rubin. *J. Am. Med. Assoc.* **150**, 207-9 (1952). Sept.

Case histories reviewed of women who received low-dosage pelvic irradiation while non-pregnant and who are mothers and grandmothers of normal children. NSA 6-6260.

1451

SUPPRESSION OF THE TUBERCULIN REACTION IN RABBITS BY TOTAL BODY IRRADIATION WITH X RAYS. B. Lennox, W. J. Dempster, and J. W. Boag. *Brit. J. Exptl. Path.* **33**, 380-9 (1952). Oct.

Irradiation of rabbit near time of inoculation with tubercle bacilli delays appearance of positive intradermal reaction. Exposure of tuberculin-sensitive rabbit temporarily renders the reaction negative or much weaker. Effect is unaltered by local screening. Histology of tuberculin reaction sites and timing of the process, suggest suppression is result of overproduction of cortisone under x-ray stimulus. NSA 6-6261.

1452

CATALASE POISONS IN RELATION TO CHANGES IN RADIOSENSITIVITY. E. Boyland and E. Gallico. *Brit. J. Cancer* **6**, 160-72 (1952). June.

List of catalase poisons given, including some hitherto unknown. Concentration required for 50% inhibition of catalase is compared with lethal dose for mice. Azide and hydroxylamine are discussed. NSA 6-6262.

1453

SOME OBSERVATIONS ON EFFECT OF GAMMA RADIATION ON THE BIOCHEMISTRY OF THE RAT THYMUS. John F. Thomson, Wallace W. Tourtellotte, and Magdalene S. Carttar. *Proc. Soc. Exptl. Biol. Med.* **80**, 268-72 (1952). June.

Negligible changes were seen in activities of succinic and malic dehydrogenase, cytochrome oxidase and adenosine triphosphatase in thymus homogenate from rat exposed to 800 r γ radiation; however, diminution both in

concentration and P^{32} incorporation of thymus DNA and RNA was evident 3 hours after exposure. NSA 6-6264.

1454

A RARE DOMINANT CHLOROPHYLL MUTANT IN DURUM WHEAT. Luther Smith. *J. Heredity* 43, 125-8 (1952). May-June.

Chlorophyll chimera was found in durum wheat plant grown from seed exposed to Test Able atomic bomb. In selfed generations of heterozygous plants about 3/4 of the off-spring were self-colored yellow-green changing to a golden color. Heterozygous golden plants x normal plants gave an F_1 half golden and half normal. Homozygous golden plants x normal plants gave an F_1 all golden. It is concluded that golden character is result of induced dominant mutation. NSA 6-6265.

1455

INDIRECT EFFECTS OF X RAYS ON CHROMOSOMES. G. Bonnier. *Brit. J. Radiology* 25, 180-2 (1952). Apr.

Review of work to date on induction of mutations in *Drosophila*. NSA 6-6266.

1456

EXPERIMENTAL RADIOTHERAPY OF ABDOMINAL CANCER. I. FACTORS AFFECTING RADIATION TOLERANCE OF THE ABDOMEN IN THE RAT. Lionel Cohen and Annabelle Cohen. *Brit. J. Radiology* 25, 485-90 (1952). Sept.

Systemic effects of radiation differ with both physical integral dose and anatomical zone treated. Data indicate that the abdomen has specific sensitivity 1.47 times greater than average for body as a whole, an important factor to be taken into account in the treatment of abdominal cancer with radiotherapy. NSA 6-6267.

1457

PHARMACOLOGICAL STUDIES ON IRRADIATED ANIMALS. II. EFFECT OF CORTISONE ON X-RAY MORTALITY OF MICE. Friedrich Ellinger. *Proc. Soc. Exptl. Biol. Med.* 80, 214-17 (1952).

A daily intramuscular dose of 0.25 mg of cortisone for 14 days after exposure to LD_{50} dose of x rays gave definite increase in mortality. Ascorbic acid, administered with cortisone did not modify results. NSA 6-6274.

1458

ROENTGEN DOSES DURING DIAGNOSTIC PROCEDURES. Vern W. Ritter, S. Reid Warren, Jr., and Eugene P. Pendergass. *Radiology* 59, 238-51 (1952). Aug.

Curves and formulas are given for estimating depth and integral doses of x radiation resulting from diagnostic radiological procedures. NSA 6-6275.

1459

ALTERATION OF THE MORTALITY OF ROENTGEN IRRADIATED MICE BY CHEMICAL MEANS. G. Limperos. *Am. J. Roentgenol. Radium Therapy Nucl. Med.* 67, 810 (1952). May.

Mortality of x rayed mice is altered by chemical agents capable of influencing generation of free radicals from cellular water, sulfhydryl compounds, sulfhydryl inhibitors and oxygen. Effect of thiourea, thiouracil and sodium maleate on mortality is described. NSA 6-6276.

1460

ADMINISTRATION OF PROTECTIVE AGENTS AND SUBSEQUENT X RADIATION. Finn Devik. *Brit. J. Radiology* 25, 481-4 (1952). Sept.

Mice were given 200 r total-body x ray dose and chromosome injuries in bone marrow were determined. Preradiation administration of cysteine, glutathione, thiocholine, thiourea, ascorbic acid, methylene blue, and vitamin B_1 gave no significant reduction in chromosome injury. Such injury was reduced in mice irradiated under hypoxia. NSA 6-6277.

1461

MODIFICATION OF ACUTE IRRADIATION INJURY IN MICE AND GUINEA PIGS BY INJECTION OF BONE MARROW; A HISTOPATHOLOGIC STUDY. Charles C. Congdon, Delta Uphoff, and Egon Lorenz. *J. Natl. Cancer Inst.* 13, 73-108 (1952). Aug.

Regeneration of hematopoietic tissues following irradiation is greatly enhanced by bone-marrow injections. Damage by exposure is unaltered--but injections are responsible for recovery. NSA 6-6278.

1462

ADVERSE EFFECT OF CORTISONE ON MARROW REGENERATION FOLLOWING IRRADIATION. John B. Thiersch, Loretta Conroy, Alexander R. Stevens, Jr., and Clement A. Finch. *J. Lab. Clin. Med.* 40, 174-81 (1952). Oct.

Cortisone has a retarding effect on regeneration of blood-forming tissues of rats exposed to 200 r whole-body irradiation. NSA 6-6279.

1463

A QUANTITATIVE DOSE-RESPONSE STUDY OF LYMPHOID-TUMOR DEVELOPMENT IN IRRADIATED C57 BLACK MICE. Henry S. Kaplan and Mary B. Brown. *J. Natl. Cancer Inst.* 13, 185-208 (1952). Aug. NSA 6-6282

1464

EFFECT OF BIOFLAVONIDS ON RADIOSENSITIVITY OF TRANSPLANTED TUMORS; EFFECT ON TOLERANCE TO CONTACT RADIATION. Boris Sokoloff, Walter H. Eddy, and George Cone. *Arch. Path.* 54, 197-203 (1952). Aug.

Flavonoid compound, given in total dose of 280 mg/100 g to rat bearers of Sarcoma 39 or Crocker carcinoma, submitted to single dose of 6-, 10-, 12-, or 15,000 r contact radiation, did not decrease radiosensitivity of cancer tissue. Same dose administered before 15,000 r gave considerable protection against radiation injury; after 15,000 r, gave slight protection, if any. NSA 6-6285.

1465

TREATMENT OF PLUTONIUM POISONING BY METAL DISPLACEMENT. p.472-475. INDUSTRIAL MEDICINE ON THE PLUTONIUM PROJECT. Jack Schubert. (National Nuclear Energy Series IV-20). Robert S. Stone, ed. New York, McGraw-Hill Book Co., Inc. 1951.

The chief concern with radiation poisoning is plutonium (Pu^{239}). It is deposited mainly in the skeleton, liver, and spleen. Excretion of plutonium increases after treatment with soluble salts of certain metals; zirconium is probably best. Rats given such treatment excreted significant amounts of plutonium. Excretion in the feces was not greatly altered.

1466

DEVELOPMENTAL MALFORMATIONS PRODUCED BY RADIATION: A TIMETABLE OF THEIR DEVELOPMENT. Samuel P. Hicks. (New England Deaconess Hospital, Boston and Harvard Cancer Commission and Harvard Medical School). (nd). 40p. (AECU-2264); *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 69, 272-93 (1953).

Malformations, especially those of the nervous system, were produced in developing rats by giving single doses of radiation to pregnant mothers on successive days during gestation. Embryologic mechanisms are discussed and illustrated. Timetable of radiation damage is presented. NSA 6-6494.

1467

THE EFFECT OF GAMMA RADIATION FROM COBALT-60 ON MICROORGANISMS. C. A. Lawrence, L. E. Brownell, and J. T. Graikoski. (Michigan Univ.). (nd). 13p. (AECU-2265); *Nucleonics* 11, No. 1, 9-11 (1953).

Effect of γ radiation from Co^{60} on microorganisms was measured by the number of viable organisms remaining after exposure to various doses of irradiation. Data include lethal effects on non-spore-forming bacteria, spore-forming aerobic bacteria, fungi, yeast, and protozoa NSA 6-6495.

1468
FINAL REPORT (ON) UNIVERSAL SEROLOGIC REACTION FOLLOWING IRRADIATION (FOR) PERIOD JULY 1, 1949 TO JUNE 30, 1952. Reuben L. Kahn and Fred J. Hodges. (Michigan Univ.). 66p. (AECU-2266).

Authors present discussion of: the nature of the universal reaction, differences in serologic patterns in different individuals and population groups, the constancy of serologic pattern in health, reaction following injection of horse serum, tissue lipids and other substances and reaction following irradiation in rabbits, cancer patients and polythemia patients. NSA 6-6496.

1469
THE USE OF SMALL LABORATORY ANIMALS IN MEDICAL RADIATION BIOLOGY. PART II. CORRELATION OF PHYSICAL FACTORS WITH THE BIOLOGICAL EFFECT PRODUCED IN TOTAL-BODY IRRADIATION. Friedrich Ellinger, Jasker E. Morgan, and Francis W. Chambers, Jr. (Naval Medical Research Inst., Bethesda). May 15, 1952. 26p. (NP-4076). NSA 6-6498.

1470
LETHAL MUTATIONS AND THE BACTERICIDAL ACTION OF IONIZING RADIATION. K. C. Atwood and G. E. Stapleton. *Naturwissenschaften* 39, 330-1 (1952). July. (In English).

Authors object to the hypothesis that the bactericidal action of ionizing radiation may be attributed to lethal mutation, since exponential survival curves are incompatible with lethal-mutation hypothesis in cases where bacteria are multinucleate. Induction of recessive lethal mutations in a two-nuclei cell does not require mutations in identical loci of both nuclei (cytological and genetic evidence). NSA 6-6499.

1471
THE DEPENDENCE OF SOME BIOLOGICAL EFFECTS OF RADIATION ON THE RATE OF ENERGY LOSS. Cornelius A. Tobias. IN SYMPOSIUM ON RADIOBIOLOGY. James J. Nixon, ed. N. Y., John Wiley and Sons, 1952. (Chapter 19).

Phenomenon of inhibition of cell division by irradiation is examined theoretically and experimentally in a set of varied conditions. NSA 6-6500.

1472
BEHAVIOR OF NUCLEIC ACIDS IN NERVE CELLS SUBJECTED TO ROENTGEN RADIATION. A. Della Beffa. *Arch. psicol. neurol. e psychiat.* 13, 116-27 (1952). Jan. (In Italian).

Histological and cytochemical observations on cerebral, cerebellar and spinal cord tissue of guinea pigs exposed to 900 to 3600 r of x radiation in 1 to 3 exposures are reported. NSA 6-6501.

1473
SINGLE WHOLE-BODY X IRRADIATIONS OF THE GUINEA PIG: PRINCIPAL BIOLOGICAL EFFECTS. L. Pigoury, P. Nizza, and J. Charney. *Rev. vét. militaire* 7, 1-25 (1952). (In French).

Guinea pigs were x irradiated with 100, 200, 400, 500, 800, or 1000 r. Mortality rates, mean survivals, clinical effects (symptoms, temperature changes and weight losses) blood pictures and brief description of macroscopic lesions of important organs are reported. NSA 6-6502.

1474
REACTION OF THE VAGINAL WALL TO INTRAVAGINAL IRRADIATION. Hans Tischer. *Wien med. Wochschr.* 102, 133-6 (1952). Feb. 16. (In German).

Tolerance limit of 30,000 r surface dose in 12-fold fractionated exposures was established for vaginal wall in intravaginal x irradiations. Higher doses, either single or fractionated, produce extensive, lasting radiation damage. Macroscopic and histological changes at various radiation levels are illustrated. NSA 6-6503.

1475
SENSITIZATION BY BETA RADIATION OF BACTERIA TO EFFECTS OF HIGH AND LOW TEMPERATURES AND TO EFFECTS OF REPEATED BETA RADIATION. E. Ya. Graevskii. *Doklady Akad. Nauk S.S.S.R.* 83, 565-8 (1952). Apr. 1. (In Russian).

Colonies of *Bacterium coli commune* were exposed to total doses of 0.002 to 0.85 mc/day of $\text{Ra } \beta$ radiation. Sensitized colonies were incubated at various temperatures and with additional β irradiations. Survival are curves presented. Results are interpreted as supporting target theory of action of ionizing radiation. NSA 6-6504.

1476
EFFECT OF NITROGEN MUSTARD OR X- OR RADIUM-IRRADIATION TREATMENT ON THE LEVEL OF BLOOD SERUM PROTEIN-BOUND CARBOHYDRATE (POLY-SACCHARIDE) IN PATIENTS WITH NEOPLASMS. J. W. Keyser. *Biochem. J.* 51, 46 (1952). Aug.

Treatment that results in marked clinical improvement and reduction in tumor size was associated with fall in level of serum polysaccharide (total and mucoprotein) toward normal values, with preliminary rise during treatment. With relapse, polysaccharide level rose again. NSA 6-6505.

1477
HISTOCHEMICAL AND SEROLOGICAL INVESTIGATION ON THE EFFECT OF ROENTGEN RADIATION. III. BEHAVIOR OF ACETAL PHOSPHATIDES (Aph) IN SPLEEN, THYMUS, SMALL INTESTINE, KIDNEY, AND HEART MUSCLE OF THE RAT FOLLOWING WHOLE-BODY IRRADIATION WITH 1000 R. Theophil Hornykiewytsch and Günther Seydl. *Strahlentherapie* 88, 129-39 (1952). (In German).

Tissues rich in Aph (glands of small intestine) are radioresistant, while those poor in Aph (spleen and thymus) are radiosensitive. NSA 6-6506.

1478
VARIATION OF DESOXYRIBONUCLEIC ACID IN HEPATIC CELLS FOLLOWING X IRRADIATION. A. Romanini. *Boll. soc. ital. biol. sper.* 28, 103-5 (1952). (In Italian).

Mice were given single dose of 1000 r on hepatogastric region and sacrificed at end of 1 hr, or 1, 3, or 7 days. DNA concentrations were determined in liver preparations with histophotometer. An initial indefinite increase occurs, then a rapid drop to 78% of normal at end of 24 hr, followed by another increase to 125% of normal by 7th day. NSA 6-6508.

1479
PHARMACOLOGICAL STUDIES OF IRRADIATED ANIMALS. PART I. SCOPE AND METHODOLOGY. Friedrich Ellinger. (Naval Medical Research Inst., Bethesda). May 28, 1952. 13p. (NP-4121; U-23977).

Data on effects of DNA, RNA, and spleen extract on radiation-induced mortality in mice are presented graphically. Mechanisms by which pharmacological agents modify lethal effects of ionizing radiation and the necessity of using the entire lethal-dose curve for evaluation of drug effects are discussed. NSA 6-6515.

1480
BLOOD TRANSFUSION IN IRRADIATION HEMORRHAGE. J. Garrott Allen, C. E. Basinger, Jerome J. Landy, Margaret H. Sanderson, and Daniel Enerson. *Science* 115, 523-6 (1952). May.

Frequent administration of fresh blood transfusions without antibiotics in dogs failed to improve survival rate or to ameliorate spontaneous bleeding after exposures to total-body x rays (LD_{50} - LD_{100}). More caution is indicated in use of frequent blood transfusions alone as a therapeutic measure in treating latent symptoms of irradiation injury in man. NSA 6-6516.

1481

ALLELISM OF SECOND CHROMOSOME LETHALS IN *D. MELANOGASTER*. Bruce Wallace. (Biological Lab., Cold Spring Harbor, N. Y.). (nd). 5p. (AECU-990); Proc. Natl. Acad. Sci. U. S. 36, 654-7 (1950).

Through an analysis of the frequency of allelism of 100-sec chromosome lethals induced in *D. melanogaster* by chronic γ -ray treatment, it has been estimated that the minimum number of loci capable of mutating to lethality under these conditions is 400 (234-718). NSA 5-744.

1482

BIOLOGICAL EVALUATION OF 20 MILLION VOLT ROENTGEN RAYS. V. BAR EFFECT IN *DROSOPHILA*. W. M. Luce, H. Quastler, and E. F. Lanzl. Am. J. Roentgenol. Radium Therapy 64, 963-7 (1950). Dec.

Reduction of eye facet number in *D. melanogaster* after irradiation is used to compare effects of high- and low-energy roentgen rays. Efficiency of n (20 million volt at 200 kv) $\approx$ 0.85. Result is consistent with values previously obtained with responses to single doses. NSA 5-745.

1483

CONFERENCE ON RADIATION CATARACTS AND NEUTRON EFFECTS. Phillip H. Abelson. (Division of Medical Sciences, NRC). Feb. 17, 1950. 100p. (NP-1826).

Production and detection of neutrons; experimental neutron-irradiation of animals; studies on lens of eye are discussed. NSA 5-746.

1484

THE EFFECT OF IRRADIATION ON THE DENTAL SYSTEM AS DEMONSTRATED BY THE ROENTGENOGRAM. Karl W. Bruce and Edward C. Stafne. J. Am. Dental. Assoc. 41, 684-9 (1950). Dec.

Irradiation can injure tooth germ, preventing formation of tooth; cause dwarfing of permanent teeth; effect dwarfing of roots of permanent teeth undergoing development; effect premature completion of calcification of permanent teeth; may cause early eruption of permanent teeth. NSA 5-747.

1485

EXTREME RETARDATION OF EPIPHYSEAL GROWTH FROM ROENTGEN IRRADIATION. A CASE STUDY. Charles H. Frantz. Radiology 55, 720-4 (1950). Nov.

Infant with congenital hemangio-matous hypertrophicum of right leg was treated with 400 and 200 r doses of 135-kv x rays. After 15.5 yr 29% lag developed in longitudinal growth of treated leg, although normal knee-joint motion persisted. NSA 5-748.

1486

RADIATION SENSITIVITY OF CELLS DURING MITOTIC AND MEIOTIC CYCLES WITH EMPHASIS ON POSSIBLE CYTO-CHEMICAL CHANGES. A. H. Sparrow. (Brookhaven National Lab.). (nd). 65p. (AECU-160; M-4303). Ann. N.Y. Acad. Sci. 51, 1508-40 (1951).

Original data (*Trillium erectum*) show late prophase and metaphase to be highly sensitive to x-ray breakage; early interphase of low sensitivity. Tendency of broken ends to rejoin appears to be inversely related to amount of fragmentation per dosage. Factors affecting nuclear radiosensitivity are discussed. NSA 2-1506.

1487

THE FAST NEUTRON HAZARD. Titus C. Evans. Nucleonics 4, No. 3, 2-8 (1949). Mar.

Effects of neutrons (ca. 4 Mev) and 185 kv x rays on mice were studied to determine whether distribution of exposure in time would alter relative effectiveness of the radiations. Exposures were (1) single acute, (2) multiple subacute or (3) chronic (small doses); survival data are presented graphically. Equivalence of $1n = 10$ r accepted as temporary working basis for permissible exposures. NSA 2-1507.

1488

HISTAMINE IN RAT PLASMA CORRELATION WITH BLOOD PRESSURE CHANGES FOLLOWING X-IRRADIATION. R. P. Weber and F. R. Steggerda. Proc. Soc. Exptl. Biol. and Med. 70, 261-63 (1949). Feb.

Rat blood plasma contains 1-2 γ histamine/2cc plasma at 2 hr and 5 days after exposure to LD_{50} (600 r) of x rays. Other rats similarly irradiated show fall in blood pressure at time histamine found in plasma of above mentioned rats. Relationship considered to be strong suggestion that histamine causes fall in blood pressure. NSA 2-1508.

1489

MEDICAL AND BIOLOGICAL ASPECTS OF NUCLEAR ENERGY. Andrew H. Dowdy. (Atomic Energy Project, Rochester Univ. and Douglas Aircraft Co. Project RAND). Aug. 13, 1947. 36p. (RAD-202).

A review of University of Rochester experimental studies of effects of chronic and acute x and neutron irradiation on peripheral blood picture; incidence of leukemia; mortality; weight; male sterility; genetic changes and histogenetic changes (dogs, rabbits, monkeys, rats and fruit flies). Significance of results are discussed. NSA 2-1509.

1490

PLATELET VALUES IN PERSONNEL ENGAGED IN ROENTGEN DIAGNOSTIC WORK. Harry Mossberg. Acta Radiol. 34, 186-92 (1950). Sept.

Definite decrease in platelet count found in one-third of cases. NSA 5-749.

1491

THE PROPERTIES OF X-RAY-INACTIVATED BACTERIOPHAGE. I. INACTIVATION BY DIRECT EFFECT. James Dewey Watson. J. Bacteriol. 60, 697-718 (1950). Dec.

Inactivation is a simple exponential function of dose, indicating a one-hit inactivating mechanism. Results are used to distinguish two stages in early period of phage reproduction, first being called "adsorption," the second, "invasion." NSA 5-750.

1492

RADIATION INJURY TO PLANTS GROWN IN NUTRIENT SOLUTIONS CONTAINING P^{32} . James M. Blume, C. E. Hagen, and Ruth W. Mackie. Soil Sci. 70, 415-26 (1950). Dec.

Damage to tops is more severe than damage to roots. Injury is due primarily to radiation from P^{32} accumulated within the plant, that remaining in the nutrient solution having relatively little effect. No evidence of damage to cells other than those which were in zones of active division. NSA 5-751.

1493

MANUAL ON RADIOLOGICAL PROTECTION FOR CIVILIAN DEFENSE. Elda E. Anderson. (Oak Ridge National Lab.). Apr. 1950. 173p. (M-4514). NSA 5-753.

1494

MEDICAL ASPECTS OF CIVIL DEFENSE AGAINST ATOMIC WEAPONS. William F. Bale, George H. Casarett, Donald R. Charles, Adrian Dahl, Joe W. Howland, John B. Hursh, Mary Lou Ingram, Harry J. Kingsley, Alexander Leighton, Ralph J. Low, Alec E. Martin, Herbert Mermagen, Joseph T. Payne, James Scott, J. Newell Stannard, and Luville T. Steadman. (Atomic Energy Project, Univ. of Rochester). J. Newell

Stannard and Henry A. Blair, eds. Sept. 1, 1950. 265p. (UR-112). NSA 5-756.

1495

PROBLEMS IN THE ESTABLISHMENT OF MAXIMUM PERMISSIBLE RADIATION EXPOSURE LEVELS. J. N. Stannard. (Atomic Energy Project, Univ. of Rochester). Dec. 1950. 2p. (UR-135). NSA 5-757.

1496

BIOLOGICAL ASPECTS OF ATOMIC ENERGY. Brit. Med. J., 999 (1950). Oct. 28.

Report on radiation effects, genetic hazards and their control, and responsibilities of atomic scientists. NSA 5-758.

1497

EFFECT OF ANTIBIOTICS ON MORTALITY FROM INTERNAL RADIATION. Simon Koletsky. (Atomic Energy Project, Western Reserve Univ.). Sept. 28, 1950. 14p. (NYO-1614); Proc. Soc. Exptl. Biol. Med. 75, 363-6 (1950).

Combination of streptomycin and penicillin proved effective in reducing mortality of rats given lethal doses of P^{32} . Morbidity was reduced and survival time prolonged. NSA 5-759.

1498

DOSAGE UNITS FOR HIGH-ENERGY RADIATION. U. Fano and Lauriston S. Taylor. Radiology 55, 743-7 (1950). Nov.

Authors present general discussion of changing emphasis on various aspects of radiation dosage measurement and the increasing clarification of the problem. New units formulated by workers from many countries are listed. NSA 5-763.

1499

THE PHYSICIAN IN AN ATOMIC WAR. P. Allweiss-Alvet. Mûch. med. Wochenschr. 92, 705-14 (1950). Aug. 4. (In German).

Experience gained in Hiroshima, Nagasaki, and Eniwetok Atoll is basis for this outline of pathological damages caused by bomb, and therapeutic and preventive possibilities to be considered in atomic warfare. NSA 5-3.

1500

THE EFFECT OF X-RAY UPON THE GROWTH AND INFECTIVITY OF ENDAMOEBA HISTOLYTICA. Elvio H. Sadun, Joseph N. Ane, Frances Willard Fuller, and Ruth Lewis. Am. J. Trop. Med. 30, 635-40 (1950). Sept.

Exposure of amoeba to 60,000 and 120,000 r in Balamuth culture caused some inhibition of population growth, while 30,000 r dose had no such effect. Progeny of x-rayed amoeba (120,000 r) and unexposed controls both caused severe intestinal lesions when injected into normal guinea pigs. NSA 5-12.

1501

FUNCTIONAL AND STRUCTURAL CHANGES CONSEQUENT TO HIGH DOSAGES OF RADIOACTIVE IODINE. Aubrey Gorbman. J. Clin. Endocrinol. 10, 1177-91 (1950). Oct.

Observations on sequelae in mice after administration of high, radiotoxic doses of I^{131} are summarized and related, when feasible, to man. NSA 5-13.

1502

GREYING OF HAIR. II. RESPONSE OF INDIVIDUAL HAIRS IN MICE TO VARIATIONS IN X-RADIATION. Herman B. Chase and Harold Rauch. J. Morphol. 87, 381-91 (1950). Sept.

Mice were irradiated with up to 1500 r of 100 and 200 kv x rays, 920-million-volt betatron and 50 mg Ra needle. Results suggest that radiation affects melanoblast source of pigment granules for each hair follicle. NSA 5-14.

1503

RADIOACTIVITY AND COSMIC RADIATION AS BIOLOGI-

CAL FACTORS? Josef Penkava. Sborník Českoslov. Akad. Zěmèdelské 22, 448-66 (1950). (In Czech).

Elementary outline of progress and present knowledge in this field. NSA 5-15.

1504

STUDIES ON THE EFFECTS IN VITRO OF ROENTGEN RADIATION ON THE BIOLOGICAL ACTIVITY OF THE AGENT OF CHICKEN TUMOR I (ROUS SARCOMA). W. Ray Bryan, Egon Lorenz, and John B. Moloney. J. Natl. Cancer Inst. 10, 1215-37 (1950). June.

Dose-survival curve varies with method of preparation and relative purity of tumor-agent suspension exposed. Diameter of radiosensitive structure of unit particles of tumor agent is estimated at 46-49 $m\mu$. NSA 5-16.

1505

CANCER THERAPY BY MEANS OF SLOW NEUTRONS; PRELIMINARY STUDY. José W. Otte and Eduardo Sanchez Serrano. Toko-ginecol. práct. 9, 1-15 (1950). Jan. (In Spanish).

Cancers of uterus and breast previously impregnated with B or Li (iontophoresis) were irradiated with slow neutrons (4×10^3 neutrons/cm²/sec). Observations are reported. NSA 5-23.

1506

MALIGNANT TUMORS AND THE RADIUM-ROENTGEN THERAPY. S. Scaglione. Boll. soc. ital. biol. sper. 26, 23-4 (1950). Jan. (In Italian).

Observations on 3 cases of malignant tumors of uterus and ovary apparently caused by x ray treatment for myoma of uterus given 10-15 yr previously are presented. Carcinogenic action of x rays and Ra on genital organs is discussed. NSA 5-25.

1507

A COMPARISON OF FETAL AND INFANT DEATH RATES IN THE PROGENY OF RADIOLOGISTS AND PATHOLOGISTS. James F. Crow. Am. J. Roentgenol. Radium Therapy Nuclear Med. 73, 467 (1955).

1508

THE RESPONSE OF MICE TO INOCULATION WITH CERTAIN AVIRULENT BACTERIA AFTER EXPOSURE TO SUBLETHAL TOTAL BODY X-IRRADIATION. I. L. Schechmeister and V. P. Bond. (Naval Radiological Defense Lab.). Aug. 11, 1950. 12p. (AD-233(B)). Proc. Soc. Exptl. Biol. Med. 77, 77-80 (1951).

Mice, irradiated and inoculated with avirulent organisms different from those normally present in their intestines, exhibited high incidence of bacteremia and death. NSA 5-285.

1509

THE INFLUENCE OF TEMPERATURE UPON THE DESTRUCTION OF X-RAYED HEMATOPOIETIC CELLS OF TADPOLES. Bennet M. Allen, Ole Arne Schjeide, and Lynette B. Hochwald. (Univ. of Calif., Los Angeles). Oct. 12, 1950. 17p. (UCLA-93). J. Cell. Comp. Physiol. 38, 69-82 (1951).

Visible destruction of x-rayed (500 r, hard x rays) hematopoietic cells of tadpoles (due to destructive reactions subsequent to irradiation) is conditioned by temperature at which tadpoles are reared. NSA 5-286.

1510

BY-EFFECTS OF IRRADIATION ON THE SKIN. Arthur William Stillians. J. Am. Med. Assoc. 144, 743-7 (1950). Oct. 28.

Overexposure to α rays or Ra may cause infectious eczematoid dermatitis superimposed on radiodermatitis, acne, erythema and tumors. Histological study is presented of benign tumor developing after Ra β -ray treatment of an erythematous senile keratosis. NSA 5-289.

1511

THE DISTRIBUTION OF X-RAY INDUCED CROSSOVERS

FROM CURLY INVERSION HETEROZYGOTES OF DROSOPHILA MELANOGASTER FEMALES. Claude W. Hinton and Maurice Whittinghill. *Proc. Natl. Acad. Sci. U. S. A.* 36, 552-8 (1950). Oct.

Induced crossover offspring from test crossed *Drosophila* females x-rayed with 2250 r as adults are so distributed that their meiotic origin is unlikely. Results indicate oögonial influence upon recombinants. NSA 5-290.

1512
EFFECT OF LYMPHOID NECROSIS DUE TO NITROGEN MUSTARD AND ROENTGEN IRRADIATION ON NEUROMUSCULAR FUNCTION OF HYPOPHYSECTOMIZED ANIMALS. Clara Torda and Harold G. Wolff. *Am. J. Physiol.* 163, 201-8 (1950). Oct. 1.

Hypophysectomized rats exhibit marked decrease in ability of nerve to maintain amplitude of action potential, and decrease in ability of nerve tissue to synthesize acetylcholine. Administration of ACTH restores both abilities to normal. NSA 5-291.

1513
EFFECTS OF INTERNAL IRRADIATION OF MICE WITH P^{32} , PART II. GONADS, KIDNEYS, ADRENAL GLANDS, DIGESTIVE TRACT, SPINAL CORD, LUNGS, AND LIVER. Shields Warren, Jane C. MacMillan, and Frank J. Dixon. *Radiology* 55, 557-70 (1950). Oct.

Authors describe histologic damage suffered by a series of mice injected with 25 μ c, 250 μ c, and 2 mc of P^{32} . NSA 5-292.

1514
INHIBITION OF PLANT GROWTH BY IRRADIATION. V. RADIATION EFFECTS ON INITIATION AND COMPLETION OF GROWTH. Henry Quastler and Marianne Baer. *Cancer Research* 10, 604-12 (1950). Oct.

Linear growth in Mung beans was studied after total or partial irradiation with various doses of x radiation. Results showed apparatus for growth initiation is more vulnerable than apparatus concerned with actual growth. NSA 5-293.

1515
PRELIMINARY ESTIMATE OF THE ENERGY DEPOSITION IN SOFT TISSUE DUE TO A FAST NEUTRON FLUX. B. Davison. (Atomic Energy Research Establishment, Harwell, Berks (England)). (nd). 34p. (AERE-T/M-13; H.S. 1467). NSA 5-294.

1516
PYRIDOXINE AND EXPERIMENTAL X-RADIATION INJURY IN RATS. M. L. MacFarland, M. V. Peters, R. M. Ballantyne, and E. W. McHenry. *Am. J. Physiol.* 163, 394-9 (1950). Nov. 1.

Pyridoxine deprivation did not increase x ray susceptibility of rats. Irradiation did not affect total Vitamin B_6 concentration in liver of either deficient or control animals. NSA 5-295.

1517
RADIATION-INDUCED MUTATIONS IN MAMMALS. Donald R. Charles. *Radiology* 55, 579-81 (1950). Oct.

1518
PROTECTION OF BIOLOGICAL SYSTEMS FROM THE EFFECTS OF IONIZING RADIATION. Leslie F. Nims. (Brookhaven National Lab.). (nd). 7p. (AECU-972). *J. Chim. Phys.* 48, 280-3 (1951).

Author presents a general discussion of biological aspects of radiation damage. Although it is impossible to protect biological systems from physical effects of radiation, there is protection against chemical oxidations caused by radiation. Protecting substances must be present during exposure. NSA 5-297.

1519
RATIONALE OF THERAPY OF BLOOD DISEASES.

William Appel. *J. Michigan State Med. Soc.* 49, 1188-90, 1204 (1950). Oct.

Treatment of hemorrhagic diseases, anemia and leukemia including use of x rays, P^{32} , and nitrogen mustard is discussed. NSA 5-308.

1520
SOME OBSERVATIONS WITH 1,000-KV, 400-KV, AND 200-KV X-RAY THERAPY. Walter T. Murphy and M. C. Reinhard. *Radiology* 55, 477-93 (1950). Oct.

Data collected on radiation effects and x ray and Ra therapy techniques during routine treatment of malignant neoplasms of pelvic region are presented. NSA 5-309.

1521
STUDIES OF THE METABOLISM OF CERTAIN FISSION PRODUCTS AND PLUTONIUM. Bergene Kavin, D. H. Copp, and J. G. Hamilton. (California Univ., Radiation Lab.). Aug. 7, 1950. 120p. (UCRL-812).

Distribution and excretion studies of radioisotopes of cerium, niobium, plutonium, strontium, yttrium and zirconium in rats are reported. NSA 5-318.

1522
DIFFERENTIAL REJOINING AS A FACTOR IN APPARENT SENSITIVITY OF CHROMOSOMES TO X-RAY BREAKAGE. Arnold H. Sparrow. (Brookhaven National Lab. and Marc Maldawer, Harvard Univ.). (nd). 14p. (AECU-989). *Proc. Natl. Acad. Sci. U.S.A.* 36, 636-43 (1950).

Differential rejoining was studied in microspores of *Trillium erectum* after x irradiation of (1) meiotic first metaphase and (2) early post-meiotic interphase stages. Significantly higher amount of rejoining was observed in (1). NSA 5-512.

1523
COMPARATIVE BIOLOGICAL ACTIONS OF CYCLOTRON FAST NEUTRONS AND X-RAYS I. LETHAL ACTION ON MICE AND RABBITS. Charles W. Hagen, Jr., and Raymond E. Zirkle. (Argonne National Lab.). Nov. 1950. 26p. (CH-3903).

For rabbits LD_{50-30} is 825 r of x rays, or 145 n units of neutrons, x/n ratio is 5.7. Ratio of mean survival times is 6.3 LD_{50-30} for mice is 540 r or 54 n; x/n ratio is 10. NSA 5-514.

1524
THE EFFECTS OF ACUTE EXPOSURE TO ROENTGEN RADIATION ON THE PERIPHERAL BLOOD OF EXPERIMENTAL ANIMALS. M. Ingram and W. B. Mason. (Univ. of Rochester, Atomic Energy Project). July 17, 1950. 36p. (UR-122).

Single whole-body x ray doses were given to rats (5-1500 r), monkeys (300-2000 r), and dogs (300 r) and hemograms were determined at regular intervals for 25-60 days post irradiation. NSA 5-515.

1525
EXPERIMENTAL CONFIRMATION OF A PREVIOUSLY REPORTED UNUSUAL FINDING IN THE BLOOD OF CYCLOTRON WORKERS. M. Ingram and S. W. Barnes. (Univ. of Rochester, Atomic Energy Project). Oct. 10, 1950. 8p. (UR-137). *Science* 113, 32-4 (1951).

Relationships between increased incidence of lymphocytes with bilobed nuclei and exposure to radiation from cyclotron were confirmed experimentally using 3 dogs studied throughout response and recovery stages following 3 consecutive exposures. NSA 5-516.

1526
ACTION OF X-RAYS ON THE EMBRYONIC DEVELOPMENT OF AMPHIBIA. V. A. Blinov. *Doklady Akad. Nauk S.S.S.R.* 74, 401-4 (1950). Sept. 11. (In Russian).

Radiosensitivity of the embryo was studied using axolotls and tritons (147 r/min) and frogs (1100 r/min). Final phase of blastula, late neurula, and time of gill

formation were the most radiosensitive periods of development. NSA 5-517.

1527

THE EFFECT OF X-RADIATION ON ANTIBODY FORMATION. Leon O. Jacobson, Melba J. Robson, and Edna K. Marks. *Proc. Soc. Exptl. Biol. Med.* 75, 145-52 (1950). Oct.

Antibody formation is suppressed in rabbits by 800 r total body x-ray exposure. Lead shielding of spleen or appendix protects capacity to form antibodies, even though lymphatic tissue elsewhere in body is destroyed. NSA 5-519.

1528

REPORT OF "SYMPOSIUM ON MODE OF ACTION OF IONIZING RADIATIONS." Alma Howard. *Nucleonics* 7, No. 6, 26-30 (1950). Dec.

Analysis of reaction of living cells to various radiations is presented. NSA 5-520.

1529

EMERGENCY RESPIRATORY PROTECTION IN THE ATOMIC AGE. Julius Hanoach. (Brookhaven National Lab.). July 1, 1950. 20p. (AECU-982).

This discussion is based on the 2 objectives of a radiation safety program which are (1) to assure external irradiation is limited to permissible exposure limit; (2) to prevent entrance of radiomaterials into body. NSA 5-521.

1530

A CHART FOR ESTIMATING DOSAGE TIME FACTORS FOR PERSONNEL EXPOSED TO MEASURED RADIATION FIELDS. R. E. Young and C. J. Camp. (Naval Radiological Defense Lab.). Jan. 10, 1950. 7p. (AD-189(O); NRDL-12).

A 3-scale nomograph is presented for calculating maximum permissible exposure time for personnel handling radioisotopes or who are exposed to ionizing radiation. NSA 5-522.

1531

CHROMOSOMAL INTERCHANGES IN MAIZE. E. G. Anderson. *Genetics* 20, 70-83 (1935).

Author describes 64 chromosomal interchanges in maize. Chromosomes identified by diakinesis examination of intercrossovers with known interchanges. Information supplemented by linkage studies and midprophase cytological examinations. Tabulation of interchanges for 10 chromosomes after irradiation shows frequency proportional to relative lengths of chromosomes. Selective elimination is more stringent in haploid gametophyte than in zygote. (from abstract). BA 9-17598.

1532

SULFHYDRYL-CONTAINING AGENTS AND THE EFFECTS OF IONIZING RADIATIONS II. FURTHER STUDIES OF THE BENEFICIAL EFFECT OF GLUTATHIONE ON X-IRRADIATED MICE. W. H. Chapman and E. P. Cronkite. (Naval Medical Research Inst., Bethesda). June 20, 1950. 9p. (NP-1833). *Proc. Soc. Exptl. Biol. Med.* 75, 318-22 (1950).

Results indicate a quantitative relationship between glutathione dosage and degree of x ray protection given. NSA 5-530.

1533

SINGLE CELL AUTOGRAPHS OF BONE MARROW AND BLOOD FROM RATS USING RADIOACTIVE PHOSPHORUS. William I. Morse. *Am. J. Med. Sci.* 220, 522-9 (1950). Nov.

Youngest erythropoietic and granulopoietic forms from marrow have most intense autographs indicating rapid P^{32} turnover. Autographs of megakaryocytes and lymphocytes are faint. If observations are substantiated, P^{32} may have advantages over x-ray therapy in myelogenous leukemia. NSA 5-533.

1534

THE BIOLOGIC EFFECTS OF RADIATION TRAINING PROGRAM LECTURE NOTES. S. T. Cantril. (Argonne National Lab.). May 17, 1943. Decl. May 22, 1950. 10p. (AECU-2976; CL-551).

Notes on specific ionization, effective penetrability of radiation, time factor, total dose, radiosensitivity and tolerance dose in relation to occupational hazard. Tolerance level of γ radiation for skin and total body 0.1 r/day; for neutrons, 0.01 r/day. NSA 5-908.

1535

CHANGES IN ANTIDIURETIC ACTIVITY OF RAT SERUM AFTER X-IRRADIATION. Abraham Edelmann and W. J. Eversole. (Brookhaven National Lab.). (nd). 1p. (AECU-108). *Am. J. Physiol.* 186, 709 (1950).

Irradiated rats (160 KVP, 10 ma, 0.2 mm Cu) excreted test dose of H_2O at more rapid rate than did unexposed controls, apparently due to a decrease in serum anti-diuretic activity observed at 12 and 24 hr post irradiation. NSA 5-910.

1536

COMPARATIVE LETHAL ACTION OF X RAYS AND CYCLOTRON NEUTRONS ON DROSOPHILA EGGS. Raymond E. Zirkle and Mary Ellen Parrish. (Argonne National Lab.). Dec. 1950. 6p. (CH-3904).

Various lots of eggs were given graded doses of (1) x rays, (2) fast neutrons and (3) mixed neutrons and γ rays from cyclotron. LD_{50} for (1) is 170 r, for (2) 31 n, for (3) 43 Victoreen scale units. Dosage ratio of x/n is 170/31 or 5.5; x/n with γ rays present is 170/43 or 4.0. NSA 5-911.

1537

THE EFFECTS OF CHRONIC EXPOSURE TO ROENTGEN RADIATION ON THE PERIPHERAL BLOOD OF EXPERIMENTAL ANIMALS. M. Ingram and W. B. Mason. (Univ. of Rochester, Atomic Energy Project). July 17, 1950. 23p. (UR-121).

Routine hematological examinations of dogs, rabbits, rats, and monkeys exposed to daily whole-body x-ray doses of 0.1-10.0 r/day for continuous period of not more than 2 years are reported. NSA 5-912.

1538

APPLICATION OF THE CONCEPT OF ENTROPY TO CELL REACTIONS, CONSIDERED AS A FUNDAMENTAL BIOLOGICAL LAW. Luigi Turano. *Radiologia Med.* 36, 116-29 (1950). Feb. (In Italian).

Author believes reaction of cell to ionizing radiation is to hasten death, senescence or degeneration, all of which are degrees of dissipation or degeneration of energy, of irreversible approach toward greater molecular disorder and states of higher statistical probability or entropy. NSA 5-913.

1539

THE BIOCHEMICAL, CELLULAR, AND BACTERIOLOGIC CHANGES IN THORACIC DUCT LYMPH OF DOGS EXPOSED TO TOTAL BODY IRRADIATION. Crawford S. Brown, Esther Hardenbergh, and John L. Tullis. (Naval Medical Research Inst., Bethesda). June 22, 1950. 15p. (NP-1762). *Am. J. Physiol.* 163, 668-75 (1950).

Changes in protein level, creatin, uric acid, sugar, and other components of the lymph were studied in 40 dogs after 500 r total body x ray dose. NSA 5-914.

1540

THE EFFECT OF ADRENALECTOMY ON RADIATION INDUCED MORTALITY OF THE MOUSE. E. P. Cronkite and W. H. Chapman. (Naval Medical Research Inst., Bethesda). June 17, 1950. 7p. (NP-1875). *Proc. Soc. Exptl. Med.* 74, 337-40 (1950).

Adrenalectomized, irradiated mice have shortened survival time, and death is apparently caused by mechanisms other than infection and hemorrhage. NSA 5-915.

1541

EFFECTS OF X-IRRADIATION ON PASSIVELY TRANSFERRED ANTIBODY. J. W. Hollingsworth. *Proc. Soc. Exptl. Biol. Med.* 75, 477-9 (1950). Nov.

X ray dose of 300 r had no effect on rate of destruction of passively transferred homologous or heterologous antisera given rabbits 24 hr post irradiation. Dose did decrease antibody formation to heterologous serum proteins. NSA 5-916.

1542

THE EFFECTS OF X IRRADIATION ON RANA PIPIENS (LEOPARD FROG), WITH SPECIAL REFERENCE TO SURVIVAL AND TO THE RESPONSE OF THE PERIPHERAL BLOOD. S. Phyllis Stearner. *J. Exptl. Zool.* 115, 251-62 (1950). Nov.

In a study of irradiated frogs (600-2000 r), data indicate that in this animal there is a wider range of dosages causing less than 100% mortality, and slope of survival curve is not as great as that for mammals. Hematopoietic response is similar to but slower than that of mammals. NSA 5-917.

1543

EXPERIMENTAL RADIOPHYSIOLOGY CANCERS AND HORMONES; IV. CANCERS PRODUCED BY CORPUSCULAR RADIATIONS (A PROPOSED MECHANISM OF RADIATION CARCINOGENESIS). Antoine Lacassagne, ed. Paris, Herman et Cie, 1945. 115p. (Trans. by Inez C. O'Brien). (NP-2226; Scientific and Industrial Publications 981 Translation-23 (UCRL)). NSA 5-919.

1544

MORTALITY IN SWINE AND DOSE DISTRIBUTION STUDIES IN PHANTOMS EXPOSED TO SUPER-VOLTAGE X RADIATION. John L. Tullis, F. W. Chambers, Jr., J. E. Morgan, and John H. Zeller. (Naval Medical Research Inst., Bethesda). Aug. 29, 1950. 21p. (NP-1887). *Am. J. Roentgenol and Radium Therapy* 67, 820-7 (1952).

LD_{50/30} values for 110-160 lb. swine are 350-400 r for 2000 kvp bilateral irradiation; 500 r for 2000 kvp unilateral; 510 r for 1000 kvp bilateral exposures. All exposures were total body x radiation at 2 meters. NSA 5-920.

1545

PROTECTIVE ACTION OF SODIUM NITRIDE AGAINST LETHALITY PRODUCED BY X RAYS IN MICE A. Herve and Z. M. Bacq. *Compt. rend. soc. biol.* 144, 1124-5 (1950). Aug. (In French).

Injection of 0.1 to 0.2 mg Na₃N in aqueous solution into mice prior to 700 r x ray dose reduced lethality by 60%. NSA 5-921.

1546

SULFHYDRYL-CONTAINING AGENTS AND THE EFFECTS OF IONIZING RADIATIONS III. STUDIES ON THE MECHANISM OF THE PROTECTIVE ACTION OF GLUTATHIONE. Eugene P. Cronkite, George Brecher, and W. H. Chapman. (Naval Medical Research Inst., Bethesda). June 27, 1950. 15p. (NP-1876).

Positive results of this agent were observed in mice, dogs, and rats. Clearance and tissue distribution studies are reported and marked protection of hematopoietic tissues is documented. NSA 5-922.

1547

WASTE MATERIALS IN THE UNITED STATES ATOMIC ENERGY PROGRAM. Abel Wolman and Arthur E. Gorman. (Division of Engineering, AEC). Jan. 12, 1950. 20p. (WASH-8).

Problems of radioactive waste are reviewed. Future growth of industry producing such waste may depend on

effective and economical solution to problems of disposal. NSA 5-924.

1548

THE EMERGENCY CARE OF ATOMIC BOMB CASUALTIES. PART I. THE BOMB AND ITS EFFECTS. Theodore P. Eberhard, ed. *Philadelphia Med.* 46, 533, 535, 537, 545 (1950). Dec. 2.

First of series of lectures to inform doctors of problems to be faced during 1st 48 hr after atom-bombing. NSA 5-926.

1549

THE EMERGENCY CARE OF ATOMIC BOMB CASUALTIES. PART III. THE EFFECTS OF RADIANT ENERGY ON HUMAN BEINGS. Theodore P. Eberhard, ed. *Philadelphia Med.* 46, 631, 633, 635-6 (1950). Dec. 23.

Fundamental ionizing effect of radiation is discussed. Treatment for atomic-bomb radiation victims is listed: bed; antibiotics; blood transfusions as needed; anti-hemorrhagic substance; nourishment. NSA 5-929.

1550

EMERGENCY CARE OF ATOMIC BOMB CASUALTIES. PART V. THE RECOGNITION AND TREATMENT OF SHOCK. Theodore P. Eberhard, ed. *Philadelphia Med.* 46, 697-8 (1951). Jan. 6.

Proper treatment of shock under conditions of atomic-bomb attack. NSA 5-931.

1551

GERMAN AND FOREIGN REGULATIONS FOR X-RAY PROTECTION IN MEDICAL ROENTGEN UNITS. R. Glocker. *Fortschr. Gebiete Röntgenstrahlen* 73, 13 (1950).

Regulations in medical laboratories in Germany, U.S., England, and Sweden are compared as to hourly, daily, and weekly permissible dose; maximum permeability of x-ray tube hood; minimum thickness of Pb aprons and gloves; protection against dispersion of rays in therapy units; maximum working hours; minimum vacation time. NSA 5-934.

1552

HEMATOLOGY OF ATOMIC BOMB CASUALTIES. George V. LeRoy. *Arch. Internal Med.* 86, 691-710 (1950). Nov.

Data from detailed hematological studies made on the injured at Hiroshima and Nagasaki are reported. In general, severity of symptoms paralleled severity of leukopenia. NSA 5-935.

1553

STUDIES ON THE EFFECTS OF MASSIVE DOSES OF X-RADIATION ON MORTALITY IN LABORATORY ANIMALS. p.3-10 OF BIOLOGICAL EFFECTS OF EXTERNAL RADIATION. Robert D. Boche and Francis W. Bishop. (NNES VI-2). Henry A. Blair, ed. New York, McGraw Hill Book Co., Inc. 1954.

Eighty four dogs were given 1000-kv radiation. Also, rats were given 375, 500, 625, and 750 r of 250-kv radiation. Monkeys and hamsters were also irradiated with 250-kv x-rays. It was found that the ratio of effectiveness of 250- and 100-kv radiations is approximately 650 to 800.

1554

THE RADIOACTIVE EFFECTS OF ATOMIC WEAPONS. Asher A. White. *Minnesota Med.* 33, 1085-7, 1114 (1950). Nov.

This is a general, nontechnical discussion of radiation effects of atomic explosion, relative radiosensitivity of various tissues and organs, and types, complications, sequelae and treatment of acute radiation sickness. NSA 5-937.

1555

THE GENERAL PICTURE OF IRRADIATION DAMAGE TO TISSUES PART I. SUPERFICIAL RADIATION

(BETA RAYS); PART II. PENETRATING RADIATIONS (NEUTRONS, GAMMA RAYS). P. S. Henshaw and R. S. Snider. (Oak Ridge National Lab.). July 8, 1947. Decl. July 15, 1950. 29p. (AEC-D-3009; MonH-288).

Superficial radiation damage to skin is due to damage to germinal layer. Generative type of cells is most radiosensitive type, with possible exception of lymphocytes. NSA 5-1155.

1556

THE CHANGES IN THE BLOOD OF HUMANS CHRONICALLY EXPOSED TO LOW LEVEL GAMMA RADIATION. Norman P. Knowlton, Jr. (Los Alamos Scientific Lab.). (nd). Decl. Dec. 21, 1948. 16p. (AECU-1021; LADC-587; LAMS-816(Rev) p.76-92).

Exposure of 10 persons to 0.2 r of γ radiation per week resulted in a significant fall in total WBC count and absolute neutrophil and lymphocyte counts during 77-week period. NSA 5-1156.

1557

PHYSICAL AND CHEMICAL FACTORS MODIFYING THE SENSITIVITY OF CELLS TO HIGH ENERGY AND ULTRAVIOLET RADIATION. Alexander Hollaender. (Oak Ridge National Lab.). Nov. 7, 1950. 22p. (ORNL-844). NSA 5-1157.

1558

THE INFLUENCE OF INFECTION ON THE HEMATOLOGICAL EFFECTS AND MORTALITY FOLLOWING MID-LETHAL X-RADIATION. L. R. Bennet, P. E. Rekers, and J. W. Howland. (Univ. of Rochester, Atomic Energy Project). Oct. 27, 1950. 11p. (UR-140). Radiology 57, 99-103 (1951). NSA 5-1158.

1559

ACTION OF X RAYS AND CYANIDES ON FROG STRIATED MUSCLES. J. Leconte, A. Herve, and Z. M. Bacq. Compt. rend. soc. biol. 144, 708-09 (1950). May. (In French).

Hypothesis that cyanide or cysteine might inhibit oxidizing action of x-rays on enzymes was not confirmed by experimental results reported. NSA 5-1159.

1560

IMPLANTATION OF FUNCTIONAL ERYTHROPOIETIC ELEMENTS FOLLOWING TOTAL-BODY IRRADIATION. D. L. Lindsley, T. T. Odell, Jr., and F. G. Tausche. Proc. Soc. Exptl. Biol. Med. 90, 512-15 (1955). NSA 10-1997.

1561

THE COMMON CAUSES OF LYMPHOPENIA. A. J. Shillito. J. Clin. Path. 3, 321-31 (1950). Nov.

Cases of 87 patients with lymphopenia of 1000/mm³ or less are tabulated, including an x ray worker and patient receiving x ray therapy. NSA 5-1162.

1562

DISTRIBUTION OF ENZYMES IN THE LIVERS OF CONTROL AND X-IRRADIATED RATS. Stephan Ludewig and Alfred Chanutin. Arch. Biochem. 29, 441-5 (1950). Dec.

Activities and percentage distributions of nonmercapto enzymes (catalase, esterase, arginase, rhodanase and alkaline phosphatase) in rat liver homogenate and liver connective tissue are presented. Total-body 500 r x ray exposure (rats) did not affect activity of enzymes. NSA 5-1163.

1563

EFFECT OF BAL ON RADIATION MORTALITY RATE IN MICE. Lee Works, John H. Grotts, and Gordon W. Raleigh. Quart. Bull. Northwestern Univ. Med. School 24, 295-6 (1950).

Three groups of mice were treated with (1) irradiation only (550 r, 210-kvp x rays); (2) irradiation and 2.6 mg of BAL prior to exposure; (3) BAL only. Sur-

vival rates at end of 5 weeks. (1) 5%; (2) 39%; (3) 94%. NSA 5-1164.

1564

EFFECTS OF IONIZING RADIATIONS ON A TRANSPLANTED LYMPHOSARCOMA. Joanne Hollcroft, Egon Lorenz, and Harriet Hunstiger. J. Natl. Cancer Inst. 11, 1-16 (1950). Aug.

Transplanted lymphosarcoma was treated with (1) whole body x irradiation and (2) α radiation of radon and short-lived decay products. Little difference noted grossly in regression curves. NSA 5-1165.

1565

EFFECT OF ROENTGEN RAYS ON THE TESTIS. QUANTITATIVE HISTOLOGICAL ANALYSIS FOLLOWING WHOLE-BODY EXPOSURE OF MICE. Allen B. Eschenbrenner and Eliza Miller. Arch. Path. 50, 736-49 (1950). Dec.

Mice were exposed to 50, 100, 200, 300, or 400 r of 186-kv x rays, total-body. Damage and recovery of testes were studied. Radiation affects spermatogonia selectively. NSA 5-1166.

1566

EFFECT OF X-RAY IRRADIATION ON THE ALKALINE PHOSPHATASE OF THE PLASMA AND TISSUES OF RATS. Stephan Ludewig and Alfred Chanutin. Am. J. Physiol. 163, 648-54 (1950). Dec. 1.

Decrease in phosphatase activity of plasma is relatively small after 300 r; more marked and prolonged after 500 and 600 r. Phosphatase activity of thymus is markedly increased for 2 days post exposure; small increase observed in spleen. Practically no change is seen in liver or kidneys. NSA 5-1167.

1567

FIBROSARCOMA DEVELOPING IN HEAVILY IRRADIATED SKIN. Calvin B. Stewart and William J. Pendergrast. J. Med. Assoc. Georgia 40, 24-5 (1951). Jan.

Description of a case of fibrosarcoma which developed in scar on lip 20 years after Ra therapy for squamous carcinoma. NSA 5-1168.

1568

INFLUENCE OF OVARIAN FUNCTION ON INCIDENCE OF RADIATION-INDUCED OVARIAN TUMORS IN MICE. Henry S. Kaplan. J. Natl. Cancer Inst. 11, 125-32 (1950). Aug.

From results of implanting irradiated ovaries into irradiated and nonirradiated spayed mice, and into non-irradiated, nonovariectomized mice, it is concluded that intact ovarian endocrine function inhibits tumor development in irradiated ovarian grafts. NSA 5-1169.

1569

OXIDASE INCREASE IN MELANOPLUS DIFFERENTIALIS EGGS CAUSED BY X-IRRADIATION. Theodore N. Tahmisian and Dorothy M. Adamson. J. Exptl. Zool. 115, 379-97 (1950). Nov. NSA 5-1171.

1570

PHYSICAL AND BIOLOGICAL PHENOMENA PRODUCED BY IRRADIATIONS WITH FAST ELECTRONS. W. Paul and G. Schubert. Naturwissenschaften 37, 156-63 (1950). Apr. (In German).

Comparative study of hard x rays (200 kv) and fast electrons (from 6-Mev betatron). NSA 5-1172.

1571

PROTECTIVE ACTION OF ANOXIC ANOXIA AGAINST TOTAL-BODY ROENTGEN IRRADIATION OF MAMMALS. Andrew H. Dowdy, L. R. Bennett, and Sarah M. Chastian. Radiology 55, 879-85 (1950). Dec.

LD₅₀₋₃₀ for rats irradiated in 5% O₂ is 1200-1400 r; for irradiated controls, 600 r. Anoxia produced by injection of NaCN gave no protection to rats against x ray damage. NSA 5-1173.

- 1572**
PROTECTIVE ACTION OF KCN AGAINST MORTALITY IN MICE IRRADIATED WITH VARIOUS DOSES OF X RAYS. H. Betz and A. Herve. *Compt. rend. soc. biol.* 144, 1015-17 (1950). July. (In French). NSA 5-1174.
- 1573**
LOCAL CELL RESPONSES TO INDUCED SKIN INFECTION IN TRITURUS VIRIDESCENS AFTER WHOLE-BODY IRRADIATIONS. Sophie Jakowska, R. F. Nigrelli and A. H. Sparrow. *Radiation Research* 1, 569 (1954).
Triturus is relatively resistant to infection after whole body irradiation even at dosages leading to a significant reduction in the number of phagocytic cells.
- 1574**
RADIATION-INDUCED SQUAMOUS-CELL METAPLASIA AND HYPERPLASIA OF THE NORMAL MUCOUS GLANDS OF THE ORAL CAVITY. Milton Friedman and John W. Hall. *Radiology* 55, 848-51 (1950). Dec. NSA 5-1176.
- 1575**
A STUDY OF ELASTIC ARTERIES IN IRRADIATED MICE OF DIFFERENT AGES. Christianna Smith and Lois A. Loewenthal. *Proc. Soc. Exptl. Biol. Med.* 75, 859-61 (1950). Dec.
Changes comparable to those of physiological aging were induced by x rays in tunica media of elastic arteries of mice 20-30, and 80-100 days old. NSA 5-1177.
- 1576**
SULFHYDRYL-CONTAINING AGENTS AND THE EFFECTS OF IONIZING RADIATIONS. I. BENEFICIAL EFFECT OF GLUTATHIONE INJECTION ON X-RAY-INDUCED MORTALITY RATE AND WEIGHT LOSS IN MICE. W. H. Chapman, C. R. Sipe, D. C. Eltzholtz, E. P. Cronkite, and F. W. Chambers, Jr. *Radiology* 55, 865-73 (1950). Dec. NSA 5-1178.
- 1577**
VARIATIONS OF LISTERIA MONOCYTOGENES PRODUCED BY BETA PARTICLES FROM RADIOPHOSPHORUS. Matthew C. Hunter, Grant L. Stahly, and Wm. G. Myers. *Ohio J. Sci.* 50, 253-9 (1950). Nov.
Changes in colonial characteristics, physiology, antigenicity and capacity to produce disease were caused by exposure to P^{32} . NSA 5-1179.
- 1578**
VARIATIONS IN THE MINIMUM ENDOGENEOUS NITROGEN EXCRETION AS AN EFFECT OF TOTAL-BODY X-IRRADIATION. Charles Gros and Paul Mandel. *Compt. rend.* 231, 631-3 (1950). Sept. 25. (In French). NSA 5-1180.
- 1579**
MEDICAL ASPECTS OF ATOMIC EXPLOSION. Heinz Richard Landmann. *J. Kansas Med. Soc.* 51, 557-62 (1950). Dec. NSA 5-1182.
- 1580**
THE PROTECTION OF PERSONNEL ENGAGED IN ROENTGENOLOGY AND RADIOLOGY. FINAL REPORT. F. T. Hunter and L. L. Robbins. *New Engl. J. Med.* 244, 9-13 (1951). Jan. 4.
Film-badge monitoring may be used to protect against overexposure. No correlation is apparent between variations in leukocyte count, polynuclear and eosinophil percentages, and average weekly exposure. NSA 5-1184.
- 1581**
SOME ASPECTS OF ATOMIC MEDICINE. J. M. Holford. *Proc. Roy. Soc. Med.* 43, 851-7 (1950). Nov.
Work on irradiation of aqueous solutions, morphological changes in cells, clinical picture of acute radiation illness in man, fractionation dose, genetic changes, radiation effect on mammalian testes are reviewed. NSA 5-1186.
- 1582**
THE BIOLOGICAL HALF-LIFE OF RADIOACTIVE PHOSPHORUS IN THE BLOOD OF PATIENTS WITH LEUKEMIA. I. WHOLE BLOOD WITH DEVIATIONS OF OBSERVATIONS FROM PREDICTED VALUES AND AN ESTIMATE OF TOTAL-PHOSPHORUS TURNOVER RATE. Harold Tivey and Edwin E. Osgood. *Cancer* 3, 992-1002 (1950). Nov.
Value given for half-life of P^{32} in whole blood in group of 29 patients in 8 days. NSA 5-1190.
- 1583**
THE BIOLOGICAL HALF-LIFE OF RADIOACTIVE PHOSPHORUS IN THE BLOOD OF PATIENTS WITH LEUKEMIA. II. PLASMA WITH DEVIATIONS OF OBSERVATIONS FROM PREDICTED VALUES AND AN ESTIMATE OF TOTAL-PHOSPHORUS TURNOVER RATE. Edwin E. Osgood and Harold Tivey. *Cancer* 3, 1003-09 (1950). Nov.
Logarithm of plasma radioactivity (from P^{32}) in 26 leukemia patients decreases uniformly with time after 1st 3 days, with biological half life of 8.5 days. NSA 5-1191.
- 1584**
THE BIOLOGICAL HALF-LIFE OF RADIOACTIVE PHOSPHORUS IN THE BLOOD OF PATIENTS WITH LEUKEMIA. III. ERYTHROCYTES WITH DEVIATIONS OF OBSERVATIONS FROM PREDICTED VALUES. Harold Tivey and Edwin E. Osgood. *Cancer* 3, 1010-13 (1950). Nov.
Disappearance of P^{32} from erythrocytes and from plasma in leukemia patients are not essentially different. Initial level is reduced 1/2 in 8.9 days. NSA 5-1192.
- 1585**
THE BIOLOGICAL HALF-LIFE OF RADIOACTIVE PHOSPHORUS IN THE BLOOD OF PATIENTS WITH LEUKEMIA. IV. LEUKOCYTES RADIOACTIVE PHOSPHORUS CONTENT AND THE RELATIONS TO PLASMA- P^{32} LEVELS. Edwin E. Osgood and Harold Tivey. *Cancer* 3, 1014-17 (1950). Nov. NSA 5-1193.
- 1586**
IF A BOMBS FALL. Edward J. Kehoe and Francis L. Brannigan. *Natl. Safety News*, 78-9 (1950). Oct. NSA 5-1439.
- 1587**
ATOMIC ENERGY. Alan M. Thorndike. (Brookhaven National Lab.). Sept. 8, 1950. 14p. (AECU-1077). p. 49-51 of Americana Annual, 1952. John J. Smith, ed. N. Y. Americana Corp.
Author presents a nontechnical discussion of present-day production and utilization of nuclear fuels, principals of hydrogen bomb, and international implications of atomic weapon production. NSA 5-1440.
- 1588**
BIOLOGICAL ACTION OF FAST ELECTRONS FROM A 6-MEV BETATRON. Wolfgang Paul and Gerhard Schubert. *Z. Naturforsch.* 5b, 390-4 (1950). Oct.-Nov. (In German).
Action of fast electrons (up to 6 Mev) on various biological objects is compared with that of hard x rays (200 kv). In majority of cases effect per dose unit is smaller when produced by electrons. NSA 5-1445.
- 1589**
CHANGES IN THE RELATIVE PROPORTIONS OF DIFFERENT AXIAL SKELETAL TYPES WITHIN INBRED STRAINS OF MICE BROUGHT ABOUT BY X-IRRADIATION AT CRITICAL STAGES IN EMBRYONIC DEVELOPMENT. Liane B. Russell and W. L. Russell. Paper presented at the 1950 meeting of the Genetic Society of

America, Columbus, Ohio, Sept. 11-14. Abstracted in *Genetics* 35, 689 (1950). Nov. NSA 5-1447.

1590
DEVELOPMENTAL EFFECTS OBSERVED IN HABRO-BRACON AFTER EXPOSURE TO BETA RADIATION. J. W. Dent and Robert L. Amy. *Growth* 14, 113-21 (1950). June.

Wasps, *H. juglandis*, were irradiated just before hatching or during early larval period. At highest levels of irradiation, death occurred before hatching or in larval stage; at intermediate levels, during pupation; at lowest levels most of the animals reached adult form. NSA 5-1448.

1591
THE EFFECT OF ANOXIA ON X-RAY INDUCED INJURY IN *MELANOPLUS DIFFERENTIALIS* EMBRYOS. Theodore N. Tahmisiian and Dorothy M. Adamson. Paper presented at the 47th Annual meeting of the American Society of Zoologists, Cleveland, Ohio, December 27-30, 1950. Abstracted in *Anat. Record* 108, 516 (1950). Nov.

Grasshopper embryos developed normally after being in N_2/CO_2 (95%/5%) atmosphere for 24 hr. If such anoxic embryos are irradiated, (25,000 r) and placed at 25° C in air, no negative growth occurs as in eggs exposed in air. NSA 5-1449.

1592
EFFECT OF RADIATION FROM INTRAPERITONEALLY INJECTED RADIUM CHLORIDE UPON MEGAKARYOCYTE AND BLOOD PLATELET PRODUCTION IN ALBINO RATS. Paul G. Roofe, Hal Bingham, Ralph Comer, and Martha Madison. Paper presented at the 47th Annual Meeting of the American Society of Zoologists, Cleveland, Ohio, December 27-30, 1950. Abstracted in *Anat. Record* 108, 537 (1950). Nov.

Megakaryocyte regeneration begins 9 days after $RaCl_2$ injection. Platelet production does not correspond quantitatively, presumably because young megakaryocytes do not fragment. NSA 5-1450.

1593
EFFECT OF SLOW CATHODE RAYS ON MICRO-ORGANISMS. Walter S. Moos. *Nucleonics* 8, No. 1, 50-3 (1951). Jan.

Influence of slow electrons (1 to 8 kev) on *P. aeruginosa* is maximal at a voltage giving them penetration in depth corresponding to cell diameter. NSA 5-1451.

1594
THE EFFECT OF X IRRADIATION ON FIGHTING BEHAVIOR IN MALE MICE. Howard H. Vogel, Jr. Paper presented at the 47th Annual Meeting of the American Society of Zoologists, Cleveland, Ohio, Dec. 27-30, 1950. Abstracted in *Anat. Record* 108, 547 (1950). Nov.

Effects on fighting behavior in male mice of 50 r of x rays, 5 days/week, for up to 15 weeks, were cumulative. Aggressiveness of attack decreased with increasing cumulative dose. Conditioning was strong, requiring 1200 to over 2000 r to eliminate it. NSA 5-1452.

1595
EFFECT OF X-IRRADIATION ON HEMOLYSIN DECLINE. William H. Talaferro and Lucy Graves Talaferro. *J. Infectious Diseases* 87, No. 3, 201-9 (1950).

X rays (2 doses of 400 r, whole-body) during decline of hemolysin 2-4 weeks after immunization with sheep red cells did not alter downward trend as compared with nonirradiated controls. NSA 5-1453.

1596
EFFECTS OF OXYGEN TENSION ON X-RAY INDUCED MITOTIC INHIBITION. Mary Esther Gaulden and

Marjorie Nix. Paper presented at the 1950 meeting of the Genetics Society of America, Columbus, Ohio, Sept. 11-14. Abstracted in *Genetics* 35, 665 (1950). Nov.

Large neuroblasts of grasshopper embryos (*C. Viridifasciata*) were given 64 r of x rays in oxygen tension of 100%, 21% (air), 0% (N_2 , CO_2 or vacuum). Sensitivity of mitosis to x rays was reduced when cells were exposed at lower O_2 tensions. NSA 5-1454.

1597
THE EFFECTS OF RADIATION ON THE PREIMPLANTATION STAGES OF THE MOUSE EMBRYO. Liane Brauch Russell and W. L. Russell. Paper presented at the 47th Annual Meeting of the American Society of Zoologists, Cleveland, Ohio, Dec. 27-30, 1950. Abstracted in *Anat. Record* 108, 521 (1950). Nov.

Irradiation during preimplantation (cleavage) stages causes high prenatal mortality but negligible incidence of abnormalities in those surviving to term; relative magnitudes of 2 effects are reverse of those found after postimplantation exposure. NSA 5-1455.

1598
THE EFFECTS OF RADIOACTIVE PHOSPHORUS ON *CRICETUS AURATUS*. A. Martin. Paper presented at the 1950 Meeting of the Genetics Society of America, Columbus, Ohio, Sept. 11-14. Abstracted in *Genetics* 35, 679 (1950) Nov.

Male golden hamsters were given various dosages of P^{32} by intraperitoneal injection and mated to untreated females. Histological and cytological changes in treated animals and progeny are reported. NSA 5-1456.

1599
EFFECTS OF RADIO-PHOSPHORUS (P^{32}) ON MITOSIS IN LARVAL TAIL-TIPS OF *AMBLYSTOMA PUNCTATUM*. Donald P. Costello and Catherine Henley. Paper presented at the 47th Annual Meeting of the American Society of Zoologists, Cleveland, Ohio, Dec. 27-30, 1950. Abstracted in *Anat. Record* 108, 578-9 (1950). Nov.

Wide variety of mitotic abnormalities are described. NSA 5-1457.

1600
EFFECTS OF VARYING OXYGEN TENSION ON MORTALITY OF X-RAYED MICE. George Limperos. *J. Franklin Inst.* 249, 513-14 (1950). June.

Low-oxygen atmosphere exerts protective effect, possibly because it decreases concentration of OH and HO_2 radicals and of H_2O_2 . NSA 5-1458.

1601
THE INCIDENCE OF STERILITY AND PARTIAL STERILITY IN THE DESCENDANTS OF X-IRRADIATED MICE. W. L. Russell. Paper presented at the 1950 Meeting of the Genetics Society of America, Columbus, Ohio, Sept. 11-14. Abstracted in *Genetics* 35, 689-90 (1950). Nov. NSA 5-1459.

1602
THE INDIRECT ACTION OF X AND ULTRAVIOLET RADIATION. Z. M. Bacq. *Experientia* 7, 11-19 (1951). Jan. 15. (In French).

Action of x rays on enzymes, cells and organisms are believed to be indirect. Chemical substances (peroxides and short-lived radicals) resulting from x ray action on H_2O molecules are considered to be the responsible agents. NSA 5-1460.

1603
THE INFLUENCE OF POLYPOIDY ON THE X-RAY SENSITIVITY OF CELLS. C. J. Bishop. Paper presented at the 1950 Meeting of the Genetics Society of America, Columbus, Ohio, Sept. 11-14. Abstracted in *Genetics* 35, 654 (1950). Nov.

Data indicate that diploid and tetraploid species of *Tradescantia* are equally radiosensitive if comparison is based on number of x ray induced breaks per chromosome. NSA 5-1461.

1604

INFLUENCE OF THYMECTOMY, SPLENECTOMY, AND GONADECTOMY ON INCIDENCE OF RADIATION-INDUCED LYMPHOID TUMORS IN STRAIN C57 BLACK MICE. Henry S. Kaplan. *J. Natl. Cancer Inst.* 11, 83-90 (1950). Aug.

Thymectomy effectively prevented development of radiation-induced lymphomas. Gonadectomy gave no significant results. NSA 5-1462.

1605

A PHASE CONTRAST MICROSCOPY STUDY OF X-RAY INDUCED PYCNOSIS IN THE LIVING CELL. Theodore N. Tahmisian and Dorothy M. Adamson. Paper presented at the 47th Annual Meeting of the American Society of Zoologists, Cleveland, Ohio, Dec. 27-30, 1950. Abstracted in *Anat. Record* 108, 572-3 (1950). Nov.

Authors report effect of 25,000-200,000 r of x rays on grasshopper embryos kept latent for 6 months by keeping them at submetabolic temperatures.

NSA 5-1464.

1606

RADIANT ENERGY. Abraham Edelmann. *Ann. Rev. Physiol.*, 27-46 (1950).

Author presents brief review of the literature and discussions of radiation safeguards; measurements; radiation effects on blood and other tissues.

NSA 5-1465.

1607

SOME CASES OF RADIATION INJURY IN RADIOLOGICAL WORK. S. Hultberg, L. E. Larsson, and L. Eklund. *Acta Radiol.* 33, 376 (1950). Mar.-Apr.

Case histories of 8 patients who sustained radiation injuries either in daily work or from overdose during radiography are presented. NSA 5-1467.

1608

SPONTANEOUS AND INDUCED CHROMOSOME ABERRATIONS IN THE GRASSHOPPER *CHLOEALIS CONSPERSA*. K. H. Rothfels. Paper presented at the 1950 Meeting of the Genetics Society of America, Columbus, Ohio, Sept. 11-14. Abstracted in *Genetics* 35, 687 (1950). Nov.

Grasshoppers were exposed at various distances from Co⁶⁰ source for 20 days. Dose rate of 500 X background was required to produce clearly significant increases in chromosome aberrations as compared with controls. NSA 5-1468.

1609

X-RAY INDUCED SOMATIC CROSSING OVER IN *DROSOPHILA MELANOGASTER*. George Lefevre, Jr. Paper presented at the 47th Annual Meeting of the American Society of Zoologists, Cleveland, Ohio, Dec. 27-30, 1950. Abstracted in *Anat. Record* 108, 623-4 (1950). Nov.

Data indicate that appreciable somatic crossing over occurs in heterochromatic portion of X chromosome and is greater in right than in left end. Similar distortion of normal crossing-over pattern is found when excessive germinal crossing over is induced. NSA 5-1469.

1610

ESTIMATING RADIOELEMENTS IN EXPOSED INDIVIDUALS. I. RADIOELEMENT METABOLISM. Jack Schubert. *Nucleonics* 8, No. 2, 13-28 (1951). Feb.

Metabolism of radioelements was studied, and treatment is suggested for oral ingestion of excessive amounts of such materials. NSA 5-1473.

1611

HANDBOOK FOR RADIOLOGICAL DEFENSE SUB-COURSES. (Army Chemical Center, Chemical Corps. School). Nov. 1949. 103p. (NP-1913; RDS-1B; NAV PERS 10852). NSA 5-1474.

1612

POSSIBILITY OF BIOLOGICAL EFFECTS OF COSMIC RAYS IN HIGH ALTITUDES, STRATOSPHERE, AND SPACE. A. T. Krebs. *J. Aviation Med.* 21, 481-94 (1950). Dec. NSA 5-1476.

1613

PORTABLE PILOT PLANT FOR IRRADIATING POTATOES. O. A. Kuhl, A. H. Sparrow and B. Manowitz. *Nucleonics* 13, 128-9 (1955).

1614

CARCINOGENIC ACTION OF RADIATIONS IN RATS AFTER MECHANICAL AND CHEMICAL PROTECTION. F. Maisin, P. Phaldagne, A. Duujic, and H. Maisin. p.463-7 of *Progress in Radiobiology*. F. J. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas, Publisher. 1955.

1615

RADIATION HAZARDS IN THE ATOMIC ENERGY PROGRAM. Merril Eisenbud. *Ind. Med. Surg.* 20, 7-11 (1951). Jan.

Author presents review of trends in radiation-biology studies; permissible radiation levels; radiation protection; waste disposal; instrumentation; personnel monitoring; and industrial utilization of atomic energy. NSA 5-1479.

1616

RADIOLOGICAL PROTECTION-INTERNATIONAL COMMISSION RECOMMENDATIONS. *Nucleonics* 8, No. 1, 31-7 (1951). Jan.

Recommendations included on following: internal and external radiation exposure; working conditions; film storage; protection against x rays, Ra; instruments. NSA 5-1481.

1617

SUGGESTIONS FOR FIRST-AID TREATMENT OF CASUALTIES FROM ATOMIC BOMBING. Richard Warren and James H. Jackson. *New Engl. J. Med.* 243, 696-8 (1950). Nov. 2.

Principles of casualty sorting, first-aid treatment of burns, radiation injury, and radioactive contamination are discussed. NSA 5-1482.

1618

WHAT EVERY MAINE DOCTOR SHOULD KNOW ABOUT THE MEDICAL ASPECTS OF ATOMIC WEAPONS AND ATOMIC WARFARE. COMMITTEE ON EMERGENCY CIVILIAN DEFENSE OF THE MAINE MEDICAL ASSOCIATION. *J. Maine Med. Assoc.* 41, 144-59 (1950). May.

Medical problems arising from an atomic explosion are considered. Maps of Maine cities illustrate damage distribution after an explosion. NSA 5-1483.

1619

IRRADIATION SICKNESS. Wade S. Rizk. *Mississippi Valley Med. J.* 72, 184-5 (1950). Nov.

Nature of radiation sickness is discussed, and drugs for therapy are reviewed. NSA 5-1484.

1620

RETENTION OF INJECTED COLLOIDAL THORIUM DIOXIDE IN THE BODY OF THE LABORATORY MOUSE. Thomas W. Easton. Paper presented at the 47th Annual Meeting of the American Society of Zoologists, Cleveland, Ohio, Dec. 27-30, 1950. Abstracted in *Anat. Record* 108, 515 (1950). Nov.

Mice were injected intravenously with colloidal ThO₂ (Thorotrast), 0.2 cc/day on 3 alternate days.

Retention by whole body, liver and spleen, and remainder of body was determined. NSA 5-1492.

1621

QUARTERLY PROGRESS AND WORK ACCOMPLISHMENT REPORT FOR QUARTER ENDING JUNE 30, 1950; AGRICULTURAL RESEARCH PROGRAM. (Tennessee Univ.). June 30, 1950. 17p. (ORO-7).

Includes reports on bomb radiation effects on farm animals; calcium and fission product metabolism in animals. NSA 5-1495

1622

PROGRESS REPORT; RADIOBIOCHEMISTRY. J. Schubert and Marcia R. White. (Argonne National Lab.). p.102-5 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT, FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.102-5)).

Effect of copper gluconate, sodium orthovanadate, sodium fluoroacetate, malononitrile, sodium iodacetate, disodium malonate and manganous gluconate on radiation sickness were studied. Effect of Zr citrate on tissue distribution of Pu is summarized. NSA 5-1708.

1623

PROGRESS REPORT; SPLEEN-SHIELDING EXPERIMENTS. L. O. Jacobson, E. L. Simmons, Edna K. Marks, Melba J. Robson, Evelyn O. Gaston, and W. F. Bethard. (Argonne National Lab.). p.22-9 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.22-9)).

Effect of shielding exteriorized spleen of mice during 1025 r x ray exposure is reported. Shielding of spleen, liver and appendix of rats and rabbits is also described. NSA 5-1711.

1624

MODIFICATION OF LEAD SHIELDS FOR PROTECTION OF THE SPLEEN AND APPENDIX DURING TOTAL-BODY X-IRRADIATION. Edna K. Marks. (Argonne National Lab.). p.30-1 of BIOLOGICAL AND MEDICAL DIVISION QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.30-1)). NSA 5-1712.

1625

PRELIMINARY REPORT; THE EFFECT OF SPLEEN AND APPENDIX PROTECTION ON THE SHWARTZMAN REACTION. M. O. Goldman, L. O. Jacobson, and Melba J. Robson. (Argonne National Lab.). p.32-5 of BIOLOGICAL AND MEDICAL DIVISION REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.32-5)).

In rabbits an intradermal meningococcus endotoxin injection followed in 24 hours by an intravenous injection of the same, results in the Schwartzman phenomenon. Reaction is suppressed by total-body (not local) irradiation. NSA 5-1713.

1626

PROGRESS REPORT; EFFECT OF SPLEEN PROTECTION DURING X-IRRADIATION. E. Lorenz, L. O. Jacobson, Delta Uphoff, Harriet Sutton, and R. Schweisthal. (Argonne National Lab.). p.36-8 of BIOLOGICAL MEDICAL DIVISION PROGRESS REPORT, FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.36-8)).

Effect of x rays on normal spleen-protected mice, and on those bearing transplanted lymphosarcoma was studied. Effect of spleen protection on incidence of radiation-induced lymphoid tumors was tested. NSA 5-1714.

1627

PRELIMINARY REPORT; THE VALUE OF MOUSE TESTES FOR BIOLOGICAL DOSIMETRY OF IONIZING RADIATIONS. A. B. Eschenbrenner, T. Wang, and Eliza Miller. (Argonne National Lab.). p.39-41 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.39-41)).

Biological response of mouse testes to x rays and neutron exposure appears to be the same. NSA 5-1715.

1628

QUANTITATIVE HISTOLOGIC ANALYSIS OF THE TESTES OF MICE FOLLOWING A SINGLE TOTAL-BODY EXPOSURE TO X-RAYS. A. B. Eschenbrenner and Eliza Miller. (Argonne National Lab.). p.42-6 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.42-6)).

No evidence of morphologic cell death appeared even when testes weights were reduced to 40% of normal. Spermatogenic elements decreased in quantity; interstitial tissue and supporting stroma remained normal in total amounts. NSA 5-1716.

1629

PROGRESS REPORT; EFFECT OF IRRADIATION ON A TRANSPLANTABLE MOUSE LYMPHOSARCOMA. Joanne Hollcraft and E. Lorenz. (Argonne National Lab.). p.47-9 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.47-9)).

Systemic or indirect effect of x rays on lymphosarcoma lasts for short time after simultaneous exposure of body and tumor and may be due to rapidly disappearing, non-specific toxic material produced by irradiation. NSA 5-1717.

1630

PROGRESS REPORT; THE 30-DAY LD₅₀ FOR HYBRID GUINEA PIGS. E. Lorenz, Delta Uphoff, Harriet Sutton, and R. Schweisthal. (Argonne National Lab.). p.50-2 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.50-2)).

LD₅₀₋₃₀ for hybrid guinea pigs is calculated to be 409 r, with limits of 307 and 543 r. NSA 5-1718

1631

PROGRESS REPORT; THE EFFECT OF ANOXIA UPON THE SURVIVAL OF ADULT FROGS AND DAY-OLD RATS. D. E. Smith, H. M. Patt, and Ella B. Tyree. (Argonne National Lab.). p.53-6 of BIOLOGICAL AND MEDICAL DIVISION QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.53-6)).

Anoxia during x irradiation increases survival in one-day rats, but not in frogs. NSA 5-1719.

1632

PROGRESS REPORT; EFFECT OF X IRRADIATION ON BLOOD URIC ACID IN THE CHICK. S. Phyllis Stearner, Emily J. B. Christian, and A. M. Brues. (Argonne National Lab.). p.77-8 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.77-8)).

Marked increase in blood uric acid concentration in chicken occurs 3-5 hours after 1000 r at 43 r/min. NSA 5-1723.

1633

PROGRESS REPORT; NUCLEIC ACID METABOLISM IN CHILOMONAS PARAMECIUM. H. S. Ducoff. (Argonne National Lab.). p.79-81 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.79-81)). NSA 5-1724.

1634

THE ACTUARIAL CALCULUS OF CHRONIC RADIATION LETHALITY. George A. Sacher. (Argonne National Lab.). p.82-3 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.82-3)).

Logarithm of mortality rate (Gompertz function) is (except for a short period after birth) approximately a linearly increasing function of age for all species of

mammals investigated and for many other metazoan forms. NSA 5-1725.

1635

THE RESPIRATION AND ACETATE OXIDATION RATE OF X-IRRADIATED BACTERIA (MYCOBACTERIUM CREATIN OVARANS). E. S. G. Barron, Veronica Bonzell, Betty Gasvoda, and Louise Seki. (Argonne National Lab.), p.97-8 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.97-8)).

Respiration of 3-times washed bacteria is unaffected by 6000 r; inhibited 30% by exposure in presence of acetate. NSA 5-1726.

1636

PROGRESS REPORT; PHYSIOLOGICAL STUDIES ON THE MATING REACTION IN PARAMECIUM BURSARIA I. SOME INDICATIONS FOR AN ACTION SPECTRUM IN THE MATING REACTION. C. F. Ehret. (Argonne National Lab.), p.99-100 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.99-100)). NSA 5-1727.

1637

PROGRESS REPORT; PHYSIOLOGICAL STUDIES ON THE MATING REACTION IN PARAMECIUM BURSARIA II. EFFECT OF X RAYS ON THE MATING REACTION. C. F. Ehret. (Argonne National Lab.), p.101 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.101)).

During light period, x rays stimulated reaction at doses below 10,000 r. Effect was proportional to dose and was maximal at 8000 r. No such reaction was observed during dark period. NSA 5-1728.

1638

PRELIMINARY REPORT; A QUANTITATIVE TEST OF RADIOBIOLOGICAL ADDITIVITY OF FAST NEUTRONS AND GAMMA RAYS. H. H. Vogels, Jr., R. E. Zirkle, and A. M. Brues. (Argonne National Lab.), p.106-8 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.106-8)).

Authors describe experiments planned to test the biological effectiveness of fast neutrons and γ rays using dose rates which will deliver LD_{50/30} in approximately 1, 6 and 24 hours. Criterion of effect acute lethality. NSA 5-1729.

1639

FECAL AND URINARY RESPONSE TO CHOLERA VACCINE IN X-IRRADIATED GUINEA PIGS. W. Burrows, Norma G. Deupree, and Dorothy E. Moore. (Argonne National Lab.), p.109 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.109)). Jour. Infect. Dis. 87 (2), 169-83 (1950).

Effect of pre- and postimmunization x irradiation (50-200 r) on immune response and guinea pigs to cholera 0 vaccine was assayed as serum, fecal and urinary antibody (agglutinin). NSA 5-1730.

1640

EXPERIMENTAL ENTERIC CHOLERA IN THE X-IRRADIATED GUINEA PIG. W. Burrows, Norma G. Deupree and Dorothy E. Moore. (Argonne National Lab.), p.110 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.110)).

Effect of single total-body doses of 100 or 200 r was assayed by autopsy culture of guinea pigs sacrificed at various intervals and by number of vibrios and titer of antibody excreted in feces. NSA 5-1731.

1641

THE EFFECT OF TRITIUM (H^3) ON CELLS CULTIVATED IN VITRO. Agnes N. Stroud and A. M. Brues. (Argonne National Lab.), p.111-17 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL, 1950. (ANL-4451(p.111-17)).

Chick embryo muscle cultures were treated with H^3O at dosage rates of 41.5 to 3000 rep/hour to total dosages of 72,000 rep. Mitotic and cytoplasmic reactions are described. NSA 5-1732.

1642

SUMMARY OF THE RESEARCH PROGRESS MEETING OF JULY 13, 1950. Henry P. Kramer. (Radiation Lab., Univ. of Calif.). Oct. 24, 1950. 12p. (UCRL-859).

E. coli were exposed to bombardment by neutrons, accelerated deuterons and α particles. Destructive action of energetic particles was smaller than that of less energetic particles. NSA 5-1733.

1643

SUMMARY OF THE RESEARCH PROGRESS MEETING OF OCTOBER 5, 1950. Henry P. Kramer. (Radiation Lab., Univ. of Calif.). Oct. 25, 1950. 8p. (UCRL-964).

Rats given labeled Na and K were subjected to various doses of radiation. Data indicate that one cause of radiation injury is K deficiency induced in radiation sensitive tissue. NSA 5-1734.

1644

THE PATHOLOGICAL CHANGES EXHIBITED BY ANIMALS EXPOSED TO SINGLE DOSES OF X-RADIATION. R. G. Metcalf, R. J. Blandau, and T. B. Barnett. (Atomic Energy Project, Univ. of Rochester). July 17, 1950. 44p. (UR-123).

Irradiated rats (550 r) were sacrificed at intervals from 15 minutes to 42 days post-exposure. Study was made of organ sections, peripheral blood, bone marrow and sperm from vas deferens. NSA 5-1735.

1645

ACUTE INTESTINAL RADIATION DEATH. STUDIES ON ROENTGEN DEATH IN MICE. III. Henry Quastler, Elizabeth F. Lanzl, Mildred E. Keller, and James W. Osborne. Am. J. Physiol. 164, 546-56 (1951). Feb.

Survival time of 3 1/2 days was stable over wide range of doses in mice. NSA 5-1736.

1646

EFFECT OF PHYSICAL AND CHEMICAL FACTORS ON PHAGOCYTOSIS IN THE PRESENCE OF IRRADIATED HUMAN BLOOD AND PLASMA. Jirair N. Sarian. Am. J. Roentgenol. Radium Therapy 65, 465-71 (1951). Mar.

Citration, x-irradiation and heating effects on phagocytosis opsonins and agglutinins are described. X ray doses employed were 50 and 100 r and hard and soft x rays were compared. NSA 5-1741.

1647

THE EFFECT OF VARIATION IN DOSAGE RATE OF ROENTGEN RAYS ON SURVIVAL IN YOUNG BIRDS. S. Phyllis Stearner. Am. J. Roentgenol. Radium Therapy 65, 265-71 (1951). Feb. (ANL-4291, 90-98 (1949)).

Post-irradiation survival of young birds depends on total dose, dose rate, and age at time of exposure. NSA 5-1742.

1648

STUDIES OF RADIOACTIVE PHOSPHORUS (P^{32}) APPLIED TO HUMAN SKIN. I. ERYTHEMA AND AUTO-RADIOGRAPHIC FINDINGS FOLLOWING APPLICATIONS IN VARIOUS FORMS. Victor H. Witten, Earle W. Brauer, Robert Loevinger, and Vera Holmstrom. (New York Univ. Post-Graduate Medical

School and New York Univ. Hospital). J. Invest. Dermatol. 26, 437-47 (1956).

Development of erythema in human skin after topical application of P^{32} , a pure β emitter, (1) in aqueous solution, (2) on blotting paper discs and (3) in scaled plaques is the same whether the P^{32} penetrates the skin (determined by autoradiography of biopsy specimens) or is confined to surface. Results are contrasted with results of similar studies using thorium x, and α emitters. NSA 10-11658.

1649

FAILURE OF PUPATION OF EPHESTIA LARVAE FOLLOWING EXPOSURE TO X-RAYS. Anna R. Whiting. Paper presented at the 47th Annual Meeting of the American Society of Zoologists, Cleveland, Ohio, Dec. 27-30, 1950. NSA 5-1745.

1650

IRRADIATION DAMAGE OF THE INTESTINES FOLLOWING 1,000-KV ROENTGEN THERAPY. EVALUATION OF TOLERANCE DOSE. Harold I. Amory and Irving B. Brick. Radiology 56, 49-57 (1951). Jan.

Effects of 1000-kv irradiation on small and large intestine in group of 20 patients are reported. NSA 5-1746.

1651

IRRADIATIONS BY ROENTGEN RAYS AND HEPARINEMIA AND LEUKERGY. Feliks Stanski and Roman Kordecki. Med. Weterinaryjna 6, 453-5 (1950). Aug. (In Polish).

Small x-ray doses cause prolongation of coagulation time; leukergy appears only when coagulation time is considerably prolonged (5X). Heparin effect is described. NSA 5-1747.

1652

THE SIGNIFICANCE OF THE ACTION OF RADIOACTIVE PHOSPHORUS ON HABROBRACON JUGLANDES ASHMEAD. Albert Martin Jr. Proc. Penn. Acad. Sci. 24, 60-4 (1950).

Abnormalities in progeny of irradiated wasps are described. NSA 5-1748.

1653

THE MORTALITY OF BACTERIOPHAGE CONTAINING ASSIMILATED RADIOACTIVE PHOSPHORUS. A. D. Hershey, M. D. Kamen, J. W. Kennedy, and H. Gest. J. Gen. Physiol. 34, 305-19 (1951). Jan. 20.

Bacteriophage TH containing P^{32} is inactivated at rate proportional to specific radioactivity of the constituent P. NSA 5-1749.

1654

STUDIES ON THE MUTATION OF STREPTOMYCES GRISEUS NO. 200 BY X-RAY IRRADIATION. Yoshiro Okami and Hamoa Umezawa. J. Antibiotics (Japan) 3, Suppl. B, 7-9 (1950). Sept.

S. griseus was irradiated (300,000 r/hr--time not given). Morphological mutants (6) did not produce streptomycin. NSA 5-1750.

1655

STUDIES OF RADIUM IN HUMAN BONE. Frank E. Hoecker and Paul G. Roofe. Radiology 56, 89-98 (1951). Jan.

Portions of several bones from 2 cases of osteogenic sarcoma attributed to radioactive substances in bones were examined microscopically and autoradiographically. NSA 5-1751.

1656

UNUSUAL GLOMERULONEPHRITIS IN YOUNG CHILDREN, PROBABLY RADIATION NEPHRITIS. REPORT OF THREE CASES. Wolf W. Zuelzer, Harold D. Palmer, and William A. Newton, Jr. Am. J. Path. 26, 1019-40 (1950). Nov.

Development of an unusual nephritis with fatal outcome following radiation exposure in conventional therapeutic dosage is reported. NSA 5-1752.

1657

VITAL STAINING WITH THE FLUOROCHROME ACRIDINE ORANGE AND ITS APPLICATION TO RADIOBIOLOGY. I. ALPHA-RAY EFFECTS. A. T. Krebs and Z. S. Gierlach. Am. J. Roentgenol. Radium Therapy 65, 93-8 (1951). Jan. NSA 5-1753.

1658

BIBLIOGRAPHY RADIATION PROTECTION OF PERSONNEL AND RADIOCHEMICAL LABORATORIES THEIR DESIGN AND OPERATION. Eunice Whittlesey and Eloise Givens. (Knolls Atomic Power Lab.). July 1950. 23p. (AECU-1020). NSA 5-1754.

1659

X-RADIATION FROM ELECTRON MICROSCOPE. John H. L. Watson and Luther E. Preuss. Science 112, 407-9 (1950). Oct. 6.

Unusual conditions resulting in dangerously high exposures of personnel are described. NSA 5-1759.

1660

EFFECT OF EARLY CROSS TRANSFUSION ON X-IRRADIATION DISEASE. Peter F. Salisbury, Paul E. Rekers, Joseph H. Miller, and Norman F. Marti. Science 113, 6-7 (1951). Jan. 5.

A group of 6 dogs was given 450 r dose and cross transfused; 19 similarly irradiated dogs were used as control group. Depression of total leukocytes was greater in controls. Reticulocyte response was greater in transfused animals. NSA 5-1760.

1661

PATHOGENESIS AND TREATMENT OF THE POST-IRRADIATION SYNDROME. J. Garrott Allen, Peter V. Moulder, and Daniel M. Enerson. J. Am. Med. Assoc. 145, 704-11 (1951). Mar. 10. NSA 5-1761.

1662

SOME APPLICATIONS OF NUCLEAR PHYSICS TO MEDICINE. W. V. Mayneord. London, The British Institute of Radiology, 1950. 290p. NSA 5-1773.

1663

RATE OF ABSORPTION OF COBALT FROM THE PERITONEAL CAVITY AND RATE OF ELIMINATION FROM THE BLOOD. Nathaniel I. Berlin and Wilham Siri. Am. J. Physiol. 164, 221-5 (1951). Jan. 1. NSA 5-1778.

1664

THE EFFECTS OF ATOMIC WEAPONS. (Los Alamos Scientific Laboratory). Washington, U.S. Government Printing Office. Rev. Sept. 1950. 456p.

Results to be expected from detonation of atomic weapons are described shock waves and blast damage; thermal radiation and incendiary effects; nuclear radiation and instrumentation; effects on personnel and personnel protection. NSA 5-2004.

1665

ON THE DETERMINATION OF RETENTION BEHAVIOR AND TOTAL METABOLIC EXCRETION OF RADIO-ISOTOPES FROM DAILY EXCRETION DATA. Sylvanus A. Tyler and Joan Gurian. (Argonne National Lab.), p.12-13 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT NOVEMBER, DECEMBER, 1949, JANUARY, 1950. (ANL-4401(p.12-13)).

Excretion data are described by sums of exponentials, and total excreted material is estimated. Corresponding retention function is derived. NSA 5-2010.

1666

PROGRESS REPORT; ABNORMAL BLEEDING. J. Garrott Allen. (Argonne National Lab.). Mar. 1950. 167p. (ANL-4474).

Studied. *in vitro* clotting time and changes caused by total-body x irradiation; protamine titration and platelet level in certain diseases; aminopterin in normal dogs; antiheparin activity of protamine sulfate, gelatin, lysine and toluidine blue; plasma antithrombin in irradiated and heparinized dogs; irradiation effect on coagulation. NSA 5-2017.

1667

FURTHER STUDIES ON FACTORS INFLUENCING RECOVERY FROM RADIATION INJURY. L. O. Jacobson, E. K. Marks, E. L. Simmons, M. J. Robson, and E. O. Gaston. p.31-2 OF BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT NOVEMBER, DECEMBER, 1949, JANUARY, 1950. (Argonne National Lab.). (ANL-4401(p.31-2)).

Protective effects of appendix- and spleen-shielding against radiation injury in mice, rats, and rabbits are described. NSA 5-2027.

1668

THE EFFECT OF SPLEEN PROTECTION ON IRON DISTRIBUTION IN IRRADIATED RATS. R. L. Huff, W. F. Bethard, J. F. Garcia, B. M. Roberts, L. O. Jacobson, and J. H. Lawrence. p.33-4 OF BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT NOVEMBER, DECEMBER, 1949, JANUARY, 1950. (Argonne National Lab.). (ANL-4401(p.33-4)).

Of 80 rats x-rayed with 500 r, total-body, and given 10,000 cpm of Fe^{59} 3 days post-irradiation, those spleen-shielded showed significantly greater bone-marrow Fe uptake than those with spleen unprotected. NSA 5-2028.

1669

PROGRESS REPORT CHRONIC EXTERNAL IRRADIATION. E. Lorenz, L. O. Jacobson, A. B. Eschenbrenner, D. Uphoff, H. Sutton, and R. Schweisthal. p.35-7 OF BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FOR NOVEMBER, DECEMBER, 1949, JANUARY, 1950. (Argonne National Lab.). (ANL-4401(p.35-7)).

LD_{50-30} for guinea pigs was studied. Survival, blood changes and carcinogenesis in total-body x rayed spleen-shielded mice are reported. NSA 5-2029.

1670

SUMMARY OF FINISHED EXPERIMENTS PART I. SURVIVAL AND BLOOD PICTURE OF HYBRID GUINEA PIGS EXPOSED TO LONG-CONTINUED TOTAL-BODY γ RADIATION. E. Lorenz, L. O. Jacobson, and H. Sutton. p.38-52 OF BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT NOVEMBER, DECEMBER, 1949, JANUARY, 1950. (Argonne National Lab.). (ANL-4401(p.38-52)).

In guinea pigs, death from radiation-induced pancytopenia appears to be a function of dose rate rather than total dose; no linear relationship was observed between mean survival time and mean lethal total dose. NSA 5-2030.

1671

SUMMARY OF FINISHED EXPERIMENTS; PART II. RECOVERY FROM ANEMIA INDUCED IN GUINEA PIGS BY A LIMITED EXPOSURE TO CHRONIC TOTAL-BODY γ RADIATION. E. Lorenz, L. O. Jacobson, Harriet Sutton, and R. Schweisthal. p.53-71 OF BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT, NOVEMBER, DECEMBER, 1949, JANUARY, 1950. (Argonne National Lab.). (ANL-4401(p.53-71)). NSA 5-2031.

1672

PROGRESS REPORT; NOTES ON THE EVALUATION OF MATERIALS THAT MIGHT BE EXPECTED TO ALTER RADIOSENSITIVITY. D. E. Smith, H. M. Patt, and

E. B. Tyree. p.72-4 OF BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT NOVEMBER, DECEMBER, 1949, JANUARY, 1950. (Argonne National Lab.). (ANL-4401(p.72-4)).

BAL and cysteine plus KCN administered before irradiation (1000 r) decreased radiosensitivity, the latter combination to the same degree as cysteine alone. Thiamine-HCl, L-taurine and tyrosine had no effect. NSA 5-2032.

1673

PROGRESS REPORT; THE EFFECT OF X RAYS ON THE OXIDIZABLE SULPHYDRYL GROUPS OF RATS RECEIVING CYSTEINE. H. M. Patt, D. E. Smith, M. Blackford, and R. L. Straube. p.75-7 OF BIOLOGICAL AND MEDICAL DIVISION QUARTERLY REPORT NOVEMBER, DECEMBER, 1949, JANUARY, 1950. (Argonne National Lab.). (ANL-4401(p.75-7)).

Cysteine apparently does not protect against x rays by acting as substrate for oxidation by free radicals presumably formed during exposure. NSA 5-2033.

1674

PROGRESS OF THE LONG-TERM POLONIUM-MOUSE EXPERIMENT. Miriam Finkel, Gertrude Hirsh, Donald Gardiner, and Ruth McNunis. p.78-95 OF BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT, NOVEMBER, DECEMBER, 1949, JANUARY, 1950. (Argonne National Lab.). (ANL-4401(p.78-95)).

Deleterious effects of 0.027-0.008 $\mu\text{c/g}$ of polonium chloride on survival, weight, intestinal infection, spleen weight and leucocyte count of mice are described. NSA 5-2034.

1675

THE EFFECT OF RADIUM ON CANCER OF THE CERVIX. J. V. Meigs and F. Parker, Jr. New Engl. J. Med. 203, 247 (1930).

1676

PROGRESS REPORT; INFLUENCE OF DOSAGE RATE ON X-RAY EFFECTS IN YOUNG CHICKS AND RATS. S. Phyllis Stearner and Emily J. B. Christian. p.125-9 OF BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT, NOVEMBER, DECEMBER, 1949, JANUARY, 1950. (Argonne National Lab.). (ANL-4401(p.125-9)).

Includes reports on chicks, 2-3 days old, exposed to 1000 r at 43 r/min; Vitamin P in irradiated chicks, Histamine as an etiological agent in early deaths; role of autonomic nervous system in early deaths; hemoconcentration in pre-mortality; effect of exposure of rats to 600 r at 80 r/min in contrast to 6 r/min (increased frequency of cerebral hemorrhages in the former); histopathological studies in planning stage. NSA 5-2036.

1677

PRELIMINARY REPORT, CYSTEINE PROTECTION OF TUMOR FRAGMENTS *IN VITRO* FROM IRRADIATION WITH LETHAL DOSAGES OF X RAYS. B. Vincent Hall. p. 120-42 OF BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT, NOVEMBER, DECEMBER, 1949, JANUARY, 1950. (Argonne National Lab.). (ANL-4401(p.130-42)). NSA 5-2037.

1678

PROGRESS REPORT, PHYTORADIOLOGY. S. A. Gordon, R. Stutz, and R. Weber. p.144-51 OF BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT, NOVEMBER, DECEMBER, 1949, JANUARY, 1950. (ANL-4401(p.144-51)).

Cellular expansion phase of growth in oat seedlings appears radioresistant. Post-irradiation growth inhibition is reversed by auxin and sulphydryl activants. Synthesis of C^{14} -labeled indoleacetic acid is described. NSA 5-2038.

1679

RADIOPATHOLOGY OF ISLETS OF LANGERHANS IN RATS. J. F. Spalding and C. C. Lushbaugh. Federation Proc. 14, 420 (1955).

Ionizing radiations have a necrotizing effect upon the islets of Langerhans when the whole body is exposed to 2500 r or more. Alpha cells are more sensitive than beta cells. In order to produce necrosis in beta cells 5000 r are required. Changes in both types of cells occur in 8 hours. Within 1 hour 50,000 r doses produce total islet necrosis. (from authors' summary).

1680

PRELIMINARY REPORT: MAGNITUDE OF THE MATING RESPONSE AS A FUNCTION OF IRRADIANCE IN PARAMECIUM BURSARIA. C. F. Ehret. p.168-9 OF BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT, NOVEMBER, DECEMBER, 1949, JANUARY, 1950. (Argonne National Lab.). (ANL-4401(p.168-9)). NSA 5-2041.

1681

PRELIMINARY REPORT: EFFECT OF TEMPERATURES ON INACTIVATION OF BACTERIOPHAGE BY X RAYS. C. S. Bachofer, C. F. Ehret, and S. Mayer. p.170 OF BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT NOVEMBER, DECEMBER, 1949, JANUARY, 1950. (Argonne National Lab.). (ANL-4401(p.170)).

In study of temperature effect at points from 77 to 310° K, it was established that lower temperatures decrease rate of x ray inactivation. NSA 5-2042.

1682

SOME LATE HISTOLOGICAL CHANGES IN MICE AFTER LOW DOSES OF PLUTONIUM AND RADIUM. William Bloom and Margaret A. Bloom. p.174-84 OF BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT, NOVEMBER, DECEMBER, 1949, JANUARY, 1950. (Argonne National Lab.). (ANL-4401(p.174-84)).

Mice were injected intravenously with plutonium nitrate (0.03 or 0.003 $\mu\text{C/g}$) or intraperitoneally with Ra (0.3 or 0.03 $\mu\text{C/g}$) and sacrificed at intervals of 2 mo-1 yr. Histological study of spleen, lymph node, thymus, liver, testis, lung, skin, gastro-intestinal tract and pancreas is reported. NSA 5-2043.

1683

CLOTTING TIME CHANGES AFTER TOTAL BODY X IRRADIATION. J. G. Allen, L. J. Savage, P. V. Moulder, and D. M. Enerson. p. 19-23 OF PROGRESS REPORT: ABNORMAL BLEEDING. (Argonne National Lab.). Mar. 1950. (ANL-4474(p.19-23)).

Analysis of clotting time in 79 irradiated dogs indicates increased clotting time is not attributable to chance alone. NSA 5-2044.

1684

PLASMA ANTITHROMBIN IN IRRADIATED AND HEPARINIZED DOGS; A PRELIMINARY STUDY. D. M. Enerson, B. J. Grossman, and J. G. Allen. p.88-98 OF PROGRESS REPORT: ABNORMAL BLEEDING. (Argonne National Lab.). Mar. 1950. (ANL-4474(p.88-98)).

Blood of 4 normal dogs given 0.5 mg/kg intravenous heparin injections displayed pronounced increase in whole-blood clotting time; slight increase in antithrombin titer. Of 17 x-rayed dogs, 15 had moderately increased clotting time; pronounced increase in antithrombin titer. NSA 5-2046.

1685

PHYSICAL PHENOMENA IN BLOOD COAGULATION. N. J. Galluzzi, D. M. Enerson, D. J. Glotzer, P. V. Moulder, and J. G. Allen. p.99-111 OF PROGRESS REPORT, ABNORMAL BLEEDING. (Argonne National Lab.). Mar. 1950. 13p. (ANL-4474(p.99-111)).

Increased plasma surface tension follows total body x irradiation in dogs. NSA 5-2047.

1686

FURTHER STUDIES ON THE ISOLATION OF HEPARIN FROM BLOOD OF IRRADIATED DOGS. J. M. Sutherland and J. G. Allen. p.112-22 OF PROGRESS REPORT: ABNORMAL BLEEDING. (Argonne National Lab.). Mar. 1950. (ANL-4474(p.112-22)).

By procedure described, no anticoagulant could be extracted from blood of irradiated dogs. NSA 5-2048.

1687

IN VIVO CHANGES IN THE ULTRAVIOLET ABSORPTION SPECTRUM OF DOG PLASMA FOLLOWING EXPOSURE TO X IRRADIATION. K. A. Lathrop, R. F. Gilmore, and J. G. Allen. p.123-7 OF PROGRESS REPORT: ABNORMAL BLEEDING. (Argonne National Lab.). Mar. 1950. (ANL-4474(p.123-7)).

Ultraviolet absorption at 278 m μ closely parallels protein level, irrespective of quantitative changes in albumins and globulins. NSA 5-2049.

1688

CORRELATED STUDIES ON THE IRRADIATED DOG. P. V. Moulder, K. A. Lathrop, B. J. Grossman, N. J. Galluzzi, M. H. Sanderson, E. M. Burnham, and J. G. Allen. p.128-47 OF PROGRESS REPORT: ABNORMAL BLEEDING. (Argonne National Lab.). Mar. 1950. (ANL-4474(p.128-47)).

The following were studied in 3 dogs given 450 r total-body exposure: (1) complete hemocytology; (2) coagulation; (3) plasma proteins; (4) surface tension and viscosity measurements; (5) plasma ultraviolet light absorption; (6) protein and protease sulphydryl polarographic curves. NSA 5-2050.

1689

SUMMARY OF IRRADIATION EFFECTS OF THE BLOOD COAGULATION MECHANISM. J. G. Allen, P. V. Moulder, D. M. Enerson, K. A. Lathrop, and M. H. Sanderson. p.148-67 OF PROGRESS REPORT: ABNORMAL BLEEDING. (Argonne National Lab.). Mar. 1950. (ANL-4474(p.148-67)). NSA 5-2051.

1690

ALTERATIONS IN THERMAL FRAGILITY OF RAT ERYTHROCYTES FOLLOWING TOTAL BODY X-IRRADIATION. Leontine Goldschmidt, Robert L. Rosenthal, Victor P. Bond, and Maurice C. Fishler. Am. J. Physiol. 164, 202-6 (1951). Jan. 1.

Definite increase in red-cell fragility was demonstrated in rats 4-12 hr after 500 and 600 r total-body x ray exposure. NSA 5-2052.

1691

THE CHANGES IN CELL MORPHOLOGY AND HISTOCHEMISTRY OF THE TESTIS FOLLOWING IRRADIATION AND THEIR RELATION TO OTHER INDUCED TESTICULAR CHANGES. I. QUANTITATIVE RANDOM SAMPLING OF GERMINAL CELLS AT INTERVALS FOLLOWING DIRECT IRRADIATION. Lloyd C. Fogg and Russell F. Cowing. Cancer Research 11, 23-8 (1951). Jan.

Authors plotted all population types (frequency of various types) against time post-irradiation. NSA 5-2053.

1692

CYTOLOGICAL LOCALIZATION OF THE TRANSLOCATION POINT FOR THE BARLEY MUTANT ELECTOIDES 7. Arne Hagberg and Joe Hin Tjio. Hereditas 36, No. 4, 487-91 (1950).

By applying oxiquinoline technique, translocation point was localized to long arm of chromosome I, between secondary constriction and chromosome end, or to shortest arm of chromosome V. NSA 5-2054.

1693

DO X-RAYS RESUSCITATE HEAT-KILLED SEEDS? Nils Nybom. *Hereditas* 36, No. 4, 516-17 (1950).

Barley seeds were treated with (1) heat (90° C for 30 minutes), (2) irradiation (20,000 r, 170 kv, 6 ma, 1 mm Al), or (3) both. Percentage of germinating seeds increased from 46% for (1) to 80% for (3). Both (1) and (2) gave full and positive peroxidase reactions. NSA 5-2055.

1694

THE EFFECTS OF ELECTRONS, POSITRONS AND α -PARTICLES IN PLANT DEVELOPMENT. A. Gustafsson, L. Ehrenberg, and M. Brunnberg. *Hereditas* 36, No. 4, 419-44 (1950).

Effects of electron-emitting P^{32} and S^{35} , positron- and γ -emitting Na^{22} , and α -particle-emitting Rn^{222} and Po^{210} on seedling lethality, growth, induced chromosomal aberrations are reported. Uptake of radioisotopes is described. NSA 5-2056.

1695

THE EFFECT OF RADIOACTIVE PHOSPHORUS UPON THE DEVELOPMENT OF THE EMBRYONIC TOOTH BUD AND SUPPORTING STRUCTURES. M. S. Burstone. *Am. J. Path.* 27, 21-32 (1951). Jan.-Feb.

Administration of P^{32} to pregnant mice results in disturbances of osteogenesis and odontogenesis in offspring. Dosages producing these changes are less than those required to produce similar changes by injecting immature mice. NSA 5-2057.

1696

THE EFFECT OF RADIOACTIVE PHOSPHORUS UPON THE DEVELOPMENT OF THE TEETH AND MANDIBULAR JOINT OF THE MOUSE. M. S. Burstone. *J. Am. Dental Assoc.* 41, 1-18 (1950). July.

Disturbances of osteogenesis and/or odontogenesis in young mice given P^{32} are described. Effect of β radiation on teeth and jaws is similar to that of x radiation. NSA 5-2058.

1697

EFFECT OF RADIOPHOSPHORUS ON RATS WITH COBALT-INDUCED POLYCYTHEMIA. W. F. Bethard, E. Skirmont, and L. O. Jacobson. Paper presented at the Central Society for Clinical Research, 23d Annual Meeting. Chicago, Nov. 3-4, 1950.

No significant difference in sensitivity to P^{32} appears to exist between normal rats and those with an established Co polycythemia. NSA 5-2059.

1698

THE EFFECTS OF ROENTGEN, γ , AND β RAYS ON THE EPIDERMAL CELL. EXPERIMENTS ON THE "NIPPLE TEST" ASSOCIATED WITH THE DUSTIN REACTION. W. Jadassohn, E. Bujard, R. Paillard, P. Wenger, and P. Gaudin. *Acta. Radiol.* 34, 469-87 (1950). Dec. (In French).

Combined action of irradiation therapy and treatment by estrogenic hormones on nipple of male guinea pig was studied. NSA 5-2060.

1699

THE EFFECT OF X-RADIATION ON EXPERIMENTALLY PRODUCED CUTANEOUS SENSITIVITY. Sheldon G. Cohen, Lloyd D. Mayer, and Leo H. Crip. *J. Investigative Dermatol.* 16, 91-6 (1951). Feb.

Of 37 guinea pigs sensitized to p-phenylenediamine with production of cutaneous hypersensitivity, 19 received 175 r, total-body x ray dose. Attenuation of sensitivity occurred in majority of irradiated animals. NSA 5-2061.

1700

EFFECT OF X-RAYS ON IMMUNITY A REVIEW.

William H. Taliaferro and Lucy Graves Taliaferro. *J. Immunol.* 66, 181-212 (1951). Feb. NSA 5-2062.

1701

EFFECT OF X-RAYS ON NUCLEIC ACID AND PROTEIN SYNTHESIS. Richard Abrams. *Arch. Biochem.* 30, 90-9 (1951). Jan.

X ray effect on nucleic acid purines was studied in rat intestine and rabbit intestine and bone marrow. DNA and RNA synthesis rate were depressed by x rays; proteins relatively unaffected. Radiation did not effect purine composition of nucleic acids, but relative concentration of RNA was lowered. NSA 5-2063.

1702

FAILURE OF A FLAVONOID TO REDUCE RADIATION MORTALITY IN MICE. E. P. Cronkite, W. H. Chapman, and F. W. Chambers. *Proc. Soc. Exptl. Biol. Med.* 76, 282-4 (1951). Feb.

Vitamin P was apparently of no value in treating radiation injury in LD_{60} - LD_{100} range in mice. NSA 5-2064.

1703

THE INABILITY OF GLUTATHIONE TO PROTECT ERYTHROPOIETIC BONE MARROW AGAINST IRRADIATION INJURY AT A DOSE LEVEL OF 300 r. Thomas G. Hennessy, Fleming B. Folsom, and John K. Grover. (Naval Radiological Defense Lab.). Nov. 6, 1950. 11p. (AD-267(B)).

Glutathione gave no protection to rats against radiation from x-ray using Fe^{59} to measure erythropoietic depression. NSA 5-2066.

1704

INDUCED PREGNANCY IN A MAMMALIAN HOST FOLLOWING SEVERE TOTAL BODY X-IRRADIATION. Paul E. Rekers. *J. Lab. Clin. Med.* 37, 331-41 (1951). Mar.

Pregnancy was readily and naturally induced in dogs after large doses of total-body irradiation of LD_{90} or more. Protective action of embryonic tissue and benefit from fetal endocrine systems are discussed. NSA 5-2067.

1705

IRRADIATION INJURIES OF THE HAND. Michael L. Mason. *Quart. Bull. Northwestern Univ. Med. School* 25, No. 1, 51-9 (1951). Spring.

Real cause of irradiation dermatitis is reported to lie in effect of rays upon cells of skin and subcutaneous tissue. Reaction depends upon amount and quality of irradiation delivered and individual susceptibility of tissues. NSA 5-2068.

1706

OCULAR CHANGES PRODUCED BY TOTAL BODY IRRADIATION. Helenor Campbell Wilder and Russell M. Maynard. *Am. J. Path.* 27, 1-19 (1951). Jan.-Feb.

Study of pathological changes in eyes of goats and pigs irradiated at Bikini as compared with x rayed animals, showed effects in both cases to be similar. NSA 5-2069.

1707

REGENERATION OF HEMATOPOIETIC ORGANS IN HEAVILY-IRRADIATED MICE PROTECTED BY KCN INJECTION. H. Betz and L. Fruhling. *Compt. rend. soc. biol.* 144, 1013-15 (1950). July. (In French).

Mice were exposed to 700 r of 250 kv x rays immediately after intraperitoneal injection of 0.05 mg KCN. Regeneration of blood, bone marrow, spleen, thymus, lymphatic nodes and liver are described. NSA 5-2070.

1708

A STUDY OF THE HEMORRHAGIC STATE IN DOGS AFTER A LETHAL DOSE OF TWO MILLION VOLT

X-RAYS. E. P. Cronkite, B. Halpern, D. P. Jackson, and George V. LeRoy. Paper presented at the Central Society for Clinical Research 23d Annual Meeting. Chicago, Nov. 3-4, 1950.

Post-irradiation hemorrhagic state of animals given lethal x ray doses is not identical with any hemorrhagic diseases encountered in clinical practice. NSA 5-2071.

1709
X-RAY INDUCED DOMINANT LETHALS IN *DROSOPHILA MELANOGASTER*. G. Bonnier and K. G. Luning. *Hereditas* 36, No. 4, 445-56 (1950).

Age of males at fertilization and time lapse between irradiation and fertilization are both factors in decreasing hatching rate in eggs. NSA 5-2072.

1710
EVALUATION OF PRESENT DAY KNOWLEDGE OF COSMIC RADIATION AT EXTREME ALTITUDE IN TERMS OF THE HAZARD TO HEALTH. Hermann J. Schaefer. (Naval School of Aviation Medicine and Research, Pensacola). Apr. 30, 1950. 32p. (NP-1735). NSA-2076.

1711
PUBLIC HEALTH ASPECTS OF ATOMIC ENERGY. A. Wolman. *Am. J. Pub. Health* 40, 1502-7 (1950). Dec.

Public health considerations in regard to atomic energy industry are discussed. NSA 5-2080.

1712
TOLERANCE DOSE PROBLEMS IN RADIOLOGICAL WORK. P. Bjerre Hansen and C. B. Madsen. *Acta. Radiol.* 34, 519-28 (1950). Dec.

Proposal to reduce tolerance dose to 100 mr/wk is presented. NSA 5-2081.

1713
CITRUS VITAMIN P AS PROTECTION AGAINST ATOMIC RADIATION. Boris Sokoloff and Walter H. Eddy. *Citrus Ind.* 16, 5-8 (1951). Feb.

Radiation illness after dose of 1100-1200 r is described. X ray effect on capillaries is noted. Vitamin P increases post-radiation recovery power of rats. NSA 5-2082.

1714
THE DIAGNOSIS AND TREATMENT OF RADIATION SICKNESS IN ATOMIC WARFARE. Eugene P. Cronkite. *Western J. Surg. Obstet. Gynecol.* 59, 55-61 (1951). Feb. NSA 5-2083.

1715
INVESTIGATION OF IMMEDIATE EFFECTS OF X-RAYS ON LIVING ANIMAL TISSUES. J. G. Stephens and H. Florey. *Brit. J. Radiol.* 32, 159-166 (1957).

Contrary to the results obtained by previous workers, no immediate fall of blood pressure or alteration in respiratory rate occurred during prolonged irradiation of living animal tissues.

1716
THE ROLE OF INFECTION IN RADIATION INJURY. C. Phillip Miller and Carolyn W. Hammond. *Trans. Assoc. Am. Physicians* 63, 155-60 (1950). May 2-3.

Results indicate that infection plays an important role in death from x radiation. NSA 5-2085.

1717
CHROMOSOME BREAKAGE IN PLANTS INDUCED BY RADIOACTIVE PHOSPHORUS (P^{32}). T. J. Arnason, E. Cumming and J. W. T. Spinks. *Science* 107, 198-199 (1948).

Seeds were divided into two lots supplied with 0.18 and 0.018 microcurie of P^{32} . Seedlings were transferred to untreated soil 13 days after germination. Irregularities were most frequent in tetraploid durum and hexaploid aestivum wheat. No clear aberration was observed in

barley. Aberrations in division I chromosome fragments, chains of 3 or 4 chromosomes, rings of 4, and unequal pairs; in division II anaphase and telophase bridges and fragments. (from abstract). BA 22-15506.

1718
DECREASE OF ADRENAL ASCORBIC ACID AND CHOLESTEROL IN RAT AND GUINEA PIG, FOLLOWING LARGE DOSES OF GLUTATHIONE. M. M. Carey, E. P. Vollmer, R. L. Zwemer, and D. L. Spence. *Am. J. Physiol.* 164, 770-3 (1951). Mar. 1.

Glutathione, in dosage that protects mice against irradiation and potassium poisoning, produces toxic reactions in rats and guinea pigs. Adrenal cholesterol and ascorbic acid are lowered, indicating stimulus to adrenal cortex. NSA 5-2096.

1719
THE USE OF RADIOACTIVE AND STABLE ISOTOPES IN HEMATOLOGY. L. R. Wasserman, I. A. Rashkoff, and T. F. Yoh. *J. Mt. Sinai Hosp. N. Y.* 17, 1037-47 (1951). Mar.-Apr.

Use of N^{15} , Fe^{55} , Fe^{59} , Zn^{65} , P^{32} , N^{14} , and Au^{198} in hematological investigations is reviewed. NSA 5-2110.

1720
CONCERNING X-RAY TREATMENT OF PYOGENIC INFECTIONS. Ger Eilermann. *Strahlentherapie* 78, 609-18 (1949). NSA 4-1873.

1721
PROGRESS REPORT RADIOBIOLOGY EXPERIMENT STATION, BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT. p.152-4 OF BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT NOVEMBER, DECEMBER, 1949, JANUARY, 1950. Austin M. Brues, Director. (Argonne National Lab.). (ANL-4401(p.152-4)).

Biosynthesis was studied using radiovitamin B and rutin, Co^{60} , P^{32} , and C^{14} . Effect of slow neutrons on growth and development of hemp plants after irradiation of seeds is outlined. NSA 5-2154.

1722
INDUSTRIAL AND SAFETY PROBLEMS OF NUCLEAR TECHNOLOGY. Morris H. Shamos and Sidney G. Roth, ed. New York, Harper and Brothers, 1950. 368p.

Discussion of the Atomic Energy Commission and its activities, radiochemistry and isotopes, the radiochemical laboratory, hazards, safety, and insurance. NSA 5-2304.

1723
BIOLOGY DEPARTMENT; p.111-20 OF QUARTERLY PROGRESS REPORT JULY 1-SEPTEMBER 30, 1950. (Brookhaven National Lab.). Nov. 1950. (BNL-82 (p.111-20)).

Measurement of nucleic acids in cells of *Lilium longiflorum* by 2 methods showed little quantitative agreement between the two. Action of x rays on enzymes, seeds, bacteria, and corn is described. NSA 5-2312.

1724
QUARTERLY TECHNICAL REPORT JULY 1, 1950, THROUGH SEPTEMBER 30, 1950. Henry A. Blair, Director, ed. (Atomic Energy Project, Univ. of Rochester). Nov. 1, 1950. 135p. (UR-142).

Includes reports on x ray effect on rat testes; uranium poisoning; fast neutron survey of small cyclotron. NSA 5-2315.

1725
ORGAN WEIGHTS AND THE CALCULATIONS OF TRANSPORT OF INSOLUBLE PARTICLES FROM THE LUNG. C. W. LaBelle, H. E. Stokinger, and J. M. Dohl. p.41-51 OF QUARTERLY TECHNICAL REPORT;

JULY 1, 1950 THROUGH SEPTEMBER 30, 1950. (Atomic Energy Project, Univ. of Rochester). Nov. 1, 1950. (UR-142(p.41-51)).

Normal organs of rats and their variation are described. Elementary calculations based on inhalation exposure show how results may be affected in specific cases. NSA 5-2316.

1726

THE SURVIVAL OF RATS ADRENALECTOMIZED AFTER X-IRRADIATION. Abraham Edelmann and Seymour Katsh. (Brookhaven National Lab.). 1p. (AECU-1137). Am. J. Physiol. 168, 626-7 (1952).

Life span of irradiated rats (600 r, 160 kvp, 10 ma, 0.2 mm Cu) was reduced when time between exposure and adrenalectomy was decreased. Need for adrenal hormones is apparently most acute immediately after irradiation, diminishing after 3-5 days. NSA 5-2317.

1727

THE EFFECTS OF X-IRRADIATION ON A NATURALLY OCCURRING ENDEMIC INFECTION. V. P. Bond, I. L. Schechmeister, M. N. Swift, and M. C. Fishler. (Naval Radiological Defense Lab.). Nov. 29, 1950. 17p. (AD-273(B)). J. Infectious Diseases 91, 26-32 (1952).

Study of x ray effect on rats from laboratory colony in which a pulmonary infection was endemic is reported. NSA 5-2318.

1728

PRELIMINARY REPORT FURTHER STUDIES OF THE PROTECTIVE EFFECTS OF SHIELDING. E. L. Simmons. p.27 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, MAY, JUNE, JULY, 1950. (Argonne National Lab.). (ANL-4488(p.27)).

Marked increase in survival occurs in rats with intestine surgically mobilized and lead-shielded during total-body x irradiation. Effects of spleen-shielding of mice are also reported. NSA 5-2320.

1729

ON THE NATURE OF CYSTEINE-INDUCED RADIO-RESISTANCE; SULFHYDRYL LEVELS AND DISTRIBUTION OF CYSTEINE SULFUR. H. M. Patt, R. L. Straube, Margaret E. Blackford, and D. E. Smith. p.38 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, MAY, JUNE, JULY, 1950. (Argonne National Lab.). (ANL-4488(p.38)). NSA 5-2321.

1730

PROGRESS REPORT RENAL FUNCTION IN THE CHICKEN FOLLOWING X IRRADIATION. S. Phyllis Stearner, A. M. Brues, and Emily J. B. Christian. p.52-3 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, MAY, JUNE, JULY, 1950. (Argonne National Lab.). (ANL-4488(p.52-3)).

Blood uric acid increases rapidly in the chicken after 1000 r, 43 r/minute, x-ray dose. It is suggested that increase results from renal failure rather than from altered nitrogen metabolism. NSA 5-2322.

1731

EFFECT OF WHOLE BODY ROENTGEN RADIATION ON PHAGOCYTIC FUNCTION IN RABBITS. G. V. Taplin, J. S. Grevior, C. Finnegan, M. L. LaNier and A. Dunn. Federation Proc. 11, 396 (1952).

Pre- and post-irradiation studies on several hundred rabbits subjected to 300 to 1200 r acute whole body x-irradiation revealed that dose of 300 r had little effect upon the blood clearance of prodigiosin. After 800 r there was depression of the macrophage system during the first 2 weeks and then a return to normal in the fourth week. (from authors' summary).

1732

FAILURE OF INTRAPERITONEAL GRAFTS OF HETEROLOGOUS GUINEA PIG MARROW TO FUNCTION IN THE IRRADIATED RAT. STUDIES WITH FE⁵⁹. H. Maisin, A. Dunjic, P. Maldague and J. Maisin. Compt. Rend. Soc. Biol. 150, 828-31 (1956).

1733

PRELIMINARY REPORT AUTOAGGLUTINATION IN PARAMECIUM BURSARIA FOLLOWING EXPOSURE TO ULTRAVIOLET AND TO X-RADIATION. C. F. Ehret. p.74-7 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, MAY, JUNE, JULY, 1950. (Argonne National Lab.). (ANL-4488(p.74-7)).

Autoagglutination observed after ultraviolet and x irradiation in *P. bursaria* is grossly similar to agglutination between opposite mating types of sexually reactive normal animals during their light period. NSA 5-2325.

1734

PROGRESS REPORT STUDIES ON THE MECHANISM OF ACTION OF IRRADIATED WATER ON CELL METABOLISM. E. S. G. Barron and Betty Redfield. p.78-81 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, MAY, JUNE, JULY, 1950. (Argonne National Lab.). (ANL-4488(p.78-81)).

Mechanism of inhibited respiration in sea-urchin sperm suspended in x-irradiated H₂O was investigated. NSA 5-2326.

1735

THE ABSENCE OF INHIBITION OF --SH ENZYMES BY MODERATE AMOUNTS OF X RADIATION. Marjorie Le May. p.92 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, MAY, JUNE, JULY, 1950. (Argonne National Lab.). (ANL-4488(p.92)).

X-ray doses high enough to cause hematological changes and death in rats do not cause measurable effects in metabolism of rat kidney slices nor in enzyme systems studied (succinic dehydrogenase included). NSA 5-2327.

1736

PRELIMINARY REPORT THE EFFECT OF X IRRADIATION ON FIGHTING BEHAVIOR IN MALE MICE. H. H. Vogel, Jr. p.93-104 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, MAY, JUNE, JULY, 1950. (Argonne National Lab.). (ANL-4488(p.93-104)).

Fighting behavior in mice conditioned to fight is not completely suppressed, post irradiation, until shortly before death. NSA 5-2328.

1737

PRELIMINARY REPORT A COMPARATIVE STUDY OF RADIATION LETHALITY IN SEVERAL SPECIES OF EXPERIMENTAL ANIMALS IRRADIATED FOR THE DURATION-OF-LIFE. p.105-22 OF DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, MAY, JUNE, JULY, 1950. George Sacher. (Argonne National Lab.). (ANL-4488(p.105-22)). NSA 5-2329.

1738

THE DEGENERATIVE CHANGES IN THE TESTES OF THE ADULT RAT AFTER X-IRRADIATION. K. E. Mason and S. L. Shaver. p.16-28 OF QUARTERLY TECHNICAL REPORT, JULY 1, 1950 THROUGH SEPTEMBER 30, 1950. Nov. 1, 1950. (Atomic Energy Project, Univ. of Rochester). (UR-142(p.16-28)).

Degeneration in rat testes after 500 r total body irradiation is possibly due to combined effect of a secondary mediator and direct x ray effect, neither

of which alone produces observable degeneration. NSA 5-2330.

1739

ACTION OF 1:4-NAPHTHOHYDROQUINONE-DIPHOSPHATE AND ITS 2-METHYL DERIVATIVES ON IRRADIATED AND NON-IRRADIATED RATS WITH HENSEN SARCOMA. E. Friedmann and Norman T. J. Bailey. *Biochem. et Biophys. Acta.* 274-82 (1950). Feb.

Neither agent has significant effect on growth of non-irradiated Jensen sarcoma in rats. NSA 5-2331.

1740

BIOELECTRIC POTENTIALS AS A MEASURE OF RADIATION INJURY. A. A. Bless. *Proc. Natl. Acad. Sci. U.S.* 36, 617-23 (1950). Nov.

Potentials measured from tip of coleoptile to seed coat were compared with coleoptile length in wheat seedlings irradiated with up to 6000 r of x rays at various ages. NSA 5-2332.

1741

BIOLOGIC EFFECTS OF RADIOACTIVE PHOSPHORUS POISONING IN RATS. Simon Koletsky and James H. Christie. *Am. J. Path.* 27, 175-94 (1951). Mar.-Apr.

Extensive morphologic lesions caused by lethal doses of P^{32} are described. NSA 5-2333.

1742

THE CHANGES IN CELL MORPHOLOGY AND HISTOCHEMISTRY OF THE TESTIS FOLLOWING IRRADIATION AND THEIR RELATION TO OTHER INDUCED TESTICULAR CHANGES; II. COMPARISON OF EFFECTS OF DOSES OF 1,440 r AND 5,050 r WITH 300 r. Lloyd C. Fogg and Russell F. Cowing. *Cancer Research* 11, 81-6 (1951). Feb. NSA 5-2334.

1743

EFFECT OF HIGH-VOLTAGE CATHODE RAYS ON ASCORBIC ACID; IN VITRO AND IN SITU EXPERIMENTS. Bernard E. Proctor and John P. O'Meara. *Ind. Eng. Chem.* 43, 718-21 (1951). Mar.

Loss of ascorbic acid on irradiation is less *in situ* (orange juice) than *in vitro* (0.25% oxalic acid). Dilute solutions of ascorbic acid are more radiosensitive than concentrated ones. NSA 5-2335.

1744

INHIBITION OF NUCLEIC ACID SYNTHESIS BY X-RAY IRRADIATION AT DIFFERENT STAGES OF THE MITOTIC CYCLE. p.12-17 OF PROGRESS RADIO-BIOLOGY. Lorna K. Mee. F. J. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas, Publisher. 1955.

1745

THE LOCI OF ACTION OF ULTRA-VIOLET AND X-RADIATION, AND OF PHOTO-RECOVERY, IN THE EGG AND SPERM OF THE SEA URCHIN. Harold F. Blum, J. Courtland Robinson, and Gordon M. Loos. *Proc. Natl. Acad. Sci. U.S.* 36, 623-7 (1950). Nov.

Moderate doses of ultraviolet and x radiation delay cell division in eggs of *A. punctulata*. Locus of action appears to be cell nuclei. Photo recovery has locus in egg cytoplasm. NSA 5-2338.

1746

MASCULINIZATION OF XIPHOPHORES FEMALES BY X-IRRADIATION OF THE GONAD. Jean-Henri Vivien. *Compt. rend.* 231, 1166-8 (1950). Nov. 20. (In French).

Although 1200 r applied to gonads caused masculine development of anal and caudal fins, autopsy of female *X helleri* fish revealed normal appearing ovary. NSA 5-2339.

1747

MECHANISM OF PROTECTIVE ACTION OF GLUTA-

THIONE AGAINST WHOLE BODY IRRADIATION. E. P. Cronkite, G. Brecher, and W. H. Chapman. *Proc. Soc. Exptl. Biol. Med.* 76, 396-8 (1951). Feb. NSA 5-2340.

1748

PROLONGATION OF SURVIVAL OF SKIN HOMO-TRANSPLANTS IN THE RABBIT BY IRRADIATION OF THE HOST. W. J. Dempster, B. Lennox, and J. W. Boag. *Brit. J. Exptl. Path.* 31, 670-9 (1950). Oct.

Dose of 250 r given rabbits before application of skin grafts from another rabbit markedly improved survival of grafts. NSA 5-2342.

1749

QUANTITATIVE EFFECTS OF RADON IMPLANTED IN THE MEDULLA OBLONGATA; A TECHNIQUE FOR PRODUCING DISCRETE LESIONS. Herbert L. Borison and S. C. Wang. *J. Comp. Neurol.* 94, 33-53 (1951). Feb. NSA 5-2343.

1750

ON CERTAIN BIOLOGICAL EFFECTS OF PENETRATING RADIATION. S. E. Monoilov and K. P. Ivanov. *Doklady Akad. Nauk. S.S.S.R.* 105, 180-1 (1955). (Russian).

Aerobic phases of biological oxidation in tissues exposed to radiation were investigated. Isolated frog hearts were analyzed and the electrocardiographs are presented. NSA 10-2582.

1751

MEDICAL ASPECTS OF ATOMIC WARFARE; MARCH 27-31, 1950. (Atomic Energy Commission Training Program). Mar. 1950. 77p. (M-4517).

Topics include clinical radiation disease; radiation health protection; large-scale medical problems. NSA 5-2346.

1752

ATOMIC RADIATION HAZARDS FOR FISH. Elmer Higgins. *J. Wildlife Management* 15, 1-12 (1951). Jan.

Discussion of atomic wastes as source of radiation exposure, biological effects of acute radiation; radiation levels in contaminated streams; effects of low level exposure. NSA 5-2348.

1753

FOOD INSPECTION AND NUCLEAR ENERGY. John H. Rust. *J. Am. Vet. Med. Assoc.* 118, 135-8 (1951). Mar.

Procedures are suggested to prevent radioactive animals from being processed for food products. NSA 5-2349.

1754

HAZARDS IN RADIOTHERAPY. B. Jolles. *Med. Press.* 225, 40-3 (1951). Jan. 10. NSA 5-2350.

1755

INTERNATIONAL RECOMMENDATIONS ON RADIOLOGICAL PROTECTION. *Radiology* 56, 431-9 (1951). Mar.

New radiation safety standards with more rigid criteria are adopted. NSA 5-2352.

1756

ROENTGEN-RAY PROTECTION. R. Glocker. *Z. angew. Phys.* 2, 266-71 (1950). June. (In German).

Discusses concept of dose and roentgen units, types of x ray damage, tolerance dose, radiation-safe apparatus, shielding materials and requirements. NSA 5-2353.

1757

SOME MEDICAL ASPECTS OF ATOMIC WARFARE. S. R. Burstson. *Med. J. Australia* 38, Vol. I, 281-6 (1951). Feb. 24. NSA 5-2354.

1758

STUDIES OF THE HAZARD INVOLVED IN USE OF C^{14} III. LONG TERM RETENTION IN BONE. Howard E.

Skapper, Constance Nolan, and Linda Simpson. J. Biol. Chem. 189, 159-66 (1951). Mar. NSA 5-2355.

1759

THE EFFECT OF AUREOMYCIN ON THE RADIATION SYNDROME IN DOGS. F. W. Furth and M. P. Coulter. (Atomic Energy Project, Univ. of Rochester). Dec. 15, 1950. 18p. (UR-146). Am. J. Path. 28, 25-35 (1952).

Dogs treated post-radiation (450 r of 250-kv x rays) with clinical doses of aureomycin show decreased mortality as compared with controls. NSA 5-2356.

1760

PROBLEMS OF CLINICAL RADIOBIOLOGY. Jorgen E. Thygesen. Radiology 56, 403-7 (1951). Mar. NSA 5-2357.

1761

PUBLIC HEALTH ASPECTS OF CIVIL DEFENSE FROM ATOMIC WEAPONS. James P. Cooney. p.129-32 OF LECTURES PRESENTED AT THE INSERVICE TRAINING COURSE IN RADIOLOGICAL HEALTH, Feb. 5-8, 1951. Ann Arbor, University of Michigan School of Public Health.

A discussion of problems likely to be encountered by physicians after an atomic bomb explosion. NSA 5-6947.

1762

RADIOISOTOPES TECHNIQUES CONFERENCE--Oxford, 1951. J. L. Putman. Nucleonics 9, No. 4, 5-16 (1951). Oct.

A review of papers presented at the Radioisotopes Techniques Conference, indicating the wide variety of applications of radioisotopes in medicine and industry. The review gives some inkling of the preventive medical problems to be solved with respect to radiation work. NSA 5-6949.

1763

THE EFFECT OF EARLY SMALL EXCHANGE TRANSFUSION ON THE X-IRRADIATED DOG. S. N. Swisher and F. W. Furth. (Atomic Energy Project, Univ. of Rochester). Oct. 11, 1951. 12p. (UR-186). Proc. Soc. Exptl. Biol. Med. 78, 226-9 (1951).

Removal of 250 cc of blood from 20 lb. dogs immediately after 550 r whole body exposure and replacement with an equal volume of normal compatible whole blood produces delay in onset of radiation syndrome and mortality; possibly a decrease in mortality; no effect on trends of leukocytes, platelets or hematocrit of peripheral blood. NSA 5-6956.

1764

THE PROTECTIVE EFFECT OF PITRESSIN AND OF EPINEPHRINE AGAINST TOTAL BODY X-RADIATION. John L. Gray, Elizabeth J. Moulden, John T. Tew, and H. Jensen. (Army Medical Research Lab., Ft. Knox.). Sept. 18, 1951. 12p. (AMRL-64). Proc. Soc. Exptl. Biol. Med. 79, 384-7 (1952).

Pre-exposure treatment with pitressin or epinephrine caused increased survival of rats exposed to lethal dose of x rays. Protective effect is attributed to production of temporary tissue anoxia. NSA 5-6957.

1765

THE PRESENCE AND IDENTITY OF VASOTROPIC SUBSTANCES IN THE BLOOD OF RATS SUBJECTED TO ACUTE WHOLE BODY ROENTGEN RAY IRRADIATION. T. J. Haley, Margaret R. Andem, Richard F. Riley, and Idamae Williams. (Atomic Energy Project, Univ. of Calif., Los Angeles). Oct. 18, 1951. 17p. (UCLA-161). Am. J. Physiol. 168, 628-36 (1952).

Effect of x radiation on peripheral vascular function (rat) is attributed to a vasodepressor material released by the liver and present in circulation during 1st post-exposure week. It fits criteria for ferritin. Vaso-excitor material is present in blood during 2nd post-exposure week. NSA 5-6958.

1766

LOW-TEMPERATURE STERILIZATION OF ORGANIC TISSUE BY HIGH-VOLTAGE CATHODE-RAY IRRADIATION. Irving A. Meeker, Jr. and Robert E. Gross. Science 114, 283-5 (1951). Sept. 14.

At low temperatures there is a zone of radiation damage which lies above sterilization dose but below dose causing tissue damage. Authors report two aortic segments preserved in this way (human) were grafted with good results 4 and 6 months postoperatively. NSA 5-6959.

1767

THE EFFECT OF SINGLE MASSIVE DOSES OF ROENTGEN RADIATION UPON THE LIVER. Irving M. Ariel. Radiology 57, 561-75 (1951). Oct.

Author studied morphological changes in rabbit liver after single doses of x radiation, 300 to 100,000 r, 90 kv. NSA 5-6960.

1768

ANIMAL-EXPERIMENTAL INVESTIGATION OF PARENTERAL THORIUM X APPLICATION. Heinz Spieß. Z. ges. exptl. Med. 117, No. 6, 567-86 (1951). (In German).

Author studied clinical effects (rabbits) of intravenous injection of Th X (Ra²²⁴) in single or divided doses up to 1000 esu. Results reported include hematological changes; effects on blood sugar, proteins, Ca and P; effects on kidneys, reproductive system, metabolism; localization of injected Th X; effect on fracture healing. NSA 5-6961.

1769

ALTERATION IN SHAPE AND SIZE OF PLASTICS IN THE PROTHALLIA OF POLYPODIACEAE AND EQUISETACEAE UNDER THE INFLUENCE OF X RADIATION. L. P. Breslavets. Doklady Akad. Nauk. S.S.S.R. 78, No. 6, 1235-8 (1951). June 21. (In Russian).

Effects of 15,000 to 120,000 r of x radiation on plastids in prothallium of the fern *Pteris longifolia* and of 7500 to 100,000 r on those in prothallium of the horsetail *Equisetum arvense* are illustrated. NSA 5-6962.

1770

BIOLOGICAL AND MEDICAL EFFECTS OF RADIATION AT LOW LEVELS. Titus C. Evans. p.60-6 OF LECTURES PRESENTED AT THE INSERVICE TRAINING COURSE IN RADIOLOGICAL HEALTH, Feb. 5-8, 1951. Ann Arbor, University of Michigan School of Public Health, 1951. NSA 5-6963.

1771

EFFECT OF X RADIATION ON WHEAT SEED IN RELATION TO DEGREE OF RIPENESS. O. S. Engel. Doklady Akad. Nauk. S.S.S.R. 78, No. 4, 811-14 (1951). June 1. (In Russian).

Data on growth of roots and stalks of wheat sprouts from seed exposed at various stages of ripeness to 500 to 64,000 r of x radiation are tabulated and plotted. NSA 5-6964.

1772

EFFECT OF X-RADIATION ON THE DESOXYRIBONUCLEIC ACID AND ON THE SIZE OF GRASSHOPPER EMBRYONIC NUCLEI. Nyra J. Harrington and Robert W. Hoza. Biol. Bull. 101, 138-50 (1951). Oct.

Visually apparent loss of Feulgen-stainability after irradiation probably is not due to decrease in DNA desoxypentose, but to swelling of nuclei. Loss of methyl green stainability by nuclei is interpreted as indication of radiation-induced depolymerization of nucleic acid. NSA 5-6965.

1773

THE EFFECT OF OXYGEN CONCENTRATION ON THE

MUTAGENIC ACTION OF MUSTARD GAS. C. Auerbach and J. M. Robson. *Experientia* 7, 341-2 (1951). Sept. 15.

Production of mutations in *Drosophila* by treatment with mustard gas is independent of atmosphere (O_2 or N_2) during exposure. Contrasting results with radiation are interpreted as indicating that O_2 is specifically involved in the production of mutations by x rays. NSA 5-6967.

1774
ELECTROMAGNETIC RADIATION FUNDAMENTALS AND THEIR APPLICATIONS IN FOOD TECHNOLOGY. Bernard E. Proctor and Samuel A. Goldblith. *Advances in Food Research* 3, 119-96 (1951).

Includes tabulation of effects of x rays, cathode rays and radiations from radioisotopes on bacterial and enzymatic activities and on vitamins. NSA 5-6966.

1775
THE EFFECT OF IONIZING RADIATIONS ON THE BROAD BEAN ROOT. PART IX. CHROMOSOME BREAKAGE AND THE LETHALITY OF IONIZING RADIATIONS TO THE ROOT MERISTEM. J. M. Thoday. *Brit. J. Radiol.* 24, 572-6 (1951). Oct.

Data show α rays more efficient, per ionization, in producing chromosome aberrations of all types in *Vicia* meristems than are x rays. Relations between frequencies of the various aberrations and dose are presented. NSA 5-6968.

1776
RADIUM HAZARD IN A MILITARY AIRCRAFT INSTRUMENT SHOP FINAL REPORT. (Technical Objective AW-5B). R. K. Skow, O. J. Sobol, and Willa Wadleigh. (Naval Radiological Defense Lab.). June 19, 1951. 20p. (AD-238(H)).

Survey of radium contamination in a military-aircraft instrument shop revealed contamination in excess of permissible AEC standards. Hazard-control measures put into effect (after decontamination of the shop) effected considerable reduction in spread of contamination. NSA 5-6969.

1777
UNITS OF RADIATION AND RADIOACTIVITY. Elda E. Anderson. p.45-7 OF LECTURES PRESENTED AT THE INSERVICE TRAINING COURSE IN RADIOLOGICAL HEALTH, Feb. 5-8, 1951. Ann Arbor, University of Michigan School of Public Health, 1951.

Includes definition of maximal permissible tissue doses. NSA 5-6978.

1778
PUBLIC HEALTH ASPECTS OF ATOMIC POWER INSTALLATIONS. p.16 OF LECTURES PRESENTED AT THE INSERVICE TRAINING COURSE IN RADIOLOGICAL HEALTH, Feb. 5-8, 1951. Ann Arbor, University of Michigan School of Public Health, 1951. Lyle B. Borst.

Includes discussion of public health aspects of radiation work and need for public health personnel trained to work in this field. NSA 5-6979.

1779
QUANTITATIVE LIMITS OF PERMISSIBLE EXPOSURE OF PERSONNEL (EXTERNAL AND INTERNAL). K. Z. Morgan. p.67-76 OF LECTURES PRESENTED AT THE INSERVICE TRAINING COURSE IN RADIOLOGICAL HEALTH, Feb. 5-8, 1951. Ann Arbor, University of Michigan School of Public Health, 1951. NSA 5-6980.

1780
BASIC PRINCIPLES OF RADIATION PROTECTION. Elda E. Anderson. IN LECTURES PRESENTED AT THE INSERVICE TRAINING COURSE IN RADIOLOGICAL HEALTH, Feb. 5-8, 1951. Ann Arbor, University of Michigan School of Public Health, 1951.

A review, emphasizing the need for day to day application of knowledge relative to radiation protection now that radiation work is becoming so common in medicine and industry. NSA 5-6981.

1781
RADIOLOGICAL HEALTH. Edwin G. Williams. p.126-8 OF LECTURES PRESENTED AT THE INSERVICE TRAINING CENTER IN RADIOLOGICAL HEALTH, Feb. 5-8, 1951. Ann Arbor, University of Michigan School of Public Health, 1951.

Recommends community-wide program to acquaint public with facts relative to health aspects of radiation. Responsibilities of public health officers for control of radiation hazards are discussed. NSA 5-6985.

1782
COSMIC RAYS AND THEIR RADIATION-BIOLOGICAL ACTION. E. Schopper. *Rontgen Blatt* 4, 224-36 (1951). Sept. (In German)

A definite hazard would be expected to exist in space for larger terrestrial creatures in whose bodies the secondary radiation could reach its maximum. Effective protection would be offered by at least 1 to 2 m of water equivalent. NSA 5-6987

1783
PARTIAL OR COMPLETE PELVIC EXENTERATION FOR EXTENSIVE IRRADIATION NECROSIS OF PELVIC VISCERA IN THE FEMALE. Alexander Brunschwig. *Surg. Gynecol. Obstet.* 93, 431-8 (1951). Oct. NSA 5-6990.

1784
ACUTE RADIATION INJURIES IN MAN. Louis H. Hempelmann. *Surg. Gynecol. Obstet.* 93, 385-403 (1951). Oct.

Author presents a review of biological reactions produced by ionizing radiation and types of radiation injury, followed by four case histories taken from the files of the Los Alamos Scientific Laboratory and Los Alamos Hospital (1 case of acute localized injury; 3 cases of acute generalized injury). NSA 5-6991.

1785
PRESENT DAY RADIOTHERAPEUTICAL PROBLEMS. A. Herve. *Rev. med. Liege* 6, 651-60 (1951). Oct.

Author includes examples of the use of ionizing radiation in cell physiology of carcinogenesis and of uses of chemical agents for protection against radiation injuries. NSA 5-6997.

1786
HEMIN SYNTHESIS IN POLONIUM-INDUCED ANEMIA IN THE RAT. R. G. Thomas, K. I. Altman, J. N. Stannard, and K. Salomon. *Federation Proc.* 12, 143-44 (1953).

The incorporation of ^{14}C -glycine into circulating erythrocytes has been studied in anemic rats. Relative rates of incorporation of ^{14}C into hemin and globin fractions remained unchanged. Lowering of the millimolar isotope concentration in hemoglobin occurred in four groups of rats receiving 40 μC of polonium kg (from authors' summary).

1787
INDUCED REVERSIONS OF BIOCHEMICAL MUTANTS IN *NEUROSPORA CRASSA*. N. H. Giles, Jr. *Genetics* 33, 105 (1948). Jan. NSA 1-229.

1788
OBSERVATIONS ON MORTALITY AND CARCINOGENESIS IN FEMALE CBA MICE GIVEN SUBACUTE AND CHRONIC IRRADIATION. F. J. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas, 1955. R. H. Mole. *Prog. Radiobiol.* p. 468-75.

1789
ACTION OF TEMPERATURE DURING X-RAY TREATMENT

OF TRADESCANTIA CHROMOSOMES. A. C. Faberg. Genetics 33, 104(1948). Jan.

With short irradiation time (500 r/80 sec.) and short period of temperature change (half period, 15 sec.) relative to the time a chromosome break remains free (about 4 min.), temperature effect on production of chromosome aberrations exists during treatment only. NSA 1-231.

1790

THE BIOLOGICAL EFFECTS OF X-RAYS ON MATING TYPES AND CONJUGATION OF PARAMECIUM BURSARIA Ralph Wichterman. Biol. Bull. 94, 113-127(1948). Apr.

Individuals of opposite mating types (P. bursaria) received x ray doses of 100,000 r to 1,000,000 r in steps of 100,000 r. Locomotion rate increased after 100,000 r, decreased after higher doses. Clones obtained from 300,000 r-600,000 r dose specimens had green symbiotic zoochlorellae destroyed by the radiation. Effect of x rays on mating reaction is described NSA 1-232.

1791

CHROMOSOME BREAKAGE INDUCED BY ABSORBED RADIOACTIVE PHOSPHORUS P^{32} T. J. Arnason, Elame Cumming, and J. W. T. Spinks. Can. J. Research 26, 109-14(1948). Apr.

Germinating seeds and seedlings of Triticum vulgare, T. durum, T. monococcum and Hordeum distichon were provided with 0.18 or 0.018 μ c of P^{32} . Both concentrations caused chromosome breaks or rearrangements suggesting that effectiveness of P^{32} is increased by its incorporation into chromosome molecules. NSA 1-233.

1792

COMPARISON OF THE LETHAL EFFECT OF NEUTRONS AND GAMMA RAYS ON MOUSE TUMORS (a) BY IRRADIATION OF GRAFTED TUMORS IN VIVO, (b) BY IRRADIATION OF TUMOR FRAGMENTS IN VITRO. L. H. Gray and John Read. Brit. J. Radiol. 21, 5-10(1948). Jan

When dose is measured on the basis of ion pair production/cc tissue, the mean lethal dose of neutrons (mouse carcinoma 2146) is 24 times smaller in vivo and 9.5 times smaller in vitro than γ radiation. NSA 1-234.

1793

DEATH AFTER AUTOGAMY IN PARAMECIUM AURELIA FOLLOWING EXPOSURE IN SOLUTION TO THE RADIOACTIVE ISOTOPES P^{32} AND $Sr^{89,90}$ Y^{90} . E. L. Powers, Jr. Genetics 33, 120(1948). Jan. NSA 1-235.

1794

THE DIFFERENTIAL EFFECTS OF COMBINED RADIATIONS ON CHROMOSOME BREAKAGE AND MUTATION RATE. C. P. Swanson. Science 107, 458 (1948). May 7.

Gene mutations result from initial energy absorptions and are not affected by combined treatments (X, uv and infrared rays); chromosome changes (breakage followed by recombination) are influenced by agents which influence recombination rather than by initial breakage. NSA 1-236.

1795

EFFECTS OF GRADED DOSAGE OF X-RAYS ON THE PRODUCTION OF EYE FACETS IN THE BAR-EYED RACE OF DROSOPHILA MELANOGASTER. W. M. Luce, H. B. Chase, and Henry Quastler. Genetics 33, 115(1948). Jan.

Irradiation with x rays (115, 460, 920, or 1380 r) of Bar-eyed mutant of Drosophila between 48 and 72 hr of egg-larval life caused reduction in number of eye facets. Reduction was greater with higher doses. Significance of time limits of this x ray effect are discussed NSA 1-237.

1796

EXPERIMENTS TO TEST THE VALIDITY OF THE LINEAR R-DOSE/MUTATION FREQUENCY RELATION

IN DROSOPHILA AT LOW DOSAGE. Warren P. Spencer and Curt Stern. Genetics 33, 43-73(1948). Jan.

Even for x-ray dosages as low as 50 r and 25 r the linear r-dose/mutation frequency relation holds. NSA1-238.

1797

THE GENETIC EFFECTS OF NON-STERILIZING DOSES OF PENETRATING RADIATION. Frank Ellis. Brit. J. Radiol. 21, 1-4(1948). Jan. NSA 1-239.

1798

GENETIC EFFECTS OF ATOMIC BOMBING. Lancet 294, 292-3(1948) NSA 1-240.

1799

HUMAN PATHOLOGIC ANATOMY OF IONIZING RADIATION EFFECTS OF THE ATOMIC BOMB EXPLOSIONS. E. DeCoursey. Military Surgeon 102, 427-32(1948) June

Necropsy findings conducted on A-bomb victims in Nagasaki and Hiroshima are described. NSA 1-241.

1800

INACTIVATION OF BACTERIOPHAGE BY RADIATIONS, AND THEIR BEARINGS ON NATURE OF BACTERIOPHAGE. D. E. Lea and M. H. Salaman. Proc. Roy. Soc. (London) 133B, 434-44(1946).

Bacteriophages (1) S-13, (2) C-36 and (3) Staph-K were irradiated with γ -, x-, and α -rays. Effect was independent of exposure time, survival curve was exponential. For any one radiation, inactivation dose for the three phages increased in the order (1), (2), (3); for any one phage, inactivation dose increase in the order γ -, x-, and α -rays. NSA 1-242.

1801

Chicago. Univ. Air Force Radiation Lab. QUARTERLY PROGRESS REPORT NO. 19. Apr. 15, 1956 14sp. Contract AF41(657)-25 (NP-5964).

Various compounds were evaluated as protective or therapeutic agents against radiation injury. Data are included on the effects of several thioctic acids, a number of unrelated chemical compounds, metabolic antagonists, cortical steroids, and thiourea on the mortality of rats and mice, the effects of whole-body x irradiation and starvation on the free amino acid content of rat plasma; the effect of environmental factors and whole-body x irradiation on citrate synthesis in rats (For preceding period see NP-5877.) NSA 10-9037.

1802

THE INFLUENCE OF COSMIC RADIATION SHOWERS ARISING FROM LEAD PLATES ON THE RATE OF CARCINOGENESIS. F. H. J. Figge. Anat. Record 97, 386-7 (1947).

Mice injected with methylcholanthrene were exposed to cosmic rays directly or through lead plates and rates of carcinogenesis in the two groups were compared. NSA 1-244.

1803

INFLUENCE OF ROENTGEN RAYS ON ISOLATED CELL NUCLEI. Hans von Euler and L. Hahn. Acta Radiologica 27, 268-80(1946).

Calf thymus nuclei at pH 4-6 were irradiated with 25,000 and 65,000 r; nucleoproteins were prepared from them and characterized by chemical analysis, viscosity, dialysis and adsorption measurements. No significant changes due to radiation were found. NSA 1-245.

1804

THE RELATIVE EFFECTIVENESS OF FAST NEUTRONS AND GAMMA RAYS IN PRODUCING SOMATIC CROSSING OVER IN DROSOPHILA. George Lefevre, Jr. Genetics 33, 113 (1948). Jan.

Neutrons were relatively much more effective per ionization than were γ rays in producing eye color mosaics

in heterozygous white and eosin-white female *Drosophila* exposed as larvae 24 to 30 hr after egg laying. Possible mechanisms causing somatic crossing over which requires 2 hits within a limited period are discussed. NSA 1-247.

1805
THE RELATIVE EFFECTIVENESS OF FAST NEUTRONS AND GAMMA RAYS IN PRODUCING SOMATIC MUTATION IN *DROSOPHILA*. George Lefevre, Jr. Genetics **33**, 112(1948). Jan.

Mosaic incidence following exposures to neutrons 26 hours after egg laying was higher than expected when compared to γ ray exposures. Authors conclude that neutrons are not less effective than γ rays per ionization in producing mosaics. NSA 1-248.

1806
EFFECT OF RADIOACTIVE MATERIALS ON STIMULATING PLANT GROWTH. Carl B. French. Can. Chem. Process Ind **32**, 225-6(1948). Mar.

As a result of experiments on five vegetables, the author concludes that the use of radioactive materials in conjunction with commercial fertilizers tends to increase the yield of many crops. NSA 1-254.

1807
ARMY DOCTORS SAY MASS HYSTERIA NEED NOT FOLLOW ATOMIC BOMB EXPLOSION. Military Surgeon **102** No. 6, 501-3(1948). NSA 1-265.

1808
EFFECT OF DESOXYCORTICOSTERONE ON MICE IRRADIATED WITH X-RAYS. F. Ellinger Proc. Soc. Exptl. Biol. Med. **64**, 31-5(1947).

Author postulates that action of x rays is due to liberation of histamine-like substance by tissue breakdown. Studied effect of desoxycorticosterone on mortality of mice irradiated with LD_{50} x ray dose. Death of mice is attributed to fatty changes in liver. NSA 1-322.

1809
PREVENTION OF RADIATION HEMORRHAGE. Lancet **254**, 489(1948). Mar 27

Survey of the work done by Rekers and Field with the flavonol compound, rutin, in reducing excessive capillary fragility following x radiation. NSA 1-323.

1810
STOP BLEEDING IN PATIENTS. Science News Letter **53**, 196-7(1948). Mar. 27.

The development of toluidin blue and protamine sulfate as therapeutic agents for control of hemorrhages induced by x rays is described NSA 1-324.

1811
EFFECTS OF RADIOACTIVE SODIUM ON LEUKEMIA AND ALLIED DISEASES, PRELIMINARY REPORT T. C. Evand, M. Lenz, C. P. Donlan, and M. J. LeMay. Am. J. Roentgenol. Radium Therapy **59**, 469-81(1948). Apr. NSA 1-348.

1812
THE VALUE OF PLATELET COUNTS IN RADIOTHERAPY. W. M. Court Brown. Brit. J. Radiol. **21**, 221-5(1948). May.

The effect of wide-field irradiation on the blood platelet level is described, and it is suggested that blood platelet level is a more reliable indicator of the effect of radiation on the bone marrow than is the total white cell count NSA 1-356.

1813
A SYMPOSIUM ON THE USE OF ISOTOPES IN BIOLOGY AND MEDICINE. Madison University of Wisconsin Press, 1948. 445p. (Addresses given at the Univ. of Wisconsin, Sept. 10-13, 1947).

Includes section on health hazards and personnel protection NSA 1-370.

1814
Technical Information Div., Library of Congress
RADIOACTIVE MANGANESE, IRON, COBALT, COPPER, ZINC, AND STRONTIUM. A SELECTED BIBLIOGRAPHY OF RECENT LITERATURE WITH SPECIAL REFERENCE TO BIOLOGICAL AND MEDICAL APPLICATIONS M. C. Leikind and M. H. Eller. Feb. 24, 1948. 19p. (NP-232, U807). NSA 1-387.

1815
Argonne National Lab.
THE HEMATOLOGICAL EFFECTS OF IONIZING RADIATIONS L. O. Jacobson, E. K. Marks, and E. Lorenz Oct. 1947. Decl. July 1, 1948. 93p. (AECD-2085, CH-3864). Radiology **52**, 371-95(1949), NNS Div. IV. Vol. 20, pt. A, Paper 5.

A summary of Plutonium project hematological studies covering: the effects of (1) acute and (2) chronic whole body exposure to externally administered penetrating radiations; (3) acute and (4) chronic toxicity of internally administered radioisotopes on peripheral blood and hematopoietic system. NSA 1-404.

1816
COMPARISON OF EFFECTS OF MUSTARD, ULTRAVIOLET AND X-RADIATION, AND COLCHICINE ON CORNEA. J. S. Friedenwald, W. Buschke, and Sylvia G. Moses. Bull. of John Hopkins Hosp **82**, 312(1948). Feb.

Of the agents compared, U-V resembled nitrogen mustard most closely with respect to cellular effects. With both mustard and U-V there may be some relationship between factors inhibiting mitosis and those leading to nuclear fragmentation, but nuclear fragmentation was not found in x irradiated corneae in spite of markedly inhibited mitosis. Neither mitotic inhibition nor nuclear fragmentation appeared to be directly connected with the loosening of corneal epithelium nor with increased NPN content of the cornea after exposure to U-V or mustard. (Beef and rat cornea were studied.) NSA 1-405.

1817
CYTOGENETIC EFFECTS IN CORN EXPOSED TO ATOMIC BOMB IONIZING RADIATION AT BIKINI. L. F. Randolph, A. E. Longley, and Ching Hsiung Li. Science **108**, 13-15 (1948).

It is concluded from the experiments reported that radiation from the A-bomb produced effects in corn comparable to those induced by exposure to approximately 15,000 r of x rays Bomb produced relatively more chlorophyll deficiencies and dead tissue sectors. NSA 1-406.

1818
EFFECTS OF SMALL DAILY DOSES OF FAST NEUTRONS ON MICE Titus C. Evans, Radiology **50**, 811-834(1948). June.

Daily exposures of 0.14 n (total dose of 60 n) reduced survival time, reduced growth in hematopoietic organs and gonads, slightly increased frequency of cataracts. Effects of larger doses is also described. Daily exposures of 1.4 n were more effective than doses of 11 r. Effective r/n ratio varied with effects observed. NSA 1-407.

1819
THE GENETICAL EFFECTS OF MUSTARD GAS SUBSTANCES AND NEUTRONS. A. Gustafsson and J. MacKey Hereditas **34**, 371-385(1948).

Cyclotron-produced neutrons differ from x rays with regard to their immediate effect on dormant seeds of barley. High x ray doses decrease the number of mature plants to a few percent, but average fertility remains 40-50%, neutrons give numerous surviving plants but greatly decrease fertility. NSA 1-408.

1820
THE INFLUENCE OF CHRONIC IRRADIATION WITH

GAMMA RAYS AT LOW DOSAGES ON THE MUTATION RATE IN DROSOPHILA MELANOGASTER. Ernst Caspari and Curt Stern. Genetics 33, 75-94(1948). Jan.

Rate of occurrence of lethal sex-linked mutations in Drosophila exposed to 2.5 r γ rays/day for 21 days was determined. Results indicate that the fractionation of dosage results in genetic effectiveness different from that of same total dose administered at one time. NSA 1-409.

1821

NAGASAKI SURVIVORS AS SEEN IN 1947. S. Warren. Military Surgeon 102, 98(1948). Feb.

Report of follow-up studies of the surviving population of Hiroshima and Nagasaki. NSA 1-410

1822

RADIANT ENERGY INJURIES. T. Leucutia. Am. J. Roentgenol. Radium Therapy 59, 890-3(1948).

A consideration of some of the medical aspects of the atomic bombing of Hiroshima and Nagasaki. NSA 1-411

1823

A NEW THEORY OF THE MECHANISM OF IRRADIATION EFFECTS. W. Minder. Radiol. Clin. 16, 73-81(1947)

An attempt to explain changes brought about by irradiation of known mixtures by a simple theory correlating the amount of substance changed by radiation with radiation intensity and time of radiation. NSA 1-412.

1824

THE PROBLEM OF TRANSFERENCE OF ENERGY IN BIOLOGICAL IRRADIATION. W. Minder. Radiol. Clin. 15, Suppl. 81-5(1946)

Author cites experimental observations on effects of radiation on solutions in support of hypothesis that energy-transfer and therefore radiation effect is only possible when there is freedom of molecular movement (diffusion). NSA 1-413.

1825

OCULAR LESIONS FOLLOWING ATOMIC BOMBING OF HIROSHIMA AND NAGASAKI. J. J. Flick. Am. J. Ophthalmol. 31, 137(1948). Feb.

Ocular lesions secondary to hematological changes are described. These lesions disappeared without residual damage in persons who recovered from the hemopoietic depression. NSA 1-414

1826

PRELIMINARY OBSERVATIONS ON THE EFFECTS OF IRRADIATION UPON THE CHYLOMICRONS IN HUMAN BLOOD. Kai Setala. Radiology 50, 803-9(1948). June.

Irradiation regularly caused changes in amount and metabolism of visible blood lipids when exposure was within a given time after ingestion of fatty food. Exposure of abdomen, pelvis and bifurcation of common carotid were followed by a particularly marked effect. NSA 1-415.

1827

DOSAGE LEVELS IN ADMINISTRATION OF ISOTOPES TO ANIMALS AND MAN. Hermann Lisco. U. S. Naval Med. Bull. Suppl. 161-3(1948). Mar-Apr.

Tentative conclusions (based on laboratory studies) relative to dose levels of radioactive isotopes likely to produce injurious effects in man are presented. NSA 1-416.

1828

Argonne National Lab

DISTRIBUTION AND EXCRETION OF PLUTONIUM

E. R. Russell and J. J. Nickson, June 11, 1946. Decl. July 7, 1948. 20p (MDDC-503, MUC-ERR-209) NNS Div IV, Vol. 20, pt. A, Paper 8)

Rate of excretion of plutonium in the urine was found to be nearly 0.01% of that contained in body. Excretion rate may be lower after 155 days. NSA 1-417.

1829

Atomic Energy Project, Univ. of Rochester

THE LYMPHOCYTE: STUDIES ON ITS RELATIONSHIP TO IMMUNOLOGIC PROCESSES IN THE CAT. Charles G. Craddock, William N. Valentine, and John S. Lawrence. Decl. July 9, 1948. 44p. (AECD-2095, UR-32) J. Lab. Clin. Med. 34, 158-77(1948)

Authors found no significant amounts of antibody in thoracic duct lymphocytes in spite of significant amounts of antibody in serum and cell-free lymph. Exposure of immunized cats to 1500 r failed to alter antibody concentration of cell free lymph. NSA 1-418

1830

Radiation Lab., Univ. of Calif.

THE RADIOLOGICAL USE OF HIGH ENERGY DEUTERON BEAMS. Cornelius A. Tobias, Hal Anger, P. P. Weymouth, and R. Lowry Dobson. May 28, 1948. Decl. July 9, 1948. 19p. (AECD-2099A)

An investigation of the suitability of the 190 MEV deuteron beam as radiation source for producing biological effects is reported. LD₅₀ was 150 rep for exposure time (mice) of 15 seconds. LD₅₀ appeared to change roughly in proportion to 4th root of exposure time. NSA 1-419A.

1831

ABOUT THE ACTION OF THE ROENTGEN RAYS ON THE ISOLATED FROG HEART. T. Toyoma. Tohoku, J. Exptl. Med. 20, 591-595(1933). (In German)

The irradiation of the isolated frog heart by 150 or 170 kv, 2 MA, from a distance of 25 cm caused an increase in frequency of contractions due to stimulation of the pacemaker.

1832

ORIGIN OF THE ANTIBIOTIC OBTAINED BY IRRADIATION OF AMMONIUM LACTATE WITH RADIUM. F. Chodat and A. de Yakimach. Arch. sci. phys. et Nat. 28, Suppl. 63, 143-4(1946).

Radium irradiation of a synthetic medium containing NH₄ lactate, MgSO₄ and K₂HPO₄ gives rise to a substance which inhibits growth of gram negative organisms. Chemical nature of the antibiotic is not known. NSA 1-422.

1833

PATHOGENIC ACTION OF THORIUM DIOXIDE. Amandio Tavares and Ernesto Moraes. Trabajos inst. nac. de cienc. med. (Madrid) 6, 253-74(1945-46). (In Spanish).

Pathological changes and tumor induction following injections of thorotrast are described. NSA 1-423.

1834

TOXICITY OF INHALED OR INGESTED RADIOACTIVE PRODUCTS. Waldo E. Cohn. Nucleonics 3, 21-26(1948). July.

Author presents a general formulation permitting calculation of radiation dosage consequent upon internal deposition of radioactive materials. The formula is based upon consideration of physiological behavior of the material as well as source and type of radiation emitted. NSA 1-424.

1835

DOCTORS GET GUIDE FOR USE IN ATOMIC ATTACK. Science News Letter 54-8(1948). July 3. NSA 1-536.

1836

EFFECTS OF LETHAL AND SUBLETHAL DOSES OF X RAY ON SPLEEN NUCLEOTIDE LEVELS. E. M. Uyckl. Federation Proc. 13, 413(1954).

The author describes studies on effects of lethal and sublethal doses of x ray on the spleen adenosine nucleotide levels of rats, mice, and guinea pigs. Changes were noted in the adenosinetriphosphate levels, the total adenosine nucleotide, adenylic acid and adenosine-diphosphate levels of the spleen. (from authors' summary)

1837

NEUTRON THERAPY AND SPECIFIC IONIZATION. Robert

S. Stone. Am. J. Roentgenol. Radium Therapy 59, 771-785(1948). June.

The author stresses the importance of late effects of radiation therapy. NSA 1-555.

1838
RADIOACTIVE PHOSPHORUS, P^{32} , A SIX-YEAR CLINICAL EVALUATION OF INTERNAL RADIATION THERAPY. C. A. Doan, B. K. Wiseman, C. S. Wright, J. H. Geyer, W. Myers, and J. W. Myers. J. Lab. Clin. Med. 32 943-69 (1947). Aug.

Complete hematological studies and clinical observations of 100 patients treated with P^{32} at Ohio State University are reported. NSA 1-558.

1839
Argonne National Lab.
EFFECT OF X IRRADIATION ON THE MATURATION OF THE CIRCULATING RETICULOCYTE. Evelyn O. Gaston, Edna K. Marks, and Leon O. Jacobson. May 10, 1948. Decl. July 22, 1948. 34p. (AECD-2132, CH-3870).

Authors studied rate of disappearance of reticulocytes from blood of normal and x irradiated rabbits (with and without anemia) in vivo and in vitro; disappearance of human reticulocytes in health and disease. X ray dose of 800 r (total body) retards disappearance rate of rabbit reticulocytes from blood drawn 24 hr (but not 3 hr) post exposure. NSA 1-602.

1840
CHEMICAL BREAKAGE OF CHROMOSOMES. C. B. Allsopp and D. G. Catchside. Nature 161, 1011-12(1948). June 26.

Authors cite references which indicate that the target theory must be retained as the most satisfactory working hypothesis explaining the breakage of chromosomes by radiation. They take exception to the conclusions of Darlington and Koller who reject the target theory. NSA 1-603.

1841
CHROMOSOME IRREGULARITIES PRODUCED BY ATOMIC IRRADIATION Meta S. Brown, Genetics 33, 98(1948). Jan.

Examination of acetocarmine smears of the pollen mother cells of eleven cotton plants grown from seed exposed to atomic bomb radiation at Bikini indicated that γ radiation produced translocations loss of chromosomes and possibly an inversion in embryonic tissue of seed. Morphologically, plants were normal. NSA 1-604.

1842
CHROMOSOME STRUCTURAL CHANGES IN TRADE-SCANTIA MICROSPORES PRODUCED BY ABSORBED RADIOPHOSPHORUS. Norman H. Giles. Proc. Natl. Acad. Sci. 33, 283-7(1947). NSA 1-605.

1843
Atomic Energy Project, Univ. of Rochester
RADIUM POISONING; A SURVEY OF THE LITERATURE DEALING WITH THE TOXICITY AND METABOLISM OF ABSORBED RADIUM. Hannah E. Silberstein. May 26, 1945. Decl. July 19, 1948. 31p. (AECD-2122, M-1695).

Author presents a detailed survey of literature concerning radium poisoning from 1908 through 1944. NSA 1-610.

1844
Atomic Energy Project, Univ. of Rochester
INSUFFLATION STUDIES IN RABBITS WITH DUSTS OF URANIUM COMPOUNDS. Herbert E. Thompson and Luville T. Steadman. June 11, 1948. Decl. July 21, 1948. 125p. (AECD-2127; M-1984(R)). NNES Div. IV, Vol. 1, Pt. III, Chap. 22. NSA 1-611.

1845
Argonne National Lab.
HEMATOLOGICAL STUDIES OF PLUTONIUM PROJECT

PERSONNEL: EFFECT OF EXERCISE ON LEUCOPENIA, A STATISTICAL ANALYSIS. E. K. Marks, George Sacher, and L. O. Jacobson. Feb. 1948. Decl. July 22, 1948. 20p. (AECD-2133, ANL-HDY-466). NNES Div. IV, Vol. 20, pt. B, paper 6.

There is no difference in response to normal and leukopenic individuals to "standing running exercise" test. All responded with increased peripheral blood leukocyte counts immediately after exercise. Test is felt to be of little value in detecting radiation-induced leukopenia. NSA 1-613.

1846
INFLUENCE OF RADIOACTIVE MATERIALS ON CROPS. J. Am. Med. Assoc. 137, 976(1948). July 10.

A study to be carried out for purpose of determining the effects of radioactive materials used in fertilizer applications on fertilized crops is described. Investigations to date reveal no basis for the claim that radiation from the atomic bomb benefited crops at Nagasaki. NSA 1-615.

1847
THE TOLERANCE DOSE AND PREVENTION OF INJURIES CAUSED BY IONIZING RADIATIONS. Rolf M. Sievert. Brit. J. Radiol. 20, 306-18(1947). Aug.

Studies indicate that skin tolerance dose is between 0.1 and 0.5 r/day; safety tolerance dose for blood changes is about 0.01 r/day; equivalent of 10^{-11} to 10^{-10} curies/liter should not be exceeded for radiations originating within the body. NSA 1-637.

1848
ATOMIC WARFARE AND THE VETERINARY PROFESSION. Wayne O. Kester and Everett B. Miller. J. Am. Vet. Med. Assoc. 114, 113-19(1949). Mar. NSA 2-1309.

1849
THE MEDICAL ASPECTS OF THE ATOMIC BOMB. W. B. Looney. Virginia Med. Monthly 76, 73-5(1949). Feb. NSA 2-1311.

1850
CHANGES IN THE WATER CONTENT AND DISTRIBUTION IN RATS AND MICE AFTER CHRONIC AND ACUTE TOTAL-BODY X IRRADIATION. Owen France June 1946. 34p. (AECU-131, CH-3889).

X ray dose of about 15% of LD_{50} caused transient increase in thiocyanate space in rats; dose of 30% of LD_{50} caused similar increase in mice. With near-lethal doses of x rays, increases were observed (negative H_2O balance) in water content of muscle, plasma and entire carcass. Effects of chronic irradiation on hydration were also studied. NSA 2-1319.

1851
EFFECTS OF ROENTGEN IRRADIATION ON THE GASTRIC MUCOSA. Wm. E. Ricketts, Joseph B. Kirsner, Eleanor M. Humphreys and Walter Lincoln Palmer. Gastroenterology 11, 818-32(1948). Dec.

Roentgen irradiation with 1100 to 2500 r applied in divided doses to fundus and body of stomach produces an acute transitory gastritis. Atrophy of mucosa often ensues. Pathological and histological changes are described. NSA 2-1321.

1852
FOAM CELL PLAQUES IN INTIMA OF MYOMETRIAL ARTERIES: A PRESUMPTIVE SIGN OF PREVIOUS IRRADIATION. John F. Sheehan. Am. J. Clin. Path. 19, 30-4(1949). Jan.

Foam cell intimal plaque is a strongly presumptive sign of previous radium and roentgen irradiation, at least in the human uterus. It is found in 89% of irradiated uteri; in only 2% of non-irradiated uteri. NSA 2-1322.

1853
GREYING OF HAIR. I. EFFECTS PRODUCED BY SINGLE

DOSES OF X-RAY ON MICE. Herman B. Chase. J. Morphol. **84**, 57-76(1949). Jan.

Threshold response for follicles treated in the inactive phase occurs with 200 r of 100 kv x rays, 550 r/min, and 250 r of 200 kv x rays, 102 r/min. Hair development and pigmentation are separate processes. Inactive follicles give maximum greying for a particular dose. NSA 2-1323.

1854

THE RESPONSE OF GERM CELLS TO GONADOTROPIC HORMONES IN X-RAY INJURED OVARIES OF YOUNG WHITE MICE. J. M. Essenberg. Western J. Surg. Obstet. Gynecol. **57**, 61-6(1949). Feb.

Ovaries of 3-4 weeks old mice x rayed with 244 to 300 r remained sterile for 3-6 months but reacted to gonadotropic hormones by regenerating germ cells and follicles of all sizes except fully formed (graafian) follicles. Degeneration and formation of germ cells and follicles occur simultaneously. NSA 2-1324.

1855

TOTAL X-IRRADIATION OF RATS UNDER URETHANE ANESTHESIA. J. A. Henry. Nature **163**, 134-5(1949). Jan. 22.

Irradiation with LD₅₀/14 (600r) resulted in death of 50% of controls compared with 90% of anesthetized rats. NSA 2-1325.

1856

U. S. Army, Manhattan Engineer District
THE ATOMIC BOMBING OF HIROSHIMA AND NAGASAKI. nd. 45p. (LATER AND MORE COMPLETE INFORMATION IS CONTAINED IN: NP-3036, AM-2737(Vol. 1), NP-3037, AM-2737 (Vol. 2), NP-3038, AM-2737(Vol. 3), NP-3039, AM-2737(Vol. 4), NP-3040, AM-2737(Vol. 5), NP-3041) AM-2737(Vol. 6)).

A summary of effect of bombs on buildings and personnel, including an eyewitness account of the bombing of Hiroshima. NSA 2-18.

1857

United States Strategic Bombing Survey
THE EFFECTS OF ATOMIC BOMBS ON HIROSHIMA AND NAGASAKI. June 30, 1946. 50p. (Later and more complete information is contained in: NP-3036, AM-2737 (Vol. 1), NP-3037, AM-2737 (Vol. 2), NP-3038, AM-2737 (Vol. 3), NP-3039, AM-2737 (Vol. 4), NP-3040, AM-2737 (Vol. 5), NP-3041, AM-2737(Vol. 6)). NSA 2-19.

1858

Atomic Energy Project, Univ. of Rochester
A STUDY OF BLOOD AND SALIVARY LYSOZYME IN THE X-IRRADIATED DOG. L. R. Bennett, Vera Collier, Marion Kresage and Paul E. Rekers. Nov. 1, 1948. 12p. (UR-46).

Blood lysozyme activity is depressed in dogs exposed to 350 r total body x radiation, the depression paralleling the depression of the leukocyte count. Depression is less marked in animals which survive. There is no change in salivary lysozyme. NSA 2-23.

1859

COMPLICATIONS FOLLOWING IRRADIATION OF THE THYROID GLAND. R. M. Lukens. Ann. Otol. Rhinol. and Laryngol. **57**, 633-42(1948) Sept.

Five case histories are presented demonstrating that therapeutic x irradiation of the thyroid gland may damage blood vessels, overlying tissues and larynx and trachea. NSA 2-24.

1860

CYTOLOGIC CHANGES IN THYMIC GLANDS EXPOSED IN VIVO TO X-RAYS. Robert Schrek. Am. J. Pathol. **24**, 1055-64(1948) Sept.

Spontaneous and x ray (1000 r) induced degeneration of lymphocytes of thymus of rats was associated with

formation of intranuclear vacuoles, pyknosis, and fragmentation

1861

EFFECT OF FLAVONOIDS (VITAMIN P) ON MORTALITY FROM TOTAL BODY ROENTGEN IRRADIATION. William G. Clark, Rex P. Uncapher and Mary L. Jordan. Science **108**, 629-30(1948) Dec. 3.

Administration of flavonoids as 0.2% "calcium flavonate" in drinking water one week before and during post-exposure period gave some protection against petechiae, ecchymoses and generalized purpura of guinea pigs exposed to 200-225 r, 200 kv x rays, as compared to controls which received vitamin C but no flavonoids. NSA 2-26.

1862

THE EFFECTS OF ROENTGEN RAYS ON THE EMBRYOS AND LARVAE OF THE CHINOOK SALMON. Arthur D. Welander, Lauren R. Donaldson, Richard F. Foster, Kelshaw Bonham and Allyn H. Seymour. Growth **12**, 203-42(1948). Sept.

Effects of 250, 500, 1000, 2500 and 10,000 r of x rays on eyed embryos of chinook salmon are described. Gonads were found to be most sensitive to x rays, hematopoietic tissues ranked second. Most tissues and organs reacted to 1000 r or more NSA 2-27.

1863

EFFECTS OF X-RAYS ON LYMPHOID AND HEMOPOIETIC TISSUES OF ALBINO MICE. G. Brecher, K. M. Endicott, H. Gump, and H. P. Brawner. Blood **3**, 1259-74(1948). Nov.

Authors describe initial damage to hematopoietic tissues and reticuloendothelial system, extent and duration of suppression of their activity and time and rate of recovery in mice following total body exposure to 400 r, 186 kv x rays. NSA 2-28.

1864

HYDROGEN PEROXIDE AND THE INDIRECT EFFECT OF IONIZING RADIATIONS. Tikvah Alper, Nature **162**, 615-16 (1948). Oct. 16.

Studies relative to the role of H₂O₂ in the inactivation of bacteriophage S13 in vitro by ionizing radiation are described. When phage is in dilute solution, the H₂O₂ formed by ionizing radiation will inactivate it. The "active radical" mechanism is discussed NSA 2-29.

1865

INTESTINAL EFFECTS OF PELVIC IRRADIATION. Jerome M. Maas. Modern Med. (Minneapolis) **16**, No. 21, 47-8(1948). Nov. 1.

Authors estimate that 50-70% of all women treated for gynecological conditions by radiation have permanent rectal sequelae, including scarring, fistulae, hemorrhage or complete occlusion. NSA 2-30.

1866

THE "MYSTERY" OF BIOLOGICAL RADIATION EFFECTS. Austin M. Brues. Bull. Atomic Scientists **4**, 341-2 (1948). Nov.

Author considers mechanisms by which radiation produces biological effects and suggest these effects need not be considered as "mysterious." NSA 2-31.

1867

OBSERVATIONS UPON THE LYMPHOPENIA OF X-RAY IRRADIATION. C. H. G. Price. Brit. J. Radiol. **21**, 481-93(1948). Oct.

Alterations in the lymphocyte count in 16 women treated for carcinoma with deep x ray irradiation are described in detail and discussed. NSA 2-32.

1868

A PRELIMINARY NOTE ON SOME BIOLOGICAL EFFECTS OF ALPHA RADIATION ON THE FROG TADPOLE.

K. Tansley, L. H. Gray and F. G. Spear. Brit. J. Radiol. 21, 567-70(1948). Nov.

Small doses of α rays and γ rays are compared with respect to their ability to influence mitosis and degeneration in eye and brain of frog tadpoles. NSA 2-33.

1869

RADIO-BIOLOGICAL RESEARCH WITH FAST NEUTRONS. A Catsch, K. G. Zimmer, and O. Peter. Z. Naturforsch 2, 1-5(1947). Jan.-Feb. (In German).

Author found that changes in peripheral blood picture were produced by smaller doses of neutrons than of x rays, that there was no correlation of effect with radiation intensity and that rapid recovery did not occur following fast neutron irradiation. NSA 2-34.

1870

RELATIVE X-RAY SENSITIVITY OF METAPHASE AND INTERPHASE CHROMOSOMES. Arnold H. Sparrow. Nature 162, 651-2(1948) Oct. 23.

The number of chromosome fragments at microspore metaphase in Trillium erectum were counted following irradiation with 50 r of x rays. Metaphase was found to be highly sensitive, early interphase relatively resistant. Fragmentation was about 50 times greater for irradiation metaphase chromosomes. NSA 2-35.

1871

Naval Medical Research Inst., Bethesda

THE RESPONSE OF TISSUE TO TOTAL BODY IRRADIATION. Report No. 11. John L. Tullis. July 22, 1948. 27p. (NP-473).

A comparative study of lesions produced in swine after total body exposure to (1) ionizing radiations from A-bomb at Bikini, and (2) million volt x rays is described. Lesions from two types of radiation are indistinguishable, consist mostly of hemorrhage, necrosis and secondary infection. NSA 2-36.

1872

STUDIES ON THE BEHAVIOR OF FUNGI IN THE PRESENCE OF RADIOACTIVE ISOTOPES. I. A. Pearson, J. M. Hammer, K. E. Corrigan and H. S. Hayden. J. Bacteriol. 56, 397-402(1948). Oct.

P^{32} , I^{131} and x ray in amounts used were not lethal; caused no changes in morphology of pathogenicity of 43 pathogenic and non-pathogenic fungi studied. Fungi became radioactive. NSA 2-37.

1873

A STUDY OF THE HANDS OF RADIOLOGISTS. Nancy K. Braasch and Margaret J. Nickson. Radiology 51, 719-27(1948). Nov. NSA 2-38.

1874

THE SURGICAL REPAIR OF IRRADIATION DEFECTS. David W. Robinson J. Kansas Med. Soc. 49, 456-61 (1948) Nov.

Types of injuries and surgical repair techniques are described for (1) accidental x ray burns, (2) injury from intentional massive therapeutic x ray doses, (3) late changes from repeated small doses for superficial therapy and (4) burns from prolonged fluoroscopy. NSA 2-39.

1875

THRESHOLD AND LETHAL DOSES OF IONIZING RADIATIONS. L. Mallet and R. Maurin, J. radio, et electrol. 29, 63-65(1948). (In French)

Authors described their experimental determination of the minimum effective dose, LD_{50} , and absolute lethal dose for totally irradiated rats and mice, using various qualities of radiation and exposure times (x rays). NSA 2-40.

1876

TRAUMA RESULTING FROM ATOMIC EXPLOSIONS. R. P. Parsons Am. J. Surg. 76, 559-62(1948). Nov.

The types of injuries to be expected after explosion of an atomic bomb are reviewed. NSA 2-42.

1877

NATURE OF TRAUMA IN ATOMIC WARFARE. Austin M. Brues. Am. J. Surg. 76, 563-6(1948). Nov

This is a general review of events and injuries suffered at Hiroshima and Nagasaki after the atomic bomb attacks. NSA 2-43.

1878

VARIATION INDUCED BY URANIUM NITRATE IN CORN SMUT AND THE CULTIVATED MUSHROOM. E. C. Stakman, J. M. Daly, M. L. Gattani and I. Wahl. Science 108, 554-5(1948). Nov. 19. NSA 2-44.

1879

United States Strategic Bombing Survey

THE EFFECTS OF ATOMIC BOMBS ON HEALTH AND MEDICAL SERVICES IN HIROSHIMA AND NAGASAKI. May 1947. 91p. (More complete information contained in: NP-1557; NP-1558; NP-1559; NP-1560; NP-1561; and NP-1562).

Immediate and remote measurable effects of the atomic bombs and the subsequent widespread fires on the health of the civilian population are outlined.

NSA 2-136.

1880

EFFECTS OF NEW FORMS OF ENERGY ON INDUSTRY AND MEDICAL SERVICE. Jean Spencer Felton. Occupational Med 5, 73-7(1948). Jan.

A review of the implications of the wide spread use of ionizing radiation for industrial health programs.

NSA 2-137.

1881

CLINICAL REACTIONS AND INJURIES IN SUPERVOLTAGE THERAPY. Arthur Jones. Proc. Roy. Soc. Med. 41, 703-9(1948). Oct.

A consideration of the clinical effects of supervoltage radiation and of injuries following its application in the treatment of malignant disease NSA 2-279.

1882

RADIOTHERAPY IN DERMATOLOGICAL CONDITIONS. R. T. Brain. Brit. J. Radiol. 21, 501-7(1948). Oct.

Includes discussion of biological effects of radiation especially with regard to effects of radiation on skin NSA 2-310.

1883

THE RELATION OF RADIOSENSITIVITY AND RADIO-CURABILITY TO THE HISTOLOGY OF TUMOR TISSUE. Alfred Glucksmann. Brit. J. Radiol. 21, 559-66(1948). Nov.

Tumor radiosensitivity is not linked with its curability. Degree of anaplasia largely determines radiosensitivity. Radiocurability varies with degree of tissue differentiation and varies inversely with growth coefficient and tendency to metastasize. Lymph node involvement per se does not influence radiosensitivity. NSA 2-311.

1884

Argonne National Lab.

BLOOD CHANGES IN HUMANS FOLLOWING TOTAL BODY IRRADIATION. J. J. Nickson. June 2, 1947. Decl. Dec. 21, 1948. 64p. (AECD-2432, CH-3868); NNES Div. IV, Vol. 20, Pt. 3, Paper 2.

Decrease in peripheral blood lymphocytes was the most definite change noted after total body x radiation of (1) 8 individuals, single exposure and (2) 3 individuals irradiated with divided dose. No abnormalities were detected in 3 normal individuals exposed to 3 doses of 7 r each. NSA 2-395.

1885

ASYMMETRICAL SUPPRESSION OF VERTEBRAL

EPIPHYSEAL GROWTH WITH IONIZING RADIATION.

Alvin Arkin, Norman Simon and Robert Siffert. Proc. Soc. Exptl. Biol. Med. 69, 171-3(1948) Oct.

Lumbar spines of 30 young rabbits were unilaterally irradiated (radon seeds, x rays). Doses of 700 to 1000 r to epiphysis of vertebral bodies were sufficient to suppress growth of vertebrae. Five of 9 survivors showed wedging of vertebral bodies, narrowing of bodies on exposed side. NSA 2-396.

1886

California Univ.

THE BIOLOGICAL EFFECTS OF RADIATION, PROGRESS REPORT FOR THE PERIOD JANUARY 1947 TO JUNE 1947. J. H. Lawrence and H. B. Jones. June 30, 1947. 6p. (NP-516).

Includes reports on: comparison of growth inhibitors and radiation with regard to inhibition of nucleic acid metabolism, irradiation of bone marrow by injected radioactive colloid, radiosensitivity of bone marrow nucleic acid metabolism, radioresistance of enzyme systems responsible for thyroxine synthesis. NSA 2-397.

1887

CYTOLOGY OF RABBIT THYMUS AND REGENERATION OF ITS THYMOCYTES AFTER IRRADIATION, WITH SOME NOTES ON THE HUMAN THYMUS. Hal Downey. Blood 3, 1315-41(1948). Dec. NSA 2-398.

1888

DISFIGURING SEQUELAE FROM RADIUM THERAPY. G. B. Underwood and L. E. Gaul. Arch. Dermatol. and Syphilol. 57, 918-19(1948). May.

Author reports dwarfing and abnormal glandular development of left breast of a 12 yr old girl who had radium treatment of a 6 cm angioma cavernosum at 3 months of age. NSA 2-399.

1889

THE EFFECT OF DISCONTINUOUS X-IRRADIATION ON RETICULOCYTOSIS IN THE MOUSE. I. G. Heeren. Strahlentherapie 77, 383-86(1948). (In German).

Male white mice were exposed to 100 r x rays in 9 minutes either in continuous or discontinuous dose. Reticulocyte count fell from preexposure level of 5.5 to 2.5% 2-3 days after continuous radiation, fell to 3.6-4% 3 days after discontinuous radiation produced by rotating lead shutter. NSA 2-400.

1890

THE EFFECTS OF SINGLE DOSE TOTAL BODY X-IRRADIATION ON THE PERIPHERAL BLOOD OF THE RAT. S. P. Stearner, F. I. Simmons, and L. O. Jacobson. Anat. Record 99, 576-7(1947). Dec. NSA 2-401.

1891

EFFECTS RESULTING FROM ATOMIC BOMB EXPLOSION. F. L. Price. J. Florida Med. Assoc. 34, 651-3(1948). May.

Clinical and pathological changes observed in Hiroshima and Nagasaki populace after atomic bomb explosions are summarized. NSA 2-402.

1892

California Univ.

IMMEDIATE AND DELAYED BIOCHEMICAL AND BIOLOGICAL EFFECTS OF IRRADIATION ON ANIMAL TISSUES. STATUS REPORT NO. 3 FOR THE PERIOD JUNE 1947 TO DECEMBER 1947. [nd]. 14p. (NP-512).

Status of various investigations dealing with selectively radiated tissues (liver, spleen, bone marrow, thyroid) are reviewed. NSA 2-403.

1893

INCREASE OF I^{131} UPTAKE OF THYROID AFTER WHOLE BODY ROENTGEN IRRADIATION. T. C. Evans, Grace Clarke and Estelle Sobel. Anat. Record 99, 577(1947). Dec.

Adult male rats were exposed to 500 or 1000 r of x rays and two days later were given tracer dose of I^{131} . Thyroids were removed 24 hrs after I^{131} administration. Activity in thyroids of irradiated animals was found to be much higher than that of controls. Increased activity was not related to irradiation of thyroid per se. NSA 2-404.

1894

Chicago. Univ. Air Force Radiation Lab.

QUARTERLY PROGRESS REPORT NO. 20, JULY 15, 1956. 145p. Contract AF-41(657)-25. (NP-6067).

This report covers studies on: ATP-ase activity of rat peritoneal leukocytes and hematopoietic tissues after irradiation, 5-nucleotidase activity in spleen and thymus of rats after continuous Co^{60} γ irradiation; plasma free amino acids level in rats after 100 r-1200 r whole body x ray exposure temperature and environment effects on susceptibility to radiation damage, radiation protective effects of various compounds, weight loss and mortality after exposure of mice and rats to lethal x-ray doses. NSA 10-9038.

1895

AN EXPERIMENTAL STUDY OF THE EFFECT OF ZIRCONIUM AND SODIUM CITRATE TREATMENT ON THE METABOLISM OF PLUTONIUM AND RADIOYTTTRIUM. Jack Schubert Aug. 1, 1948. 11p. (AECU-38, ANL-4206), J. Lab. Clin. Med. 34, 313-25(1949).

Author describes an extension of earlier studies showing that zirconium, administered as the citrate, increases the excretion of plutonium and yttrium. NSA 2-407.

1896

PREVENTATIVE MEDICINE IN THE ATOMIC AGE. W. C. Cox. Bull. U.S. Army Med. Dept. 8, 862-76(1948). Nov NSA 2-488.

1897

THE NEGATIVE EFFECT OF FOLIC ACID ON IRRADIATION LEUKOPENIA IN THE CAT. William S. Adams and John S. Lawrence. Am. J. Med. Sci. 216, 656-60 (1948) Dec.

Prophylactic and therapeutic administration of folic acid to cats did not alter the occurrence or the magnitude of leukopenia caused by exposure to 200 r whole body irradiation. NSA 2-614.

1898

RADIATION SICKNESS. Brit. Med. J. No. 4585, 909-10 (1948). Nov. 20.

Possible causes of radiation sickness in terms of metabolic derangements and various remedies which have been used with good results by various workers are reviewed. NSA 2-615.

1899

VITAMINS AND RADIATION INJURY. Nutrition Revs. 6, 336-8(1949). Nov.

Several reports of the therapeutic effectiveness of folic acid and pyridoxine in radiation injury are reviewed. NSA 2-616.

1900

POST-IRRADIATION NEUROPATHY. Maurice M. Greenfield and Frederick M. Stark. Am. J. Roentgenol. and Radium Therapy 60, 617-22(1948). Nov.

In a series of 180 cases of carcinoma of the testis treated by intensive 1000 KV x ray, three patients developed neurologic disturbance characterized by flaccid paralysis of lower extremities without sensory loss. Chief site of nerve injury believed to be anterior horn cells in lumbosacral segments of spinal cord. NSA 2-643.

1901

MEDICAL PROGRAM OF THE ATOMIC ENERGY COMMISSION. Shields Warren. J. Am. Med. Assoc. 138, 1227-8(1948). Dec. 25.

The types of work being carried out under the medical program of the AEC are described. NSA 2-655.

1902

THE SURGICAL TREATMENT OF THE EFFECTS OF THE ATOMIC BOMB. Orville C. King. Philadelphia Med. 44, 47, 49, 51(1948). Aug. 21. NSA 2-699.

1903

THE EFFECT OF NITROGEN MUSTARD AND X IRRADIATION ON BLOOD COAGULATION. Leon O. Jacobson, Edna K. Marks, Evelyn Gaston, J. Garrett Allen and Matthew H. Block. J. Lab. Clin. Med. 33, 1566-77(1948). Dec.

A consideration of the nature of the clotting defect produced by nitrogen mustard and whole body x irradiation in rabbits. NSA 2-703.

1904

INCIDENCE AND ORIGIN OF ANDROGENETIC MALES IN X-RAYED HABROBRACON EGGS. Anna R. Whiting. Biol. Bull. 95, 354-60(1948). Dec.

Experiments were performed to determine whether (1) low incidence of androgenic males (*Habrobracon*) or (2) high embryonic mortality is the cause of low ratio of adult males. Results showed that (2) was not the cause. Chromatin bridges in 2nd meiotic division (but not in the 1st) retarded and distorted egg pronucleus to such an extent that sperm pronucleus developed in some cases into fertile haploid male with paternal traits only. NSA 2-704.

1905

INFLUENCE OF FRACTIONED ROENTGEN RADIATION ON BACTERIAL AGGLUTINATION TITRE. Johannes Clemmesen and Else Krag Andersen. Acta Pathol. Microbiol. Scand. 25, 611-14(1948).

Rabbits were given 5 doses of 120 r of x rays and their response to single intravenous injection of paratyphoid B antigen was studied. Found; fractionated doses more effective than single doses in lowering resistance to inoculation, immunization could be prevented without harming general health, effect on immunization was obtained only when all or most of irradiation was administered prior to injection. NSA 2-705.

1906

INFLUENCE OF ROENTGEN RADIATION ON THE SPREAD OF VACCINIA VIRUS IN YOUNG RABBITS. Johannes Clemmesen and Else Krag Andersen. Acta Pathol. Microbiol. Scand. 25, 615-18(1948).

Irradiation with 540 r of x ray failed to favor spread of vaccinia virus in two month old rabbits, while irradiation of 30 day old rabbits with 420 r caused definite spread of vaccinia in most irradiated animals but none in controls. NSA 2-706.

1907

EFFECT OF X-IRRADIATION ON RAT SPLEEN ADENYLATE KINASE ACTIVITY. E. M. Uyeki. Federation Proc. 14, 295(1955).

Adenylate kinase activity of rat spleens was measured. In rats exposed to 390 r and 780 r of x-ray the adenylate kinase values were increased over the control values, the maximum values occurring 3 days following x irradiation. Adenosinetriphosphate values were not significantly altered (from authors' summary).

1908

NUCLEIC ACID CONTENT IN INTESTINES OF RATS AFTER X-RADIATION. J. O. Ely and M. H. Ross. Cancer Research 8, 285-94(1948). June.

Total body exposure to 600 r of x rays caused a decrease in amount of U-V light-absorbing material in crypts of Lieberkuhn of rat intestines from 4 hrs to 17 days after exposure. DNA, RNA and structural framework of tissue all were reduced. NSA 2-708.

1909

REDUCTION OF UNDESIRABLE BY-EFFECTS IN PRODUCTS TREATED BY RADIATION. Arno Brasch and Wolfgang Huber. Science 108, 536-7(1948). Nov. 12.

Some methods are given for reducing undesirable side reactions in sterilization and preservation of foods and therapeutics by irradiation. In the case of food-stuffs, cooling before irradiation has definite beneficial effect. Ultrashort irradiation time and evacuated or special glass containers are also helpful. NSA 2-709.

1910

ANTIHISTAMINE DRUGS AND RADIATION SICKNESS. W. M. Court Brown and R. B. Hunter. Brit. Med. J. No. 4587, 984(1948). Dec. 4.

The antihistamine "Anthisan" was found to be of no value in the treatment of radiation sickness in patients undergoing post-operative x ray therapy for carcinoma of the breast. NSA 2-835.

1911

THE CLINICAL MANIFESTATIONS OF ACUTE RADIATION ILLNESS PRODUCED IN GOATS BY EXPOSURE TO AN ATOMIC BOMB, TEST ABLE, BIKINI, 1946, WITH COMMENTS ON THERAPY. Eugene P. Cronkite. Mar. 8, 1948. 42p. (NP-574).

Acute radiation syndrome is described. Results of therapeutic use of penicillin and transfusions suggest these agents may be of value. NSA 2-836.

1912

A CRITICAL ANALYSIS OF THE SYNDROME OF ACUTE TOTAL BODY RADIATION ILLNESS, ITS ROLE IN ATOMIC WARFARE AND ITS INFLUENCE ON THE FUTURE PRACTICE OF MILITARY MEDICINE. Eugene P. Cronkite and William H. Chapman. Military Surgeon 104, 7-21 (1949). Jan. NSA 2-837.

1913

MEDICAL ASPECTS OF RADIATION SAFETY. Bernard S. Wolf. Nucleonics 3, No. 4, 25-9(1948). Oct.

Author considers hazardous aspects of ionizing radiation with respect to (1) inability to detect exposure through 5 senses, (2) penetrating power of radiation, (3) delayed effects of overexposure, (4) sterilizing effect and (5) genetic effect. NSA 2-839.

1914

RECONSTRUCTION FOLLOWING IRRADIATION INJURIES. Paul W. Greeley. Arch. Surgery 56, 741-9(1948). June.

A consideration of surgical treatment of x ray induced lesions. NSA 2-840.

1915

THROMBOCYTOPENIC PURPURA FOLLOWING THERAPEUTIC ADMINISTRATION OF RADIOACTIVE SODIUM. Harold W. Jacox. Radiology 51, 860-1(1948). Dec.

Author describes a case of thrombocytopenic purpura following administration of 202 mc of radiosodium (285 r) over a period of 5 months to a 21 year old male with metastatic sympatheticoblastoma. Hemorrhagic manifestations and thrombocytopenia developed after last treatment. Death is attributed to aplastic anemia due to radiosodium. NSA 2-860.

1916

TREATMENT OF ASTHMA BY RADIOTHERAPY (RESULTS OF 680 CASES). Pasteur Vallery-Radot and Pierre Blamoutier. Presse med. 56, 813-4(1948). Nov. 20. (In French)

Authors review 23 years of study of radiation therapy for asthma and its respiratory equivalents. Radiation of lungs was most effective treatment, but splenic irradiation was also helpful, suggesting a humoral agent produced as result of irradiation. NSA 2-861.

1917

NO PLACE TO HIDE. David Bradley. Boston, Little Brown and Co. 1948. 182p.

This is the log of a doctor assigned to duty with Operations Crossroads. He believes there is no defense against atomic weapons and no satisfactory counter-measures or methods of decontamination. NSA 2-896.

1918

THE EFFECT OF FOLIC ACID ON THE RESPONSE OF THE PERIPHERAL BLOOD AND BLOOD-FORMING TISSUE OF THE RAT TO PARENTERALLY ADMINISTERED STRONTIUM⁸⁹. L. O. Jacobson, S. P. Stearner, E. L. Simmons and M. H. Block. Oct. 1, 1948. 41p. (AECU-78, ANL-4125 (Rev.)).

Authors studied peripheral blood and hemopoietic tissues of female rats after intraperitoneally administered Sr⁸⁹. Erythrocyto-, megakaryocyto- and granulocytopoieses were noted in spleens; lymphopoiesis was reduced in white pulp of spleen less reduced in lymph nodes and thymus. NSA 2-983.

1919

EFFECTS OF FOLIC ACID ON THE ANEMIA INDUCED BY X IRRADIATION. S. Phyllis Stearner. *Proc. Soc. Exp. Biol. and Med.* 69, 518-21(1948). Dec.

No definite evidence of therapeutic effect of folic acid on x ray damage was found. NSA 2-984.

1920

A FURTHER SURVEY OF RADIATION SICKNESS WITH PARTICULAR REFERENCE TO ITS TREATMENT BY PYRIDOXINE. L. M. Shorvon. *Brit. J. Radiol.* 22, 49-55 (1949). Jan.

Radiation sickness is described, various suggested remedies are reviewed and results of pyridoxine therapy in 69 cases are analyzed. Author concludes that pyridoxine is useful but not infallible in treatment of radiation sickness, has beneficial effect on the leukopenia. NSA 2-985.

1921

THE SURGICAL TREATMENT OF IRRADIATION INJURIES. Michael L. Mason. *Illinois Med. J.* 95, 20-6 (1949). Jan.

Treatment of radiation injury of skin and subcutaneous tissues consists in removal of all involved skin and plastic repair of defect. NSA 2-986.

1922

NECROSIS OF THE BRAIN DUE TO RADIATION THERAPY. Joe Pennybacker and Dorothy S. Russell. *J. Neurol. Neurosurg. Psychiat.* 11, 183-98(1948). Aug.

Clinical and pathological features of 5 cases of necrosis of brain following radiation therapy, using accepted techniques, are described. All cases had latent periods (9 months to 5 years). Pathology is considered to be related to reactions in smaller blood vessels. NSA 2-1010.

1923

POSTIRRADIATION ULCERATIONS OF THE UTERINE CERVIX. Harold W. Jacox. *Am. J. Roentgenol.* 60, 795-7(1948). Dec.

Four cases are presented in which lesions suggestive of recurrence of malignant growth developed at or near site of original cervical carcinoma. Lesions showed characteristic radiation-induced vascular changes, necrosis and ulceration, latent period of about 8 months. Lesions were not treated by further radiation therapy. NSA 2-1011.

1924

Radiation Lab., Univ. of Calif.
THE GENETIC EFFECTS OF LOW INTENSITY IRRADIATION. D. E. Uphoff and Curt Stern Dec. 15, 1948. 5p. (AECU-93, UCRL-255).

Reduced radiosensitivity of aged sperm, dependence of induced mutation frequency at low doses on time factor,

and sampling errors are considered to be possible causes of apparent genetic ineffectiveness of 52.5 r γ radiation administered continuously for 21 days (2.5 r/day). When three new tests were used, low dose, low intensity irradiation did appear to induce mutations in *Drosophila* sperm. NSA 2-1055.

1925

ACTION OF GONADOTROPHINS AND OF OESTROGENS ON X-RAYED MOUSE OVARIES. G. J. Van Eck-Vermande and J. Freud. *Arch. Intern. Pharmacodynamic* 78, 67-78 (1949). Jan. 1. NSA 2-1056.

1926

EFFECT OF IONIZING RADIATIONS ON REPRODUCTIVE CELLS AND WHITE BLOOD CELLS. Harry W. Mixer. *X-Ray Technician* 20, 215-18(1949). Jan. NSA 2-1057.

1927

EFFECT OF X-RAYS ON FERTILITY IN WHITE LEGHORN MALE CHICKENS TREATED BEFORE PUBERTY. Paul D. Sturkie, John A. Pino, J. L. Weatherwax, A. J. Donnelly and G. M. Dorrance. *Radiology* 52, 112-17 (1949). Jan.

White male leghorn chicks 4-6 weeks old were irradiated with 1,200-8,400 r, over area including testes, adrenals and part of kidneys. Most males receiving 2,100-2,800 r were sterile when mated at maturity; all were sterile after 5,600 and 8,400 r, most were fertile after 1,600 r or less. NSA 2-1058.

1928

Naval Medical Inst., Bethesda
THE INCREASED TOLERANCE OF MICE TO A LETHAL DOSE OF X-RAY RADIATION AS A RESULT OF PREVIOUS SUBLETHAL DOSES. Eugene P. Cronkite, Clyde R. Sipe, Dean Eltzholtz, William H. Chapman and F. W. Chambers. Aug. 17, 1948. 6p. (NP-589).

Three weekly exposures to 144 r followed by 30 day rest period increased the resistance of mice to subsequent lethal dose of x rays. Results are interpreted statistically. NSA 2-1059.

1929

INDUCED AND NATURALLY OCCURRING MUTATIONS. Donald F. Jones p. 120-3 of Proceedings of the Auburn Conference on the Use of Radioactive Isotopes in Agricultural Research, December 18-20, 1947, Auburn, the Alabama Polytechnic Institute. 1948.

The possible role of atomic energy in the field of plant and animal breeding is reviewed. NSA 2-1060.

1930

QUANTITATIVE HISTOLOGIC ANALYSIS OF THE EFFECT OF CHRONIC WHOLE-BODY IRRADIATION WITH GAMMA RAYS ON THE SPERMATOGENIC ELEMENTS AND THE INTERSTITIAL TISSUE OF THE TESTES OF MICE. Allen B. Eschenbrenner, Eliza Miller and Egon Lorenz. *J. Natl. Cancer Inst.* 9, 133-47 (1948). Dec.

After 2 and 4 months of exposure of male LAF₁ mice to 8.8 r, or 4.4 r γ rays in 8 hr daily, testes showed sharp fall in weight, relative increase in interstitial tissue. Spermatogenic elements decreased but all stages were present in normal proportions in 4.4 r mice, spermatogenesis was incomplete after 6 months of 8.8 r/day. NSA 2-1061.

1931

RADIATION DAMAGE OF GENETIC ORIGIN. H. J. Muller. *J. Heredity* 39, 357-8(1948). Dec.

High energy radiations are capable of affecting mutation frequency to a marked degree, most gene mutations are harmful. Dose received during fluoroscopic examination of abdomen if received by gonads would

cause about as many mutations as occur naturally during the individual's reproductive life. NSA 2-1062.

1932

Naval Medical Research Inst., Bethesda
FAILURE OF RUTIN TO DECREASE THE MORTALITY OF ACUTE IONIZING RADIATION ILLNESS IN MICE. Eugene P. Cronkite, Dean C. Eltzholtz, Clyde R. Sipe, William H. Chapman, and F. W. Chambers. Aug. 19, 1948. 10p. (NP-590). NSA 2-1126.

1933

IONIZING RADIATION INJURY. Eugene P. Cronkite. J. Amer. Med. Assoc. 139, 366-9(1949). Feb. 5.

The symptomatology and diagnosis of acute radiation sickness are discussed. NSA 2-1127.

1934

PREVENTION AND TREATMENT OF RADIOMUCITIS. Rene Huquenin, J. Fauvet and J. Ponthieu. Bull. Mem. Soc. Med. Hop (Paris) 64, 983(1948) NSA 2-1128.

1935

USE OF ROENTGEN THERAPY FOR RETINAL DISEASES CHARACTERIZED BY NEW-FORMED BLOOD VESSELS. Jack S. Guyton and Algernon B. Reese. Arch. Ophthalmol 40, 389-407(1948). Oct.

Promising results were obtained in treatment of 22 eyes in 14 patients with ocular diseases characterized by retinal and vitreous hemorrhages and by new-formed blood vessels and fibrous tissues extending from retina into vitreous. NSA 2-1147.

1936

THE RELATION OF ATMOSPHERE TO BIOLOGICAL EFFECTS OF X-RAYS. Barbara Hayden and Luther Smith. Genetics 34, 26-41(1949). Jan.

Barley seeds x rayed in a vacuum consistently showed better germination and growth, lower frequency of chromosomal aberrations than seeds exposed in air. Root tip cells from seeds irradiated in air averaged 4.7 times as many chromatid bridges as root-tip cells from seeds irradiated in vacuum. NSA 2-1510.

1937

THE CLINICAL MANIFESTATIONS OF ACUTE RADIATION ILLNESS IN GOATS. Eugene P. Cronkite. U.S. Naval Med. Bull. 49, 199-215(1949). Mar.-Apr.

Goats exposed at Bikini to ionizing radiation in amounts ranging from 100 r to more than 10,000 r are classified into 4 groups according to severity of symptoms and depression of leukocyte counts. The clinical picture is similar to that in man except for absence of vomiting and more rapid progression. NSA 2-1655.

1938

Naval Medical Research Inst., Bethesda
THE FAILURE OF FOLIC ACID TO ALTER THE CLINICAL COURSE AND HEMATOLOGIC PICTURE OF FATAL SINGLE TOTAL BODY IRRADIATION IN SWINE. E. P. Cronkite, J. L. Tullis, C. Tessmer, and T. W. Ullrich. Sept. 30, 1948. 7p. (NP-603).

Eight swine were exposed to 400 r total body radiation, 4 of these were treated with intramuscular folic acid, 45 mg/day. No difference was observed between treated and untreated swine as regards to clinical and hematological course or postmortem findings. NSA 2-1656.

1939

FURTHER STUDIES ON THE RADIOSENSITIVITY OF TUMORS AUTOGENOUS TO HOMOZYGOUS HOSTS. Anna Goldfeder. Radiology 52, 230-8(1949). Feb.

A great difference was observed in radiosensitivity of 2 analogous mammary mouse adenocarcinomata in culture. Growth characteristics of the two cultures are described and considered in light of radiosensitivity in vitro and in vivo. NSA 2-1698.

1940

ROENTGENTHERAPY OF PAIN. Origene Dufresne. Can. Med. Assoc. J. 60, 227-9(1949). Mar.

Author suggests that x rays may control pain by (1) inhibition or paralysis of nerve fibers (especially nerves of sympathetic system) or (2) indirect action on nervous elements through humoral modification. X rays also relieve pain by destroying inflammatory or tumor tissue pressing on nerves. NSA 2-1700.

1941

EFFECTS OF IONIZING RADIATIONS ON ENZYME ACTIVITIES OF YEAST CELLS. I. RELATION BETWEEN ANAEROBIC CO₂ PRODUCTION AND COLONY PRODUCTION AT INTERVALS AFTER X-RADIATION. Frederick G. Sherman and Herman B. Chase. J. Cellular and Comp. Physiol 33, 17-25(1949). Feb.

Anaerobic CO₂ production by S. cerevisiae is inhibited approximately 30% by 90,000 r dose of x rays, and approximately 85% of cells unable to form colonies on solid medium. Authors postulate that irradiated yeast cells release proliferation-promoting substances. NSA 2-1753.

1942

INFLUENCE OF TEMPERATURE ON THE RESPONSE OF FROGS TO X IRRADIATION. Harvey M. Patt and Marguerite N. Swift. Am. J. Physiol. 155, 388-93 (1948). Dec.

Radiation toxicity is not altered by altering body temperature of frogs during or 24 hr after exposure to 1000 r and 3000 r, but survival is enhanced as long as animals are kept in cold post-exposure. When removed from cold, expected mortality rate is observed, indicating no repair of radiation damage during period of lowered metabolism. NSA 2-1754.

1943

QUANTITATIVE INFERENCES CONCERNING THE GENETIC EFFECTS OF RADIATION ON HUMANS. Robley D. Evans. Science 109, 299-304(1949). Mar. 25.

Author predicts that no detectable increase in hereditary abnormalities is likely to result, even after many generations, if small fraction of population receives daily radiation doses up to 0.1 r/day. Average daily dose at Hanford, Oak Ridge, etc., stated to be about 0.005 r. NSA 2-1756.

1944

Argonne National Laboratory
RADIATION HAZARD CONTROL. May 3, 1948. 60p. (AECU-168, ANL-4146).

Includes discussion of permissible exposures for both external and internal radiations, as well as general safety and emergency procedures. NSA 2-1792.

1945

INFLUENCE OF COSMIC RADIATION ON EXPERIMENTAL TUBERCULOSIS. S. G. Ong. Nature 163, 244-5(1949). Feb. 12.

Influence of cosmic radiation on experimental tbc in mice was studied at 3500 meter altitude. Found weight of mice in group exposed to cosmic radiation higher than for other groups but mortality curves were the same. Two different experiments are reported. Hemorrhages were observed in mice exposed to cosmic radiation in both series of experiments. NSA 2-1844.

1946

THE EFFECT OF ROENTGEN RAYS ON ADULT RAINBOW TROUT. Arthur D. Welander, Lauren R. Donaldson, Richard F. Foster, Kelshaw Bonham, Allyn H. Seymour and Frank G. Lowman. [nd]. 20p. (AECU-188, UWFL-17).

Nearly mature rainbow trout received 50, 100, 500, 750, 1000, 1500 or 2500 r of 200 kv x rays (25 ma, CU,

and A1 filters). Mortality increased after 1000 r or more. All fish died within 13 wk after 2500 r. After 1500 r, 56% died within 13 wk, 87% in 64 wk. Injuries seen after 500 r or more, growth depressed after 750 r or more NSA 2-1888.

1947

THE EFFECT OF ROENTGEN RADIATION ON THE PRODUCTION OF THORACIC DUCT LYMPHOCYTES. William N. Valentine, Charles G. Craddock and John S. Lawrence. Am. J. Med. Sci. 217, 379-82(1949). Apr.

Heavy whole body irradiation causes total number of lymphocytes in thoracic duct lymph to fall rapidly in cats. Data suggest that, from time of exposure, total production potential of lymphoid tissue drained by thoracic duct is not more than 4 hr normal supply. NSA 2-1889.

1948

EXAMINATION OF THE TARGET THEORY BY DEUTERON BOMBARDMENT OF T-1 PHAGE. Ernest C. Pollard and Frederick Forro, Jr. Science 109, 374-5, 386(1949). Apr. 15.

Experiments were performed to test target theory using deuterium-bombarded T-1 bacteriophage. Data suggest Lea's theory should be modified to include the possibility of inactivation caused by secondary radiation reaching target from ion path which does not go through the target. NSA 2-1890.

1949

HYPOTHROMBOPLASTINEMIA FOLLOWING TOTAL BODY IRRADIATION. William D. Holden, Jack W. Cole, A. F. Portmann and J. P. Storaasli. Proc. Soc. Expt Biol. Med. 70, 553-6(1949). Mar.

Hemorrhagic syndrome was produced and studied in dogs by irradiation with 450 r (LD-100) 22 kvp x rays. Anemia, leukopenia, thrombocytopenia, prolongation of clot retraction, and hypothromboplastinemia were observed NSA 2-1891.

1950

NUCLEIC ACID CONTENT IN INTESTINES OF RATS AFTER NEUTRON RADIATION. J. O. Ely and M. H. Ross. Cancer Research 8, 607-12(1948). Nov.

Neutron radiation caused decreased U-V light absorption in crypts of Lieberkuhn of rat duodenum from 4-48 hr after exposure. Results were similar to those following x-irradiation. NSA 2-1892.

1951

Naval Radiological Defense Lab.

DECREASE IN THE SULFHYDRYL CONTENT OF RAT PLASMA FOLLOWING X-IRRADIATION. Bernard Shacter and M. C. Fishler. Apr. 26, 1950. 10p. (AD-214(B)).

A 750-r total-body exposure of rats is followed after several days by marked decrease in sulfhydryl content of blood plasma. NSA 4-4422.

1952

ACTION OF FAST ELECTRONS ON HUMAN SKIN. Richard Kurt Kepp. Strahlentherapie 81, 201-14(1950). (In German)

Comparative study of effects produced on human skin (thigh) by hard x-rays and by fast electrons from betatron is reported. Electron beam elicited considerably stronger effect than did x rays NSA 4-4423.

1953

THE ACTION OF PLESIOROENTGEN RAYS ON M. PYROGENES AUREUS. C. Gastaldi. Giorn. batteriol. immunol. 40, 257-80(1949). (In Italian)

M. pyogenes aureus exposed to plesio-roentgen rays (40-50 kv, 1-2 mm, no filter), was destroyed by 2,000 to 5,000 r and inhibited by 400 to 500 r. Oldest bacteria were most radiosensitive, young often survived. NSA 4-4424.

1954

ARREST OF DEVELOPMENT OF PLASMODIUM GALLINACEUM IN MOSQUITOES (AEDES AEGYPTI) BY RADIATION EFFECT OF P^{32} . P. F. Hahn, Victor H. Hass, and Aimee Wilcox. Science 111, 657-8(1950). June 16

Study indicates that radiation delivered by ingested P^{32} to mosquitoes was sufficient to arrest development of P. gallinaceum during oocyte stage. NSA 4-4425.

1955

ATROPHY OF THE GASTRIC GLANDS PRODUCED BY BETA RAYS, HISTOLOGICAL FINDINGS IN ANIMALS. D. M. Douglas, W. R. Ghent, and S. Rowlands. Lancet 1, 1035-8(1950). June 3.

Various degrees of atrophy of dog gastric glands were produced by P^{32} radiation, but underlying submucosa and muscularis were histologically normal. NSA 4-4426.

1956

CHANGES IN THE ROOT GROWTH OF BARLEY SEEDLINGS PRODUCED BY FAST ELECTRONS OF A 6-MEV BETATRON. K. H. Burns, W. Dittrich, W. Paul, and G. Schubert. Strahlentherapie 81, 173-6(1950). (In German)

Statistical analysis of results reveals weaker action of fast electrons as compared with that of x rays. NSA 4-4427.

1957

CHROMOSOME MODIFICATIONS PRODUCED IN BARLEY SEEDLINGS BY FAST ELECTRONS OF A 6-Mev BETATRON. H. J. Schmermund, H. Beck, and H. L. Heinrich. Strahlentherapie 81-177-86(1950). (In German) NSA 4-4428.

1958

A COMPARATIVE STUDY OF THE ACTION OF FAST ELECTRONS AND X-RAYS ON THE CORNEA OF SALAMANDER LARVAE. H. Czech, R. Czech, and H. J. Schmermund. Strahlentherapie 81, 187-92(1950). (In German) NSA 4-4429.

1959

DAMAGE OF THE CELL NUCLEUS BY X-RADIATION. H. Marquardt. Experientia 5, 31-43(1949).

Aberrations produced in the cell nucleus by x rays are reviewed and classified. Primary and secondary effects of x rays on B. romana are reviewed and illustrated. NSA 4-4430.

1960

DIFFERENCES IN THE BIOLOGICAL ACTION OF ORDINARY AND ULTRA-HARD RADIATIONS. F. Wachsmann. Strahlentherapie 81, 273-80(1950). (In German).

Differences vary with the biological object exposed. From shape of survival curves of irradiated tadpoles, it appears that the biological structures attacked are not the same for the two energies. Differences were also observed in rate of disappearance of reticulocytes in irradiated rabbits and in tumor regression. NSA 4-4431.

1961

DIFFERENTIAL RADIOSENSITIVITY OF HAPLOID AND DIPLOID PREPUPAE AND PUPAE OF HABROBRACON. A. M. Clark and E. M. Kelly. Cancer Research 10, 348-52(1950). June. NSA 4-4432.

1962

THE DIFFERENTIAL RESPONSE OF MALE AND FEMALE GERM CELLS OF SCIARA COPROPHILA (DIPTERA) TO IRRADIATION. Helen V. Crouse. Am. Naturalist 84, 195-202(1950). May-June

No gross rearrangements are observed when adult females are x-irradiated 43-45.5 hours after eclosion, but oocytes irradiated between 46 and 72 hours of adult life do have inversions. Approximately the same number

of breaks leading to gross rearrangements are induced by 2000 r in oocytes and 4000 r in sperm. Irradiation of sperm induces both reciprocal translocations and inversions. Interchromosomal interchanges were not recovered. NSA 4-4433.

1963

HOMOZYGOUS TRANSLOCATION OBTAINED IN THE SECOND GENERATION FROM MATERIAL TREATED WITH NEUTRONS. Dontcho Kostoff. Proc. Indian Acad. Sci. 30B, 259-63(1949). Nov.

Crepis capillaris was irradiated with neutrons (20,000 r). Effect on chromosomes is reported and compared with that caused by x rays. NSA 4-4434.

1964

INFLUENCE OF ROENTGEN RAYS ON THE REACTIVITY OF THE SKIN TO THE USUAL TESTS. A. Agostini and C. Stuart. Studi Facolta med. senese 16, 48-52(1948). (In Italian)

X rays have a definite influence on reactivity of skin in 50% of cases. Influence is of intensifying or inhibiting nature. Action seems indirect, hyperemia may play an important part. NSA 4-4435.

1965

THE PRESENT STATE OF RADIOBIOLOGY. H. Langendorff. Med. Welt 1, 173-9(1950). Feb. (In German)

Experimental material and theoretical explanations concerning effect of radiation on living matter are summarized. NSA 4-4436.

1966

THE QUANTITATIVE EFFECT AND THE QUALITATIVE INJURY TO THE FUNCTIONING OF THROMBOCYTES RELATIVE TO THE RETRACTION OF BLOOD CLOTS. A. Fonc. Bull. schweiz. Akad. med. Wiss. 6, 115-20 (1950). May. (In German)

Retraction in platelet emulsions irradiated by ultraviolet and x rays decreases with increasing dose. Very short waves cause quicker and intensified retraction. Ra irradiation accelerates start and end of retraction. NSA 4-4437.

1967

RADIOACTIVE MATERIALS AS PLANT STIMULANTS-FIELD RESULTS. Lyle T. Alexander. Agronomy J. 42, 252-5(1950). May.

In a study of various crops grown under different climatic conditions, in soil mixed with actinium, radium and uranium salts, results indicate radioactive materials have neither beneficial nor harmful effect on growth. NSA 4-4438.

1968

THE RADIOSENSITIVITY OF THE PERIPHERAL NERVOUS SYSTEM. B. Lindenbaum. Fortschr. Gebiete Rontgenstrahlen 71, 988-93(1949).

After several deep x ray treatments, sensitivity changes occurred. Applications to tongue disturb taste. Changes are mostly reversible after a period of months. NSA 4-4439.

1969

SOME ASPECTS OF THE MECHANISM OF ACTION OF IONIZING RADIATION ON LIVING CELLS. L. G. Grimmett. Texas Repts. Biol. Med. 8, 134-46(1950).

Author reviews some theories about the mechanism of radiation effects on cells and cell sensitivity to radiation of varying intensity. Fundamental processes are believed to be radiochemical. NSA 4-4440.

1970

STRUCTURE AND FUNCTION OF MOUSE OVARIES AFTER X-RAYING. G. J. van Eck-Vermande and J. Freud. Arch. intern. pharmacodynamie 78, 49-62(1949). Jan. 1. NSA 4-4441.

1971

STUDIES ON LYMPHOCYTES FROM PERSONS TREATED WITH RADIOACTIVE IODINE. William E. Watts and Don R. Matheson. J. Lab. Clin. Med. 35, 885-9(1950). June.

Significant change in the number of refractile granules in lymphocytes from persons exposed to ionizing radiation was not found. No other concise cytologic radiation effects were found. NSA 4-4442.

1972

STUDIES ON THE PROTEINS AND LIPIDES OF PLASMA FRACTIONS OF X-RAY IRRADIATED RATS. Erland C. Gjessing and Alfred Chanutin. Arch. Biochem. 27, 191-7 (1950). Oct. NSA 4-4443.

1973

ALLERGENIC EFFECTS OF RADIOTHERAPY. P. Le Goff. J. radiol. electrol. 30, 624-6(1949). (In French)

Allergic symptoms of 5 patients receiving total x ray doses up to 10,000 r (150 to 250 kv, 60 to 100 cm, 0.1 to 1.0 mm Cu) where characterized by rash and edema and seem to depend on a secondary sensitivity factor as yet unexplained. NSA 4-4444.

1974

THE APPEARANCE OF THE CHIEF SYNDROMES KNOWN IN EXPERIMENTAL RADIO-PHYSIOLOGY IN PERSONS SUBJECTED TO ATOMIC BOMB EXPLOSION. A. Lacassagne. Bull. Akad. Nat. Med. 132, 104-7(1948).

NSA 4-4445.

1975

CONTRAINDICATIONS OF RADIOTHERAPY ON THE GENITAL REGIONS OF YOUNG WOMEN, PRIMARILY CONSIDERING SAFETY. Alan Nicolle. J. radiol. electrol. 30, 662(1949). (In French)

Factors influencing the decision to use radiotherapy on diseases involving genital systems are discussed. NSA 4-4446.

1976

ON THE RADIOACTIVITY OF THOROTRAST: A CONTRIBUTION TO THE QUESTION OF ITS POSSIBLE HARMFUL AFTER-EFFECTS WHEN USED FOR RADIOLOGICAL VISUALIZATION. Fritz Ruf and Kurt Philipp. Langenbecks Arch. klin. Chir. 263, 573-87(1950). (In German)

Extreme caution is advised in the use of thorotrast for arteriography of extremities or for neurosurgery. NSA 4-4447.

1977

SOME MEASUREMENTS OF GAMMA-RAY DOSES RECEIVED BY A RADIOTHERAPIST DURING RADIUM OPERATIONS. J. L. Howarth, H. Miller and J. Walter. Brit. J. Radiol. 23, 245-55(1950). Apr.

Radiation doses received by Ra therapist (a) on fingers and hands, (b) by total body, (c) by gonads (estimated) and tabulated and discussed. NSA 4-4450.

1978

SOME MEDICAL ASPECTS OF ATOMIC WARFARE. A. Lundie. J. Roy. Army Med. Corps. 94, 246-58 (1950). May.

Medical, thermal, and radiation injuries caused by atomic bomb explosion are described. NSA 4-4451.

1979

STRUCTURE OF THE MESOPHARYNX AS LATE REACTION FOLLOWING X-IRRADIATION OF CARCINOMA OF THE LARYNX. H. Steinmann. Oncologia 2, 217-32 (1949). (In German) NSA 4-4452.

1980

STUDIES ON THE HAZARD INVOLVED IN THE USE OF C¹⁴. II. THE EFFECT OF A SINGLE DOSE OF C¹⁴-LABELED SODIUM BICARBONATE ON THE PATTERN

OF DEATHS FROM SPONTANEOUS LEUKEMIA IN AKM MICE. Howard E. Skipper, Martelia J. Bell, and Juanita B. Chapman. Cancer Research 10, 362-3(1950). June.

Dose of 18 μ c/mouse had no significant effect on pattern of mortality from leukemia. NSA 4-4453.

1981
TUBERCLE-LIKE STRUCTURES IN LATE IRRADIATION INJURIES OF THE SKIN. Lars-Gunnar Larsson. Acta Radiol. 31, 17-27(1949).

Tubercle-like changes in late irradiation injury of skin are regarded as a peculiar type of tissue reaction due to advanced regressive changes in connective tissue. NSA 4-4454.

1982
Naval Radiological Defense Lab.
HEMATOLOGIC CHANGES IN RATS PROTECTED BY CYSTEINE AGAINST TOTAL BODY X-IRRADIATION. Robert L. Rosenthal, Leontine Goldschmidt, and Bryant L. Pickering. May 3, 1950. 13p. (AD-215(B); Am. J. Physiol. 166, 15-19(1951).

After 800 r total-body x raying, cysteine-protected rats had significantly more neutrophils in blood and more myeloid cells in bone marrow than did saline-injected rats. NSA 4-4456.

1983
IRRADIATION PROPHYLAXIS. J. Am. Med. Assoc. 143, 817(1950). July 1.

Cysteine and sodium cyanide injections increase postirradiation survival of rats given large doses of radiation. Postirradiation therapy proved ineffective. NSA 4-4457.

1984
LACK OF ANTAGONISMS OF MALONONITRILE AND DESOXYRIBONUCLEIC ACID TO TRY PANOSOMIASIS, ALLOXAN DIABETES, AND LETHAL EFFECTS OF X-IRRADIATION. James Preston Parker, Paul L. Ewing, and G. A. Emerson. Texas Repts. Biol. Med. 8, 257-61 (1950). NSA 4-4458.

1985
PROTECTIVE EFFECT OF PARA-AMINOPROPIOPHENONE AGAINST LETHAL DOSES OF X-RADIATION. John B. Storer and Julius M. Coon. Proc. Soc. Exptl. Biol. Med. 74, 202-4(1950). May. NSA 4-4459.

1986
REMARKS ON THE USE OF TOLUIDINE BLUE IN VIVO IN PRESENCE OF EXCESS ANTICOAGULANTS. D. Quivy. Compt. rend. soc. biol. 143, 22-5(1949). Jan. (In French)

No specific toluidine blue action was observed on clotting of venous blood (of dogs) diluted with thrombokinase. NSA 4-4460.

1987
CONSIDERATIONS OF THE PROGNOSTIC VALUE OF VARIATIONS OF THE SEDIMENTATION RATE IN THE ROENTGENTHERAPEUTIC TREATMENT OF MALIGNANT LYMPHOGRANULOMA. Paolo Emilio Panzironi and Mariano Guttadauro. Radiologia (Buenos Aires) 5, 441-6(1949). Oct.-Dec. (In Italian)

Authors maintain that sedimentation rate is an index of high prognostic value superior to other clinical and laboratory examinations. NSA 4-4468.

1988
INVESTIGATIONS INTO DIFFERENTIATION AND OTHER MORPHOLOGICAL CHANGES IN MALIGNANT TUMORS FOLLOWING THERAPEUTIC IRRADIATION WITH X-RAYS AND RADIUM. S. Ry Andersen Copenhagen, Emar Munksgaard, 1949. 112p.

Author concludes that therapeutic irradiation of malignant tumors with x rays or Ra does not cause

demonstrable changes interpretable as criteria of differentiation. NSA 4-4471.

1989
ROENTGEN RAY TREATMENT OF TINEA CAPITIS. Charles F. Roland. Grace Hospt. Bull. 27, 29-33(1949). Jan.

Author concludes that cure rate of 98% indicates x-ray epilation is the preferred treatment of Tinea capitis. NSA 4-4492.

1990
Atomic Energy Project, Univ. of Rochester
THE ACTIVATION OF LATENT BARTONELLOSIS IN THE RAT FOLLOWING INTRAVENOUS ADMINISTRATION OF POLONIUM. Mildred Carr, Helen Haydon, James K. Scott, and J. N. Stannard. Nov. 29, 1950. Decl. Jan. 23, 1951. 18p. (AECD-3046, UR-145). NSA 5-2647.

1991
Brookhaven National Lab.
THE ADRENAL CORTICAL REQUIREMENTS OF ADRENALECTOMIZED, X-IRRADIATED RATS. Seymour Katsh and Abraham Edelmann. 1p. (AECU-1134), Federation Proc. 10, 73 No. 1 Pt. 1. (1951). Mar.

Adrenalectomized rats showed a need for increased cortical hormones in order to inhibit weight loss for 3-4 days after 600 r of x rays (160 kvp, 10 ma, 0.2 mm Cu). (Report appears in NSA in its entirety). NSA 5-2648.

1992
Brookhaven National Lab.
THE EFFECTS OF X-RAYS ON DESOXYPENTOSE NUCLEIC ACID IN SITU, QUANTITATIVE CYTOCHEMICAL STUDIES ON TRILLIUM. M. J. Moses, R. DuBow, and A. H. Sparrow. [nd] 1p. (AECU-1162).

Trillium erectum buds were exposed to 50, 200, and 20,000 r to determine whether depolymerization occurs in the intact cell. Cytochemical tests (methyl green and Feulgen reactions) did not indicate that depolymerization had been induced by irradiation. (The report appears in NSA in its entirety). NSA 5-2649.

1993
REPORT UPON SOME PRELIMINARY EXPERIMENTS WITH THE ROENTGEN RAYS ON PLANTS. G. F. Atkinson. Nature 56, 600(1897)

After experiments with leaves of Caladium, flowers Begonia, and various seedlings exposed for 1 to 10 hours, in which no perceptible injury resulted, several seedlings were exposed for 45 hours in a dark room. Removed from the dark, seedlings slowly became green, but those exposed to Roentgen rays recovered the green more slowly. This suggest that rays may injure chloroplastids.

1994
THE INABILITY OF THIOUREA TO MODIFY ROENTGEN RAY IRRADIATION MORTALITY IN RATS. Thomas J. Haley, Samuel Mann, and Andrew H. Dowdy. Feb. 16, 1951. 7p. (UCLA-112), Science 114, 153-4 (1951). Aug. 10.

Hypothyroidism induced by feeding 0.1% thiourea gives no protection to rats given 600 r whole-body x-ray dose. Hyperthyroidism caused by thyroxin injections results in slight increase in mortality rate. NSA 5-2651.

1995
PROACCELERIN DEFICIENCY FOLLOWING IRRADIATION WITH THERAPEUTIC DOSES OF RADIOPHOSPHORUS. H. Vetter and H. Vinazzer. Blood 9, 163-72(1954).

In six of seven polycythemic patients treated with radiophosphorus a significant decrease of proaccelerin content of plasma was observed. This diminution lasted 3 to 16 days. The degree of deficiency seemed to depend on the amount of radiophosphorus administered.

1996

Naval Radiological Defense Lab.

THE SUSCEPTIBILITY OF IRRADIATED MICE TO INFECTION AS A FUNCTION OF POST-IRRADIATION TIME. L. L. Shechmeister, V. P. Bond, and M. N. Swift. Dec. 12, 1950. 22p. (AD-279(B)), J. Immunol. 68, 87-95(1952).

Susceptibility of mice to airborne Streptococcus zooepidemicus was determined over a period of 50 days post-irradiation (350 r). Linear increase in susceptibility for 15 days reached a level 5 times that of control; then was followed by an exponential drop, reaching control level after 30 days. NSA 5-2653.

1997

TITRATED, REGULARLY SPACED RADIOACTIVE PHOSPHORUS OR SPRAY ROENTGEN THERAPY OF LEUKEMIAS. Edwin E. Osgood. Arch. Internal Med. 87, 329-48(1951). Mar. NSA 5-2660.

1998

Argonne National Lab.

AN INTERRELATIONSHIP BETWEEN TIME-RETENTION CURVES IN SHORT VS. PROLONGED ISOTOPE EXPOSURES. Donald L. Buchanan. Nov. 1950. 13p. (AECU-1193, UAC-329). NSA 5-2976.

1999

CHANGES IN MEAN BLOOD LEVELS OF METALLURGICAL LABORATORY EMPLOYEES DURING THE FIRST YEAR OF EMPLOYMENT AS RELATED TO WORKING CONDITIONS. Norman Pearlman and G. A. Sacher. p.419-424 of Industrial Medicine on the Plutonium Project. (NNES-IV-20). Robert S. Stone, ed. New York, McGraw-Hill Book Co., Inc. 1951.

Mean levels of several blood elements were investigated for groups exposed to radiation and uranium-toxicity hazards. No significant decrease in the mean level was found for any blood element. The average exposure was less than 0.1 r per day. (from authors' abstract).

2000

INHERITANCE OF CORN GRASS: A MACROMUTATION IN MAIZE, AND ITS POSSIBLE SIGNIFICANCE AS AN ANCESTRAL TYPE. W. Ralph Singleton. [nd]. 27p. (AECU-1165); Am. Naturalist 85, 81-95(1951).

Preliminary attempts failed to induce somatic mutations using β radiation from P^{32} and γ radiation from Co^{60} , in corn-grass-type plant. NSA 5-2983.

2001

HEALTH PHYSICS AND MEDICAL ASPECTS OF A STRONTIUM-90 INHALATION INCIDENT. Frederick P. Cowan, Lawrence B. Farabee, and Robert A. Love. [nd]. 12p. (AECU-1169), Am. J. Roentgenol. Radium Therapy Nucl. Med. 67, 805-9(1952).

Results of analysis of urinary elimination of Sr^{90} - Y^{90} for period after inhalation are presented. NSA 5-2984.

2002

Brookhaven National Lab.

EFFECTS OF RADIATION ON BIOLOGICAL SYSTEMS. A. H. Sparrow and B. A. Rubin. Feb. 15, 1951. 94p. (AECU-1207), Biol. Progress 2, 1-52(1952).

Types of radiation and dosage units, radiation energy transfer mechanisms, "target" theory, relation between chemical and biological effects of radiation, cytological, genetic, physiological and embryological effects, carcinogenesis, and radiosensitivity are discussed. NSA 5-2985.

2003

THE BIOELECTRIC POTENTIAL OF SEEDS AS A FUNCTION OF GROWTH AND OF X-RAY DOSAGE.

M. W. Jones, B. Kivel, and A. A. Bless. Plant Physiol. 26, 19-29(1951). Jan.

X rays, in general, decrease bioelectric potential of plant seeds and lower their vitality. NSA 5-2987.

2004

THE EFFECT OF RADIATIONS ON GALACTOZYMASE FORMATION IN YEAST. C. L. Brandt, P. J. Freeman, and P. A. Swenson. Science 113, 383-4(1951). Apr. 6.

Galactozymase formation was subjected to (1) ultra-violet radiation, (2) x radiation, and (3) visible light. Photodynamic action of (3) was confined to surface, (1) appears to strike deeper and prevent galactozymase synthesis, (2) prevents division but doesn't effect galactozymase formation.

2005

HEPATIC GLYCOGENESIS IN WHOLE-BODY X-IRRADIATED ANIMALS. Marguerite Lourau and Odette Lartigue. Compt. rend. 232, 1144-6(1951). (French)

Glycogenesis in the guinea pig diminished after sub-lethal x irradiation, not due to inability of hepatic cell to synthesize glycogen, but to absence of substrate. Circulating glucose was probably metabolized to substance incapable of entering into glycogen synthesis. NSA 5-2989.

2006

Naval Medical Research Inst., Bethesda

MUTATIONS PRODUCED BY ATOMIC BOMB IRRADIATION OF NEUROSPORA CRASSA, APPENDIX NO. 16 TO THE FINAL REPORT. Carroll E. Wagner, Naval Medical Research Inst., Bethesda and G. W. Beadle, California Inst. of Tech. March 7, 1949. 8p. (NP-1904).

Eighty biochemical mutants were observed in red bread mold exposed to Tests Able and Baker and are classified. NSA 5-2990.

2007

MUTATIONS INDUCED BY CHRONIC RADIATION. PAPERS PRESENTED AT THE 1950 MEETING OF THE GENETICS SOCIETY OF AMERICA, COLUMBUS, OHIO, SEPT. 11 TO 14. B. Wallace. Genetics 35, 698(1950). NSA 5-2991.

2008

ON THE VARIATION OF PENICILLIUM CHRYSOGENUM Q 176 INDUCED BY RADIUM IRRADIATION. Shohei Otani and Hyuga Okada. J. Antibiotics (Japan) 3, 819-32 Dec. (In Japanese) NSA 5-2992.

2009

PATHOLOGY OF IONIZING RADIATION. Russell M. Maynard. Rhode Island Med. J. 34, 23-5(1951). Jan.

Effects of ionizing radiations on tissues and organs of body are summarized. NSA 5-2993.

2010

PRODUCTION OF HYPOCHLORHYDRIA BY BETA RADIATION OF THE STOMACH. D. M. Douglas, W. R. Ghent, and S. Rowlands. Lancet 260, 492-5(1951; Vol. 1). Mar. 3.

Study of secretion from gastric mucosa of dogs irradiated with β rays from intragastric balloon containing P^{32} showed reduced free HCl in gastric juice. NSA 5-2995.

2011

X-RAY SENSITIVITY OF E. COLI AS MODIFIED BY OXYGEN TENSION. Alexander Hollaender, G. F. Stapleton, and F. L. Martin. Nature 167, 103-4(1951). Jan. 20.

State of oxidation or reduction inside an organism during x ray exposure and possible modifying effect of various types of pre-irradiation metabolism are discussed NSA 5-2997.

2012

DRUGS WHICH MAY GIVE PROTECTION AGAINST

ATOMIC RADIATION. J. F. Loutit. Mfg. Chemist 22, 49-51(1951). Feb.

Among substances discussed as protective devices are: amino acids, thiourea, sodium ethane, dithiophosphonate, protamine sulfate and toluidine blue. NSA 5-3001.

2013

ESTIMATING RADIOELEMENTS IN EXPOSED INDIVIDUALS II. RADIATION DOSAGE AND PERMISSIBLE LEVELS.

Jack Schubert. Nucleonics 8, No. 3, 66-78(1951). Mar.

Practical side of judging amounts and fates of radioactive substances entering a worker's body involves consideration of arbitrary standards that interrelate physiological data on "standard man" and properties of radioelements most harmful to him. NSA 5-3002.

2014

ON THE BRITISH RECOMMENDATIONS FOR PROTECTION IN ATOMIC BOMB ATTACKS. Rudolf Hanslian. Chem. Ztg. 74, 757-8(1950). Dec. 21. (In German)

Critical remarks concerning a British civil defense pamphlet are presented. Author questions sections on neutron danger and radioactive contamination NSA 5-3003.

2015

THE PHYSICIAN'S PROBLEM IN ATOMIC WARFARE.

James P. Cooney. J. Am. Med. Assoc. 145, 634-7 (1951). Mar. 3.

Types of atom bomb casualties are described. NSA 5-3004.

2016

SAFETY CONSIDERATIONS IN THE THERAPEUTIC USE OF RADIOACTIVE SUBSTANCES. George K. Schweitzer. J. Tenn. State Med. Assoc. 43, 164-6 (1950). May.

Health hazards and their detection x ray effects on body, and laboratory operation and construction are discussed. NSA 5-3005.

2017

WARFARE WITH RADIOACTIVE AGENTS. A MEDICAL APPRAISAL. PART I. GENERAL SURVEY. Finn Devik, Leiv Kreyberg, and Erik Poppe. p. 442-86 of Forsvarets Forskningsinstitutt, Arbok II, 1948-9. (In Norwegian)

An analysis of bodily damages wrought by atomic bombs in Japan is presented. NSA 5-3006.

2018

THE PATHOLOGICAL HISTORY OF CHRONIC X-RAY DERMATITIS AND EARLY X-RAY CARCINOMA.

S. B. Wolbach. J. Med. Research 21, 415-49(1909).

Author studied multiple carcinomata in skin of people who have repeated injuries from exposures to X rays. Repair fails to occur because of vascular changes. Other effects are atrophy of the glands and absorption of fat tissue and replacement by connective tissue. Changes in blood supply and connective tissue are responsible for eventual malignancy.

2019

RADIATION DOSES FROM DIAGNOSTIC X-RAY STUDIES. John S. Handloser and Robert A. Love. [nd]. 7p. (AECU-1177); RadioLOGY 57, 252-4(1951).

Doses received in various diagnostic x ray procedures, based on machines used by the medical department at Brookhaven National Laboratories are recorded as obtained using Al filters and from x-ray-tube data. NSA 5-3190.

2020

Radiation Lab., Univ. of Calif.

MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT JULY, AUGUST, AND SEPTEMBER, 1950-NOV. 8, 1950. Decl. Apr. 24, 1951. 75p. (AECU-3141; UCRL-960).

Includes reports on: metabolic properties of plutonium and allied materials, parallelism between indirect mechanism and target theories of radiation effects. NSA 5-3286.

2021

S GENE STRUCTURE-NEW EVIDENCE FROM TETRA-POLYD AND MUTATION. D. Lewis. Heredity 8, 435(1954)

Mutant S. Alleles, produced by x-rays, spontaneously have lost their 'pollen' specificity. When these specificity deficient alleles are incorporated into diploid pollen grains of autotetraploids, they show the full competition but not dominance effects of their unmutated predecessors. (from abstract)

2022

ANEMIA CAUSED IN RABBITS BY X-IRRADIATING THE EXTERIORIZED SPLEEN B R. Allen. Radiation Research 1, 487(1954)

A significant anemia is caused by x irradiating the surgically exteriorized spleens of rabbits with 1600 r. Data are presented showing the comparative peripheral blood counts of five groups of rabbits as follows: (1) spleen exteriorized and irradiated with 1600 r; (2) spleen exteriorized with no irradiation; (3) 1600 r total-body irradiation, (4) splenectomized and 1600 r total-body irradiation, (5) splenectomized but no irradiation.

2023

Washington Univ., St. Louis School of Medicine
RADIOSENSITIVE AND RADIORESISTANT PHASES IN ANTIBODY PRODUCTION. F. J. Dixon, D. W. Talmage, and S. C. Bukantz. [nd]. 2p. (AECU-1241).

Radiosensitive portion of antibody response lasts only a few hours (rabbits), remainder of response (antibody protein being produced) lasts several weeks and can be carried on undiminished in spite of radiation. NSA 5-3294.

2024

THE EFFECT OF WHOLE-BODY X-IRRADIATION ON THE METABOLISM OF THE RAT. D. E. Smith, E. B. Tyree, H. M. Patt, and E. M. Jackson. Mar. 1951. 13p. (AECU-1253; UAC-367), Proc. Soc. Exptl. Biol. Med. 78, 774-77(1951).

Single whole-body x irradiation had no effect upon rate of weight loss of starving rats nor upon level of basal O₂ consumption of starved and fed rats. NSA 5-3295.

2025

Argonne National Lab.

MORPHOLOGICAL AND RESPIRATORY CHANGES INDUCED IN MELANOPLUS DIFFERENTIALIS BY β IRRADIATION. Theodore N. Tahmisian and Jean Gasvoda. Feb. 1951. 1p. (AECU-1258, UAC-350)

Extensive damage was seen in prediapause grasshopper eggs exposed to 3.07 to 1215 r of β radiation from P³² or Sr⁸⁹ solutions. NSA 5-3296.

2026

Office of Research and Medical, ORE, AEC
MEDICAL RECORDS PILOT STUDY. Jack Moshman. [nd]. 44p. (ORO-13).

Medical records of AEC operating contractors were analyzed. Pilot study of 1050 cases included investigation of RBC and WBC counts, percentage of lymphocytes, polymorphonuclear neutrophils, and hemoglobin. NSA 5-3297.

2027

Tennessee Univ.

QUARTERLY PROGRESS AND WORK ACCOMPLISHMENT REPORT FOR QUARTER ENDING MARCH 31, 1950; AGRICULTURAL RESEARCH PROGRAM. Mar. 31, 1950. 13p. (ORO-21).

Includes reports on: bomb radiation effects on farm animals, calcium and fission product metabolism in animals, radiation effects on reproductive functions in farm animals; blood analysis of cattle. NSA 5-3298.

2028

Radiation Lab., Univ. of Calif.
LETHAL RADIATION EFFECTS OF X-RAYS, DEUTERONS,
AND ALPHA PARTICLES ON THE BACTERIUM
ESCHERICHIA COLI. R. Lowry Dobson. Feb. 28, 1951.
64p. (UCRL-1140). NSA 5-3299.

2029

AAAS SYMPOSIUM ON RADIOBIOLOGY. Abraham
Edelmann. Nucleonics 8, No. 4, 28-36(1951). Apr.

Subject matter of 22 papers includes: radiation
effect on plant growth and development, radiation-induced
mutations, x ray action on cells and rodent testicles,
effect of I^{131} on thyroid tissue; spleen shielding, C^{14}
metabolism; radiation-sickness therapy. NSA 5-3300.

2030

CHANGES IN CARCINOMA OF THE BREAST FOLLOWING
IRRADIATION. George Lumb. Brit. J. Surg. 38, 82-93
(1950). July.

Histological changes in 60 cases of breast cancer
removed by radical mastectomy after x-ray therapy (220
kv) are described and illustrated. NSA 5-3301.

2031

HISTOLOGICAL AND CYTOLOGICAL CHANGES
PRODUCED BY ALPHA-PARTICLES IN THE SKIN OF
MICE. Finn Devik. Acta Radiol. 35, 149-64(1951).
Feb.-Mar.

In this study of histological and cytological changes
in skin of hairless mice after external α irradiation,
it was found that some epidermal cells survived 100,000 r.
NSA 5-3303.

2032

THE IMPORTANCE OF THE RESISTANCE PHASE OF
THE ORGANISM AT THE TIME OF APPLICATION OF A
LETHAL DOSE OF X RADIATION. H. Betz. Comp.
rend. soc. biol. 144, 1439-42(1950). Oct. (In French).

Nonlethal 500 r x ray dose (in mice) was followed
at 7, 10 or 15 days by 700 r. Protective action of the
non-lethal exposure is discussed but no firm conclusions
are considered to be justifiable. NSA 5-3304.

2033

PATHOLOGICAL EFFECTS OF ATOMIC RADIATIONS.
G. Capretti. Giorn. clin. med. (Parma) 32, 319-55
(1951). Mar. (In Italian)

General survey of pathological symptoms and lesions
produced by ionizing radiations and atomic bomb explosions
is presented. NSA 5-3305.

2034

QUANTITATIVE EVALUATION OF GROWTH RATES IN
TUMORS BEFORE AND AFTER RADIATION. Anna
Goldfeder. Cancer Research 11, 169-73(1951). Mar.
NSA 5-3306.

2035

ROLE OF THE TIME ELEMENT IN FAST-ELECTRON
IRRADIATIONS OF HUMAN SKIN. Richard Kurt Kepp,
Kurt Muller, and Herbert Reich. Strahlentherapie 84,
No. 2, 225-44(1951). (In German)

Test irradiations of human skin with 3 Mev electrons
from a betatron showed that time factor plays a notable
part even in dose-efficiency range of 300-1800 r/min.
NSA 5-3307.

2036

STUDIES ON THE ALTERATIONS OF DEVELOPMENT OF
THE TEETH AND ADJACENT STRUCTURES FOLLOWING
LOCAL ADMINISTRATION OF CHROMIC PHOSPHATE
CONTAINING P^{32} . M. S. Burstone. J. Am. Dental
Assoc. 42, 418-23(1951). Apr.

P^{32} irradiation of developing jaws of mice produced
changes in histodifferentiation and morphodifferentiation
of dentition. Changes and abnormalities are described.
NSA 5-3308.

2037

HEALTH HAZARDS IN RADIATION WORK. M. Ingram.
Science 111, 103-9(1950).

A general discussion of health hazards in work with
ionizing radiations is presented. Education of personnel
to appreciate the need for strict observance of routine
safety measures is stressed. NSA 5-3310.

2038

ESTIMATING RADIOELEMENTS IN EXPOSED
INDIVIDUALS -III. BIOASSAY OPERATIONS AND
PROCEDURES. Jack Schubert. Nucleonics 8, 59-67
(1951). Apr.

Author outlines practical recommendations for
administrative and analytical procedures designed to
safeguard laboratory personnel from overexposure
to radioelements. NSA 5-3311.

2039

PROBLEMS IN RADIOISOTOPE THERAPY NURSING.
Pauline Gazay. Ind. Med. Surg. 20, 234-5(1951). May.

Precautions in therapeutic use of radioisotopes for
both nurse and patient are given with reference to
intravenous injection and oral dosage. NSA 5-3313.

2040

BIOLOGICAL ACTIONS OF IONIZING RADIATIONS.
L. H. Gray. VOLUME 2. CHAPTER 8, p.240-305
OF PROGRESS IN BIOPHYSICS AND BIOPHYSICAL
CHEMISTRY. J. A. V. Butler and J. T. Randall,
eds. New York, Academic Press, Inc. 1951.

The author discusses the effects on animals of whole
body exposure to ionizing radiations, including repair of
radiation damage to cells. The author also reports on
chemical agents which often result in abnormalities
similar to those produced by ionizing radiations and on
radiation damage in protozoa, yeasts, fungi, bacteria,
and viruses.

2041

SAFETY IN THE USE OF RADIOACTIVE ISOTOPES.

Edith H. Qumby. Am. J. Nursing 51, 240-3(1951). Apr.

Fundamentals of nuclear physics and precautions in
handling radioisotopes are explained, and administration
of radioelements to patients described. NSA 5-3316.

2042

FURTHER STUDIES ON RECOVERY FROM RADIATION
INJURY. L. O. Jacobson, E. L. Simmons, E. K. Marks,
E. O. Gaston, M. J. Robson, and J. H. Eldredge. J. Lab.
Clin. Med. 37, 683-97(1951). May.

In spleen-shielding studies with mice and rats it is
assumed that either (1) shielded tissues produce noncellular
substance beneficial to recovery, or (2) cells migrate
from shielded tissue to enhance recovery of irradiated
tissues. NSA 5-3317.

2043

RADIATION SICKNESS AND ITS TREATMENT WITH
DRAMAMINE. Edward DeFoe, Paul H. Ritman, and M.
Herbert Nathan. Radiology 56, 420-2(1951). Mar.

Effectiveness of dramamine in radiation sickness is
believed to be related to its antihistaminic effect.
Importance of psychogenic factors in treatment of
radiation sickness is emphasized. NSA 5-3318.

2044

THE TREATMENT OF DISTURBANCES FOLLOWING
RADIUM THERAPY WITH DESOXYCORTICOSTERONE.
R. Grattarola and M. Bassi. Minerva ginecol. 2, 188
(1950). (In Italian) NSA 5-3319.

2045

Atomic Energy Project, Univ. of Calif., Los Angeles
STUDIES ON THE RADIOSENSITIVITY OF BONE MARROW.
I. THE RELATIVE SENSITIVITY OF ERYTHROID AND
MYELOID ELEMENTS. William N. Valentine and Morton

Lee Pearce. Apr. 4, 1951. 29p. (UCLA-123), Blood 7, 1-13(1952).

Data suggest that on basis of functional impairment, erythropoietic tissue is significantly less sensitive to radiation injury than is myelopoietic tissue of the same animal. NSA 5-3601.

2046

Atomic Energy Project, Univ. of Calif., Los Angeles
STUDIES ON THE RADIOSENSITIVITY OF BONE MARROW,
II. THE EFFECT OF LARGE, REPEATED WHOLE
BODY IRRADIATION EXPOSURE ON HEMATOPOIESIS.
William N. Valentine, Morton Lee Pearce, and John S.
Lawrence. Apr. 16, 1951. 15p. (UCLA-124), Blood 7,
14-9(1952).

Little evidence of permanent functional damage of
erythropoietic tissue by repeated exposures was observed.
NSA 5-3602.

2047

Atomic Energy Project, Univ. of Calif., Los Angeles
STUDIES ON THE RADIOSENSITIVITY OF BONE MARROW,
III. THE DYNAMICS OF ERYTHROCYTE REGENERATION
AFTER HEMORRHAGE AND IRRADIATION. M. L.
Pearce, M. A. Greenfield, and W. N. Valentine. Apr.
19, 1951. 15p. (UCLA-125), Blood 7, 207-13(1952).
NSA 5-3603.

2048

Naval Medical Research Section, Joint Task Force One
ABERRATIONS FOUND IN THE PROGENIES OF PLANTS
GROWN FROM IRRADIATED COTTON SEED. Meta S.
Brown. [nd]. 10p. (NP-1903).

Second generation of Gossypium hirsutum plants from
seeds exposed to γ radiation at Bikini showed that although
chromosome breaks are readily induced, gene mutations
are infrequent. NSA 5-3604.

2049

CHANGES IN THE ELECTRIC CHARGE OF ERYTHROCYTES
OBSERVED IN IRRADIATED ANIMALS. Gaston Meyniel
and Suzanne Bazin. Compt. rend. soc. biol. 144, 1463-5
(1950). Nov. (In French)

In guinea pigs irradiated with slightly less than the
lethal x ray dose, electrophoretic study of erythrocytes
showed a 25% diminution of their surface charge appearing
7 days post-irradiation, observed only in presence of
animal's own serum. NSA 5-3605.

2050

Naval Radiological Defense Lab.
CHANGES IN THE PLASMA PHOSPHOLIPIDS IN RATS
FOLLOWING WHOLE BODY X-IRRADIATION. R. A.
Neve and Cecil Entenman. Apr. 10, 1951. 17p. (AD-307
(B)).

Changes in PLP³¹ of fasted female rats were determined
after whole-body, 250-kv, x-irradiation, with doses from
750 to 5000 r. Marked increase in plasma level of PLP³¹
was observed. NSA 5-3606.

2051

EFFECT OF HIGH CONCENTRATION OF PHOSPHORUS-
32 ON GROWTH OF THE POTATO. W. K. Sinclair and
W. R. Stanton. Nature 167, 234-5(1951). Feb. 10,

Abnormalities in plants treated with 10 and 100 μ c
P³² per plant included increased fleshiness of leaves,
loss of secondary leaflets and increased branching.
NSA 5-3607.

2052

EFFECT OF ROENTGEN-RAY RADIATION ON THE
BIOSYNTHESIS OF NUCLEIC ACIDS AND NUCLEIC
ACID PURINES. Howard E. Skipper and Jack H. Mitchell,
Jr. Cancer 4, 363-6(1951). Mar.

X radiation (950 r) inhibits incorporation of radio-
carbon from bicarbonate and formate into visceral

nucleic acids and nucleic acid purines over a 6 hr period.
NSA 5-3608.

2053

Naval Radiological Defense Lab.
EFFECTS OF TOTAL BODY X-IRRADIATION ON BLOOD
COAGULATION IN THE RAT. (Technical Objective
AW-6). Stanton H. Cohn. Mar. 2, 1951. 23p. (AD-298(B)).

Hemorrhagic syndrome after exposure of rats to
400 r of x rays was studied, and a blood coagulation
defect was found. NSA 5-3609.

2054

IONIZING RADIATION AND BLOOD-FORMING TISSUES.
J. Am. Med. Assoc. 144, 1182-3(1950). Dec. 2.

This is a discussion based on studies of normal
laboratory animals exposed to single whole-body x ray
doses in LD₅₀ range. NSA 5-3610.

2055

ON THE MUTATION THEORY OF THE ORIGIN OF
CANCER. B. Rajewsky. Z. Krebsforsch. 56, 274-84
(1949). (In German)

Strong tumor-producing effect of small α -ray doses
is described NSA 5-3611.

2056

PATHOLOGY OF IONIZING RADIATION. Elbert De
Coursey. Minnesota Med. 34, 313-18, 318(1951). Apr.

Lymphoid and hematopoietic tissues, skin, genital
organs and gastrointestinal tract are reported to be most
severely affected by ionizing radiation from an atomic
bomb explosion. NSA 5-3612.

2057

RADIATION EFFECTS IN PLANT NUTRITION
EXPERIMENTS WITH PHOSPHORUS-32. C. Bould, D. J.
D. Nicholas, and W. D. F. Thomas. Nature 167, 140-2
(1951). Jan. 27.

In a study of radiation effects on growth and physiology
of barley and tomato plants using P³²-labeled NaH₂PO₄,
data show radiation effects are slight and insufficient
to preclude the use of P³² in plant-nutrition studies.
NSA 5-3613.

2058

RADIATION EFFECTS ON LIVER GLYCOGEN IN THE
RAT. M. H. Ross and J. O. Ely. J. Cellular Comp.
Physiol. 37, 163-71(1951). Feb.

Results indicate that the effect of radiation on
glycogen deposition in rats is not a primary one.
NSA 5-3614.

2059

STUDIES IN THE GENETICS OF SOME X-RAY-INDUCED
MORPHOLOGICAL MUTANTS IN COPRINUS LAGOPUS.
Ursula Mittwoch. J. Genetics 50, 202-5(1951). Jan.
NSA 5-3615.

2060

Atomic Energy Project. Univ. of Calif., Los Angeles
RECOMMENDATIONS FOR CIVIL DEFENSE RELATIVE
TO RADIOLOGICAL SAFETY. Andrew H. Dowdy. Feb.
15, 1951. 57p. (UCLA-113).

Topics include: atomic bomb phenomena pertaining
to radiation hazards, anti-personnel effects and emergency
exposure levels, prevention of contamination, diagnosis
and treatment of radiation injuries. NSA 5-2617.

2061

HEALTH HAZARDS FROM COSMIC RADIATION AT HIGH
ALTITUDE. H. J. Schaefer. Tech. Data Dig. 15, No. 10,
21-6(1950). Oct.

It is concluded that there is no danger of human
beings above 70,000 ft being killed instantly or within a
short time by heavy-nuclei rays but that harmful effects
are slowly accumulated. Average energy of cosmic ray
primaries is 20 billion ev. Energy dissipation is classified

as "penetrating shower" due to heavy particles (protons, neutrons, mesons) or "cascade shower" due to electrons, positrons, and α particles. NSA 5-3618.

2062

Atomic Energy Project, Univ. of Rochester
BACTERIOLOGICAL STUDIES IN THE X-RADIATED DOG. F. W. Furth, M. P. Coulter, and J. W. Howland. Feb. 23, 1951. 20p. (UR-157); Am. J. pathol. 28, 171-83 1952.

Bacteriological studies were carried out on 24 dogs given 450 r whole-body x-ray dose. Aureomycin was administered to 12 dogs post-irradiation. NSA 5-3621.

2063

THE EFFECT OF AUREOMYCIN AND TERRAMYCIN ON THE X-RADIATED RAT. F. W. Furth, M. P. Coulter, and J. W. Howland, Feb. 14, 1951. 14p. (UR-158); Am. J. Pathol. 28, 185-95(1952). (UR-158).

Aureomycin and terramycin administered to rats after 700 r lowered incidence of diarrhea, common in x radiated rats, favorably influenced regain of weight. Aureomycin did not effect mortality while terramycin decreased it. NSA 5-3622.

2064

EFFECT OF PERORAL ADMINISTRATION OF AUREOMYCIN ON THE SURVIVAL OF RATS EXPOSED TO LETHAL DOSES OF X-RAYS. G. Lambert, J. Maisin, M. Mandart, E. Plugers, and G. Podio. Compt. rend. soc. biol. 144, 1558-60 (1950). Nov. (In French)

Aureomycin hydrochloride administration increased survival after 500 r irradiation of rats, but not after 600 r irradiation. NSA 5-3623.

2065

Chicago Univ.
TREATMENT OF INFECTION FOLLOWING EXPOSURE TO IONIZING RADIATION. C. Phillip Muller and Carolyn W. Hammond. [nd]. 6p. (NP-1927).

Control of post-irradiation bacteremia in mice was studied using streptomycin, chloramphenicol, aureomycin and terramycin as therapeutic agents. NSA 5-3624.

2066

THE EFFECT OF INTENSITY OF INFRARED ON X-RAY-INDUCED CHROMOSOME ABERRATIONS IN TRADE-SCANTIA. H. T. Yost, Jr. Genetics 37, 457-68(1952).

2067

Atomic Energy Project. Univ. of Rochester
THE EFFECTS OF WHOLE BODY X-IRRADIATION ON THE BLOOD GLUCOSE LEVELS IN RABBITS. H. E. Thompson and L. T. Steadman. p. 13-33 of Quarterly Technical Report, October 1, 1950 thru December 31, 1950. Feb. 1, 1951. (UR-152(p.13-33)). NSA 5-3817.

2068

Atomic Energy Project, Univ. of Rochester
FAILURE OF ALPHA TOCOPHEROL TO PROTECT AGAINST RADIATION INJURY IN THE RAT. F. W. Furth, M. P. Coulter, and J. W. Howland. p. 34-8 of Quarterly Technical Report; October 1, 1950 thru December 31, 1950. Feb. 1, 1951. (UR-152(p.34-8)).

Administration of large alpha tocopherol or aureomycin doses prior to large x ray doses fails to alter irradiation lethality for rats. NSA 5-3818.

2069

Atomic Energy Project, Univ. of Rochester
THE INCIDENCE OF BACTEREMIA IN THE X-RADIATED RAT. M. P. Coulter, F. W. Furth, and J. W. Howland. p. 44-6 of Quarterly Technical Report; October 1, 1950, thru December 31, 1950. Feb. 1, 1951. (UR-152(p.44-6)). NSA 5-3819

2070

Atomic Energy Project, Univ. of Rochester

EFFECTS OF A SECOND LARGE DOSE OF X-RADIATION ON DOGS SURVIVING ONE DOSE OF X-RADIATION. F. W. Furth, M. P. Coulter, and J. W. Howland. p. 47-53 of Quarterly Technical Report; October 1, 1950 thru December 31, 1950. Feb. 1, 1951. (UR-152(p.47-53)).

After 1st 450 r x ray dose, 30% of the 19 dogs showed signs of radiation toxicity. After second dose all developed radiation sickness and only 1 survived. NSA 5-3820.

2071

ACTION OF RADIATIONS ON BIOCHEMICAL PROCESSES IN THE LIVING CELL. A. Santos Ruiz. Rev. geofis. 9, 296-316(1950). July-Sept. (In Spanish) NSA 5-3822.

2072

CATION EXCHANGE IN MAMMALIAN ERYTHROCYTES. III THE PROLYTIC EFFECT OF X-RAYS ON HUMAN CELLS. C. W. Sheppard and Gertrude E. Beyl. J. Gen. Physiol. 34, 391-704(1951).

Heparinized human whole blood was exposed to 54,000 r in vitro, then equilibrated under controlled atmosphere at 24° or 38° C. There was progressive loss of K and quantitative replacement with Na in rbc, with no osmotic disturbance over a 26 hr. period. At dose of 20,000 r and 24° C mean rate of loss of K is about 0.4% of cell's initial K/hr. Rate doubles when dose is increased by 20,000 r and is greater when storage temperature is 5° C. Rate of entrance of K into rbc is not altered by irradiation. Authors suggest that radiation may interfere with selective K accumulation by the cell (preferential retention). NSA 5-3823.

2073

DAMAGES IN GROWING BONES PRODUCED BY X-RAYS, AND WAYS TO AVOID THEM. Caspar Montag. Strahlentherapie 84, 314-24(1951). (In German). NSA 5-3824.

2074

COMPARISON OF X- AND BETA-RADIATION EFFECTS IN RABBITS. F. W. Bishop. p.194-203, of Biological Effects of External Radiation. (NNES VI-2). Henry A. Blair, ed. New York, McGraw-Hill Book Co., Inc. 1954.

The minimal dosage necessary to produce an erythematous reaction in the ear of the rabbit with 30-kv x-rays is about 1000 r. With 900 r there was epilation without erythema. The lower dose of beta rays capable of causing an erythema in the rabbit ear is about 3000 r. Epilation was not observed until 3500 rep had been given. (from authors' summary). NSA 5-3827.

2075

EFFECT OF X-IRRADIATION ON INTESTINAL MOTILITY OF THE RAT. Robert A. Conrad. Am. J. Physiol. 165, 375-85(1951). May 1.

Increased tone and motility of rat intestine following x ray doses of 100 r and above are apparently due to stimulation of cholinergic nerves.

2076

ENDOTHELIAL DAMAGE BY X-RAYS DISCLOSED BY LYMPH FISTULA STUDIES. R. R. Bigelow, J. Furth, M. C. Woods, and R. H. Storey. Proc. Soc. Exptl. Biol. Med. 76, 734-6(1951).

Increased capillary permeability was observed in dogs and rats exposed to LD₅₀ of x rays (appearance of many erythrocytes in lymph). Loss due to capillary damage, death of aging erythrocytes, and inhibited erythropoiesis are considered main causes of radiation anemia. NSA 5-3828.

2077

INDUCED AND OTHER VARIATIONS IN BACTERIAL CULTURES. PART II. GENERAL SURVEY OF CHANGES PRODUCED IN BACT. LACTIS AEROGENES

(*AEROBACTER AEROGENES*) BY ULTRA-VIOLET LIGHT AND SOME OTHER MUTAGENIC AGENTS. A. C. R. Dean and Cyril Hinshelwood. *J. Chem. Soc.*, 1159-68 (1951). May.

Agents used: U-V, β and γ from S^{35} , chemicals (proflavine and Fenton's reagent). Chief effects; decreased growth rate in minimally adequate medium, modification of sugar fermentation tests. Specific amino acid requirements seldom appeared, absolute ones, never. A significant proportion of mutants appeared only when fraction surviving exposure was small. NSA 5-3829.

2078

INFLUENCE OF AGE, BODY WEIGHT, AND SEX ON SUSCEPTIBILITY OF MICE TO THE LETHAL EFFECTS OF X-RADIATION. Herbert L. Abrams. *Proc. Soc. Exptl. Biol. Med.* 76, 729-32 (1951). Apr.

Age of mice at time of irradiation profoundly alters resistance to a single whole-body x ray dose. Body weight and sex have no apparent significance with regard to capacity to withstand irradiation. NSA 5-3830.

2079

THE INFLUENCE OF POLYPOIDITY ON THE X-RAY SENSITIVITY OF CELLS. C. J. Bishop. *Records Genetics Soc. Am.*, No. 19, 88 (1950).

When microspores and pollen grains of diploid and tetraploid species of *Tradescantia* were treated with equal x ray doses, results showed sensitivity of the two was the same when compared on the basis of breaks/chromosomes. Comparison of breaks/cell shows that tetraploid species has twice as many breaks as the diploid plants. NSA 5-3831.

2080

LIFE SPAN OF WHITE BLOOD CELLS AS MEASURED IN IRRADIATED PARABiotic RATS. Donald C. Van Dyke and Rex L. Huff. *Am. J. Physiol.* 165, 341-7 (1951). May 1.

Average survival time of mononuclear leukocytes in the blood of irradiated parabiotic rat is calculated to be 170 min; of polymorphonuclear leukocytes, 23 min. NSA 5-3833.

2081

RESEARCH AND DISCUSSION ON DIFFERENT MECHANISMS OF RADIATION ACTION IN SOME BIOLOGICAL SYSTEMS. Wolfgang Huber. *Naturwissenschaften* 38, 21-9 (1951). Jan. (In German)

Reproduction of cells is impaired by chemical action of ionizing radiations on nucleic acid molecule. Any reaction of biological objects to radiation dose and dose efficiency must be considered in conjunction with such accompanying factors as temperature, medium, and atmospheric conditions. NSA 5-3834

2082

Brookhaven National Lab.

THE THEORETICAL GROUND-LEVEL DOSE-RATE FROM THE RADIOARGON EMITTED BY THE BROOKHAVEN REACTOR STACK. Phillip H. Lowry, July 1950. 33p. (BNL-81). NSA 5-3835.

2083

Metallurgical Lab., Univ. of Chicago
MEDICAL SERVICES OF THE PLUTONIUM PROJECT; [NNES DIV. IV, VOL. 20, PART A, CHAP. 1]. John E. Wirth. July 24, 1946. 24p. (CH-3543).

Nature of preemployment physical examination and criteria for acceptance or rejection of personnel are discussed. Dispensary care, laboratory facilities, special hazards, and clinical manifestations of radiation damage are reviewed. NSA 5-3836.

2084

PROTECTION AGAINST NEUTRONS. Hermann Muth. *Strahlentherapie* 78, 551-562 (1949). NSA 4-1854.

2085

RADIATION OF VAGINAL CELLS IN CERVICAL CARCINOMA. I. DESCRIPTION OF CELLULAR CHANGES. R. M. Graham. *Surg., Gynecol. Obstet.* 84, 153 (1947).

Two hundred and six cases of cervical carcinoma, in which patients were treated by radiation, have been studied by vaginal smear. Immediate and late changes in cells in vaginal secretion are described, correlation with studies by biopsy is discussed and applicability of method to the study of radiation effects in cervical cancer is suggested.

2086

Atomic Energy Project, Univ. of Rochester
RADIUM ANALYSIS OF SOURCE AND TAP WATER. J. B. Hursh and A. A. Gates. p. 100-5 of Quarterly Technical Report, October 1, 1950 thru December 31, 1950. Feb. 1, 1951. 6p. (UR-152(p. 100-5)).

Ra content of H_2O samples (source and tap) from 18 Western U. S. cities was measured. Ra in source water ranged from 20×10^{-16} to 0.3×10^{-16} g of Ra/ml; for tap water, 3×10^{-16} to 0.3×10^{-16} g of Ra/ml. NSA 5-3839.

2087

TOLERABLE RADIATION DOSES. Larkin Kerwin. *Laval med.* 16, 489-505 (1951). Apr. (In French)

Results show that a maximum daily dose of 0.1 r, often accepted as tolerable, produces observable effects and, if multiplied by a factor of only 5, can become damaging. NSA 5-3843.

2088

EFFECT OF CRUDE AND CRYSTALLIZED AUREOMYCIN ON THE WEIGHT OF NORMAL AND X-RADIATED RATS. F. W. Furth, M. P. Coulter, and J. W. Howland. p. 39-43 of Quarterly Technical Report; October 1, 1950 thru December 31, 1950. Feb. 1, 1951. 5p. (UR-152(p. 39-43)).

Aureomycin administered orally in either crude or crystalline form failed to increase weight gain of normal or x rayed rats, although incidence of diarrhea of x rayed rats was markedly diminished. NSA 5-3845.

2089

THE BIOLOGICAL ACTIVITY OF A FLAVONOID (VITAMIN "P") COMPOUND. Boris Sokoloff, Walter H. Eddy, and James B. Redd. *J. Clin. Invest.* 30, 395-400 (1951). Apr.

A flavonoid preparation from citrus fruit protects against leukotoxine and bacterial polysaccharide, protects rats somewhat against x ray damage and reduces erythema of skin in patients undergoing deep x ray therapy. NSA 5-3846.

2090

IRRADIATION DAMAGE TO MICE. Oscar Felsenfeld, Sachiko Janet Ishihara, Thora Waters, and Jeannette Norsen. *Lab. Digest* 14, 18-19 (1951). Mar.

Neomycin, Glucomycin, Neobacm and Prodigiosin increased survival of mice following LD_{50} exposure. NSA 5-3847.

2091

TREATMENT OF LEUKEMIA WITH ARTIFICIAL RADIOACTIVE SODIUM. A PRELIMINARY REPORT. Orgen E. Thygesen, Aage Videbaek, and Irgens Villaume. *Acta Radiol.* 25, 305-16 (1944).

Author believes preliminary results of treating chronic lymphatic leukosis with intravenous Na^{24} indicate

the need for further investigation of Na²⁴ on a broader basis. NSA 5-3850.

2092

Atomic Energy Project, Univ. of Calif., Los Angeles
PULMONARY DISTRIBUTION OF RADIOACTIVE PARTICLES IN RABBITS AFTER INHALATION AND INTRAVENOUS INJECTION. George V. Taplin, James S. Grevior, Mary Louise Gautschi, Camille Finnegan, and Arthur Dunn. Ann. Allergy 9, 703-13, 726(1951).

Results show that a single short inhalation exposure to insoluble radioactive particles about 1 μ in size may be hazardous. Efficiency of respiratory tract clearance is an important physiological safety factor. NSA 5-3859.

2093

Notre Dame Univ.
SOME ELEMENTARY PHYSICAL AND CHEMICAL PROCESSES IN RADIOBIOLOGY. Milton Burton. [nd]. 14p. (AECU-1328).

Radiobiological observations, particularly relating to target theory, are reviewed. Effect of O₂ and inhibition of O₂ effects are explained in terms of elementary physical and chemical processes of radiation chemistry. NSA 5-3910.

2094

Notre Dame Univ.
ELEMENTARY PROCESSES IN THE RADIATION CHEMISTRY OF WATER AND IMPLICATIONS FOR RADIOBIOLOGY. Milton Burton. [nd]. 22p (AECU-1326). Brit. J. Radiol. 24, 416-22(1951).

Effect of radiation on a simple biological entity suspended in water is described. NSA 5-3911.

2095

National Research Council, Committee on Nuclear Science
RESEARCH AND TRAINING FACILITIES FOR RADIOBIOLOGY AND FOR USE OF ISOTOPES IN BIOLOGY AND MEDICINE IN THE UNITED STATES AND CANADA. Harold D. Copp. June 1950. 156p. (NP-3083).

For 130 institutions the following are listed; research, clinical use of isotopes, and training for such use; future work; health-protection, and number of staff members and students. NSA 5-4053.

2096

Brookhaven National Lab.
BIOLOGY DEPARTMENT, p. 115-24 of Quarterly Progress report; October 1-December 31, 1950. Mar. 1951. (BNL-93(p. 115-24)).

Topics include chromosome breakage and mitotic inhibition; regeneration of x rayed *Tradescantia*, cytochemical analysis of x ray effects, effect of x ray on fibrinogen, H₂O metabolism, effect of glucose on radiation syndrome; role of adrenal in irradiation syndrome. NSA 5-4054.

2097

Atomic Energy Project, Univ. of Calif., Los Angeles
THE EFFECT OF ROENTGEN RAY IRRADIATION ON RATS PREMEDITATED WITH THYROXIN AND THIOURACIL DERIVATIVES. Thomas J. Haley, Samuel Mann, and Andrew N. Dowdy. May 18, 1951. 11p. (UCLA-135), J. Am. Pharm. Assoc. Sci. Ed. 41, 39-41(1952)

Potential sulfhydryl groups in the molecules of thiouracil compounds are available for protecting sulfhydryl groups in the animal but a great excess of the compounds is necessary before protective effect is observed. NSA 5-4057.

2098

Atomic Energy Project, Univ. of Rochester
CROSS CIRCULATION STUDIES ON THE IRRADIATED DOG. P. Rekers, P. Salisbury, J. Miller, N. Marti, and N. Papageorge's, Jr. Mar. 30, 1950. 12p. (UR-159).

Cross circulation through carotid to carotid anastomosis or cross transfusion was performed using one dog 6-10 days after 450 r x ray dose and one normal dog. The procedure caused an increase in rbc and wbc in irradiated animals during cross-circulation, and a somewhat more sustained (returned to leukopenic levels 48 hours after cross-transfusion) elevation of wbc with cross-transfusion. NSA 5-4058.

2099

Atomic Energy Project, Univ. of Rochester
EFFECT OF SINGLE DOSES OF X-RAY ON THE SURVIVAL OF RATS. T. Noonan, F. Van Slyke, and J. Hursh. Apr. 20, 1951. 12p. (UR-161).

Mean survival times of irradiated rats (150, 300 or 600 r, 250 kvp x rays, 18.5 r/min) was reduced by an amount proportional to dose. NSA 5-4059.

2100

Naval Medical Research Section, Joint Task Force One
CYTOLOGICAL ANALYSIS OF TRANSLOCATIONS IN CORN CHROMOSOMES RESULTING FROM IONIZING RADIATION OF THE TEST ABLE ATOMIC BOMB AND X-RAYS AND OF TRANSLOCATIONS FROM OTHER SOURCES. A. E. Longley. June 10, 1950. 60p. (NP-3072). NSA 5-4061.

2101

Oklahoma Univ., Research Inst.
STUDIES IN ISOLATION AND IDENTIFICATION OF FLAVONOID PIGMENTS OF USE IN THE CONTROL OF RADIATION INJURY, PROGRESS REPORT FOR 1950. Dec. 29, 1950. 17p. (ORO-32). NSA 5-4063.

2102

Naval Radiological Defense Lab.
RELATIVE IMPORTANCE OF EXTERNAL AND INTERNAL RADIATION HAZARDS FROM AN ATOMIC BOMB DETONATION. A. L. Baietti and F. R. Holden. Nov. 8, 1950. 13p. (AD-268(H)).

Although for 1st 24 hr after atom bomb detonation external radiation is of greater tactical importance, internal hazards, developing later, may persist for longer periods producing serious internal effects in man. NSA 5-4064.

2103

Radiation Lab., Univ. of Calif.
MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT; OCTOBER, NOVEMBER, DECEMBER, 1950. Feb. 27, 1951. Decl. July 16, 1951. 61p. (AECU-3200, UCRL-1143).

Extensive radiotracer program is outlined, Specific liver irradiation lowers the disappearance constant of injected chromic phosphate in rabbits and mice, partly by decreasing efficiency of liver phagocytes, partly by decreasing liver blood flow. NSA 5-4306.

2104

Argonne National Lab.
TRITIUM-INDUCED EFFECTS IN PARAMECIUM AURELIA. E. L. Powers and Deborah Shefner. May 1951. 13p. (AECU-1485, UAC-403). Proc. Soc. Exptl. Biol. Med. 78, 493-97(1951).

An increasing death rate was observed with increasing radioactivity of the medium. NSA 5-4311.

2105

Oak Ridge National Lab., Y-12 Area
THE EFFECT OF X IRRADIATION ON ERYTHROGENESIS, PLASMA, AND CELL VOLUMES. Jacob Furth, G. A. Andrews, R. H. Storey, and Leon Wish. June 11, 1951. 32p. (ORNL-878), Southern Med. J. 44, 85-92(1951).

Continuous leakage of erythrocytes through damaged endothelium to tissue spaces and lymph channels is believed to be a major cause of post-irradiation shock and anemia. NSA 5-4312.

2106

Atomic Energy Project, Univ. of Calif., Los Angeles
THE EFFECT OF ROENTGEN IRRADIATION UPON
PROTEIN ABSORPTION IN THE MOUSE. Leslie R.
Bennett, Sarah M. Chastain, Arthur B. Decker, and
James F. Mead. May 31, 1951. 13p. (UCLA-137).
Proc. Soc. Exptl. Biol. Med. 77, 715-18(1951).

No change in protein absorption rate occurs in mice
exposed to 600-r whole-body dose of x rays, although a
change in tone and mobility of the gastrointestinal tract
was noted. NSA 5-4313.

2107

Radiation Lab., Univ. of Calif.

THE MOVEMENT OF SODIUM AND POTASSIUM IN THE
TISSUES OF THE RAT FOLLOWING ACUTE RADIATION
INJURY USING Na²² AND K^{42,43} AS TRACERS. John Z.
Bowers and Kenneth G. Scott. Jan. 1951. 20p. (UCRL-
1101). NSA 5-4314.

2108

DEVELOPMENT OF THYROID NEOPLASMS IN THE
RAT FOLLOWING A SINGLE INJECTION OF RADIO-
ACTIVE IODINE. R. C. Goldberg and I. L. Chaikoff.
Proc. Soc. Exptl. Biol. Med. 76, 563-6(1951). Mar.

Thyroid gland changes in 10 rats sacrificed 18 months
after single injection of 400 μ c of I¹³¹ are reported
NSA 5-4315

2109

RADIOACTIVITY, A FACTOR IN PLANT ENVIRONMENT.
C. Stuart Gager. Science 25, 263-4(1907).

This article mentions researches that lead to the
conclusion that the phenomenon of radioactivity is not
confined to the so-called radioactive elements, radium,
uranium, thorium, and others but is a general property
of matter. It is a factor in the normal environment of
living things.

2110

THE EFFECT OF IONIZING RADIATIONS ON THE
BROAD BEAN ROOT. PART VIII. L. H. Gray and M. E.
Scholes. Brit. J. Radiol. 24, 285-91(1951). May.

After exposures to doses of γ radiation up to 250 r,
x radiation to 140 r and α radiation to 36 rep, growth
rate of *Vicia faba* roots falls, then returns to normal.
Chromosome structural damage is believed to be the
major factor in growth inhibition by all 3 radiations.
NSA 5-4317.

2111

THE EFFECT OF IONIZING RADIATIONS ON THE BROAD
BEAN ROOT. VIII. (continued). L. H. Gray and M. E.
Scholes. Brit. J. Radiol. 24, 348-52(1951). June.

Two appendices to the previous articles are presented,
covering methods of handling and irradiation, methods of
estimating number of cells per unit volume of tissue of
particular region. NSA 5-4318.

2112

EFFECTS OF IRRADIATION ON EMBRYONIC DEVELOP-
MENT. I. X-RAYS ON THE 10TH DAY OF GESTATION
IN THE RAT. James G. Wilson and John W. Karr.
Am. J. Anat. 88, 1-34(1951). Jan.

Exposure of intrauterine rat embryos to 50, 100,
200, or 400 r on 10th day of gestation results in: general
and localized growth retardation, aberrant growth or
malformation, or embryonic death. NSA 5-4319.

2113

THE EFFECT OF X-RADIATION ON THE BIOSYNTHESIS
OF HEMOGLOBIN. Jonas E. Richmond, Kurt L. Altman
and Kurt Salomon. J. Biol. Chem. 190, 817-25(1951).
June.

Hemin and globin synthesis are differently affected
by radiation, both evidently occurring at different rates.
NSA 5-4320.

2114

THE FREQUENCY OF X-RAY INDUCED CHROMOSOME
ABERRATIONS IN TRADESCANTIA AS MODIFIED BY
NEAR INFRARED RADIATION. Henry T. Yost, Jr.
Genetics 36, 176-84(1951). Mar. NSA 5-4321.

2115

INHIBITION OF CITRIC ACID SYNTHESIS IN VIVO BY
X-RADIATION. Kenneth P. DuBois, Kenneth W. Cochran,
and John Doull. Proc. Soc. Exptl. Biol. Med. 76, 422-7
(1951). Mar.

Lethal doses of x ray inhibited citrate accumulation
in spleen, thymus, ileum, pancreas and testes of
fluoroacetate-treated rats. No effect was observed on
citrate accumulation in brain and heart. Sublethal doses
were inhibitory only in spleen and thymus. Inhibition was
greater with increasing x ray doses, was reversible after
sublethal but not lethal doses. Citrate accumulated in
livers of fluoroacetate-treated, x irradiated rats in contrast
to normal rats treated with fluoroacetate. NSA 5-4322.

2116

IRRADIATED HUMAN PLASMA AND PHAGOCYTOSIS.
Jirair N. Sarian. Am. J. Roentgenol. Radium Therapy
65, 940-6(1951). June.

Irradiation enhances phagocytosis, probably due to
activation of opsonins of plasma. Use of irradiated sera
is discussed. NSA 5-4323.

2117

NEUTRON CATARACTS. Arlington C. Krause and James
O. Bond. Am. J. Ophthalmol. 34, 25-35(1951). Jan.

X and neutron radiation-induced cataracts are described
and actions of the two radiations are discussed.
NSA 5-4324.

2118

Naval Radiological Defense Lab.

PLASMA PROTEINS AND PLASMA VOLUMES IN RATS
FOLLOWING TOTAL BODY X-IRRADIATION.
(TECHNICAL OBJECTIVE AW-6). Helen Supplee, James
D. Hauschildt, and Cecil Entenman. May 17, 1951.
21p. (AD-318(b)); Am. J. Physiol. 169, 483-90(1952).
NSA 5-4325.

2119

RELATION OF CLEARANCE AND DISTRIBUTION OF
INJECTED GLUTATHIONE TO PROTECTION AGAINST
RADIATION INJURY. E. P. Cronkite, W. H. Chapman,
and George Brecher. Proc. Soc. Exptl. Biol. Med. 76,
456-9(1951). Mar.

Data suggest concentration of glutathione at sites vital
for survival may be prime factor in glutathione pro-
tection of irradiated mammals. NSA 5-4326.

2120

STUDIES ON THE EFFECT OF RADIOACTIVE
PHOSPHORUS ON THE BIOCHEMICAL OXIDATION OF
SEWAGE. W. N. Grune and Rolf Eliassen. Sewage and
Ind. Wastes 23, 141-54(1951). Feb.

P³² concentrations of 10 mc/liter exert no significant
effect on first stage of biochemical oxidation of sewage.
NSA 5-4327.

2121

Hanford Works

THE GROSS RETENTION AND METABOLISM OF
TRITIUM OXIDE IN THE MOUSE. R. C. Thompson.
Jan. 23, 1951. 13p. (HW-20092). NSA 5-4329.

2122

Hanford Works

DEPOSITION OF RADIOACTIVITY IN RATS DRINKING
PILE EFFLUENT WATER. K. E. Herde. Jan. 24, 1951.
13p. (HW-20102).

Growth rate of rats was unaffected by drinking
nuclear reactor cooling water with an activity of 3×10^{-4}
and 3×10^{-6} μ c/ml for 200-500 days. NSA 5-4330.

2123

Department of the Navy, Bureau of Naval Personnel
FUNDAMENTALS OF RADIOLOGICAL DEFENSE. 1950.
88p. (NavPers-10870).

Fundamentals of atomic structure, radiation, nuclear physics and reactors, explosion phenomena, physiological aspects of an atomic explosion, radiation detection and decontamination are presented. NSA 5-4334.

2124

Oak Ridge National Lab.

EFFECT OF IMMATURITY, HYPOPHYSECTOMY AND ADRENALECTOMY UPON THE CHANGES IN THE BLOOD PLASMA DURING THE ACUTE RADIATION SYNDROME IN THE RAT. Henry I. Kohn, Nancy Swingley, W. J. Robertson, and Marian Kirshlis. June 7, 1951. 32p. (ORNL-656), Am. J. Physiol. 165, 43-56(1951).

Plasma levels of glucose, NPN, P, total protein, albumin/globulin ratio, chloride and cholesterol were studied in rats 10-14 days following x irradiation (whole body). Immature animals were more radiosensitive than mature, age also altered response of hypophysectomized, adrenalectomized animals. Radiation effects are classified as primary (effects in irradiated cells) and secondary (effects elsewhere). NSA 5-4337.

2125

BENEFICIAL EFFECTS OF VITAMIN B₁₂ AND FOLIC ACID ON RECOVERY FROM INTERNAL RADIATION BY P³². W. E. Cornatzer, Camillo Arton, George T. Harrell, Jr., and David Cayer. Proc. Soc. Exptl. Biol. Med. 76, 552-4(1951). Mar. NSA 5-4338.

2126

INHIBITION OF RUTIN OF CAPILLARY INJURY BY ALPHA-RADIATION IN RATS. John Q. Griffith and James F. Couch. Blood 6, 552-4(1951). June.

Twenty milligrams of rutin given by pellet and 25 mg in solution gave good protection against up to 200 μ c (radon ointment) of α radiation. NSA 5-4339

2127

THE PRESSOR AMINES IN THE ADRENAL MEDULLA AFTER IRRADIATION. C. T. Anderson, H. Blaschko, J. H. Burn, and R. H. Mole. Brit. J. Pharmacol. 6, 342-50(1951). June.

Pressor amines in the adrenal gland are decreased in mice 48 hours after total body x irradiation. Dopadecarboxylase (possibly important in synthesis of the pressor amines) in the liver was somewhat less after x irradiation, and could be restored to normal levels by feeding the mice pyridoxine, but this did not influence fall of pressor amines. Adrenal glands were hypertrophied after irradiation. Pyridoxine HCl appeared to protect against radiation sickness and to reduce mortality after total body x irradiation of mice. NSA 5-4340.

2128

EXCRETION OF YTTRIUM-91 IN RABBITS. Barbara Kidman, Margaret Tutti, and Janet Vaughan. Nature 167, 858(1951). May 26.

Effect of age on excretion and retention of Y in rabbits is described. Findings confirm validity of decay-curve method for estimating excretion of Y⁹⁰. NSA 5-4356.

2129

PERIPHERAL-BLOOD AND BONE-MARROW TESTS DURING EXPERIMENTAL INTOXICATION WITH URANIUM. Aldo Masturzo. Folio Med. (Naples) 33, 643-71(1950). Nov. (In Italian)

Results of gradual intoxication of guinea pigs and rabbits with uranium chloride include normochromic anemia with hyperchromic tendency and hyperplasias of bone marrow, the hyperactivity extending mainly to less mature elements. NSA 5-4357.

2130

Cancer Research Inst., New England Deaconess Hospital.

THE MECHANISM OF ACUTE HYPOTENSION FOLLOWING TOTAL BODY IRRADIATION. Philip O. B. Montgomery and Shields Warren. [nd]. 18p. (AECU-1488). Proc. Soc. Exptl. Biol. Med. 77, 803-7(1951).

Cause of immediate hypotension following large doses of total-body irradiation is believed to be depression of the nervous system. NSA 5-4645.

2131

Argonne National Lab.

EFFECTS OF X IRRADIATION IN NEWBORN RATS. S. Phyllis Stearner and Emily J. B. Christian. June 1951. J. Exptl. Zool. 118, 495-505(1951).

Results of x irradiating newborn rats with 400 to 1000 r at 6, 40 and 80 r/min is described. NSA 5-4646.

2132

Chicago. Univ. Air Force Radiation Lab.

QUARTERLY PROGRESS REPORT NO. 21. (1956). 125p. Contract AF41(657)-26. (NP-6176).

Included reports on: survival time, weight loss, mortality of mice treated with various compounds before and after various whole body x ray exposures, effect of dose fractionation on certain enzyme systems(*in vivo*) in tissues of rats and guinea pigs; changes in survival and spleen ATP-ase in irradiated mice receiving spleen cells from donor mice recovering from treatment with 6-MP, aminopterin, Myleran, or TEM; effects of small γ and fast neutron doses on life span of mice. NSA 11-2779.

2133

ADRENAL SHIELDING AND SURVIVAL OF RATS AFTER X-IRRADIATION. Abraham Edelman. Am. J. Physiol. 165, 57-60(1951). Apr. 1.

Shielding of adrenal glands of rats appreciably decreased the number of deaths following 700 or 800 r whole-body x irradiation NSA 5-4648.

2134

COMBINED EFFECTS OF X-RAYS AND TEMPERATURE ON MITOSIS. L. F. La Cour. Nature 167, 318-19(1951). Feb. 24.

Combined cold and x rays show mitosis, and when applied simultaneously suppress it. No chromosome sickness present, no breakage observed following irradiation in *Trillium grandiflorum* chilled at 0 to 3°C for 3 days pre-irradiation of root tips. NSA 5-4649.

2135

CRITICAL INTRODUCTION TO THE STUDY OF THE TARGET THEORY. I GENERAL OUTLINE OF THE THEORY. Aldo Piergrossi. Radiol. med. 37, 389-411(1951). May. (In Italian) NSA 5-4650.

2136

CRITICAL INTRODUCTION TO THE STUDY OF THE "HIT" THEORY. PART II. RADIOBIOLOGICAL EFFECTS AND DENSITY OF IONIZATION. Aldo Piergrossi. Radiol. med. 37, 471-88(1951). June. (In Italian)

Effects of various spacial distributions of ions and concept of elementary radiosensitive volumes within the living cell are discussed. NSA 5-4651.

2137

Naval Radiological Defense Lab.

THE RELATIONSHIP OF RADIATION DOSE TO LETHALITY AMONG EXERCISED ANIMALS EXPOSED TO ROENTGEN RAYS. (TECHNICAL OBJECTIVE AW-6). D. I. Kumeldorf and D. C. Jones. July 11, 1951. 18p. (AD-521(B)). Am. J. Physiol. 167, 626-32(1951).

Mortality of x irradiated rats is significantly greater when exposure is followed by daily exhaustive exercise. Specific environment associated with method of exercise is not responsible for increased mortality. NSA 5-4652.

2138

Los Alamos Scientific Lab.

RADIOLOGIC HAZARDS PREDICTED FOR A GIVEN HEIGHT BURST OF AN ATOMIC BOMB. Charles H. Perry Apr. 6, 1951. Decl. July 30, 1951. 14p. (AECD-3210).

Radiologic hazard created by a 1000-ft high air burst of a nominal sized nuclear bomb is appraised. NSA 5-4653.

2139

Brookhaven National Lab.

RADIOLOGICAL MONITORING FOR CIVIL DEFENSE. J. B. H. Kuper. [nd]. 7p. (AECU-1507).

Suggestions are presented for a practical radiological monitoring system employing "wardens" and "surveyors" to determine dosage from mixed radiation field and to compute permissible working times for emergency personnel. NSA 5-4654.

2140

Clinton Labs.

AN ATTEMPT TO DETECT SMALL AMOUNTS OF IRRADIATION INJURY. M. B. Cupp. Sept. 1945. Decl. May 28, 1951. 6p. (AECD-3183; MonH-21).

Serum of irradiated animals was injected into leukemic animals in a search for more sensitive tests for radiation injury. NSA 5-4661.

2141

GENETIC CONTROL OF GLUTATHIONE SYNTHESIS IN GLOMERELLA. C. L. Market. Genetics 37, 603-4 (1952).

2142

THE EFFECT OF OXYGEN ON MUTATION INDUCTION BY X-RAYS. Edward H. Anderson. Proc. Natl. Acad. Sci. U. S. 37, 340-49(1951). Juné.

Sensitivity of 2 strains of *E. coli* to lethal x ray effects was increased by presence of O_2 during exposure. Mutation rates increased with length of x ray exposure in presence of either O_2 or N_2 . NSA 5-4899.

2143

Argonne National Lab.

EXHIBIT-RADIOAUTOGRAPHS OF U^{233} IN BONE AND SOFT TISSUE. James S. Arnold. Mar. 1951. Decl. June 6, 1951. 17p. (AECD-3176).

Radioautographs show deposition of U^{233} and Pu in bone and soft tissues of animals sacrificed at periods of 24 hr to 4 yr following injection. NSA 5-4932.

2144

LESIONS OF THE ALIMENTARY TRACT OF DOGS EXPOSED TO WHOLE-BODY X-RADIATION OF 300-3,000 r. G. Brecher and E. P. Cronkite. Am. J. Pathol. 27, 676-7 (1951).

Deaths following doses of less than 1000 r were primarily due to the sequelae of pancytopenia, with the tonsils serving as the portal of entry for bacteria. In dogs exposed to 2000 or 3000 r, the functional disturbances produced by the extensive denudation of the mucosa of the small intestine were probably responsible for the extreme dehydration and shortened survival time.

2145

CLINICAL RADIATION DOSAGE. III. BIOLOGICAL FACTORS IN RADON AND ISOTOPE DOSAGE. L. Cohen. Brit. J. Radiology 23, 25-7(1950). NSA 4-1865.

2146

Western Reserve Univ.

MONTHLY PROGRESS REPORT, MAY, 1951. Hymer L. Friedell. July 6, 1951. 8p. (NYO-1631).

Includes report on: effect of further irradiation upon irradiation-damaged hematopoietic systems of animals using P^{32} and Au^{198} , toxicity and distribution of $CrPO_4$, effect of peritoneal lavage on survival of x rayed dogs; x ray effect on protein digestion and absorption in dogs. NSA 5-4941.

2147

Oak Ridge National Lab

STUDIES OF RADIOACTIVITY IN FISH FROM WHITE OAK LAKE AND THE CLINCH RIVER. Venus I. Knobl July 9, 1951. 39p. (ORNL-1031).

Sr^{89} , Sr^{90} , Y^{90} and Cs^{137} in bodies of fish in White Oak Lake made then unsafe as food. Fish in Clinch River are not recommended for consumption but appear to have insignificant activity. NSA 5-4942.

2148

Radiation Lab, Univ of Calif

BIOLOGICAL STUDIES OF RADIATION EFFECTS. p. 41-72 of Medical and Health Physics Quarterly Report, January, February, March, 1951 J. H. Lawrence May 8, 1951. (AECD-3219(p. 41-72))

Includes reports on: effect of cyclotron irradiation on pituitary gland of rats, fate of Fe^{59} -tagged red blood cells injected into rats, in vivo kinetics of iron turnover in tissues of normal persons and those with blood disorders. NSA 5-4950.

2149

Brookhaven National Lab.

EFFECTS OF CONTINUOUS GAMMA RADIATION ON CORN! W. Ralph Singleton [nd] 2p (AECU-1391). NSA 5-4951.

2150

Brookhaven National Lab

THE RELATION OF NUCLEIC ACID METABOLISM TO THE GENETIC EFFECT OF RADIATION IN BACTERIA. B. A. Rubin. [nd]. 1p. (AECU-1436)

This report appears in its entirety in NSA NSA 5-4953.

2151

Brookhaven National Lab

A CYTOLOGICAL AND CYTOCHEMICAL APPROACH TO AN UNDERSTANDING OF RADIATION DAMAGE IN DIVIDING CELLS A. H. Sparrow, M. J. Moses, and R. Steele [nd] 17p. (AECU-1438), Brit. J. Radiology 25, 182-9(1952)

A study of the amount of chromosome fragmentation induced by dosage of 50 r at various stages in the meiotic nuclear cycle of *Trillium erectum*. NSA 5-4954.

2152

New England Deaconess Hospital, Boston, Cancer Research Inst.

SOME ACUTE CYTOLOGIC EFFECTS OF IONIZING RADIATION. Shields Warren, Margaret W. Holt, and Sheldon C. Sommers. [nd]. 10p. (AECU-1443), Am. J. Clin. Pathol. 22, 411-17(1952).

Lethal radiation effects in radiosensitive rat and mouse cells include formation of large intranuclear vacuoles and stretched nuclear membranes. Nonlethal changes are smaller intranuclear vacuoles, decreased Feulgen stain of nuclear chromatin and sap, and loss of sharp staining of nuclear membranes. NSA 5-4955

2153

Delaware Univ

RADIOSENSITIVITY OF HAPLOID AND DIPLOID HABROBRACON DURING PUPAL DEVELOPMENT. A. M. Clark. Delaware Univ and C. J. Mitchell, Marine Biological Lab., Woods Hole, Mass. [nd] 15p. (AECU-1444)

Differential radiosensitivity of haploid and diploid wasps was studied using x rays. Diploids were more resistant than haploids at all stages of pupal development. NSA 5-4956.

2154

Brookhaven National Lab

EFFECTS OF CONTINUOUS GAMMA RADIATION ON MUTATION RATE IN MAIZE W. R. Singleton. [nd]. 1p. (AECU-1461).

Continuous γ radiation from Co^{60} was used in study of mutations induced in maize pollen. (The report appears in its entirety in NSA). NSA 5-4957.

2155

Brookhaven National Lab.

THE EFFECT OF CONTINUOUS GAMMA RADIATION UPON STARCH FORMATION IN ZEA MAYS POLLEN.

M. L. Koester [nd]. 1p. (AECU-1463).

Pollen from corn receiving up to 1.3 r/day showed no increase over control in percent abnormal pollen, above 2.6 r/day gradual increase occurred in percent abnormal pollen grains (The report appears in its entirety in NSA). NSA 5-4958.

2156

Brookhaven National Lab. and New York Univ.

EFFECTS OF DIRECT CATHODE RAY PARTICLE IRRADIATION OF THE HYPOPHYSIS AND WHOLE BODY X-IRRADIATION ON THE ADRENOCORTICOTROPHIN, GONADOTROPHINS, AND THYROTROPHIN OF THE PITUITARY GLAND OF THE RAT. G. M. Mateyko, A. Edelman, H. A. Charipper, and A. S. Gordon. [nd]. 1p. (AECU-1513), *Am. J. Physiol.* **167**, 808-9 (1951).

This report appears in its entirety in NSA. NSA 5-4959.

2157

Argonne National Lab.

EFFECT OF CYSTEINE ON THE RADIOSENSITIVITY OF THYMIC CELLS IN VITRO! R. L. Staube, George Svihla, M. E. Blackford, and H. M. Patt. July 1951. 1p. (AECU-1532, UAC-407)

Cysteine (0.02 M) does not alter activity of normal cells. At 24 hr post irradiation (1000 r) control thymic cell suspensions showed reduced survival with many cells nonmotile, those with cysteine contain near normal complement of motile forms. NSA 5-4960.

2158

COSMIC RAYS AND THE ORIGIN OF SPECIES. M. Delbruck and N. W. Timofeef-Ressovsky. *Nature* **137**, 358-9 (1936).

Dr. Hamskaw Thomas suggested that the large variety of species and high percentage of endemics found at high altitudes might be due to mutants produced by irradiation with cosmic rays. Authors consider this argument invalidated because: 1) mutation rate induced by cosmic rays in any species can be derived if x-ray induced mutability for this species is known, 2) difference between mutations at sea level and those at great altitudes is negligible.

2159

Argonne National Lab

PLANNED CONTROLS OF EXPERIMENTAL CONDITIONS IN THE NEUTRON TOXICITY PROGRAM AT ARGONNE NATIONAL LABORATORY. Howard H. Vogel, Jr. July 1951. 1p. (AECU-1555, UAC-413).

Acute lethal action of radiobiological additivity of fast neutrons and γ rays was studied in mice. Effect of transportation on longevity of experimental animals is described (The report appears in its entirety in NSA). NSA 5-4962.

2160

Argonne National Lab.

THE EFFECT OF X RAYS ON THYMOCYTES AND ITS MODIFICATION BY CHEMICAL MEANS. H. M. Patt, M. E. Blackford, R. L. Straube, and D. E. Smith, July 1951. 1p. (AECU-1557, UAC-409), *Am. J. Physiol.* **167**, 816 (1951).

X rays decreased life span of rabbit thymocytes in vitro, % surviving cells decreasing exponentially with increasing dosage. Results show at least two mechanisms concerned in cytotoxic action of x rays, one of which is subject to action of cysteine and anoxia. (The report appears in its entirety in NSA). NSA 5-4963.

2161

Los Alamos Scientific Lab.

THE USE OF X-RAY AND NITROGEN MUSTARD TO DETERMINE THE MITOTIC AND INTERMITOTIC TIMES IN NORMAL AND MALIGNANT RAT TISSUES. William R. Widner, John B. Storer and C. C. Lushbaugh. [nd]. 31p. (AECU-1567), *Cancer Research* **11**, 877-84 (1951). NSA 5-4964.

2162

Argonne National Lab. and Chicago Univ.

EXPONENTIAL AND SIGMOID SURVIVAL CURVES RESULTING FROM ALPHA AND X IRRADIATION OF ASPERGILLUS SPORES. Raymond E. Zirkle, Dorothy F. Marchbank, and Kathryn D. Kuck. Mar. 1951. 14p. (ANL-4610), *J. Cellular Comp. Physiol.* **39**, 75-85 (1952). NSA 5-4965.

2163

Brookhaven National Lab.

BIOLOGY DEPARTMENT, p. 86-93 OF QUARTERLY PROGRESS REPORT; JANUARY 1- MARCH 31, 1951. June 1951 (BNL-103(p. 86-93))

Includes reports on: effect of continuous γ irradiation on mutation rate of corn, relation of pituitary to diuresis in irradiated rats, effect of castration on x ray sensitivity of rats, O_2 uptake of duck erythrocytes. NSA 5-4966.

2164

Western Reserve Univ.

MONTHLY PROGRESS REPORT MARCH 1951. Hymer L. Friedell. May 6, 1951. 8p. (NYO-1629).

Includes report on: effect of x rays and P^{32} or Au^{198} radiations, significance of initial radiation dose on rat leukocyte depression, reduced lethality of P^{32} in divided doses; effect of in vivo dialysis of blood on survival of x rayed dogs; protective effect of propylene glycol, glycerine, and cysteine against radiation. NSA 5-4967.

2165

Oak Ridge National Lab

CHANGES IN COMPOSITION OF BLOOD PLASMA OF THE RAT DURING ACUTE RADIATION SYNDROME, AND THEIR PARTIAL MITIGATION BY DIBENZAMINE AND CORTIN. Henry I. Kohn. June 12, 1951. 54p. (ORNL-387), *Am. J. Physiol.* **165**, 27-42 (1951). NSA 5-4968.

2166

ACTION OF X-RAYS ON THE GROWTH AND MULTIPLICATION OF ALGAE. B. Luyet. *Compt. rend. soc. biol.* **116**, 878-80 (1934). (In French).

Author studied the influence of exposure for 5-250 min to 30kV x rays (12 ma) on algae growth using length of filament and number of cell divisions as criteria of growth. Exposure for 250 min. was lethal. Polyploid cells were found after exposure and author attributes their formation to inability of the irradiated cell to complete normal mitosis.

2167

Columbia Univ.

BIOLOGICAL EFFECTS OF RADIATION. G. Failla. Paper 6 of Health Physics Insurance Seminar. [Feb. 6-10, 1950]. Mar. 12, 1951. 5p. (TID-388(paper 6)).

Brief, general discussion of nature of roentgen (r) unit, relative biological effects of various radiations and possibilities of radiation-produced cancer, cataracts, and leukemia is presented. NSA 5-4970.

2168

Atomic Energy Project, Univ. of Calif., Los Angeles
THE ROLE OF AN ANTIBIOTIC-PRODUCING ORGANISM IN THE SMALL INTESTINE. James Vincent and Robert Veomett. June 21, 1951. 34p. (UCLA-142).

Rats retaining a high count of an indigenous pleomorphic bacillus which produced an antibiotic-like substance in vitro, showed little evidence of postirradiation infection. NSA 5-4971.

2169

Atomic Energy Project, Univ. of Rochester
PATHOLOGY IN ANIMALS SUBJECTED TO REPEATED
DAILY EXPOSURE TO ROENTGEN RAYS. Roger G.
Metcalf and Frank A. Inda. July 5, 1951. 59p. (UR-88).

Tissue injuries were observed in rats exposed to
0.1, 0.5, 1.0 or 10 r/day of x rays for 2 yrs, in rabbits
exposed to same daily doses for 1 yr, and in dogs exposed
to 0.1, 0.5, 1.0, 3.0, 6.0 and 10 r for 500 or 622 days.
NSA 5-4973.

2170

Atomic Energy Project, Univ. of Rochester
POSSIBLE LATE TUMOR DEVELOPMENT IN RAT
EMBRYOS IRRADIATED WITH 100 r OF X-RADIATION
ON THE 9TH DAY OF GESTATION. Robert L. Brent and
H. Charles Jordan. Jan. 19, 1951. 1p. (UR-150).

The report appears in its entirety in NSA. NSA 5-4974.

2171

Atomic Energy Project, Univ. of Rochester
NEOPLASTIC GROWTHS INDUCED BY X-IRRADIATION
IN EMBRYONIC RATS J. G. Wilson. Jan. 22, 1951.
1p. (UR-153). Report appears in its entirety in NSA.
NSA 5-4975.

2172

Atomic Energy Project, Univ. of Rochester
A NOTE ON THE SYNTHESIS OF FATTY ACIDS IN BONE
MARROW HOMOGENATES AS AFFECTED BY X-
RADIATION. K. Altman, J. Richmond, and K. Salomon.
May 17, 1951. 12p. (UR-169); Biochem. et Biophys.
Acta 7, 460-65(1951). NSA 5-4976.

2173

Army Inst. of Pathology
MEDICAL EFFECTS OF ATOMIC BOMBS, THE REPORT
OF THE JOINT COMMISSION FOR THE INVESTIGATION
OF THE EFFECTS OF THE ATOMIC BOMB IN JAPAN,
VOLUME I. Ashley W. Oughterson, George V. LeRoy,
Averill A. Liebow, E. Cuyler Hammond, Henry L.
Barnett, Jack D. Rosenbaum, and B. Aubrey Schneider.
Apr. 19, 1951. 246p. (NP-3036, AM-2837(vol. I)).

Data on mean and differential leucocyte counts of
Japanese exposed to residual activity are presented, and
circumstances of bombing are described. NSA 5-4977.

2174

Army Inst. of Pathology
MEDICAL EFFECTS OF ATOMIC BOMBS, THE REPORT
OF THE JOINT COMMISSION FOR THE INVESTIGATION
OF THE EFFECTS OF THE ATOMIC BOMB IN JAPAN,
VOLUME II. Ashley W. Oughterson, George V. LeRoy,
Averill A. Liebow, E. Cuyler Hammond, Henry L.
Barnett, Jack D. Rosenbaum, and B. Aubrey Schneider.
[nd]. 345p. (NP-3037, AM-2837(Vol. II)).

Clinical records and specimens taken by Japanese
physicians are reviewed. NSA 5-4978.

2175

Army Inst. of Pathology
MEDICAL EFFECTS OF ATOMIC BOMBS, THE REPORT
OF THE JOINT COMMISSION FOR THE INVESTIGATION
OF THE EFFECTS OF THE ATOMIC BOMB IN JAPAN,
VOLUME III. Ashley W. Oughterson, George V. LeRoy,
Averill A. Liebow, E. Cuyler Hammond, Henry L.
Barnett, Jack D. Rosenbaum, B. Aubrey Schneider. [nd].
212p. (NP-3038, AM-2837(vol. III)).

Peripheral blood and bone marrow changes in patients
with radiation injury are described NSA 5-4979.

2176

Army Inst. of Pathology
MEDICAL EFFECTS OF ATOMIC BOMBS, THE REPORT
OF THE JOINT COMMISSION FOR THE INVESTIGATION
OF THE EFFECTS OF THE ATOMIC BOMB IN JAPAN,
VOLUME IV. Ashley W. Oughterson, George V. LeRoy,

Averill A. Liebow, E. Cuyler Hammond, Henry L.
Barnett, Jack D. Rosenbaum, and B. Aubrey Schneider.
[nd]. 324p. (NP-3039, AM-2837(vol. IV)).

Pathology observed in material from autopsy of atom
bomb victims is described. NSA 5-4980.

2177

New York Operations Office
MAXIMUM PERMISSIBLE EXPOSURE OF PERSONNEL.
Merril Eisenbud. Paper 7 of Health Physics Insurance
Seminar, February 6-10, 1950). Mar. 21, 1951.
(TID-388(paper 7)).

Maximum permissible weekly exposures are tabulated
for x, γ , β -radiation and uranium. NSA 5-4988.

2178

Army Inst. of Pathology
MEDICAL EFFECTS OF ATOMIC BOMBS, THE REPORT
OF THE JOINT COMMISSION FOR THE INVESTIGATION
OF THE EFFECTS OF THE ATOMIC BOMB IN JAPAN,
VOLUME V. Ashley W. Oughterson, George V. LeRoy,
Averill A. Liebow, E. Cuyler Hammond, Henry L.
Barnett, Jack D. Rosenbaum, and B. Aubrey Schneider.
[nd]. 343p. (NP-3040, AM-2837(vol. V)).

Statistical analysis of medical histories of over 13,000
Japanese alive 20 days after bombing is presented.
NSA 5-4987.

2179

Atomic Energy Commission
HEALTH PHYSICS INSURANCE SEMINAR, (FEBRUARY
6-10, 1950). K. Z. Morgan, E. Pollard, F. P. Cowan,
J. B. H. Kuper, D. Balber, N. H. Woodruff, P. C.
Aebersold, G. Failla, M. Eisenbud, H. Blatz, and G.
W. Morgan. Mar. 12, 1951. 161p. (TID-388).

Topics of 15 papers include; atomic and nuclear physics,
radiation units, effects, uses, maximum permissible
exposures, radioisotopes; decontamination and waste
disposal. NSA 5-4986.

2180

PROMPT EFFECT OF GAMMA RADIATION ON RESPIRATION
OF MONKEYS. M. Brooks. Federation Proc. 14, 20-21
(1955).

After total-body irradiation, there was an increase
in the respiratory rate with all doses above 1000 r. The
oxygen consumption rate was unchanged with a dose of
2500 r and tended to be depressed with higher doses.

2181

New Univ. Hospital and New York Univ.
STUDIES OF THORIUM X APPLIED TO HUMAN SKIN,
I. ROUTES AND DEGREE OF PENETRATION AND
SITES OF DEPOSITION OF THORIUM X APPLIED IN
SELECTED VEHICLES Victor H. Witten, Milton S.
Ross, Eleanor Oshry, Arthur B. Hyman, and Vera
Holmstrom. [nd]. 22p (AECU-1470). J. Invest. Dermatol.
17, 311-22(1951).

Radioautographs show Ra^{224} penetrates epidermis, is
distributed through prickle cell and basal layers, flows
down hair follicle penetrating wall and passes down sweat
duct into sweat gland. NSA 5-4999.

2182

Radiation Lab., Univ. of Calif.
METABOLIC PROPERTIES OF VARIOUS MATERIALS.
J. G. Hamilton. p. 4-40 of Medical and Health Physics
Quarterly report, January, February, and March, 1951.
May 8, 1951. Decl. Aug. 6, 1951. (AECU-3219(p. 4-40)).

Includes report on; thyroid uptake of At^{211} by monkeys,
tissue distribution of At^{211} given intravenously to rats,
preparation of various radiotracers NSA 5-5001.

2183

CYTOLOGIC CHANGES FOLLOWING INTRAVENOUS
INJECTION OF THORIUM DIOXIDE. William R. Christensen
and Sheldon C. Sommers. [nd]. 7p. (AECU-1535).

Precancerous condition was observed in rat tissues 15 mo. after injection of colloidal thorium dioxide. Microscopic studies of livers 15 mo. after injection revealed marked R-E hyperplasia and anaplasia without invasiveness. NSA 5-5002.

2184

Tennessee Univ.

QUARTERLY PROGRESS AND WORK ACCOMPLISHMENT REPORT FOR QUARTER ENDING MARCH 31, 1951. Mar. 31, 1951. 23p. (ORO-35).

Includes report on: effect of irradiation on O_2 consumption of spermatozoa, tissue distribution of Ca, Sr, P and effect of developmental stage on uptake of Ca (bone studies). NSA 5-5027.

2185

Vogel, F. Stephen and John C. Ballin. Proc. Soc. Exptl. Morphological Changes in Thymus of Rats Following Whole-Body Exposure to Massive Doses of Radiation. F. Stephen Vogel and John C. Ballin. Proc. Soc. Exptl. Biol. Med. 90, 419-23(1955). NSA 10-1990.

2186

THE LOCATION OF LITERATURE ON ATOMIC ENERGY. Fred E. Croxton. Coll. and Research Libraries 12, 103-8(1951). Apr. NSA 5-5350.

2187

Atomic Energy Project, Univ. of Rochester. BIOLOGICAL EFFECTS OF EXTERNAL RADIATION (X RAYS AND γ RAYS). p. 13-33 of Quarterly Technical Report, January 1, 1951 through March 31, 1951. Henry A. Blair, Director. May 9, 1951. (UR-164(p. 13-33)).

Includes reports on: urinary excretion of 17-ketosteroids in dogs after 350 r total-body x ray dose, blood cultures of antibiotic-treated dogs post irradiation, glucose tolerance in dogs after 450 r total-body x rays. NSA 5-5464.

2188

Argonne National Lab.

β -IRRADIATION EFFECTS FROM DIFFUSE AND POINT SOURCES OF Sr^{90} , PROGRESS REPORT. Janet V. Passonneau and Katherine Hamilton. p. 123-5 of Division of Biological and Medical Research, Quarterly Report, August, September, October, 1950. Austin M. Brues, Director. (ANL-4531(p. 123-5)).

Skin of rats was exposed for 48 hr to Sr^{90} -impregnated paper or glass beads, effects are described. NSA 5-5466.

2189

Argonne National Lab.

EFFECTS OF EXTERNAL X IRRADIATION. p. 14-63, 107-19, 126-42, and 177-82 of Division of Biological and Medical Research, Quarterly Report, August, September, October 1950. Austin M. Brues, Director. (ANL-4531 (p. 14-63, 107-19, 126-42 177-82)).

External-radiation effects were studied in various animals including mice, guinea pigs, rats, C. paramecium, grasshoppers, and chicks. NSA 5-5465.

2190

CONCERNING X-RAY THERAPY OF TUBERCULOUS LYMPH NODES OF THE NECK. Karl Umbach. Strahlentherapie 78, 403-10(1949). NSA 4-1871

2191

STUDIES ON THE BIOLOGICAL EFFECT OF RADIATION OF VARIOUS WAVELENGTHS. M. Bolaffio. Strahlentherapie 20, 673-736(1925).

2192

Carbide and Carbon Chemicals Co., Y-12 Area. RADIATION EFFECTS ON THE BLOOD. Francis Sachs. July 23, 1951. 11p. (Y-B4-22).

Bibliography of 51 titles from Nuclear Science Abstracts on the subject of radiation effects on blood is presented. NSA 5-5469.

2193

Atomic Energy Project, Univ. of Calif., Los Angeles. THE EFFECT OF ANOXIA ON THE HEMATOLOGICAL INJURY IN RATS CAUSED BY ROENTGEN IRRADIATION. Leslie R. Bennett, Robert A. Hansen, and Andrew H. Dowdy. Sept. 12, 1954. 18p (UCLA-156)

Hemograms of rats after 500 or 1000 r of x rays whole body exposure administered to animals subjected to 4% O_2 atmosphere, show peripheral blood elements received partial protection against injury NSA 5-5471.

2194

Western Reserve Univ., School of Medicine. SOME BIOCHEMICAL EFFECTS OF RADIATION ON LYMPHATIC TISSUE. Paul S. Lavik and Helen Harrington, July 15, 1951. 30p (NYO-1626)

Effect of toxic dose of P^{32} or x rays on P composition and P^{32} incorporation in thymus, spleen, and liver were studied in adult rats NSA 5-5472.

2195

Argonne National Lab.

RADIATION EFFECTS ON TUMORS, p.17-20, 48-57 of Quarterly Report November, December, 1950 and January 1951, Division of Biological and Medical Research. Austin M. Brues, Director. (ANL-4571(p. 17-20, 48-57)).

Effect of various radiation exposures on various mouse tumors was studied. Account of pretreatment with NaCN and methylene blue is given NSA 5-5473.

2196

Argonne National Lab.

PHYSIOLOGICAL EFFECTS OF X RADIATION, p. 21-4, 28-9, 58-9, 94-100, 106-25 of Quarterly Report November, December, 1950 and January, 1951, Division of Biological and Medical Research. Austin M. Brues, Director. (ANL-4571(p. 21-4, 28-9, 58-9, 94-100, 106-25))

Includes report on: changes in bone marrow of guinea pigs with γ -ray induced anemia, fast neutron effect on mice, x ray effect on newborn rats, erythrocyte sedimentation in x rayed dogs, respiration of x rayed C. creatinovorans. NSA 5-5474.

2197

Argonne National Lab.

RADIATION PROTECTION, p. 30-46 of Quarterly Report November, December, 1950 and January, 1951, Division of Biological and Medical Research. Austin M. Brues, Director. (ANL-4571(p. 30-46)).

Includes report on: spleen shielding and cysteine pretreatment of x rayed mice, O_2 consumption and weight loss of x irradiated rats, post irradiation survival of primitive red blood cells and lymphocytes in estrogen-treated animals. NSA 5-5475.

2198

Argonne National Lab.

[CYTOLOGICAL EFFECTS OF RADIATION]. p. 64-70, 79-88, and 93 of Quarterly Report November, December, 1950 and January, 1951, Division of Biological and Medical Research. Austin M. Brues, Director. (ANL-4571(p. 64-70, 79-88, 93)).

Includes report on: x ray effect on anaerobic diapause grasshopper embryos treated with N_2CO_2 , thermal-neutron irradiation of hemp seed, genetic effects of metabolized tritium in P. aurelia. NSA 5-5476.

2199

Atomic Energy Project. Univ. of Calif., Los Angeles. LATE EFFECTS OF ROENTGEN IRRADIATION, I. STUDIES ON RATS IRRADIATED UNDER ANOXIC ANOXIA. Leslie R. Bennett, Sarah M. Chastain, Jerry S. Flint, Robert A. Hansen, and Alvin E. Lewis. Sept. 7, 1951. 24p. (UCLA-154), Radiology 61, 411-18(1953).

Rats were studied as long as 540 days after 600-1400 r whole-body x ray exposure. Life span was shortened,

with high death rate due to pneumonia. Nephrosclerosis and generalized arteriosclerosis, hypertension, blood dyscrasias, cataracts, cachexia and late epilation were also observed. NSA 5-5478.

2200
MORTALITY AND SKIN TRANSPLANTABILITY IN X-IRRADIATED MICE RECEIVING ISOLOGOUS, HOMOLOGOUS OR HETEROLOGOUS BONE MARROW. J. J. Trentin. *J. Proc. Soc. Exptl. Biol. Med.* **92**, 688-93(1956). (Baylor Univ. Coll. of Medicine and Univ. of Texas Dental Branch, Houston).

The degree and duration of protection afforded by isologous, homologous, and heterologous sources of bone marrow administered after lethal doses of x-irradiation in mice was directly proportional to the closeness of genetic relationship of the marrow donor to the irradiated mice. NSA 10-11668.

2201
THE EFFECT OF X RADIATION AND RAPID ELECTRONS (4-Mev) ON MITOSIS IN ROOT ENDS OF *VICIA FABAE*. H. L. Heinrich, W. Paul, and G. Schubert. *Naturwissenschaften* **37**, 544-5(1950). Dec.

Changes noted: shortening of chromosomes; decreased mitoses, increased damage to cells in telo- and anaphase. Rapid electrons were less effective than x rays. NSA 5-5480.

2202
PROTECTIVE PROPERTIES OF SODIUM CYANIDE AND SODIUM NITRIDE AGAINST X-RAYS. A. Herve, Z. M. Bacq, and H. Betz. *J. chim. phys.* **48**, 256-7(1951). May-June. (In French)

Injection of 0.1 mg NaCN immediately prior to irradiation (700 r) reduces mortality of mice 50 to 80% Na₂N or glutathione reduce mortality 40 to 50% while simultaneous administration of the latter two give an additive effect, reducing mortality 90 to 95%. NSA 5-5481.

2203
EFFECT OF HIBERNATION UPON SURVIVAL TIME FOLLOWING WHOLE-BODY IRRADIATION IN THE MARMOT (*MARMOTA MONAX*). Falconer Smith and Marie M. Grenan. *Science* **113**, 686-8(1951). June 15.

Results indicate that delayed development of lethal processes after irradiation accompanies lowered body temperature and reduced metabolic rate in the marmot. NSA 5-5483.

2204
CHANGES IN THE TOTAL CIRCULATING EOSINOPHILE COUNT IN CYCLOTRON WORKERS. Campbell Moses and Madeline Platt. *Science* **113**, 676(1951). June 15.

Eosinophil counts of three workers who received indeterminate cyclotron exposure were markedly increased over period of 12 wk. Eosinophil count is suggested as radiation exposure indicator. NSA 5-5484.

2205
SOME EARLY NUCLEAR EFFECTS OF IONIZING RADIATION. Shields Warren, Margaret W. Hold, and Sheldon C. Sommers. *Proc. Soc. Exptl. Biol. Med.* **77**, 288-91(1951). June.

Tissues of P³²-injected rats and mice showed large intranuclear vacuoles and stretching of nuclear membranes in radiosensitive cells, small intranuclear vacuoles and lighter staining in parts of radioresistant tissues. NSA 5-5485.

2206
INCREASE IN THE NUMBER OF LABROCYTES IN THE HEMATOPOIETIC TISSUES OF MICE FOLLOWING X-IRRADIATION. Lucie Arvy, Jacques-Andre Boiffard,

and Manfred Gabe. *Compt. rend.* **232**, 1022-4(1951). Mar. 5. (In French)

Labrocytes (heparinocytes, tissular basophils) increase in the medulla of lymphatic ganglia and bone marrow of mice after 2000 r whole-body exposure. NSA 5-5486.

2207
INHIBITION BY TESTOSTERONE OF RADIATION-INDUCED LYMPHOID TUMOR DEVELOPMENT IN INTACT AND CASTRATE MALE MICE. Henry S. Kaplan and Mary B. Brown. *Cancer Research* **11**, 262(1951). Apr.

Testosterone was found to exert a striking inhibitory effect on the development of lymphoid tumors in irradiated male mice. Castration did not significantly modify lymphoid tumor incidence. NSA 5-5487.

2208
EFFECT ON LYMPHOID TUMOR INCIDENCE OF CHANGES IN TOTAL DOSE, FRACTIONATION, AND PERIODICITY OF WHOLE-BODY ROENTGEN IRRADIATION. Henry S. Kaplan and Mary B. Brown. *Cancer Research* **11**, 262(1951). Apr. NSA 5-5488.

2209
STERILIZATION AND INTERSEXUALITY OBTAINED IN CHICKEN EMBRYOS BY X-IRRADIATION. PRELIMINARY REPORT. Berthe Salzgeber. *Bull. Biol. France, Belg.* **84**, No. 3, 225-33(1950). July-Sept. (In French) NSA 5-5490.

2210
THE EFFECT OF IONIZING RADIATIONS ON THE BROAD BEAN ROOT. PART VIII (continued). L. H. Gray and M. E. Scholes. *Brit. J. Radiol.* **24**, 82-92, 176-80, 228-36(1951). Feb.-Apr.

Detailed study of x and α radiation effects on normal root growth of *Vicia faba* is reported. Growth is first depressed, then returns to normal, the extent of effect depending on dose (duration of exposure). NSA 5-5491.

2211
THE PROTECTION OF BACTERIA BY PYRUVATE AGAINST RADIATION EFFECTS. T. L. Thompson, Roy B. Mefferd, Jr., and Orville Wyss. *J. Bacteriol.* **62**, 39-43(1951). July. NSA 5-5492.

2212
RESPONSES OF MITOTIC CELLS IN LIVER AND CARCINOMA TO CONTINUOUS INTERNAL IRRADIATION. Austin M. Brues and Leola Rietz. *Cancer Research* **11**, 240(1951). Apr.

Cellular changes in rat liver exposed to β radiation from glass beads containing Y⁹¹ or Ce¹⁴⁴-Pr¹⁴⁴ are described NSA 5-5493.

2213
ADRENAL CORTICAL FUNCTION AND LYMPHOID TUMOR INCIDENCE IN IRRADIATED MICE. Henry S. Kaplan, Mary Brown, and Sumner N. Marder. *Cancer Research* **11**, 262-3(1951). Apr.

Adrenalectomized mice proved more susceptible to lymphoma induction than did controls. NSA 5-5494.

2214
THE EFFECT OF IRRADIATION ON AZO DYE NEOPLASIA IN THE RAT LIVER. I. INFLUENCE OF X-RAY AND RADIOGOLD ON THE INCIDENCE OF HEPATOMA AND THE HISTOLOGY OF THE LIVER IN RATS FED DIMETHYLAMINOAZOBENZENE. George Z. Williams, Nelson F. Young, and Jeffries P. Moore. *Cancer Research* **11**, 289(1951). Apr. NSA 5-5495.

2215
SUCCESSFUL GROWTH AND SERIAL TRANSPLANTATION OF HUMAN TUMORS IN RATS AND MICE IRRADIATED BY X-RAYS. Helene Wallace Toolan. *Cancer Research* **11**, 285-6(1951). Apr. NSA 5-5497.

2216

CHANGES IN THE RADIOSENSITIVITY OF TUMOR FRAGMENTS INDUCED BY PRE-TREATMENT IN VITRO WITH CYSTEINE, METHYLENE BLUE, AND SODIUM CYANIDE B. Vincent Hall. Cancer Research **11**, 254 (1951) Apr. NSA 5-5498.

2217

BIOLOGICAL EFFECTS OF VERY SMALL X-RAY DOSES ADMINISTERED DAILY FOR ONE YEAR. Rudolf Pape. Strahlentherapie **84**, No. 2, 245-54(1951). (In German)
Blood-forming tissues were apparently stimulated by daily doses of 0.25 r given for 3 mon to 1 rat, and for 1 yr to 2 rats. NSA 5-5499.

2218

EFFECT OF LOCAL ROENTGEN IRRADIATION ON THE PERMEABILITY OF CAPILLARIES IN MAN. Anton Neumayr and Bruno Thurnher. Strahlentherapie **84**, No. 2, 297-305(1951). (In German)

Increased capillary permeability was observed in man, with a threshold effect varying from 3 to 100 r. NSA 5-5500.

2219

CONTRIBUTION TO THE PATHOLOGY OF GENERAL X-RAY INJURIES, WITH SPECIAL EMPHASIS ON THE ROLE PLAYED BY HISTAMINE. Willi Hiemsch. Strahlentherapie **84**, No. 2, 255-71(1951). (In German)

Results indicate that histamine accumulation does not play a decisive part in general injury of the body produced by x rays. NSA 5-5501.

2220

FUTHER OBSERVATIONS ON INHIBITION OF LYMPHOID TUMOR DEVELOPMENT BY SHIELDING AND PARTIAL-BODY IRRADIATION OF MICE Henry S. Kaplan. Cancer Research **11**, 261-2(1951). Apr. NSA 5-5502.

2221

EFFECT OF X-RADIATION AND OF RADIOMIMETIC SUBSTANCES ON THE SULFHYDRYL CONTENT OF PLASMA: RELATIONSHIP TO ADRENAL ACTIVITY FOLLOWING STRESS Bernard Shacter. Cancer Research **11**, 277-8(1951). Apr. NSA 5-5503.

2222

Carbide and Carbon Chemical Co., Y-12 Area
LITERATURE SURVEY ON SKIN DECONTAMINATION-UNCLASSIFIED MATERIAL, PART III Francis L. Sachs. July 5, 1951. 23p. (Y-B4-10).

Total of 169 titles on: toxicity of various compounds, skin permeability, x ray effects on skin, hazards in use of radioisotopes, carcinogens, decontamination, protective ointments, effects of atom bomb explosions are listed. NSA 5-5506.

2223

Atomic Energy Research Establishment, Harwell, Berks (England)
STATISTICAL REVIEW OF HAEMATOLOGICAL TECHNIQUES AND RECORDS. A. C. Chamberlain and F. M. Turner. Mar. 1951. 36p. (AERE-Med/R-708), Brit. J. Radiol. **25**, No. 292, 169-76(1952).

Causes and extent of normal variations in total white cell, lymphocyte and neutrophil count are considered. Author concludes that WBC counts are not as valuable a tool in detecting radiation injury as previously reported. NSA 5-5507.

2224

MEDICAL ASPECTS OF THE ATOMIC BOMB. Albert Rabinowitz. S. African Med. J. **25**, 489-93(1951). July 14 NSA 5-5510.

2225

Brookhaven National Lab.
SURVIVAL OF ADRENALECTOMIZED RATS WITH AND

WITHOUT REPLACEMENT THERAPY FOLLOWING X-IRRADIATION. Abraham Edelmann. [nd]. 13p. (AECU-1599), Am. J. Physiol. **167**, 345-8(1951).

Daily doses of adrenal extract or desoxycorticosterone acetate increased survival time of 650-r irradiated, adrenalectomized rats. NSA 5-5512.

2226

THE DISTRIBUTION OF PARENTERAL RADIOACTIVE GOLD COLLOID (Au¹⁹⁸) IN THE RAT Mary Lynn Haigler and George Z. Williams. Cancer Research **11**, 253(1951). Apr. NSA 5-5523.

2227

LES ISOTOPES RADIOACTIFS EN MEDICINE ET EN BIOLOGIE. M. Tubiana Paris, Masson et Cie. 1950. 391p.

Book summarizes physical, biological and medical uses and aspects of radiation and radioisotopes. NSA 5-5525.

2228

Argonne National Lab.
TOXICOLOGY. p. 72-106, 120-2, 157-62, 183-91 of Division of Biological and Medical Research, Quarterly Report, August, September, October, 1950. Austin M Brues, Director. (ANL-4531(p. 72-106, 120-2, 157-62, 183-91)).

Includes reports on: Ra removal from patient, determination of Rn in expired air, result of Po injection in mice HTO administration effects on rats, toxicity of U²³³, ²³⁸, ²³² in mice. NSA 5-5526.

2229

ON INDUSTRIAL RADIUM POISONINGS. Helmut Roth. Deut. med Wochschr. **76**, 776-7(1951). June 8. (In German)

A case of Ra poisoning is analyzed and suggestions are made for protection of workers NSA 5-5533.

2230

PART PLAYED BY NATURAL RADIOACTIVE ELEMENTS IN BIOLOGICAL PROCESSES. A. A. Drobkov. Uspekhi Sovremennoi Biol. **31**, No. 1, 82-100(1951). (In Russian)

Investigations on role of natural radioactive elements (K, Ra, U, Th, Rb, C¹⁴) in physiological processes in plants and animals are outlined with special emphasis on works of Russian authors. NSA 5-5554.

2231

THE RELATIONSHIP BETWEEN CHOLESTEROL AND RADIATION SICKNESS. Rudolf Hummel. Strahlentherapie **28**, 308-314(1930). (In German)

Author believes there is parallelism between decrease in cholesterol level in whole blood and x ray sickness, but not between decrease in serum cholesterol and x ray sickness. BA 5-19629.

2232

Brookhaven National Lab.
BIOLOGY AND MEDICINE. p. 44-9, 94-121 of Quarterly Progress Report, April 1-June 30, 1951. Aug. 1951. 34p. (BNL-117(p 44-9, 94-121)).

Includes reports on: x ray effects on Trillium and rats, γ -ray effect of Z. mays, relation of nucleic acid metabolism to genetic effect of radiation, intraocular tissue transplants and other medical studies on radiation effects NSA 5-6044.

2233

Argonne National Lab.
RADIUM TOXICITY PROGRAM; A PROGRESS REPORT OF CLINICAL STUDIES ON TWENTY-FOUR PATIENTS. William B. Looney. July 1951. 48p. (ANL-4666).

Author reports on clinical study of 24 patients who had received radium chloride 20 yr previously. From extensive tests made it was concluded that radium plus

unknown factor(s) combine to produce bone degeneration. NSA 5-6046.

2234

New York Univ. Hospital
SKIN CHANGES PRODUCED BY LOW VOLTAGE ROENTGEN RAY IRRADIATION, FINAL REPORT. Marion B. Sulzberger, Rudolf L. Baer, and Alexander Borota. [nd]. (AECU-1616). NSA 5-6049.

2235

Brookhaven National Lab.
THE ACTION OF X-RAYS ON FIBRINOGEN SOLUTIONS. H. A. Scheraga and L. F. Nims. [nd]. 21p. (AECU-1628), Arch Biochem. Biophys. 36, 336-44(1952).

Irradiation of fibrinogen solutions leads to fragmentation and polymerization of original fibrinogen molecule. NSA 5-6050.

2236

Brookhaven National Lab.
LUNG CARCINOMA IN AN INDUSTRIAL POPULATION AT AN ATOMIC PILE SITE. Robert A. Love. [nd] 3p. (AECU-1620).

Radiation exposure is shown not to be responsible for high incidence of primary lung carcinoma in industrial population at Brookhaven National Laboratory.

NSA 5-6051.

2237

Metallurgical Lab., Univ. of Chicago
THE ACUTE LETHAL ACTION OF SINGLE DOSES OF X-RAYS ON GUINEA PIGS. C. W. Hagen, Jr and G. A. Sacher. Aug. 1951. 12p. (CH-3907).

LD₅₀ was found to be 200 r for guinea pigs and mean survival times following lethal doses was quantitatively similar to those of other experimental animals.

NSA 5-6052.

2238

Western Reserve Univ., School of Medicine
THE EFFECT OF IONIZING RADIATION ON THE DESOXYRIBONUCLEIC ACID CONTENT OF RAT THYMUS NUCLEI. Helen Harrington and Paul S. Lavik. Sept. 27, 1951. 16p. (NYO-1627).

Data show irradiation causes no significant change in DNA phosphorus content/ nucleus of thymus cells of normal and x-rayed rats. Observed decrease in entire tissue is explained as being due to inhibited DNA synthesis resulting in decreased production of new cells followed by elimination of old lymphocytes from the thymus.

NSA 5-6053.

2239

EFFECT OF WHOLE BODY X-IRRADIATION ON THE STORAGE OF IRON IN LIVER, SPLEEN, AND KIDNEY OF RATS. Stephan Ludewig and Alfred Chanutin Am. J. Physiol. 166, 384-6(1951). Aug. 1.

After 500 r x ray exposure Fe contents of liver and spleen increased during 1st 2wk, decreased during 3rd wk, small increases noted in Fe contents of kidneys during 2nd post-irradiation week. NSA 5-6054.

2240

EFFECT OF WHOLE BODY X-IRRADIATION ON SERUM IRON CONCENTRATION OF RATS. Alfred Chanutin and Stephan Ludewig. Am. J. Physiol. 166, 380-3(1951). Aug. 1. NSA 5-6055.

2241

HEMATOLOGY OF THE DOG FOLLOWING INTRAVENOUS ADMINISTRATION OF RADIOACTIVE COLLOIDAL GOLD. Brownell Wheeler, Marvin A. Jackson, and Paul F. Hahn. Am. J. Physiol. 166, 323-7(1951). Aug. 1.

White blood cell count sedimentation rate, hemoglobin, hematocrit, and liver function changes are described in 14 dogs following injection of 1 mc/kg of Au¹⁹⁸. NSA 5-6056.

2242

ON THE POSSIBILITY OF DEMONSTRATING X-RAY AND Ra DAMAGE IN PERSONNEL BY OBSERVATION OF THE PROTHROMBIN LEVEL IN THE BLOOD. F. K. Beller, Jr. Fortschr. Gebiete Roentgenstrahlen 75, 95-8 (1951). July. (In German)

Observations indicate that slight radiation injury cannot be demonstrated by a decrease in prothrombin level, as x rays do not generally affect clotting potential of the blood. NSA 5-6057.

2243

STUDIES ON THE EFFECT OF X-IRRADIATION UPON PELOMYXA CAROLINENSIS WITH SPECIAL REFERENCE TO NUCLEAR DIVISION AND PLASMOTOMY E. W. Daniels. J. Expt. Zool. 117, 189-209(1951). June.

M L D. for this amoeboid protozoan was 96,000 r of x rays, survival curve was sigmoid. Doses between 15,000 and 140,000 r caused marked division delay when irradiation was administered during interphase and delay was proportional to dose with higher doses. Frequency of simple divisions (plasmotomies) was not altered. Fusion (plasmogamy) of irradiated and normal organisms tended to prevent x ray induced delay before the first mitosis. NSA 5-6058.

2244

EXPERIMENTAL RADIATION CATARACTS. David G. Cogan and David D. Donaldson Arch. Ophthalmol. (Chicago) 45, 508-22(1951). May.

Effects of x rays on eyes of rabbits 3 wk to 3 yr old were studied. NSA 5-6059.

2245

ROENTGEN IRRADIATION OF DESOXYRIBONUCLEIC ACID. III. THE RELATION OF DOSE TO DEGREE OF DEPOLYMERIZATION IN VIVO AND THE INFLUENCE OF OXYGEN TENSION. George Limperos. Cancer Research 11, 325-29(1951). May.

Depolymerization of DNA in rat thymus is proportional to x ray dose, reduced oxygen tension inhibits depolymerization. Prevention of involution of rat thymus tissue is described. NSA 5-6060.

2246

HISTOLOGICAL AND CHEMICAL ALTERATIONS PRODUCED IN MOUSE EPIDERMIS BY SOFT X-RADIATION. M. H. Toosy. Cancer Research 11, 361-5(1951) May.

Areas of epidermis on backs of mice were exposed to 50 kv x rays, at a distance of 20 mm, 2 ma, 100 r/sec, no filter. Histological and chemical studies made. Changes in irradiated mice are compared with changes in normal mice and mice exposed to methylcholanthrene. Chemical criteria of effect: Ca content of skin, iodine number of skin lipids, total skin lipids, reducible substances from skin lipids. NSA 5-6061.

2247

THE EXPERIMENTAL USE OF BONE MARROW IN ACUTE RADIATION INJURY. John M. Talbot and Ernest A. Pinson. Military Surgeon 108, 412-17(1951). May.

Studies of bone marrow homotransplants in rats with marrow depressed by benzene and x rays suggest that such transplants will survive in healthy condition for an approximate minimum of 4 weeks. Data on marrow injections are included. NSA 5-6062.

2248

EFFECTS OF EXTERNAL AND INTERNAL RADIATION ON CELL DIVISION. Austin M. Brues and Leola Reitz. Ann. N. Y. Acad. Sci. 51, 1497-1507(1951). Mar

Effect of ionizing radiations on mitosis include reversible delay in cell division, followed by visible chromosome damage and changes in mitotic figures. Study was made on regenerating rat liver. NSA 5-6063.

2249

EARLY HYPERTENSION IN RABBITS WHO HAVE BEEN EXPOSED TO WHOLE-BODY IRRADIATION. P. Brooks and H. B. Gerstner. *Federation Proc.* **15**, 25(1956).

All irradiated rabbits showed a pronounced initial reaction characterized by severe-hypotension and acceleration of respiratory rate. Blood of 16 irradiated animals was withdrawn during the collapse phase and the plasma was lyophilized. The lyophilized irradiated material produced a consistent blood pressure fall when injected into nonirradiated rabbits.

2250

THE RELATION OF OXYGEN UPTAKE TO HEMOGLOBIN SYNTHESIS. Jonas E. Richmond, Kurt I. Altman, and Kurt Salomon. *Science* **113**, 404-5(1951). Apr. 13.

Authors studied homogenates of bone marrow of (1) normal rabbits and (2) rabbits at various intervals after exposure to 800 r of x rays. Using C^{14} glycine as a hemoglobin precursor, they measured O_2 consumption and synthesis of hemin and globin. Findings are evaluated in parallel with histological findings. NSA 5-6065.

2251

RECOVERY FROM RADIATION INJURY. L. O. Jacobson, E. L. Simmons, E. K. Marks, and J. H. Eldredge. *Science* **113**, 510-11(1951). May 4.

Results indicate that factor involved in shielding or transplant experiments is definitely effective after irradiation and is probably of noncellular nature. NSA 5-6066.

2252

EFFECT OF X-RADIATION UPON SUCCINOXIDASE OF RAT KIDNEY (18772). M. LeMay. *Proc. Soc. Exptl. Biol. Med.* **77**, 337-9(1951). June.

No x ray alteration of succinic dehydrogenase or cytochrome oxidase was apparent in vitro using rat kidney homogenates from rats receiving whole body x ray exposure to 400 or 800 r. NSA 5-6067.

2253

PHOTORESTORATION FOLLOWING X IRRADIATION OF LYSOGENIC BACTERIA. Raymond Latarjet. *Compt. rend.* **232**, 1713-15(1951). Apr. 30. (In French) NSA 5-6068.

2254

OBSERVATIONS ON THE SKIN REACTION TO THE SUBCUTANEOUS APPLICATION OF METALLIC POLONIUM IN MICE. Leif Kreyberg and Finn Devik. *Acta. Radiol.* **35**, 356-62(1951). May-June.

Local changes and mechanism of the severe hyperplastic phenomenon observed in the mice are discussed. Authors emphasize possibility of an indirect effect mediated through the connective tissue vascular system. (Po on Ni plate was placed subcutaneously, some was absorbed). NSA 5-6069.

2255

NEGATIVE RESULTS FOLLOWING EXPOSURE OF SEVERAL KINDS OF SEEDS TO COSMIC RAYS AND OTHER RADIATION AT HIGH ALTITUDES. J. M. Beal. *Botan. Gaz.* **112**, 533-4(1951). June.

No mutagenic effects were observed in angiosperm seedlings grown from seeds exposed to cosmic radiations at high altitudes. NSA 5-6070.

2256

POST-RADIATION PARABIOSIS AND SURVIVAL IN RATS. G. Brecher and F. P. Cronkite. *Proc. Soc. Exptl. Biol. Med.* **77**, 292-4(1951). June.

Rats survive an otherwise fatal x ray dose if joined after irradiation to nonirradiated litter mates. Myelopoiesis was accelerated by transfer of some material from the nonirradiated partner. NSA 5-6071.

2257

NUCLEAR AND CELL DIVISION IN ALLIUM CEPA AS INFLUENCED BY SLOW NEUTRONS AND X-RAYS. Ellen Myrberg Rasch. *Botan. Gaz.* **112**, 331-47(1951). June.

Plants from all irradiated bulbs were markedly retarded in growth, while all those from bulbs irradiated with slow neutrons or 10,000 r of x rays died. Cytological analysis of root tips is included. NSA 5-6072.

2258

EFFECT OF TOTAL BODY X-IRRADIATION ON GLUTATHIONE LEVELS IN RATS. Ruth D. Peterson, Clarissa H. Beatty, and Edward S. West. *Proc. Soc. Exptl. Biol. Med.* **77**, 747-9(1951). Aug.

Irradiation with 500 r, total body, causes decrease in blood glutathione of rats, and in some cases a decrease in liver glutathione. NSA 5-6073.

2259

THE INTERACTION OF NUCLEIC ACID AND X-RADIATION ON THE CHROMATIN OF RYE AND PEA. Louise R. Sieburth. *Northwest Sci.* **25**, 132-6(1951). Aug.

Seeds were exposed to x ray or ribose nucleate or to both. Effects of 5000 r: pycnosis and multinucleolated cells, dense clumping of nucleolar chromatin (both rye and pea). Effects of 200 r: same effects but to a lesser degree were observed in rye only. NSA 5-6074.

2260

CYTOLOGIC AND PATHOLOGIC EFFECTS OF IONIZING RADIATION OF INTEREST TO THE VETERINARIAN. John H. Rust. *J. Am. Vet. Med. Assoc.* **118**, 355-62(1951). June. NSA 5-6075.

2261

THE VALUE OF SMALL LEAD SHIELDS AGAINST THE INJURIOUS EFFECT OF TOTAL-BODY IRRADIATION. J. Gershon-Cohen, M. B. Hermel, and J. Q. Griffith, Jr. *Science* **114**, 157-8(1951). Aug. 10.

Survival times, weights and blood data of rats with liver, lung and/or abdomen shielded during exposure are tabulated. NSA 5-6076.

2262

EFFECT OF PRETREATMENT WITH CYSTEINE ON SURVIVAL OF MICE EXPOSED TO EXTERNAL AND INTERNAL IRRADIATION. Horace Goldie, Gadson J. Tarleton, Jr., and Paul F. Hahn. *Proc. Soc. Exptl. Biol. Med.* **77**, 790-4(1951). Aug.

Mice pretreated with small doses of cysteine before lethal x ray doses showed high percentage of survival 10-14 days post irradiation. NSA 5-6077.

2263

REDUCTION OF X-RAY SENSITIVITY OF ESCHERICHIA COLI B/R BY SULFHYDRYL COMPOUNDS, ALCOHOLS, GLYCOLS, AND SODIUM HYDROSULFITE. W. T. Burnett, Jr., G. E. Stapleton, M. L. Morse, and Alexander Hollaender. *Proc. Soc. Exptl. Biol. Med.* **77**, 636-8(1951). Aug. NSA 5-6078.

2264

PRODUCTION OF POLYPOIDS BY COLCHICINE AND X-RAYS. D. Lewis. *Nature* **167**, 891-2(1951). June 2.

X rays were used to make colchicine more effective in producing tetraploid instead of diploid or chemical plants. NSA 5-6079.

2265

DIAGNOSIS OF RADIATION INJURY AS PRODUCED BY ATOMIC BOMBS. Eugene P. Cronkite. *Med. ann. Dist. Columbia* **20**, 661-9(1951).

Nontechnical summary of radiation injuries to be expected from atomic bomb blast is presented. NSA 5-6095.

2266

Atomic Energy Project, Univ. of Rochester
NEOPLASIA INDUCED IN RAT EMBRYOS BY ROENTGEN

IRRADIATION. James G. Wilson, Robert L. Brent, and H. Charles Jordan. Sept. 5, 1951. 30p. (UR-183); Cancer Research 12, 222-8(1952).

Rat embryos x-rayed on 9th day of gestation developed discrete tumor-like growths in and around the brain, incidence was directly related to dosage. NSA 5-6563.

2267

Brookhaven National Lab.

SOME CYTOLOGICAL AND MORPHOLOGICAL CHANGES INDUCED IN PLANTS BY IONIZING RADIATION. Arnold H. Sparrow. [nd]. 1p. (AECU-1645). Science 114 488 (1951).

Several species were exposed to chronic Co^{60} γ radiation for periods up to 4 mo. Changes are described and possible explanations discussed. Recovery to a normal growth pattern indicates that most morphological aberrations were not genetic but were probably the result of radiation-induced physiological changes. The report appears in its entirety in NSA. NSA 5-6564.

2268

RECOVERY PATTERN OF THE BLOOD PICTURE IN GUINEA PIGS FOLLOWING A LIMITED TOTAL BODY EXPOSURE TO CHRONIC GAMMA RADIATION. Egon Lorenz. J. Chm. phys. 48, 264-74(1951). May-June.

Guinea pigs were given 8.8 r daily until erythrocyte count fell to 2.8 million/mm. Blood and bone marrow studies indicate a hematopoietic sensitivity comparable to that of man. NSA 5-6566.

2269

ANALOGOUS EFFECTS OF RADIATION AND TRYPAN BLUE ON RATS RESISTANT TO TRANSPLANTED HEPATOMA. Annabelle Cohen and Lionel Cohen. Nature 167, 1063(1951). June 30. NSA 5-6567.

2270

RESULTS AND PROBLEMS OF THE TARGET THEORY IN RADIOBIOLOGY. K. Sommermeyer. Naturwissenschaften 38, 289-98(1951). July. NSA 5-6568.

2271

GENETIC, EMBRYOLOGIC, AND NEONATAL PROBLEMS RELATED TO IONIZING RADIATIONS OF INTEREST TO VETERINARIANS. John H. Rust. J. Am. Vet. Med. Assoc. 119, 103-7(1951). Aug.

X ray effects on amphibia, fruit flies, and small laboratory animals are presented and results are extrapolated to large animals. NSA 5-6569.

2272

ATOMIC BOMB INJURY: RADIATION. Charles L. Dunham, Eugene P. Cronkite, George V. LeRoy, and Shields Warren. J. Am. Med. Assoc. 147, 50-4(1951). Sept. 1.

Acute radiation syndrome observed after total-body x ray exposure is described NSA 5-6570.

2273

A STUDY OF GENETIC EFFECTS OF COSMIC RADIATION ON COTTON SEED. Govan N. Stroman and Thomas H. Lewis. J. Heredity 42, 210-13(1951). July-Aug.

Cotton seed was sent to an altitude of 90.5 miles in a V-2 rocket. Exposed seed was grown through second generation, but changes remain to be finally evaluated NSA 5-6572.

2274

OBSERVATIONS UPON THE LYMPHOPENIA OF X-RAY IRRADIATION, PART II. C. H. G. Price. Brit. J. Radiol. 24, 556-67(1951). Oct.

In a study of rats exposed to fractional doses of 95-kv x rays, total lymphocyte count was definitely related to total radiation dose. Lymphocyte survival/dose curve is of double exponential form. Major effect is best explained as a direct effect of radiation which can be regarded as a single hit target phenomenon. NSA 5-6574.

2275

EFFECTS OF ANTISPLENIC TISSUE SERUM ON ROENTGEN-RAY DAMAGE (WHOLE BODY IRRADIATION). Norman Molomot, Milton Friedman, Irene Jacob Ryby, and Alvin Harber. Am. J. Roentgenol. Radium Therapy 66, 245-47(1951). Aug.

Under conditions used, antispleen serum did not affect increased susceptibility of x rayed mice to infection with Rickettsia pox. NSA 5-6575.

2276

MAMMARY-TUMOR INCIDENCE IN FEMALE C_2Hb MICE FOLLOWING LONG CONTINUED GAMMA IRRADIATION. Egon Lorenz, Allen B. Eschenbrenner, Walter E. Heston, and Delta Uphoff. J. Natl. Cancer Inst. 11, 947-61(1951). Apr.

Mean survival time of chronically irradiated mice was shortened 36% compared with controls. Tumor incidence was increased by radiation. Physiological and hormonal factors are discussed. NSA 5-6576.

2277

DEPENDENCE OF THE HUMAN SKIN REACTION PRODUCED BY IONIZING RADIATION UPON THE TYPE OF RADIATION. C. W. Wilson. Radiology 57, 83-9(1951). July.

Speculations presented are based on the assumption that the human skin reaction to ionizing radiation is due to the production of chromosome abnormalities arising from chromosome breaks. Relative effects are demonstrated by data from experiments with Tradescantia and rough extrapolations are made to conditions for thinner chromatids. NSA 5-6577.

2278

SUCCESSFUL SUBCUTANEOUS GROWTH AND TRANSPLANTATION OF HUMAN TUMORS IN X-IRRADIATED LABORATORY ANIMALS. Helene Wallace Toolan. Proc. Soc. Exptl. Biol. Med. 77, 572-8(1951). July. NSA 5-6578.

2279

ON THE NATURE OF RETINAL EXCITATION BY X-RAYS. Vasco Ronchi. Atti fondazione "Giorgio Ronchi" 6, 221-4 (1951). Aug. (In Italian) NSA 5-6579.

2280

ADENOSINE TRIPHOSPHATE LEVELS IN MOUSE BLOOD AFTER WHOLE-BODY IRRADIATION AND DURING TUMOR GROWTH. Paul A. Zahl and Harry G. Albaum. Proc. Soc. Exptl. Biol. Med. 77, 388-93(1951). July.

During wasting in whole body x irradiated mice, no changes occurred in blood levels of total nucleotide or of adenylic acid, ADP or ATP. Massive doses of ATP given by injection did not induce shock in mice. Mice with implanted tumors had decrease in blood ATP, until 10th post-exposure day, then a rise. Tumor growth was not accompanied by changes in blood level of total nucleotide, adenylic acid or ATP. NSA 5-6581.

2281

COMPARATIVE EFFECTS OF THERMAL NEUTRON IRRADIATION OF MAIZE POLLEN AND MAIZE SEED ON SUBSEQUENT SEEDING GROWTH. John W. Schmidt and E. F. Frolik. J. Heredity 42, 173-7(1951). July-Aug.

On basis of x ray comparison, thermal neutrons were 6-12 times as effective on maize seed as on maize pollen in reducing subsequent seedling height. NSA 5-6571.

2282

EXPERIMENTAL STUDIES ON EARLY LENS CHANGES AFTER ROENTGEN IRRADIATION. Ludwig Von Sallmann and Beatrice D. Locke. Arch. Ophthalmol. (Chicago) 45, 431(1951).

In radiotracer studies, increased permeability of blood-aqueous barrier was demonstrated up to 6 wk after

irradiation of rabbit's eye with 2000 r. Theories on x ray injury are presented. NSA 5-6582.

2283

EFFECTS OF X-RAYS PRODUCED AT TWO MEGAVOLTS ON SOME ASCOSPOROGENOUS YEASTS. Cecil G. Dunn Am. Brewer 84, No. 5, 27-9, 84(1951).

Five genera of ascosporogenous yeast showed different degrees of x-ray sensitivity (500-25,000 r), 80% of cells of all genera were destroyed by 25,000 r. Susceptibility rather than number of cells determines percent of survival. NSA 5-6583.

2284

LETHAL IRRADIATION OF MICE WITH HIGH DOSES OF ROENTGEN AND GAMMA RAYS. P. Bonet-Maury and F. Patti Radiology 57, 419-23(1951). Sept.

Greater amount of γ energy than of x ray energy is required for similar biological effects in mice. Result is attributed to different primary radiochemical reactions resulting from unequal distribution along electronic path of the two radiations. NSA 5-6584.

2285

GROWTH OF BACTERIA IN THE PRESENCE OF RADIO-ACTIVE PHOSPHORUS. Francis E. Clark and C. A. I. Goring. J. Bacteriol 62, 352-4(1951). Sept.

P^{32} has lethal effect on many individual cells, but those surviving continue to multiply until growth is limited by other factors. Some delay in aging may be caused by low levels of P^{32} . NSA 5-6585.

2286

THE ELECTROLYTIC RESISTANCE OF THE BLOOD CLOT IN POLYCYTHEMIA VERA BEFORE AND AFTER RADIATION AND ITS RELATIONSHIP TO CLOT RETRACTION. Henry H. Henstell, Irma S. Henstell, and Edward M. Ornitz, Jr. Am. J. Clin. Path. 21, 820-7(1951). Sept. NSA 5-6586.

2287

MECHANISMS OF BIOLOGICAL EFFECTS OF PENETRATING RADIATIONS. Cornelius A. Tobias. Federation Proc. 10, 595-601(1951). Sept.

Author describes interaction of radiation with matter, various biological effects of breakdown of macromolecules by direct radiation action and recent experimental approaches to study indirect radiation action. NSA 5-6587.

2288

LIVER CIRRHOSIS WITH ASCITES, INDUCED IN DOGS BY CHRONIC MASSIVE HEPATIC IRRADIATION WITH RADIOACTIVE COLLOIDAL GOLD. P. F. Hahn, Marvin A. Jackson, and Horace Goldie. Science 114, 303-5 (1951). Sept. NSA 5-6588.

2289

EFFECT OF THYROID HORMONE ON RADIATION LETHALITY. Willie W. Smith and Falconer Smith. Am. J. Physiol. 165, 639-50(1951). June. NSA 5-6595.

2290

EFFECTS OF THYROID AND RADIATION ON SENSITIVITY TO HYPOXIA, BASAL RATE OF O_2 CONSUMPTION, AND TOLERANCE TO EXERCISE. Willie W. Smith and Falconer Smith. Am. J. Physiol. 165, 651-61(1951). June. NSA 5-6597.

2291

STUDIES ON THE PROBLEM OF PROTECTION AGAINST THE EFFECTS OF X RAYS. Arne Forssberg. J. chim. phys. 48, 262-3(1951). May-June.

Protective properties of cysteine against radiation injury are reported. NSA 5-6598.

2292

EXERCISE EFFECTS ON TOLERANCE TO RADIATION. Falconer Smith and William W. Smith. Am. J. Physiol. 165, 662-6(1951). June.

Effect of moderate exercise for 8 consecutive hr/day, or for 12 hr a day in spaced periods of 3 hr decreased slightly the tolerance of mice to whole-body x rays. Radiation lethality apparently does not parallel rate of O_2 utilization under these conditions. NSA 5-6599.

2293

PROTECTION FROM WHOLE-BODY IRRADIATION BY CHEMICAL MEANS. R. H. Mole. J. chim. phys. 48, 258-61(1951). May-June.

Thiourea given immediately before irradiation gave some radiation protection to mice, while sodium dithionate, sodium ethane-di-thiophosphate, glycerol and sodium thiosulfate did not. NSA 5-6600.

2294

HEMATOLOGY, DIAGNOSIS, AND THERAPY OF RADIATION INJURY. E. P. Cronkite. U S Armed Forces Med. J. 2, 1019-25(1951). July. NSA 5-6602.

2295

EFFECTS OF BETA RADIATION ON THE GASTRIC MUCOSA OF DOGS. D. M. Douglas, W. R. Ghent, and S. Rowlands. J. chim. phys. 48, 249-51(1951). May-June.

Methods of reducing gastric acidity of dogs by direct irradiation of stomach walls with β rays is described. Applicators are inflatable balloons impregnated with P^{32} . NSA 5-6612.

2296

COLCHICINE, X-RAYS AND MUTATION PROCESS. Ake, Gustafsson, and Niles Nybom. Hereditas 35, 280-4(1949).

Special strain of Ymer barley seed was tested for effects of irradiation and colchicine. Course of mutation process was found to be considerably altered by application of colchicine previous to irradiation. Xantha and albobivridis types and very rare mutants increase in number after colchicine pre-treatment (Colchicine solutions of 0.1 to 0.001%, x ray doses of 5000 to 15,000 r.) NSA 4-640.

2297

THE INFLUENCE OF THE Y-CHROMOSOME ON X-RAY INDUCED MUTATION RATE IN DROSOPHILA MELANOGASTER. Jean Kerschner. Proc. Natl. Acad. Sci. U S. 35, 647-51(1949). Nov.

An extra y-chromosome decreased x-ray induced visible and sex-linked lethal mutation frequency in male fly, in female it appeared to be without effect. NSA 4-641.

2298

MUTANT STRAINS OF ESCHERICHIA COLI UNABLE TO SYNTHESIZE P-AMINOBENZOIC ACID. J. O. Lampen, M. J. Jones, and R. R. Roepke. J. Biol. Chem. 180, 423-34 (1949). Aug. NSA 4-642.

2299

STUDIES ON X-RAY MUTATIONS IN THE WHITE AND FORKED LOCI OF DROSOPHILA MELANOGASTER. II. STUDY OF THE FORMATION OF GYNANDROMORPHS AND OTHER KINDS OF MOSAICS. G. Bonnier, K. G. Luning, and Ann Margret Perje. Hereditas 35, 301-35 (1949). NSA 4-643.

2300

ROENTGEN THERAPY FOR PITUITARY ADENOMA. CORRELATION OF TUMOR DOSE WITH RESPONSE IN 64 CASES. Arnold L. Bachman and William Harris. Radiology 53, 331-41(1949). Sept. NSA 4-647.

2301

FURTHER STUDIES ON THE EFFECTS OF IRRADIATION THERAPY FOR CARCINOMA OF THE CERVIX UPON THE URINARY TRACT. Houston S. Everett, C. Bernard Brack, and George J. Farber. Am. J. Obstet. Gynecol. 58, 908-19(1949). Nov. NSA 4-650.

2302

THE BIOLOGICAL EFFECT OF ROENTGEN RAY IN

TUBERCULOSIS. I. THE LEUKOCYTE PICTURE IN PULMONARY TUBERCULOSIS TREATED WITH ROENTGEN RADIATION. Georg. Brdiczka. Beitr. Klin. Tuberk. 72, 298-311(1929). (In German)

Differential leukocyte counts and erythrocyte sedimentation rate determinations were made 2-3 times weekly on 31 patients with tuberculosis during and after 1/40-1/10 skin unit doses of filtered (1/2 mm Zn) radiation weekly (total dose 20-70% of skin unit dose) No consistent pattern of leukocyte response was observed. BA 6-7259.

2303

PROTECTION OF OPTICAL INSTRUMENTS BY RADIUM EMANATIONS. Richard E. Vicklund. U S. Patent 2,478,955 Aug. 15, 1949.

Lenses and optical instruments may be protected against discoloration, clouding or etching due to fungi by placing metal foil, spread with thin coat of α -ray emitter, on rim of optical instrument NSA 4-731.

2304

A COMPARISON OF THE RADIOSENSITIVITIES OF TUMORS AUTOGENOUS TO INBRED STRAINS OF ANIMALS. Anna Goldfeder. Acta Unio Intern. contra Cancrum 6, 787-93(1949)

Distinctive relationship appears to exist in various tumors between their radiosensitivities and their grades of differentiation after irradiation, even among analogous tumors. NSA 4-985.

2305

THE CHANGES INDUCED IN IODINE METABOLISM OF THE RAT BY INTERNAL RADIATION OF ITS THYROID WITH I^{131} . D. D. Feller, I. L. Chaikoff, Alvin Taurog, and Hardin B. Jones. Endocrinology 45, 464-79(1949) Nov.

Under conditions of this experiment thyroid function was undisturbed in rats up to 10 days after injection of 24 or 30 μ c of I^{131} . Changes caused by 300 and 875 μ c are discussed. NSA 4-984.

2306

THE BIOLOGIC EFFECT OF HIGH ENERGY ROENTGEN RAYS. Henry Quastler Acta Unio Intern. contra Cancrum 6, 825-30(1949).

In a clinical and histological study of mice irradiated with 20 MeV roentgen rays and in other studies on plant seedlings, no specific effect of high energy rays was found. Observed: survival time, greying of hair in mice, stunting of growth of beans, sex-linked mutations in *Drosophila*; and other biological indicators. Found efficiency of high energy protons approx. 3/4 as effective as conventional x rays if both were measured and referred to 25 r thimble chamber. Main advantages of high energy rays lies in their ability to deliver optimum tumor doses without severe skin burns and systemic reactions. NSA 4-983.

2307

THE BEHAVIOR OF THE TUMOR CELL UNDER THE INFLUENCE OF IRRADIATION AND CHEMICALS. P. C. Koller. Acta Unio Intern. contra Cancrum 6, 812-15(1949).

Alterations in mitosis and chromosome structure induced in tumor cells by x ray doses of 200 to 600 r are described. NSA 4-982.

2308

ATOM BOMB CATARACTS. David G. Cogan, S. Forrest Martin, and Samuel J. Kimura. Science 110, 654-5(1949) Dec. 16.

Description of ten cases of cataracts believed to have been caused by exposure to atomic bomb explosions in Japan are presented. NSA 4-981.

2309

A COMPARISON OF THE REACTION OF CELLS TO NITRO-

GEN MUSTARD AND X-RAYS. Robert Schreck Acta Unio Intern. contra Cancrum 6, 848-56(1949).

Reactions of nitrogen mustard and x rays on cells from rabbit thymus and bone marrow, and on human blood cells in suspension were studied. Results suggest that the two agents may produce different effects on the same nuclear compound. NSA 4-986.

2310

CYCLOTRON-INDUCED RADIATION CATARACTS. P. H. Abelson and P. G. Kurger. Science 110, 655-7(1949) Dec. 16.

Case studies of 10 scientists who developed cataracts, probably as a result of chronic exposure to neutrons in energy range 0 to 20 Mev are presented. NSA 4-987.

2311

EFFECT OF ADRENAL CORTICAL EXTRACT AND OF X-RADIATION ON SERUM PROTEINS OF MICE. John Milne, and Abraham White. Proc. Soc. Exptl. Biol. Med. 72, 424-8(1949) Nov.

Large increase in serum protein levels was found in mice after adrenal cortical extract injection or exposure to 200 r of x rays. There was no significant difference in relative distribution of serum proteins. NSA 4-988.

2312

EFFECT OF PROTEIN DEPLETION UPON SUSCEPTIBILITY OF RATS TO TOTAL BODY IRRADIATION.

F. Lamont Jennings. Proc. Soc. Exptl. Biol. Med. 72, 487-91(1949) Nov.

Protein depletion before exposure materially increases rat susceptibility to total body irradiation and its effects. (Rats were on low protein diet for 10 weeks before irradiation, lost approximately 25% of body weight.) NSA 4-989.

2313

THE EFFECT OF RADIATION ON THE BIOLOGICAL BEHAVIOR OF A MOUSE MAMMARY CARCINOMA. Henry S. Kaplan and Edwin D. Murphy. Acta Unio Intern. contra Cancrum 6, 810-11(1949).

Authors suggest on basis of results reported that moderate x ray irradiation may alter behavior of a tumor in direction of increased autonomy. NSA 4-990.

2314

THE EFFECT OF RADIOACTIVE STRONTIUM ON THE PERIPHERAL BLOOD PICTURE OF THE NORMAL DOG. J. Eugene Nelson, John G. Gibson, 2nd, Bert L. Vallee, and Marvin A. Van Dilla. Acta Unio Intern. contra Cancrum 6, 819-24(1949).

A mixture of Sr^{89} and Sr^{90} was given intravenously to three dogs, 2 normal; 1 castrated. Leucopenia was maximum 21 days after injection. Fall in count was due to decrease in granulocytes, there being no change in absolute lymphocytes or monocytes. Hematocrit fell at all 3 dosage levels. One dog died during maximal leukopenia, the other two survived this stage but died later. All showed aplastic marrow at autopsy. Clinical changes are described. NSA 4-991.

2315

THE EFFECT OF SPLENECTOMY ON THE TOXICITY OF Sr^{89} TO THE HEMATOPOIETIC SYSTEM OF MICE. Leon O. Jacobson, Eric I. Simmons, and Matthew H. Block. J. Lab. Clin. Med. 34, 1640-55(1949) Dec.

Rapid development and persistence of ectopic erythrocytopoiesis in spleen prevents anemia in mice irradiated with 2.0 μ c/g of Sr^{89} (injected intraperitoneally). NSA 4-992.

2316

THE EFFECT OF X-IRRADIATION ON ANTIBODY FORMATION. L. O. Jacobson, M. E. Robson, E. K. Marks, and M. C. Goldman. J. Lab. Clin. Med. 34, 1612-13(1949) Nov.

Antibody formation is suppressed by total body irradiation. Capacity to produce antibodies to an injected particulate antigen is not lost when a part of the body (spleen or appendix) is shielded from radiations which destroy lymphatic tissue. NSA 4-993.

2317
THE EFFECTS OF ATOMIC RADIATION ON THE ORAL AND PHARYNGEAL MUCOSA. Joseph L. Bernier. *J. Am. Dental Assoc.* 39, 647-57(1949). Dec. NSA 4-994.

2318
EFFECTS OF IONIZING RADIATIONS ON ENZYME ACTIVITIES OF YEAST CELLS. II. INFLUENCE OF DILUTION ON X-RAY INDUCED INHIBITION OF ANEROBIC CO₂ PRODUCTION AND COLONY FORMATION Frederick G. Sherman and Herman B. Chase. *J. Cellular Comp. Physiol.* 34, 207-19(1949) Oct.

Dilution of yeast cell suspension results in marked augmentation of radiation effect on anaerobic CO₂ production in yeast grown in Reader's solution. NSA 4-995.

2319
THE EFFECTS OF ROENTGEN RAYS ON THE INFLAMMATORY CELLS OF THE MOUSE AND RABBIT. William A. Townsend and Berry Campbell. *Blood* 4, 1346-56(1949) Dec.

No acceleration of cell differentiation during the inflammatory cycle was induced by x-raying inflammatory cells of mice. Structural abnormalities appear in cells of mice after 250 r, in rabbits after 700 r. NSA 4-996.

2320
EFFECTS OF X-RAY DOSES ON THE CONTROLLED GREYING RESPONSE IN MICE. Hermann B. Chase. *Acta Unio Intern. contra Cancrum* 6, 768-70(1949).

Age, sex, weight and specific location do not influence hair response to irradiation, but stage of hair development does. Maximum graying occurs when inactive or resting follicles are irradiated. Threshold of effect is 250 r. NSA 4-997.

2321
EXPERIMENTAL STUDIES OF THE INFLUENCE OF RADIATION QUALITY. DOSE RATE, AND FRACTIONATION ON THE DIRECT INJURY OF CELLS BY IONIZING RADIATIONS. L. H. Gray. *Acta Unio Intern. contra Cancrum* 6, 794-8(1949).

More densely ionizing radiations may be either more or less effective in producing gene mutations, in inactivating enzymes in dilute aqueous solution and in affecting growth of many tissues including tumor tissue. Root tip meristems are selected as an example, demonstrating that growth inhibition is highly dependent on dose rate and fractionation with x or γ radiation but not with densely ionizing radiation. No dose rate dependence was observed with α radiation. Types of chromosome structural changes observed appear to account for interdependence of effects of varying dose rate and radiation quality. NSA 4-998

2322
FACTORS OF INDUCTION OF OVARIAN TUMORS BY X-RAYS: TYPES, CHARACTER AND HISTOGENESIS OF THESE GROWTHS. J. Furth. *Acta Unio Intern. contra Cancrum* 6, 785-6(1949)

Mice 4-6 weeks old were exposed to x ray doses of 87 r, 175r or 350r. Ovarian tumors began to appear when mice reached 11 months of age and their frequency increased with time. NSA 4-999

2323
INFLUENCE OF COSMIC RADIATION ON INDUCED CARCINOGENESIS IN MICE. E. P. George, M. George, Joan Booth, and E. S. Horning. *Nature* 164, 1044-5 (1949). Dec. 17. NSA 4-1000.

2324
EXPERIENCES RELATIVE TO THE ACTION OF X-RAYS ON A PHYCOMYCES. L. Errera. *Compt. rend.* 122, 787(1896). (In French).

2325
FACTORS INFLUENCING RESPONSE TO RADIATION THERAPY. Henry Schmitz. *Amer. J. Roentgenol.* 7, 52(1920).

Factors influencing the response to radiation therapy are discussed, especially differences in the sensitivity of various changes observed in irradiated cells and tissue is described in detail. Radium is considered to exert its primary effect on cell nucleus, injuring it so that it will not divide.

2326
NEUTRON EFFECTS ON ALKALINE PHOSPHATASE OF RAT INTESTINE. M. H. Ross and J. O. Ely. *Am. J. Roentgenol. Radium Therapy* 62, 725-5(1949) Nov. NSA 4-1004.

2327
NEUTRON AND ROENTGEN-RAY EFFECTS ON PROTEIN CONTENT OF RAT INTESTINE. M. H. Ross and J. O. Ely. *Am. J. Roentgenol. Radium Therapy* 62, 718-22 (1949) Nov. NSA 4-1005.

2328
NEW EXPERIMENTS ON THE RESTORATION FACTOR OF RADIOBIOLOGY. Paul Lamarque and Charles Gros. *J. Radiol. Electrol.* 30, 539-42(1949) (In French.)

Further studies of the postirradiation recuperative power of *B. mori* eggs are reported. These properties are suspended by refrigeration and are greatest when dose is fractionated and eggs are incubated between exposures. NSA 4-1006.

2329
THE POSSIBLE CARCINOGENIC EFFECTS OF THE ATOMIC BOMB AT HIROSHIMA AND NAGASAKI. Shields Warren. *Acta Unio Intern. contra Cancrum* 6, 874-7(1949). NSA 4-1007.

2330
RADIATION EFFECTS DUE TO PHOSPHORUS-32 IN FERTILIZER EXPERIMENTS. R. Scott Russell, S. N. Adams, and R. P. Martin. *Nature* 164, 993-5(1949) Dec. 10.

Studies carried out with winter wheat and barley show that the amount of fertilizer phosphate absorbed is significantly depressed by the presence of tracer, although growth of roots and shoots may not be affected. NSA 4-1008.

2331
RADIOPHOSPHORUS, SEEDLING LETHALITY, AND CHROMOSOME DISTURBANCES. L. Ehrenberg, A. Gustafsson, A. Levan, and U. von Wettstein. *Hereditas* 35, 469-89(1949).

Cytogenetical effects of P³² on cereal seed of two-rowed barley, hexaploid spring wheat and tetraploid wheat were studied. Wheat seeds were found to be more susceptible than barley. NSA 4-1009.

2332
THE RESISTANCE OF SCIARA (DIPTERA) TO THE MUTAGENIC EFFECTS OF IRRADIATION. Helen V. Crouse. *Biol. Bull.* 97, 311-14(1949). Dec. NSA 4-1010.

2333
STUDIES ON THE INFLUENCE OF PENETRATING RADIATIONS ON CARCINOGENESIS. Frank H. Figge. *Acta Unio Intern. contra Cancrum* 6, 782-4(1949).

Author concludes that potency of such powerful carcinogens as methylcholanthrene may be altered by slight variations in intensity of penetrating environmental radiation. NSA 4-1011.

2334

RADIATION INJURY FOLLOWING AN A-BOMB EXPLOSION. Colin F. Bruegge and M. C. Vorder. (United States Army, Washington, D. C.). (Armed Forces Institute of Pathology.). *Ann. Internal Med.* **36**, 1444-58(1952).

Blast injuries and burns account for approximately 85% of the casualties from an atomic bomb explosion high in the air. The lymphoid and hematopoietic tissues, skin, genital organs and gastrointestinal tract were most severely affected by ionizing radiation.

2335

CLINICAL AND PATHOLOGICAL OBSERVATIONS ON THE EFFECTS OF THE ATOMIC BOMB. Atomic Bomb Investigating Groups, Manhattan District. [nd] 32p. (NP-1202).

Cases of skin burn and radiation disease occurring after Nagasaki bombing described. NSA 4-1017.

2336

ATOMIC ENERGY IN MEDICINE. Irving Rubin. *Am. Druggist* **121**, 81-83, 94, 96, 98(1950). Jan.

Author presents a general description and discussion of structure, types, uses and effects of radioisotopes in medicine. NSA 4-1018.

2337

CLINICAL RADIATION DOSAGE II. INTER-RELATION OF TIME, AREA, AND THERAPEUTIC RATIO. Lionel Cohen. *Brit. J. Radiology* **22**, 706-13(1949) Dec.

It is concluded that optimal fractionation scheme, therapeutic ratio and maximum permissible heterogeneity can be calculated and determined for tumor of a specific dimensions. NSA 4-1022.

2338

CULTURE OF HUMAN LEUKEMIC BLOOD CELLS IN VITRO, SOME EFFECTS OF X-RAYS. F. W. Gunz. *Brit. J. Cancer* **3**, 330-44(1949) Sept. NSA 4-1023

2339

HERPES ZOSTER AFTER IRRADIATION. Frank Ellis and Basil A. Stoll. *Brit. Med. J.* **1323-8**(1949) Dec. 10.

Herpes zoster may result from either a systemic mechanism following release of substances set free by irradiation or from an effect at level of the cord concerned, through afferent nerves of the irradiated area. NSA 4-1026.

2340

THE INFLUENCE OF THE PROTEIN CONTENT OF THE DIET ON THE RESPONSE OF WALKER RAT CARCINOMA 256 TO X-RADIATION. L. A. Elson and L. F. Lamberton. *Brit. J. Cancer* **3**, 414-26(1949) Sept.

Response of tumors to radiation is divided into phase (1) initial inhibition of tumor growth, which appears favored by low protein diet, and phase (2) elimination of inhibited tumor and cure of animal, favored by high protein diet. NSA 4-1027.

2341

THE CALCULATION OF THE ENERGY DEPOSITION IN SOFT TISSUE BY THERMAL NEUTRONS Atomic Energy Research Establishment. J. H. Tait. Oct. 1949. 20p. (AERE-T/R-416). NSA 4-1325.

2342

EFFECTS OF X-RAYS AND NITROGEN MUSTARD ON LYMPHATIC NODULE OF THE RABBIT. P. P. H. De Bruyn and R. C. Robertson. *Proc. Soc. Exptl. Biol. Med.* **72**, 717-18(1949) Dec.

No quantitative histological difference was found in response of lymphatic nodules in rabbits to LD₅₀ doses of these two agents. Difference was minor in mesenteric lymph node, in appendix, nitrogen mustard was twice as effective as x rays. NSA 4-1327.

2343

LIMB REGENERATION IN *TRITURUS VIRIDESCENS* AS AFFECTED BY LETHAL DOSES OF RADIOACTIVE PHOSPHORUS. J. N. Dent. *Anat. Record* **105**, 325-35 (1949) Oct. NSA 4-1329.

2344

Atomic Energy Research Establishment, Harwell, Berks (England)
SOME PAPERS ON THE EFFECTS OF RADIATIONS ON BACTERIA AND MOULDS. Oct. 14, 1949. 7p. (AERE-Inf/Bib-51).

Bibliography listing 60 references in period 1930-1949. NSA 4-1330

2345

SYNERGISTIC ACTION OF ESTROGENIC HORMONE AND X-RAYS IN INDUCING THYMIC LYMPHOSARCOMA OF MICE Arthur Kirschbaum, Joyce R. Shapiro, and Harry W. Mixer. *Proc. Soc. Expt. Biol. Med.* **72**, 632-4(1949). Dec. NSA 4-1331

2346

TARGET-THEORETICAL INTERPRETATION OF THE RELATION BETWEEN THE STEEPNESS OF THE DOSAGE-EFFECT CURVE AND THE IONIZATION DENSITY Kurt von Sanden. *Z. Naturforsch.* **4b**, 257-62(1949) Oct.-Nov. (In German) NSA 4-1332.

2347

AMYLOID DEGENERATION OF THE HUMAN BRAIN FOLLOWING X-RAY THERAPY K. Lowenberg-Scharenberg and R. C. Bassett. *J. Neuropathol. Exptl. Neurol.* **9**, 93-102(1950) Jan. NSA 4-1334

2348

LESIONS OF THE EYE FROM RADIANT ENERGY. David G. Cogan. *J. Am. Med. Assoc.* **142**, 145-51(1950) Jan. 21.

Author discusses sources and types of radiation, transmission and absorption of radiant energy in ocular media and clinical characteristics of eye lesions caused by radiant energy. NSA 4-1335.

2349

Fairchild Airplane and Engine Corp.
ATTEMPTS TO PREVENT AND COUNTERACT EFFECTS OF IONIZING RADIATIONS BY CHEMICAL AND PHARMACOLOGICAL MEANS. W. A. Selle. Sept. 15, 1949. 30p (NEPA-1127). NSA 4-1339.

2350

THE HEMORRHAGIC SYNDROME OF ACUTE IONIZING RADIATION ILLNESS PRODUCED IN GOATS AND SWINE BY EXPOSURE TO THE ATOMIC BOMB AT BIKINI, 1946. E. P. Cronkite. *Blood* **5**, 32-45(1950) Jan. NSA 4-1340.

2351

Argonne National Lab.
ARGONNE NATIONAL LABORATORY BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT MAY, JUNE, JULY, 1949. Austin M. Brues and Herman Lisco. 143p. (ANL-4333).

Includes reports on: x ray effect on antibody formation and mouse lymphoma, 30-day LD₅₀ for an blood picture of irradiated guinea pigs, comparison of 186-kv and 11.4 Mev x rays, 30-day LD₅₀ for mice after x rays and radon, polonium effect on mice, survival of x rayed chicks. NSA 4-1616

2352

THE INFLUENCE OF X-RAYS ON GERMINATION. J. Mالدني and M. Thouvenin. *Compt. rend.* **126**, 548-9 (1898). (In French).

2353

TOLERANCE OF *TRADESCANTIA* TO CONTINUOUS EXPOSURES TO GAMMA RADIATION FROM COBALT⁶⁰. Arnold H. Sparrow. *Genetics* **35**, 135(1950). (AECU-681)

Tradescantia paludosa plants exposed to (continuous) doses of 122 and 30.4 r per day γ radiation showed little growth, while normal growth occurred at 7.5 r per day or less. Complete pollen abortion was produced after 16 days at 122 r per day. A significant increase in frequency of micronuclei was obtained with 84 mr per day after 32 days exposure (total dose 2.69 r). (from abstract) NSA 4-1618

2354

NON-RANDOM DISTRIBUTION OF CHROMOSOME FRAGMENTATION IN UNIRRADIATED *TRILLIUM*. A. H. Sparrow and E. Christensen. [nd] 1 p. (AECU-691), *Genetics* 35, 135 (1950). NSA 4-1619

2355

THE PATTERN AND SIGNIFICANCE OF DELAYED PHENOTYPIC EXPRESSION OF MUTATIONS INDUCED IN *E. COLI* BY ABSORBED P^{32} . B. A. Rubin. [nd] 1p. (AECU-693). *Genetics* 35, 133 (1950).

Absorbed P^{32} has been shown to induce increases in the proportion of streptomycin-resistant cells among populations of *E. Coli*. Absorption of P^{32} by bacteria is greatly influenced by concentration of carrier P. Large increases in intracellular produce insignificant changes in specific ionization in a cell the size of *E. Coli* but produce a disproportionately great increases with radiation dose but the relative size of mutant populations changes with continued culture. Complete phenotypic expression of mutations appear also to depend upon the number of cell divisions (resting v. dividing cultures). There is both a quantitative and a qualitative difference in distribution of mutant types produced by an effect not accounted for by ionization alone. The effect may be due to transmutation of P^{32} to S^{32} . NSA 4-1620.

2356

Atomic Energy Project, Univ. of Calif., Los Angeles RELATION OF LOW TEMPERATURES TO X-RAY INJURY OF HEMATOPOIETIC TISSUE OF TADPOLES. (PRELIMINARY ACCOUNT). Bennet M. Allen, Ole Arne Schjelde, and Lynette B. Hochwald. Nov. 30, 1949. 9p. (UCLA-50), *Proc. Soc. Exptl. Biol. Med.* 73, 60-2 (1950).

Temperature of *R. catesbeiana* tadpoles at time of exposure matters little in destructive processes developing later. These destructive effects depend primarily upon temperature to which tadpoles are subjected post-irradiation. NSA 4-1622

2357

THE ACTION OF IONIZING RADIATIONS ON STRIATED FROG MUSCLE. Z. M. Bacq, J. Lecomte, and A. Herve. *Arch. intern. physiol.* 57, 142-53 (1949) Dec. (In French)

Both x rays and β radiation from P^{32} determine appearance of Lundsgaard effect (contraction of striated muscle after work). Authors consider this proof of muscular glucidic metabolism. Irradiation is considered to act like an enzyme poison. H_2O_2 content of Ringer's solution (the suspending medium) was measured after doses of 4000 r to 8000 r. NSA 4-1623

2358

CYANIDE AND X-RAYS. Z. M. Bacq and A. Herve. *J. physiologie* 41, 124-A-125-A (1949). (In French).

Protective influence of NaCN against x-ray damage is believed to be due to its action on peroxides formed in the cells by radiation. NSA 4-1624

2359

FRACTURES OF THE FEMORAL NECK AND OSSEOUS ALTERATIONS AFTER PELVIC IRRADIATION. Henri Kritter. *Semaine Hopitaux Paris* 25, 2999-3001 (1949) Oct. (In French)

Author reports 17 cases of pathological fractures of neck of the femur discovered after high therapeutic doses

of x ray (up to 20,000 r) for uterine maladies. Radio-therapeutic bone effect appears to be similar to radio-therapeutic lung effect. NSA 4-1625.

2360

FURTHER STUDIES ON THE INFLUENCE OF DOSE FRACTIONATION ON THE LETHAL X-RAY EFFECT PRODUCED BY TOTAL BODY IRRADIATION IN MICE. Friedrich Ellinger and James C. Barnett. *Radiology* 54, 90-2 (1950) Jan.

Effect of 1000 r of 200 kV x rays (air dose) at 23.4 r/minute in 1 exposure (LD_{100}) was compared with effect of same dose given in fractions of 100-50 r in air within 10-20 days. Effect of dose fractionation was found to depend on size of single fraction as well as on over-all exposure time, the size of the fractions being more important. With respect to tumor destruction there appeared also to be a definite optimum for dose fractionation in total body exposure. NSA 4-1626.

2361

THE HISTOLOGICAL STRUCTURE OF THE OVARIES OF FETAL MICE AFTER THE DESTRUCTION OF THE HYPOPHYSIS BY X-RAYS. Albert Raynaud and Marcel Frilley. *Compt. rend. soc. biol.* 143, 959-63 (1949) July (In French).

After hypophyseal destruction general growth of the ovaries is not affected noticeably. Animals were irradiated with 150,000 r to 200,000 r to the base of the cranium at 12-13 days of fetal age and sacrificed when 18 days old. NSA 4-1627

2362

THE HISTOLOGICAL STRUCTURE OF THE TESTICLES OF FETAL MICE AFTER DESTRUCTION OF THE HYPOPHYSIS BY X-RADIATIONS. Albert Raynaud, and Marcel Frilley. *Compt. rend. soc. biol.* 143, 954-8 (1949) July (In French).

Studies indicate that if destruction of the hypophyseal line occurs rapidly and completely on 12th - 13th day of fetal life, testicular growth and development of the interstitial gland may then be accomplished in a nearly normal fashion. NSA 4-1628.

2363

MUTATIONS INDUCED IN *DROSOPHILA* BY INGESTED PHOSPHORUS-32. A. J. Bateman and W. K. Sinclair. *Nature* 165, 117-18 (1950) Jan. 21. NSA 4-1629.

2364

THE DESTRUCTIVE ACTION OF ASTATINE²¹¹ (ELEMENT 85) ON THE THYROID GLAND OF THE RAT. J. G. Hamilton, C. W. Asling, W. M. Garrison, K. G. Scott, and D. Axelrod Heller. Oct. 1, 1949. 8p. (UCRL-477), *Proc. Soc. Exptl. Biol. Med.* 73, 51-3 (1950).

Astatine induces extreme degree of radiation injury of thyroid gland in rat without apparent involvement of adjoining parathyroid gland. NSA 4-1635.

2365

X-RAY THERAPY OF NON-MALIGNANT CONDITIONS. Paul W. Roman and Stanley H. Macht. *Virginia Med. Monthly* 77, 71-4 (1950) Feb

Review of literature on results of radiation therapy of nonmalignant conditions and on theories of action of x ray therapy is presented with results of treatment of 70 patients. NSA 4-1653.

2366

Naval Radiological Defense Lab.

THE EFFECT OF EXERCISE UPON THE LETHALITY OF ROENTGEN RAYS FOR RATS. D. J. Kimeldorf, D. C. Jones, J. L. Lee, T. A. Gonzalez, and M. C. Fishler. Dec. 12, 1949. 10p. (AD-178(B)).

Lethality of x rays at doses of 600, 700 and 860 r was increased by repeated performance of vigorous exercise postirradiation. Relation of radiosensitivity to metabolic level is discussed. NSA 4-1838.

2367

EFFECTS OF IONIZING RADIATIONS ON CARBOHYDRATE EXCHANGE IN ANIMAL ORGANS. B. M. Graevskaya and R. Ja. Keilina. *Uspekhi Sovremennoi Biol.* 40, 230-8 (1955). (In Russian).

This is a review with 63 references. NSA 10-1175

2368

A CONTRIBUTION TO THE PROBLEM OF RADIOTOXINS. J. Zacek. *Spisy Lekarske Fakulty Masarykovy Univ.* 22, 1-10(1948). (In Czech).

Effect of parenteral injection of radiotoxins is concluded to be the same as that provoked by direct x irradiation. NSA 4-1840.

2369

EFFECT OF WHOLE BODY X-RADIATION AND OF INTRAPERITONEAL HYDROGEN PEROXIDE ON MOUSE LIVER CATALASE. Robert N. Feinstein, Carrie L. Butler, and Daniel D. Hendley. *Science* 111, 149-50 (1950) Feb. 10.

Authors compared effects on liver catalase of single whole-body exposure to 800 r with intraperitoneal injection of 20 milliequivalents of H_2O_2 as 4% solution. Results agree with *in vitro* experiments NSA 4-1841

2370

EFFECT OF X-RADIATION ON *TRYPANOSOMA CRUZI* John Emmett. *J. Parasitol.* 36, 45-7(1950) Feb.

Doses of 10,000 r and upwards decrease infective power of *T. cruzi*, paralleling radiosensitivity of *T. gambiense* and *T. brucei*. NSA 4-1842.

2371

THE EFFECTS OF IONIZING RADIATIONS ON THE CELL NUCLEI OF EXPERIMENTAL AND SPONTANEOUS TUMORS. L. Cusmano. *Tumori* 23, 63-85(1949) (In Italian).

Nuclei of malignant cells were studied in benzpyrene sarcomas of rats postirradiation and in uterine cancer of women after Ra therapy. In both types of cases, tumors showed rapid decrease of proliferating A cells, temporary increase of hyperplod A cells and increase of sublethal B cells. NSA 4-1843

2372

THE INDIRECT EFFECT OF X-RAYS ON THE HEART AND CIRCULATION IN MAN. Gerd Bedurftig, and Gunther Grussner. *Strahlentherapie* 78, 445-58(1949) (In German)

Changes in pulse rate and blood pressure of carcinoma patients following x ray therapy are described. NSA 4-1844

2373

MALIGNANT TUMORS OF THE UTERINE FUNDUS SUBSEQUENT TO IRRADIATION FOR BENIGN PELVIC CONDITIONS. H. Speert, and T. C. Peightal. *Am J. Obstet. Gynecol.* 57, 261-73(1949) Feb. NSA 4-1845.

2374

OBSERVATIONS ON DISORDERS OF THE THYROID GLAND ASSOCIATED WITH EXPOSURE OF THE SUPRARENAL GLANDS TO X-RAYS. K. A. Jarvinen. *Ann. Med. intern. fenn.* 37, 227-44(1948). NSA 4-1846.

2375

QUARTERLY RESEARCH REPORT. School of Aviation Medicine, United States Air Force, Oct. 1 to Dec 31, 1949.

Research projects include study of antibody response of x rayed animals and isotopic oxygen consumption at low oxygen tensions. NSA 4-1848.

2376

THE RADIOBIOLOGICAL COURSE OF A REACTION IN THE VEGETATIVE NERVOUS SYSTEM Heinz Vieten. *Strahlentherapie* 79, 13-58(1949) (In German)

Author reviews the effect of radiation on the sympathetic nervous system and on blood levels of glucose, K, Ca and eosinophils. A total of 110 papers is cited NSA 4-1849.

2377

THE RECIPROCAL VICINITY EFFECT OF IRRADIATED TISSUES ON A "DIFFUSIBLE SUBSTANCE" IN IRRADIATED TISSUES. Benjamin Jolles. *Brit. J. Radiology* 23, 18-24 (1950) Jan.

Reaction to x rays was significantly more marked when dose was given over 2 small adjacent areas of skin than over one area of skin at a symmetrical site. When space between 2 paired areas exceeded a certain minimum, reaction equally that seen on single area. NSA 4-1850

2378

CYTOLOGICAL ASPECTS OF PROTECTION FROM IONIZING RADIATIONS. A. Glucksmann. *Brit. J. Radiol* 23, 41-5(1950) Jan.

Target theory and intracellular poison concept of x ray effects are reviewed. NSA 4-1852.

2379

MEDICAL ASPECTS OF PROTECTION FROM IONIZING RADIATIONS. F. Ellis. *Brit. J. Radiol.* 23, 28-34(1950) Jan NSA 4-1853

2380

THE TREATMENT OF X-RAY ILLNESS WITH ANTISTINE. H. Fetzner and E. Werle. *Strahlentherapie* 78, 619-24 (1949) (In German).

Antistine was used to treat x ray illness on the theory that reactions are caused by intoxication with histamine. NSA 4-1859

2381

CONCERNING THE POSSIBLE INFLUENCE OF X-RAY THERAPY ON ABDOMINAL DISEASES, ESPECIALLY ULCER OF THE STOMACH AND OF THE DUODENUM. R. Birkner and W. Werner. *Strahlentherapie* 79, 81-92 (1949) (In German). NSA 4-1867.

2382

RADIATION RESULTS IN LEUKEMIA DURING THE LAST TEN YEARS. Horst Muller. *Strahlentherapie* 79, 193-200 (1949) (In German). NSA 4-1885.

2383

SPLENIC CHANGES IN CF1 FEMALE MICE OVER A FORTY-ONE DAY PERIOD POST X-IRRADIATION. Robert E. Carter. [nd]. 9p. (AECU-709).

Between 3 and 8 days post irradiation, decrease in splenic weight may serve as remarkably accurate indication of radiation received NSA 4-2113.

2384

Oak Ridge National Lab. THE CYTOGENETIC EFFECT OF SLOW NEUTRONS. Alan D. Conger and Norman H. Giles, Jr. Feb. 6, 1950. 55p. (ORNL-409), *Genetics* 35, 397-419(1950)

Production of chromosome aberrations in trades-cantia microspores by (1) slow neutrons and (2) x rays was studied H, N, and Bo are responsible for about 99% of ionization by neutron capture and about 77% of this dose is due to protons and α particles from N and Bo. NSA 4-2114

2385

Oak Ridge National Lab. THE EFFECT OF RADIATIONS ON GENETIC MECHANISMS OF *PARAMECIUM AURELIA*. R. F. Kimball. Feb. 15, 1950. 17p. (ORNL-565), *J. Cellular Comp. Physiol* 35, Suppl 1, 157-69 (1950) NSA 4-2115.

2386

Oak Ridge National Lab. EFFECTS OF RADIATION ON MITOSIS. J. Gordon Carlson. Feb. 15, 1950. (ORNL-570), *J. Cellular Comp. Physiol.* 35, (Suppl. 1), 89-101(1950).

A discussion of effects of x- and ultraviolet radiations upon mitosis of grasshopper embryo neuroblasts. Author believes effectiveness of very low ionizing radiation dosages in interfering with enzyme systems may be very important in understanding radiation effects on mitosis. NSA 4-2116

2387

Oak Ridge National Lab.

THE EFFECT OF OXYGEN CONCENTRATION ON THE RATE OF X-RAY INDUCED MUTATIONS IN DROSOPHILA. William K. Baker and Elizabeth Sgourakis. Feb. 1, 1950. 18p. (ORNL-575), Proc Soc Natl. Acad. Sci. U. S. 36, 176-84(1950).

Striking reduction was found in number of recessive sex-linked lethal mutations induced in D. melanogaster males x rayed in atmosphere of low O₂ concentration. NSA 4-2117

2388

Oak Ridge National Lab.

RESUSCITATION OF HEAT-INACTIVATED SEEDS BY X RADIATION. S. R. Suskind. Feb. 9, 1950. 21p. (ORNL-579), J. Heredity 41, 97-102(1950).

Studies were made to test previously reported "resuscitation" of heat-inactivated seeds by x-radiation. Results were not confirmed. NSA 4-2118.

2389

Oak Ridge National Lab.

INTERNAL DOSE DETERMINATIONS OF SEVERAL RADIOISOTOPES. Charles H. Perry. Feb. 27, 1950. 97p. (ORNL-591).

Methods of calculation and tabulated results are presented for tissue doses produced by radioisotopes of those elements which are common in body metabolism. NSA 4-2119.

2390

Oak Ridge National Lab.

X-RAY INDUCED DEVELOPMENT ABNORMALITIES IN THE MOUSE AND THEIR USE IN THE ANALYSIS OF EMBRYOLOGICAL PATTERNS. I. EXTERNAL AND GROSS VISCERAL CHANGES. Liane Brauch Russell. Feb. 17, 1950. 76p. (ORNL-595) J. Exptl. Zool. 114, 545-611(1950). NSA 4-2120.

2391

University Calif., Los Angeles

STUDY OF THE EFFECTS OF VARYING OXYGEN TENSIONS ON THE RESPONSE OF MAMMALIAN TISSUES TO ROENTGEN IRRADIATION. Andrew H. Dowdy, Leshe R. Bennett, and Sarah M. Chastain. Jan. 3, 1950. 20p. (UCLA-55).

Effects of brief extreme anoxia on LD₅₀ and on the acute radiation syndrome observed in mammals after total body x irradiation were investigated. NSA 4-2121.

2392

University Calif., Los Angeles

A COMPARISON OF THE RESPONSE OF NORMAL AND HYPOTHYROID MICE TO ACUTE WHOLE BODY ROENTGEN RADIATION. Thomas J. Haley, Samuel Mann, and Andrew H. Dowdy. Feb. 20, 1950. 9p. (UCLA-66), Science 112, 33-4(1950).

Results show hypothyroid state does not protect mouse from x irradiation damage. Amount of available O₂ and not its rate of utilization determines extent of such damage. NSA 4-2122

2393

CYTOGENETICAL EFFECTS OF INTERNAL RADIATIONS FROM RADIOISOTOPES. Norman H. Giles, Jr., and Rene A. Bolomey. p. 104-12 of Cold Spring Harbor Symposia on Quantitative Biology, Vol. XIII. Cold Spring Harbor, L. I., N. Y., Biological Laboratory. 1948.

Results of cytological analysis to determine amount of change caused by radiations from isotopes in Tradescantia buds and microspore nuclei grown on P³² and C¹⁴ media are presented. NSA 4-2127.

2394

A CONTRIBUTION TO THE STUDY OF TRANSIENT PLEURO-PULMONARY MODIFICATIONS OCCURRING AFTER RADIOTHERAPY OF BREAST CARCINOMA.

R. Sarasin, G. Voluter and J. Garcia-Calderon. J. Radiol. Electrol. 29, 445-52(1948) (In French)

Nine case histories of pulmonary complications developing after use of up to 12,000 r on breast cancer are given with radiographs of affected areas.

2395

CYANIDE PROTECTION AGAINST X-IRRADIATION.

Z. M. Bacq, A. Herve, J. Lecomte, and P. Fischer. Science 111, 356-7(1950) Apr. 7.

Protective action of NaCN against x rays in mice described. NSA 4-2876.

2396

DISEASES OF THE HANDS AND NAILS. Arthur C. Curtis

and Lewis W. Kirkman. Oral Surg. Oral Med. Oral Pathol. 3, 289-355(1950). Mar.

Symptoms and treatment are described for various ailments of skin and nails. Radiodermatitis is discussed, skin reactions to x rays and Ra compared.

NSA 4-2877

2397

Field Information Agency Technical, Office of Military Government for Germany.

DAMAGES BY RADIATION. B. Rajewsky, A. Schraub, G. Kahlau, W. Drebow, A. Krebs, and H. Schaefer. p. 123-75 of Fiat Review of German Science, 1939-46; Biophysics, pt. I. Boris Rajewsky and Michael Schon. 1948. (In German).

Topics include: radiation-induced cancer, radiation-produced changes in blood, radium poisoning, measurement and distribution of radioelements in the body; radiography. NSA 4-2879.

2398

British Mission to Japan

THE EFFECTS OF THE ATOMIC BOMBS AT HIROSHIMA AND NAGASAKI. [nd] 39p. (NP-1156).

General effects on the two cities are presented in this report by the official mission of the British government. NSA 4-2880.

2399

MEDICAL ASPECTS OF THE ATOMIC BOMB. G. M. McDonnell. Ordnance. 34, 308-10(1950) Mar.-Apr.

Atomic casualties produced by blast, heat and ionizing radiation are discussed. Detonation in air, on the ground and underwater are described and effects listed. Author states radiation danger is highly overrated relative to other bomb associated causes of death.

NSA 4-2883

2400

POST-RADIOTHERAPEUTIC ESOPHAGEAL STENOSES.

R. Nadal and J. Piequet. J. Radiol. Electrol. 29, 296-7(1948). (In French).

Three cases of stenosis occurring after x irradiation are presented. NSA 4-2884.

2401

FOUNDATIONS AND RESULTS OF ELECTRON THERAPY WITH A 6-Mev BETATRON. Gerhard Schubert. Schweiz. Med. Wochschr. 80, 193-200(1950) Feb. 25. (In German).

Radiobiological effect of fast electrons is somewhat smaller than that of x rays as ionization per unit path is less. Studies were made on barley seeds, B. coli and D. melanogaster flies. NSA 4-2901.

2402

MANUAL OF ROENTGEN THERAPY. F. Purzer, Stuttgart, Wissenschaftliche Verlagsgesellschaft m. b. H 1949. 144p. (In German)

Includes discussions of: physical-chemical basis and biological effects of x rays on an organism, radiation sickness, x ray therapy, details of technique and dosimetry. NSA 4-2909

2403

OBSERVATIONS CONCERNING A COMBINED COLCHICINE-X-RAY THERAPY OF LEUKEMIA. Edwin Keibl and Anny Lotsch. Schweiz med. Wochschr. 80, 228-31(1940) Mar. 4 (In German).

From studies on leukemia patients it was concluded that although colchicine alone has no therapeutic value, it has a selective effect of making leucocytes sensitive to x rays, thus increasing effectiveness of irradiation. NSA 4-2911.

2404

BIOLOGICAL EVALUATION OF 20 MILLION VOLT ROENTGEN RAYS. Henry Quastler and Elisabeth F. Lenzl. Am. J. Roentgenol. Radium Therapy 63, 566-74 (1950) Apr.

Efficiency of 20 million volt roentgen rays produced by betatron was compared with that of conventional roentgen rays at different dose levels in studies on mice. At low dosage levels, high-energy rays are significantly lower in efficiency. NSA 4-3274.

2405

THE BIOLOGICAL SIGNIFICANCE OF THE TISSUE DOSE OF IONIZING RADIATION. Harald H. Rossi. Trans. New York Acad. Sci. 2, 270-5(1949) June. NSA 4-3275

2406

DEPRESSION OF TRACER ION UPTAKE CURVE IN RAT ERYTHROCYTES FOLLOWING TOTAL BODY X-IRRADIATION. Thomas G. Hennessy and Rex L. Huff. Proc. Soc. Exptl. Biol. Med. 73, 436-9(1950) Mar.

Radioiron red cell uptake curve appears to be a sensitive indicator of x ray damage to bone marrow, histological evidence of sensitivity of erythroid tissue to x rays confirmed. NSA 4-3276

2407

THE "LAW OF INITIAL VALUES" IN FUNCTIONAL X-RAY THERAPY. Heinz Vieten. Strahlentherapie 78, 429-40(1949). NSA 4-1875

2408

THE EFFECT OF X-RAY IRRADIATION ON THE TEETH AND SUPPORTING STRUCTURES OF THE MOUSE M. S. Burstone. J. Dental Research 29, 220-31(1950) Apr.

Degree of radiation damage to teeth and jaws of mice appears dependent upon age at which animals are irradiated and stage of histogenesis of individual teeth. NSA 4-3278.

2409

THE EFFECT OF X-RAYS UPON MUTATION OF THE GENE A IN MAIZE. L. J. Stadler and Herschel Roman. Genetics 33, 273-303(1948) May. NSA 4-3279.

2410

THE EFFECT OF LOCAL X-RAY IRRADIATION ON THE TAIL DEVELOPMENT OF YOUNG AXOLOTLIS. V. V. Brunst. J. Morphology 86, 115-41(1950) Jan.

Effects of 1,000, 2,000, 3,000, or 6,000 r (43 kv, no filter, 17 cm) delivered to localized areas in tail region of axolotls described. Treated animals were studied histologically 35-40 days or 85-100 days after irradiation. Primary effect was inflammation, degeneration of epithelium, notochord and neural tube and inhibition of growth. Secondary effect, which followed primary effect, was characterized by inhibition of growth of exposed

portions and subsequent growth of second tail in many animals, the second tail being smaller than normal and having varying anatomical aberrations. NSA 4-3280.

2411

HISTOLOGICAL AND HISTOCHEMICAL STUDIES OF THE SKIN OF GUINEA PIGS TREATED WITH X-RAYS.

J. Fredericq. Compt. rend. soc. biol. 142, 850-3 (1948) June (In French).

Radiation; x ray (filtered through 1 mm Al) in doses of 3000 r, 15000 r, or 1000 r. Studied; morphological changes in epidermis over a period of 30 days. Histochemical studies were included to estimate sulfhydryl content in regenerating areas. Sulfhydryl groups are considered to be a requirement of cells regenerating after radiation injury. NSA 4-3281.

2412

PROCEEDINGS OF THE SECOND CONFERENCE ON THE BIOLOGY OF NORMAL AND ATYPICAL PIGMENT CELL GROWTH, HELD AT NEW YORK. Nov. 18-19, 1949.

Herman B. Chase and Virginia W. Smith. Zoological 35, 1-32(1950) Apr. 17

From study of x ray effects of mouse pigmentation as related to melanoblast distribution, authors conclude reservoir of melanoblasts is within epidermal follicle and x irradiation destroys source of supply of granules (epidermal melanoblasts of the follicle). NSA 4-3286.

2413

"A" BOMB BURNS. Patrick Clarkson. Guy's Hosp. Gaz. 64, 86-94(1950) Mar. 11.

Physics of nuclear fissions, pattern of disaster (types of effects) and acute diffuse ionizing radiation illness are described. NSA 4-3288.

2414

"A" BOMB BURNS. Patrick Clarkson. Guy's Hosp. Gaz. 64, 120-4(1950) Mar. 25.

This is the second part of general article on atomic bomb effects. Dosage and types of radiation necessary to produce local radiation burns and typical manifestations of radiation burns are outlined. NSA 4-3289.

2415

THE ATOMIC BOMB VERSUS SURVIVAL. Melville J. Aston. Military Surgeon 106, 270-5(1950) Apr.

Elementary mechanics of atomic bomb is discussed, radiation, blast and burn effects attendant on atomic bombing is described. NSA 4-3290.

2416

ATOMIC WARFARE AND ANIMALS. J. H. Wilkins. Ft. Dodge Biochem. Rev. 21, 3-5, 21(1950) March

Four atomic blast effects, flash, blast, fission products and radiations are discussed. Radiation sickness symptoms in dogs are outlined and treatment described. NSA 4-3291

2417

BLOOD CHANGES IN LUMINIZERS USING RADIOACTIVE MATERIAL. Ethel Browning. Brit. Med. J. 1, 428-31 (1949) Mar. 12.

Transient lymphocytosis, presence of Turk cells, premyelocytes and premature large mononuclear cells and the rare occurrence of anemia were found. Author concludes blood changes are due to slight temporary hyperstimulation of reticulo-endothelial system. NSA 4-3292

2418

DESTRUCTIVE ASPECTS OF ATOMIC EXPLOSION.

Elbert DeCoursey. S. Dakota J. Med. Pharm. 3, 71-3 (1950) Mar.

Author presents a general discussion of symptoms and pathology of ionizing radiations such as those seen after atomic explosions at Nagasaki and Hiroshima. NSA 4-3293.

2419

LATE RADIATION EFFECTS IN ROENTGEN THERAPY FOR HYPERTHYROIDISM, THEIR POSSIBLE BEARING ON THE USE OF RADIOACTIVE IODINE Edith H. Qumby and Sidney C. Werner. J. Am. Med. Assoc. **140**, 1046-7(1949) July 23.

Long-term follow ups on I^{131} -treated patients are necessary before it can be determined if such therapy results in late degenerative malignancy in treated areas NSA 4-3295.

2420

REMARKS ON SEVERAL CASES OF CUTANEOUS HYPERSENSITIVITY. J. Reboul and J. M. Meynard. J. Radiol. Electrol. **30**, 732-3(1949) (In French).

Four cases of reaction to radiotherapy are described in detail. Authors conclude that certain individuals are hypersensitive to certain doses and discuss possibility that percentage plots of population reacting against dose may show sigmoid population distribution for sensitivity. NSA 4-3299.

2421

CONSIDERATIONS OF RADIATION SICKNESS AND ITS THERAPY. A. Herve. Brux. Med. **29**, 445-50(1949) (In French).

Study of 210 cases receiving radiation delivered at 151 to 200 kv and 59 to 400 kv shows that higher voltages are better tolerated for the same dose than lower voltages. Other physical factors and specific radiation sensitivity must be considered. NSA 4-3301

2422

BETA IRRADIATION AS A POSSIBLE THERAPEUTIC AGENT IN GLAUCOMA George M. Halik, Louis A. Breffeilli, and Aeleta Barber. Am. J. Ophthalmology **31**, 945-52(1948) Aug.

Ra-irradiated rabbits were studied for effects of β irradiation of ciliary body and to determine degree of destruction which could be brought about in that body without lens injury. NSA 4-3304

2423

COEXISTENT BRONCHOGENIC CARCINOMA AND ACTIVE PULMONARY TUBERCULOSIS. Edward Robbins and Gertrude Silverman. Cancer **2**, 65-97(1949) Jan.

Eleven cases of bronchogenic carcinoma and one of bronchial adenoma are presented. Four cases were irradiated, and in three, tuberculosis was apparently activated, a strong contraindication for use of irradiation where tuberculosis has not been definitely eliminated. NSA 4-3310

2424

THE EFFECT OF LOW-VOLTAGE ROENTGEN RAYS ON THE NORMAL AND VASCULARIZED CORNEA OF THE RABBIT. A PRELIMINARY REPORT ON THE PHILLIPS MACHINE. Harold G. Scheie, Richard H. Dennis, Richard C. Ripple, Larry L. Calkins, and John A. Buesseler. Am. J. Ophthalmology **33**, 549-71(1950) Apr.

Species: rabbits, preliminary studies in patients. Radiation: 44KV x rays compared with β radiation. Doses: few hundred r up to 5000 r, fractionated in various ways (mostly weekly doses). Changes: corneal opacity, cataract, prevention of vascularization after caustic chemicals in rabbit's eye. Effects varied with dose, schedule and radiation. NSA 4-3316

2425

EFFECTS OF ROENTGEN IRRADIATION ON GERM PLASMA IN RELATION TO INFERTILITY. Ira I Kaplan. Fertility and Sterility **1**, 123-45(1950) Mar.

Results of treating patients for testicular tumors and similar condition involving the testes with x-irradiation and radiotherapeutic treatment of amenorrhea and

sterility in women indicate to the author that the method, properly used, is safe and valuable therapeutically. NSA 4-3317

2426

LOW DOSAGE IRRADIATION IN MALE INFERTILITY, A NEGATIVE REPORT. Charles W. Charney. Fertility and Sterility **1**, 150-7(1950) Mar.

X rays applied to pituitary and/or testes failed to change infertile condition to 20 male patients, dose was apparently too high, as degenerative testicular changes occurred. NSA 4-3321.

2427

Argonne National Lab. AN INTERSPECIES COMPARISON OF THE RADIO-TOXICITIES OF X-RAY, Sr^{89} , and Pu^{239} . C. Ladd Prosser and Marguerite N. Swift. June 1949. Decl. Apr. 18, 1950. 10p. (AEC-2828).

Radiotoxicity of the radioactive isotopes was determined in mouse, rat, rabbit, dog and goat. NSA 4-3343.

2428

Atomic Energy Project, Univ. of Rochester APLASTIC ANEMIA. William Valentine. Jan. 22, 1945. Decl. Apr. 28, 1950. 12p. (AEC-2833).

Literature survey was made to discover: (1) incidence of aplastic anemia, particularly secondary type in individuals exposed to noxious agents and (2) blood picture in aplastic anemia, especially early hematological changes which might serve as warning signs. NSA 4-3567

2429

Rochester Univ., School of Medicine and Dentistry SELECTIVE TESTICULAR DAMAGE IN RATS DUE TO X-RAYS. Samuel L. Shaver and Karl E. Mason. [nd] 1p. (AECU-747).

Dosage of 500 r total-body x irradiation, administered in approximately 8 min. proved most suitable for producing minimal but selective effects upon the testis or the rat. NSA 4-3580.

2430

Rochester Univ., School of Medicine and Dentistry. THE EFFECT OF AUREOMYCIN AND ANTIBIOTICS ON WHOLE BODY IRRADIATION. Joe W. Howland, Frank Furth, and M. Coulter. [nd] 2p. (AECU-748), Federation Proc. **9**, 334-5(1950).

Results are presented from experimental exposure of more than 1,200 rats and 18 dogs to lethal doses of filtered 250 kvp x irradiation and subsequent treatment with aureomycin or other (combined) antibiotics. NSA 4-3581.

2431

Brookhaven National Lab. THE EFFECT OF GROWTH IN A RADIOACTIVE CULTURE MEDIUM ON THE MUTATION RATE OF E. COLI TO STREPTOMYCIN RESISTANCE. B. A. Rubin [nd] 2p. (AECU-762). NSA 4-3582.

2432

Brookhaven National Lab. THE GENETICS OF STREPTOMYCIN RESISTANCE INDUCED BY ADSORBED RADIOACTIVE PHOSPHORUS (P^{32}). B. A. Rubin and P. Steinglass. [nd] 2p. (AECU-765). NSA 4-3583

2433

Brookhaven National Lab. SENSITIVITY OF CHROMOSOMES TO BREAKAGE BY X-RAYS AND ITS RELATIONSHIP TO THE NUCLEIC ACID CYCLE IN DIVIDING CELLS. Arnold H. Sparrow, Montrose J. Moses, and Robert Steele. [nd] 1p. (AECU-790). Cancer Research **10**, 241-2(1950).

Number of chromosome breaks produced after irradiation by 50 r of 160 KV x rays at various stages of mitotic nuclear cycles was studied in Trillium erectum.

A change of at least 50 fold was observed throughout the mitotic cycle. NSA 4-3585

2434

Brookhaven National Lab.

NO STIMULATION FROM X-RAYS OR GAMMA RAYS.

W. Ralph Singleton, [nd] 2p. (AECU-804).

Study was made of growth of Co^{60} -irradiated seeds of standard early field corn to determine whether there is a stimulating effect of x or γ rays. Neither stimulating nor depressing effect was found using doses of 2,000, 4,000, 8,000 and 16,000 r of both x and γ rays.

NSA 4-3587

2435

Brookhaven National Lab.

A CYTOLOGICAL AND CYTOCHEMICAL APPROACH TO AN UNDERSTANDING OF RADIATION DAMAGE IN DIVIDING CELLS. Arnold H. Sparrow. [nd] 2p. (AECU-821).

Analysis of induced chromosome fragmentation following irradiation at different stages of mitosis in *Trillium erectum* indicates that major changes occur in radiosensitivity of the chromosomes. NSA 4-3588.

2436

Brookhaven National Lab.

CONSIDERATION OF THE RELATIONSHIP BETWEEN CHROMOSOME BREAKAGE AND MITOTIC INHIBITION INDUCED BY IONIZING RADIATION. Arnold H. Sparrow. [nd]. 1p. (AECU-822), 5th Intl. Congress of Cancer, Paris. July 1950, p. 132

From this study it appears that both inhibition and breakage may be related to the same primary changes produced in nucleoprotein by ionizing radiation.

NSA 4-3589

2437

Rochester Univ.

DIFFERENCE IN THE EFFECTS OF X-IRRADIATION IN RAT EMBRYOS OF DIFFERENT AGES. James G. Wilson and John W. Karr. [nd] 1p. (AECU-830).

Subsequent development was altered much more severely by x irradiation on 9th than on 10th day of gestation. Eye was most common site of mal-development. NSA 4-3590

2438

Argonne National Lab.

QUARTERLY REPORT AUGUST, SEPTEMBER, OCTOBER, 1949. Biological and Medical Divisions. Austin M. Brues and Hermann Lisco. 139p. (ANL-4360).

Included reports on: influence of spleen on post-irradiation hematopoietic recovery, effect of cysteine on peripheral blood and body weight of irradiated rat, statistical analysis of serial blood counts on human subjects.

NSA 4-3591

2439

Los Alamos Scientific Lab.

THE EFFECT OF ACUTE DOSES OF X-IRRADIATION ON THE SPLENIC AND THYMIC WEIGHT OF CF-1 FEMALE MICE. Robert E. Carter, Payne S. Harris, and James T. Brennan. Mar. 7, 1950. 8p. (LA-1075).

High positive correlation was obtained between total x-radiation received during single exposure and loss of weight of spleen and thymus of mice. NSA 4-3592.

2440

Oak Ridge National Lab.

CHANGES IN THE COMPOSITION OF THE BLOOD PLASMA OF THE GUINEA PIG DURING THE ACUTE RADIATION SYNDROME. Henry I. Kohn. Apr. 14, 1950. 12p. (ORNL-464), *Am. J. Physiol.* **162**, 703-08 (1950).

Changes are described in glucose concentration, nonprotein nitrogen level, albumin-globulin ratio, total

protein level, chloride concentration and cholesterol in the blood of irradiated guinea pigs. NSA 4-3593.

2441

DIFFERENTIAL X-RAY SENSITIVITY OF *TRADESCANTIA*

CHROMOSOMES DURING THE MITOTIC CYCLE. Charles J. Bishop. *Genetics* **35**, 175-87(1950) Mar. NS. 3595.

2442

HEMOPOIETIC FUNCTION AND IRRADIATION OF THE PYLORIC-DUODENAL TRACT. PART I. BEHAVIOR OF ERYTHROPENIA AND OF DIGESTIVE LEUCOCYTOSIS IN NORMAL PERSONS SUBJECTED TO IRRADIATION OF THE PYLORIC-DUODENAL TRACT. Cesare Tripodo and Giuseppe del Buono. *Haematologica* **31**, 693-710(1949) (In Italian).

Digestive erythropenia is confirmed as the initial mechanism that in normal conditions determines and regulates physiological erythropoiesis. NSA 4-3596

2443

OCULAR LESIONS INDUCED BY ACUTE EXPOSURE OF THE WHOLE BODY OF NEWBORN MICE TO ROENTGEN RADIATION. Egon Lorenz and Thelma B. Dunn. *Arch. Ophthalmology* **43**, 742-9(1950) Apr.

After single 400-r x ray dose at birth, survivors exhibited opacity of lens, partial opacity and vascularization of cornea, or atrophy of retina NSA 4-3598

2444

ON THE EXISTENCE OF BUFFERS, INHIBITORS OF THE RADIATION DETOXIFICATION OF STRYCHNINE. Jean Loiseleur and Georges Velley. *Compt. rend.* **230**, 784-6 (1950) Feb. 20. (In French).

Authors conclude that radiation detoxification is the result of activated oxygen, dissolved in solution, combining with strychnine to form less toxic molecule. Buffers act by removing this oxygen. NSA 4-3599.

2445

POSITIVE CEPHALIN-CHOLESTEROL FLOCCULATION

TEST IN X-RAY WORKERS. Nell Butler and James F. Crenshaw. *Am. J. Med. Technol.* **14**, 255-8(1948) Sept.

Of 28 x ray workers exposed for periods ranging between 4 mo and 20 yr, 82% show positive tests. Author suggest this may be an indication of slight changes in liver function due to x irradiation. NSA 4-3600

2446

RADIATION SCOLIOSIS: AN EXPERIMENTAL STUDY.

Alvin M. Arkin and Norman Simon. *J. Bone Joint Surg* **32A**, 396-40(1950) Apr.

In a study of production of scolioses in rabbits by direct action of radiation upon spine epiphyseal plates it was concluded that a single dose of 1,000 r is required to produce definite wedging in spines of young rabbits. NSA 4-3601

2447

SOME HISTOLOGICAL EFFECTS OF CARBON 14 ON THE LEAVES OF CERTAIN MEDICINAL PLANTS.

J. M. Beal. *Botan. Gaz.* **110**, 600-4(1949) June.

Cytological description of leaves of *Digitalis purpurea*, *D. lanata*, *Papaver somniferum*, *Nicotiana rustica* and *Atropa belladonna* grown in C^{14}O_2 atmosphere for various periods of time is presented. NSA 4-3602.

2448

CARCINOGENS AND CARCINOGENESIS. W. C. Hueper.

Am. J. Med. **8**, 355-71(1950) Mar.

Extensive survey of known and suggested carcinogenic agents is presented including discussion of radioactive substances, and their properties as carcinogens NSA 4-3611

2449

EVALUATION OF HORMONAL AND RADIATION THERAPY IN CASES OF FUNCTIONAL STERILITY AND SECONDARY

AMENORRHEA. PRELIMINARY REPORT. Rita S. Finkler. Am. J. Obstet. Gynecol. 58, 559-64(1949) Sept.

Author concludes that radiation appears to be therapy of choice because of high percentage of success, more rapid response, and economy, but mentions that great care must be taken in accurate diagnosis and in proper selection of cases for this therapy. NSA 4-3612

2450

THE EFFECTS OF IRRADIATION ON AZO DYE NEOPLASIA IN THE RAT LIVER. II. CATALASE, ALKALINE PHOSPHATASE, ARGINASE, AND RIBOFLAVIN LEVELS OF THE LIVER FOLLOWING X-RAY AND RADIOGOLD IRRADIATION OF RATS FED DIMETHYLAMINOAZO-BENZENE. Nelson F. Young and George Z. Williams. Paper Presented at a meeting of the American Association for Cancer Research, Inc., Apr. 27-29, 1951. Cancer Research 11, 291(1951) Apr. NSA 5-5496

2451

RADIOACTIVE PHOSPHORUS II. IN THE TREATMENT OF MYELOID LEUKEMIA. Henry D. Diamond and Lloyd F. Craver. Cancer 4, 999-1008(1951) Sept.

From study of 77 myeloid leukemia patients it was concluded that orally administered P^{32} is effective as palliative method of treatment; used with local x raying, hematological phase and bulky tumefaction of spleen may be controlled in early stages. NSA 5-6614.

2452

PATHOLOGICAL EFFECTS AND RADIOAUTOGRAPHIC LOCALIZATION OF I^{131} IN HUMANS. John T. Godwin, B. J. Duffy, Jr., Patrick J. Fitzgerald, J. B. Trunnell, and Rulon W. Rawson. Cancer 4, 936-51(1951) Sept. NSA 5-6615

2453

EFFECTS OF THE ACTIVATION OF THE ATMOSPHERE BY THE RADIUM EMANATION ON THE GERMINATION AND GROWTH OF DIFFERENT VEGETABLE ORGANISMS. G. Fabre. Compt. rend. soc. biol. 70, 187-88(1911). (In French).

2454

THE APPLICATION OF RADIOCARBON IN THE STUDY OF RADIOLESIONS. G. Hevesy. J. chim. phys. 48, 275-9(1951) May-June.

Postirradiation effect of mitotic arrest is discussed. X ray effect on C^{14} incorporation into purine of DNA and RNA is described. NSA 5-6715

2455

CAPILLARY FRAGILITY AND VITAMIN P PROTECTIVE ACTION AGAINST RADIATION. Boris Sokoloff, James B. Redd, and Raymond Dutcher. Proc. Soc. Exptl. Biol. Med. 75, 6(1950) Oct.

Increased capillary fragility brought about by administration of leukotaxine, a bacterial polysaccharide, or by x ray exposure, can be prevented by vitamin P (flavonoids of citrus fruit). NSA 5-1161.

2456

Atomic Energy Project, Univ. of Calif, Los Angeles THE INFLUENCE OF ANOXIA UPON DESTRUCTION AND MITOSIS OF THE HEMATOPOIETIC CELLS OF X-IRRADIATED TADPOLES. Bennet M Allen, Ole Arne Schjeide, and Ronald Piccirillo. Aug. 14, 1951. 13p. (UCLA-149).

Anoxia markedly reduces hematopoietic cell destruction due to x irradiation (500 r) and reduces colchicine effect (pycnosis and arrested mitosis) on R. catesbiana tadpoles during 24 hr post irradiation period. NSA 5-4972.

2457

Atomic Energy Project, Univ. of Calif., Los Angeles THE RELATION OF MITOSIS TO THE MANIFESTATION OF X-RAY DAMAGE IN HEMATOPOIETIC CELLS OF

TADPOLES. Ole Arne Schjeide and Bennet M Allen. Oct. 2, 1950. 22p. (UCLA-94), J. Cell. and Comp. Physiol. 38, 51-68(1951).

Hematopoietic cell destruction after 500 r x rays was directly correlated with mitotic rate during this same time. Mitotic rate and rate of cell destruction by 500 r were proportional to temperature, but at 10,000 and 20,000 r, the cell destruction exceeded mitotic rate NSA 5-287.

2458

GENETIC CHANGES WITHIN POPULATIONS AFTER X-IRRADIATION Bruce Wallace [nd] 26p. (AECU-1107), Genetics 36, 612-628(1951)

Study of genetic changes in offspring of irradiated D. melanogaster parents is presented. NSA 5-909.

2459

CONCERNING RECENT RESEARCH ON PROTECTION AGAINST HIGH-INTENSITY WHOLE-BODY EXPOSURE TO PENETRATING RADIATIONS. A. Lacassagne Fortschr. Gebiete Rontgenstrahlen 75, Suppl., 98-105(1951) Dec. (In French).

Adult rats were injected with Loiseleur's solution (glucose, cysteine, thiourea, ascorbic acid and succinic acid) 16 minutes before or after x irradiation with 666 to 836 r. Lower mortality of treated animals was apparently caused by survival of a greater number of stem cells in hematopoietic tissue. NSA 6-3917

2460

STUDY OF RECOVERY AFTER IRRADIATION WITH X RAYS. Paul Lamarque. J. chim. phys. 48, 252-5(1951) May-June (In French).

Total dose required to produce a given damaging effect is smaller when radiation is delivered as single exposure than when it is delivered in 2 exposures separated by a time interval. (Bombyx mori eggs). NSA 5-5482

2461

THE TREATMENT OF MALIGNANT DISEASE BY RADIUM AND X RAYS, BEING A PRACTICE OF RADIOTHERAPY. Ralston Paterson. London, Edward Arnold, 1948. 662p

This textbook on therapeutic applications of ionizing radiations contains a chapter on biological action of radiation. NSA 2-862

2462

GENETIC CHANGES IN POPULATION UNDER IRRADIATION. Bruce Wallace and J. C. King. [nd] 19p. (AECU-1442), Am. Naturalist 85, 209-22(1951).

Consideration of frequencies of lethals, semilethals and subvitals within populations of D. melanogaster, and of estimated adaptive values of the populations suggests the development of heterotic gene combinations. NSA 5-5463.

2463

THE DEVELOPMENT OF SECONDARY TAILS IN YOUNG AXOLOTLS AFTER LOCAL X-RAY IRRADIATION. V. V. Brunst and Frank H. Figge. J. Morphol. 89, 111-33 (1951) July.

X-ray doses of 600-12,000 r applied to tail areas of 10 day axolotls caused formation of secondary tails. NSA 5-6573

2464

Atomic Energy Project, Univ. of Rochester BIOLOGICAL EFFECTS OF EXTERNAL RADIATION [X RAYS AND γ RAYS] p. 13-51 OF QUARTERLY TECHNICAL REPORT, APR. 1, 1951 THROUGH JUNE 30, 1951. Henry A. Blair, Director. July 31, 1951. 38p. (UR-174(p-13-51)).

Includes reports on: effect of nutrition and antibiotic on post-irradiation survival of rats, effort of Aureomycin on reduced post-irradiation leucocyte and platelet volumes in dogs, prognostic significance of postirradiation flocculation test on serum of dogs. NSA 5-5470

2465

RADON IMPLANTATION IN THE MEDULLA OBLONGATA OF THE DOG; EFFECTS ON THE DEGREE AND EXTENT OF CELLULAR REACTIONS Joseph H. Globus, S. C. Wang, and H. I. Maibach J. Neuropathol. Exptl. Neurol. **11**, 429-42 (1952) Oct. NSA 7-1342.

2466

BURNS IN ATOMIC WARFARE. George F. Lull. Today's Health, **28**, 18-19, **44**(1950) Oct.

Medical problems of an atomic bomb attack are reviewed. Emphasis is placed on necessity for treatment of thousands of burn casualties. NSA 4-6493.

2467

THE RELATION OF BREAK SENSITIVITY AND REJOINING IN TRILLIUM FOLLOWING X-IRRADIATION. E. R. Deschner. Genetics **38**, 660-1 (1953).

2468

Naval Radiological Defense Lab.

PERFORMANCE STUDIES ON ANIMALS EXPOSED TO EXTERNAL RADIATION II. EXHAUSTIVE EXERCISE TESTS ON RATS EXPOSED TO X-RAYS IN THE LETHAL DOSE RANGE D. J. Kimeldorf and D. C. Jones. Aug. **25**, 1950. **23p.** (AD-241(B)).

Performance of rats in standardized exhaustive performance test was depressed after whole-body irradiation with x-ray doses of 700 and 860 r NSA 4-6501

2469

Oak Ridge National Lab.

SOME EFFECTS OF GAMMA RAYS ON RECOMBINATION AND ON CROSSING OVER IN DROSOPHILA MELANOGASTER. Maurice Whittinghill. Sept. **11**, 1950. **43p.** (ORNL-817), Genetics **36**, 352-55 (1951) July. NSA 4-6502

2470

Oak Ridge National Lab.

THE EFFECT OF X-IRRADIATION IN OXYGEN AND IN HYDROGEN AT NORMAL AND POSITIVE PRESSURES ON CHROMOSOME ABERRATION FREQUENCY IN TRADESCANTIA MICROSPORES. Norman H. Giles, Jr and Alvin V. Beatty. Sept. **15**, 1950. **15p.** (ORNL-822), Genetics **35**, 666-7 (1950), Science **112**, 643-5 (1950)

Oxygen increases frequency of x-ray-induced chromosome aberrations and amount of O₂ present during exposure determines extent of effect. NSA 4-6503.

2471

Atomic Energy Project, Univ. of Calif., Los Angeles
THE EFFECT OF X-IRRADIATION UPON FAT ABSORPTION IN THE MOUSE. James F. Mead, Arthur B. Decker, and Leslie R. Bennett. Sept. **12**, 1950. **21p.** (UCLA-90), J. Nutrition **43**, 485-500 (1951).

It was concluded that there is no evidence for post-irradiation impairment of fat absorption NSA 4-6504

2472

ACTION OF α RAYS AND OF ULTRAVIOLET LIGHT ON BACTERIUM COLI. Hermann Engelhard and Thea Houtermans. Z. Naturforsch. **5b**, 264-9 (1950) July-Aug. (In German)

Lethal effect of the α radiation on B. coli was determined as a function of dose. At equal doses, intensity has no effect. Ultraviolet radiation produces different type of survival curve indicating presence of some bacteria resistant to U-V. Morphological pictures indicate a many-hit process while shape of curves indicates 2 mechanisms, one of 1-hit and one of many-hit variety NSA 4-6505

2473

THE EFFECT OF ISOTOPIC (¹³¹I) RADIATION AND X-RADIATION ON THE TOTAL COPROPORPHYRIN EXCRETION IN HUMANS. Henry J. Koch, Jr., Timothy R. Talbot, Michel Bernstein, Jean MacKinnon, and Catherine Elias. J. Clin. Endocrinol. **10**, 1029-53 (1950) Sept

Increased excretion of coproporphyrin in urine and feces of patients receiving ¹³¹I and x radiation, and one receiving ACTH. Lymphopenia preceded or was concomitant with this increase in all cases. NSA 4-6506.

2474

EXPERIMENTAL HISTOPLASMOSIS AND X-RAYS. F. A. Brandt. S. African J. Med. Sci. **15**, 1-4 (1950) July.

Mice, gerbils and guinea pigs were irradiated (800 r, x rays) and inoculated with Histoplasma capsulatum. Observations are reported NSA 4-6507.

2475

HISTOLOGICAL CHANGES PRODUCED IN THE EPITHELIUM OF THE FROG'S CORNEA BY TOTAL AND PARTIAL IRRADIATIONS WITH X-RAYS G. S. Streln. Doklady Akad. Nauk S. S. R. **73**, 1283-6 (1950) Aug. **21**. NSA 4-6508.

2476

BENIGN TUMORS, NEVI, AND PRECANCEROUS. Carl W. Laymon. Minnesota Med. **33**, 908-9, 913 (1950) Sept.

Treatments of warts, fibromas, pigmented moles, nevi, keratoses and precancerous lesions including radiodermatitis are described. NSA 4-6509.

2477

CURATIVE TREATMENT OF RADIOLESIONS RESULTING FROM THE ADMINISTRATION OF LETHAL DOSES OF X-RAYS Jean Loiseleur and George Velley. Compt. rend. **231**, 529-31 (1950) Sept. **4** (In French)

Of 18 rabbits exposed to 950 r whole-body x ray exposure, 10 were injected immediately with a solution of cysteine and ascorbic acid, with additional doses given after 30 min and 2 hr. Six of 10 survived in good health, untreated controls died NSA 4-6510.

2478

RECONSTRUCTIVE SURGERY OF THE HAND AND INDUSTRIAL REHABILITATION Michael L. Lewin Ind. Med. Surg. **19**, 457-61 (1950) Oct

Case report of patient with chronic ulcerative radiodermatitis of the hand caused by overexposure to fluoroscope x radiation is included in discussion of reconstructive surgery NSA 4-6511

2479

REDUCTION IN LETHAL EFFECT OF X-RADIATION BY PRETREATMENT WITH THIOUREA OR SODIUM ETHANE DITHIOPHOSPHONATE. R. H. Mole, J. St. L. Philpot, and G. R. V. Hodges. Nature **166**, 515 (1950) Sept. **23**.

Protective effects of thiourea and dithiophosphonate in mice was highly significant, those of glycerol barely so. Postirradiation thiourea was ineffective. NSA 4-6512

2480

Oak Ridge National Lab.

RECENT EVIDENCE ON THE MECHANISM OF CHROMOSOME ABERRATION PRODUCTION BY IONIZING RADIATIONS. Norman H. Giles, Jr. Aug. **29**, 1950. **27p.** (ORNL-811)

Increased frequency of aberrations in Tradescantia arises from increased production of chromosome breaks when O₂ is present NSA 4-5822

2481

THE EFFECT OF ROENTGEN RAY IRRADIATION ON NORMAL, HYPOTHYROID, AND HYPERTHYROID RATS Thomas J. Haley, Samuel Mann, and Andrew H. Dowdy. July **10**, 1950. **13p.** (UCLA-81), Endocrinology **48**, 365-9 (1951)

Thyroparathyroidectomy did not significantly increase survival time nor decrease total mortality of x-rayed rats. Hypothyroidism significantly increased mortality rate as compared with normal and hypothyroid animals NSA 4-5823

2482

ATTEMPT TO DETECT A MAMMARY TUMOR-AGENT

IN STRAIN C MICE BY X-RADIATION Howard B. Andervont and Thelma B. Dunn J. Natl. Cancer Inst. 10, 1157-90 (1950) Apr

No significant differences were found between tumor incidences or average ages at which tumors arose in hybrids born to irradiated and nonirradiated C mothers NSA 4-5824

2483
BIOLOGICAL EFFECTS OF RADIATION IN THE KARAKUL Richard T. Street Fur Farming J. 3, No. 5, 9 (1950) Mar-Apr

Karakul sheep described as one of the most radio-resistant of animals NSA 4-5825.

2484
Atomic Energy Research Establishment, Harwell Berks (England)
SOME PUBLISHED REPORTS ON THE EFFECTS OF RADIATION ON REPRODUCTION AND ON THE GENETIC EFFECTS OF RADIATION A. Lundie Mar 8, 1950 10p (AERE Inf/Bib-61)

This is a bibliography of 61 publications NSA 4-5826.

2485
THE TOXICITY AND PATHOLOGICAL EFFECTS OF ROENTGEN RAYS IN THE CHICKEN John A. Jacques and David A. Karnofsky Am. J. Roentgenol. Radium Therapy 64, 289-97 (1950) Aug

Acute deaths in young chicks are produced by dose rates greater than 10r/min and total doses of 1000 r or more. Delayed LD₅₀ in chicks surviving acute effects of high dose rates is about 800 r, at low dose rates about 1, 100-1,200 r. Adult males and females may die acutely following 1250-3000 r but some individuals survive 5000 r for several days. Those surviving acute effects die within 3-10 days. LD₅₀ in these is 600-800 r. Chickens dying acutely show: necrotic foci in liver pyknosis and fragmentation of lymphatic cells. Those dying delayed deaths: no liver injury but severe involution of all hematopoietic tissues, ulceration and degeneration of GI tract, bacterial infection NSA 4-5827.

2486
THE TOXICITY OF ROENTGEN RAYS TO THE CHICK EMBRYO David A. Karnofsky, Priscilla A. Patterson and Lois P. Ridgway. Am. J. Roentgenol. Radium Therapy 64, 280-8 (1950) Aug NSA 4-5828.

2487
Hanford Works
BIOLOGICAL MONITORING OF THE LABORATORY AREA BY ANALYSES OF RODENTS AND OTHER FORMS OF WILDLIFE K. E. Herde May 26, 1947. Dec. 1 July 12, 1950 14p (AECD-2888)

Waterfowl, rodents and carnivores trapped near radioactive-waste disposal pond or in radiation laboratory were examined for alpha- and beta-emitting elements NSA 4-5829.

2488
Radiation Lab. Univ. of Calif.
MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT: JAN., FEB., MAR., 1950 May 2, 1950 Dec. 1 Aug 23, 1950 105p (AECD-2901)

Includes reports on: metabolic properties of Pu and allied materials, tracer studies on metabolism of fission products, Sr deposition in young, adult, and rachitic rats NSA 4-5845

2489
HEMATOLOGICAL EFFECTS OF IONIZING RADIATIONS VII. PROGRESS REPORT APR. 1, 1949-FEB. 28, 1950 B. V. A. Low-Beer and Paul M. Aggeler [nd] 87p. (UCRL-862)

Patients followed hematologically include: group treated with 100-, 200-, or 1000 kv x rays, arthritic

group given P³², group given I¹³¹ orally for Grave's disease Dose-effect relations are analyzed NSA 4-6018

2490
THE DISTRIBUTION OF PHOSPHATASES IN THE RABBIT APPENDIX AFTER X-IRRADIATION William L. Doyle. Am. J. Anat. 87, 79-117 (1950) July. NSA 4-6019.

2491
EFFECTS OF X-RAYS PRODUCED AT 50 KILOVOLTS ON DIFFERENT SPECIES OF BACTERIA Harvey Fram, Bernard E. Proctor, and Cecil G. Dunn J. Bact. 60, 263-7 (1950) Sept

E. coli, A. aerogenes, S. marcescens, P. aeruginosa, P. fluorescens, and S. aureus destruction rates were studied S. aureus proved most radioresistant NSA 4-6021

2492
THE IMMEDIATE ACTION OF X-RAYS ON THE CHONDRIOSOMES AND LACUNOMES OF THE INTESTINAL EPITHELIUM Antonietta Guardabassi Atti accad. nazl. Lincei, Classe sci. fis. mat. e nat. 7, 334-8 (1949) Dec. (In Italian).

Cytoplasmic elements underwent modifications more readily than nuclear elements in rats and mice given 150-900 r NSA 4-6022

2493
INHIBITION OF GROWTH AND THE PRODUCTION OF OEDEMA BY X-IRRADIATION Robert Rugh. J. Exptl. Zool. 114, 137-57 (1950) June.

R. pipiens tadpoles were exposed to 10,000 to 50,000 r. Inhibition of growth, lordosis, edema and other morphological changes were studied and are described NSA 4-6023

2494
PENICILLIN-SCREENED AUXOTROPHIC MUTATIONS IN SALMONELLA TYPHIMURIUM AND THEIR RELATION TO X-RAY DOSAGE H. H. Plough, Helen N. Young, and Madelon R. Grimm J. Bact. 60, 145-57 (1950) Aug NSA 4-6024

2495
THORIUM-X INVESTIGATIONS HISTOLOGICAL STUDY OF THORIUM-X APPLICATION ON RABBIT SKIN Harold C. Fishman. J. Investigative Dermatol. 15, 71-4 (1950) Aug NSA 4-6025.

2496
X-RAY-INDUCED GENETIC EFFECTS IN GERMINAL AND SOMATIC TISSUE OF DROSOPHILA MELANOGASTER George Lefevre, Jr. Am. Naturalist 84, 341-65 (1950) Sept-Oct NSA 4-6026

2497
LEUKEMIA IN RADIOLOGISTS IN A 20-YEAR PERIOD Herman C. March Am. J. Med. Sci. 220, 282-6 (1950) Sept

Leukemia occurred 9 times as frequently in radiologists as in nonradiological physicians during a 20 year period NSA 4-6028.

2498
POTENTIAL BIOLOGIC DANGERS OF NASOPHARYNGEAL BETA IRRADIATION Isadore Lampe Trans. Am. Acad. Ophthalmol. Otol. 502-7 (1950) May-June NSA 4-6030.

2499
HAEMORRHAGIC DISEASES. A. F. Robertson Bull. Vancouver Med. Assoc. 26, 278-82 (1950) Aug

Diagnosis and treatment of diseases characterized by hemorrhages, including radiation sickness, are briefly discussed NSA 4-6032

2500
THE ABUSE OF NASOPHARYNGEAL IRRADIATION. Kenneth M. Day Trans. Am. Acad. Ophthalmol. Otol. 522-5 (1950) May-June NSA 4-6035

2501
THE PRIMARY CANCER-PRODUCING EVENT IN THE LIGHT OF THE MUTATION THEORY AND THE "HIT"

PRINCIPLE. Friedrich Hartmut Dost. Arztliche Forsch. 4, 116-34(1950) Mar. 10. (In German). NSA 4-6040.

2502

ADVANCES IN RADIOBIOLOGY BETWEEN 1937 AND 1950. Antoine Lacassagne. Nucleonics 7, No. 4, 62-7(1950) Oct. NSA 4-6251.

2503

CHANGES PRODUCED BY X-RAYS IN BLOOD CORPUSCLES PART 3. E. A. Zimmer. Strahlentherapie 82, 129-42 (1950) May 15, (In German).

Author reports observations on blood changes produced in experimental animals and in patients with cancer, splenectomy, skull irradiation or hyperthyroidism, i.e. effect of irradiating various organs especially effects observed following irradiation of bone marrow, spleen and liver. NSA 4-6252

2504

CHANGES PRODUCED BY X-RAYS IN BLOOD CORPUSCLES PART 4. E. A. Zimmer. Strahlentherapie 82, 261-80 (1950) June 12. (In German).

Author describes effect of therapeutic x radiation for polycythemia vera on formed elements of blood and hematopoietic tissue. Doses were given in increments of 100 r for the most part. NSA 4-6253.

2505

THE CYTOLOGICAL EFFECTS OF LOW-INTENSITY RADIATION. Karl Sax. Science 112, 332-3(1950) Sept. 22.

Tradescantia paludosa was exposed to low intensities of γ radiation for several months. Chromosome aberrations and pollen sterility level fell off after a few weeks of exposure. NSA 4-6254

2506

EFFECT OF BETA IRRADIATION ON GASTRIC ACIDITY. Raymond F. Hedin, Winston R. Miller, and Demetrius G. Jelatis. Arch. Surg. 61, 748-57(1950) Oct.

From these data it appears a dosage of 10,000 rep from P^{32} produces a marked reduction in gastric acidity for prolonged time in dogs without complete achlorhydria. NSA 4-6255

2507

EFFECT OF INTERNAL IRRADIATION OF MICE WITH P^{32} . PART I: SPLEEN, LYMPH NODES, THYMUS, BONE, AND BONE MARROW. Shields Warren, Jane C. MacMillan, and Frank J. Dixon. Radiology 55, 375-89 (1950) Sept.

Histological studies on mice receiving continuous internal irradiation from P^{32} are described. Detailed description of injury and recovery phases in various hematopoietic tissues in mice receiving various doses is presented. NSA 4-6256.

2508

EFFECTS OF PHOSPHORUS³² ON THE HAMSTER Clem Russ. Proc. Soc. Exptl. Biol. Med. 74, 729-31 (1950) Aug.

Single doses of 1, 6, 8, or 10 μ c/g body weight were administered to hamsters. The largest dose caused death in 11 days, 6 or 8 mc/g caused severe testicular damage and sterility, 1 mc/g caused some testicular damage by 30 days after injection but no immediate damage. Spermatogenic cells were more sensitive than Sertoli cells. NSA 4-6257.

2509

EFFECTS OF X-IRRADIATION AND URETHANE TREATMENT ON CHICKEN BONE MARROW ENZYMES. James S. Dinning, I. Meschan, Cecilia K. Keith, and Paul L. Day. Proc. Soc. Exptl. Biol. Med. 74, 776-7 (1950) Aug.

Hens exposed to 300 r of x rays showed reduced bone marrow endogenous respiration, choline oxidase and succinoxidase. Injected urethane reduced marrow choline

oxidase and succinoxidase. Combination of the two rendered hens leucopenic. NSA 4-6258.

2510

EFFECTS OF X-RAYS ON SIZE OF YEAST CELLS. Kirkland C. Brace. Proc. Soc. Exptl. Biol. Med. 74, (1950) Aug.

After 20,000 r of x rays, yeast cells and descendants achieved mean cell volume twice that of controls. This enlargement is a nonselective increase in cell constituents rather than a swelling due to H_2O uptake. NSA 4-6259.

2511

KILLING OF DROSOPHILA EGGS BY ENERGETIC RAYS, AS A BIOPHYSICAL PROBLEM. H. Langendorff and K. Sommermeyer. Strahlentherapie 82, 316-20(1950) June 12. (In German)

Authors present an interpretation of the lethal effect of x rays on Drosophila eggs. Younger stages of egg development showed considerable variability and demonstrated that many hits were required to produce the lethal effect. NSA 4-6260

2512

THE MUTAGENIC EFFECT OF RADIOPHOSPHORUS IN BARLEY K. F. Thompson, J. MacKey, A. Gustafsson, and L. Ehrenberg. Hereditas 36, 220-3(1950) Apr. 22.

Mutagenic effect of P^{32} on barley was studied by soaking seeds in H_2O containing various quantities of radioactive phosphate ions, and measuring chlorophyll mutation rates per spike progeny in second generation. P^{32} was found to be highly mutagenic. NSA 4-6261.

2513

ON THE MATHEMATICAL THEORY OF THE REACTION OF CELLS TO X-RAY IRRADIATION. Edmund Pinney. Bull. Math. Biophys. 12, 199-206(1950) Sept.

A solution by means of LaPlace transformation methods is offered for the equation proposed by Sievert (Acta Radiol. 22: 233 (1941)) to describe variation in concentration of certain substances in cells exposed to x rays for a finite time. Author affirms that concentration approaches a constant value, otherwise oscillations in concentration may occur or oscillations appear and increase steadily in amplitude until cell dies or mathematical model no longer applies. NSA 4-6262

2514

ON THE PROBLEM OF MEMBRANE PERMEABILITY Ladislaus Neu. Strahlentherapie 82, 257-60(1950) June 12 (In German).

With aid of author's "radiation equation" membrane potentials of a living tissue irradiated with electromagnetic waves can be calculated if tissue's electric conductivity is known. Membranes can be regarded as equipotential surfaces of electric field. NSA 4-6263.

2515

ON X-RAY DAMAGES IN THE INTESTINE W. Ceelen. Strahlentherapie 82, 13-22(1950) May 15. (In German).

Radiation affects mesenchymal tissue and blood vessels, resulting in (1) altered circulation and epithelial necrosis, (2) preneurotic state of all tissues or (3) ulcerative necrosis of intestinal wall. Bacterial action is not distinguishable from radiation effect. NSA 4-6264.

2516

PRELIMINARY REPORT OF X-RAY EFFECTS ON THE NEMATODE RHABDITIS STRONGYLOIDES. Lyell J. Thomas and Henry Quastler. Science 112, 356-7(1950) Sept. 29.

Non-lethal effects of x irradiation on this bisexual nematode were studied. Doses of 100-10,000 r caused no visible change. After 20,000 r to wet cultures, larvae showed altered refractive index of rhabditis granules of intestine. Dose of 40,000 r produced vacuolate, probably sterile, reproductive systems, looped intestines, variation

in egg size and shell structure, appearance of "dauer" like worms. Dry cultures receiving 40,000 r showed effects similar to those obtained after 20,000 r to wet cultures. NSA 4-6265.

2517

RADIOBIOLOGY AND ITS PLACE IN RESEARCH AND THERAPY. H. Langendorff. Strahlentherapie 82, 1-12 (1950) May 15 (In German).

Mechanisms of action of radiation considered are: (1) hit theory and (2) alterations in metabolism of cell produced indirectly by chemical action on one of the constituents, e.g. water. NSA 4-6266.

2518

STUDIES ON THE EFFECT OF RADIOACTIVE COLLOIDAL GOLD ON THE DEVELOPMENT OF THE ORAL STRUCTURE OF THE MOUSE. M. S. Burstone. Arch. Path. 50, 419-26 (1950) Oct.

Injection of colloidal Au¹⁹⁸ adjacent to jaw of immature mouse results in abnormalities of osteogenesis and odontogenesis including failure of root formation. NSA 4-6267

2519

ULTRA-FRACTIONING IN X-RAY TREATMENTS. I. EXPERIMENTAL STUDY OF THE BIOLOGICAL EFFECT OF AN INTERMITTENT IRRADIATION. E. Witte. Strahlentherapie 82, 209-22 (1950) June 12 (In German)

Effect of "ultrafractionated" x irradiation is a weakening of the x ray effect by 50% or more. Observations on experimental studies on Drosophila pupae are interpreted in light of the target theory. NSA 4-6268.

2520

A RAPID METHOD FOR THE ESTIMATION OF THE GLUTAMIC-ASPARTIC TRANSAMINASE IN TISSUES AND ITS APPLICATION TO RADIATION SICKNESS. N. E. Tonhazy, N. G. White, and W. W. Umbriet. Arch. Biochem. 28, 36-42 (1950) Aug.

Method is described for determining transaminase activities of normal and x-rayed mouse tissue. Within limits of measurement there was no significant decrease in transaminase activity in irradiated mice from that seen in controls. NSA 4-6274.

2521

ON THE HISTORY OF THERAPEUTICAL APPLICATIONS OF X-RAYS IN DERMATOLOGY. Richard Schmitz. Strahlentherapie 82, 401-18 (1950) July 7. (In German).

This paper includes a historical review of therapy of skin diseases and a bibliography, mostly of German publications since 1917. NSA 4-6289.

2522

THE EFFECT OF CYSTEINE ON THE PERIPHERAL BLOOD OF THE IRRADIATED RAT. Harvey M. Patt, Douglas E. Smith, and Eugenia Jackson. Blood 5, 758-63 (1950) Aug.

Single intravenous cysteine injection (950 mg/kg), 5 min prior to 800-r total-body x ray dose significantly modified x ray induced hematologic changes (depression of heterophils, lymphocytes and erythrocytes less severe and recovery more rapid). NSA 4-5349.

2523

THE BIOLOGIC ACTION OF X-RAYS ON EMBRYOS OF AMPHIBIANS. EXPERIMENTS IN TRANSPLANTATION. Teodoro Perrin. Riv. biol. 42, 119-54 (1950) Jan-Mar. (In Italian).

The development of tissues from an irradiated embryo after transplantation to normal embryos is described. NSA 4-5348.

2524

Atomic Energy Project, Univ. of Rochester
EFFECTS OF POLONIUM²¹⁰ AND SELENIUM⁷⁵ IN
EXPERIMENTAL SCHISTOSOMA MANSONI INFECTION

IN MICE. N. P. Watts and K. P. McConnell. Apr. 27, 1950. Decl. July 6, 1950. 13p. (AECD-2874); Am. J. Hyg. 53, 11-6 (1951)

Neither α nor γ radiation as supplied by Po²¹⁰ and Se⁷⁵ were observed to damage worm form of S. mansoni in experimental infection in mice. NSA 4-5346.

2525

EFFECTS OF IRRADIATION ON NUCLEIC ACID FORMATION. Lola S. Kelly and Hardin B. Jones. Proc. Soc. Exptl. Biol. Med. 74, 493-7 (1950) July.

Existence of indirect effect of x radiation on DNA turnover rate is confirmed in studies on mice. Radiation was administered as injected Y⁹⁰ colloids which localize in the liver. Mice studied had bilateral transplants of mammary carcinoma. NSA 4-5350.

2526

THE INFLUENCE OF CERTAIN METALLIC IONS ON THE SURVIVAL OF RATS RECEIVING A LETHAL DOSE OF X-RAYS. G. Lambert, J. Maisin, M. Mandart, M. Meersseman, G. Podio, and E. Plugers. Compt. rend. soc. biol. 144, 444-8 (1950) Mar. (In French).

Ba and Li ions hastened death of rats exposed to 600 r (180 kv) of x rays for 13 min. Mercuric ions seemed to decrease mortality. Salts were administered either before or after radiation. NSA 4-5351.

2527

IRRADIATION NECROSIS OF THE HEAD OF THE FEMUR. J. T. MacDougall, A. Gibson, and T. H. Williams. Arch. Surg. 61, 325-45 (1950) Aug.

Case history is given and brief survey of literature included. NSA 4-5352.

2528

LETHAL IRRADIATION OF THE MOUSE BY X- AND γ RAYS. THERAPEUTIC ATTEMPTS. P. Bonet-Maury and F. Patti. J. Radiol. Electrol. 31, 286-9 (1950). (In French).

X ray and γ ray effects were studied in mice. Survival rates as function of total dose and time of death after exposure are presented. The γ/x ratio of effectiveness varies from 2.1 to 3.6. NSA 4-5353.

2529

PHYSIOLOGICAL EFFECTS OF RADIANT ENERGY. R. Lowry Dobson and John H. Lawrence. p. 479-500 of Annual Review of Physiology, Vol. X. Stanford, Calif., Annual Reviews, Inc., 1948.

Highlights of recent developments in this field are presented. Effects of α , β , γ and x rays, neutrons and fission fragments are included. NSA 4-5354.

2530

PROTECTION OF MICE AGAINST X-RADIATION BY THIOUREA. G. Limperos and W. A. Mosher. Science 112, 86-7 (1950) July 21.

Mice given oral and intraperitoneal thiourea prior to 650 r of x rays have lower mortality rate than control mice. NSA 4-5355

2531

SEVERAL BIOLOGICAL EFFECTS OF WEAK RADIO-ACTIVITIES. C. Champy. Bull. acad. natl. med. 134, 407-8 (1950) June 13. (In French)

X ray stimulation of growth of frog eggs and effect on barley root of immersion in water containing radio-materials are discussed. NSA 4-5356.

2532

SOME EFFECTS OF TESTOSTERONE PROPIONATE ON MICE IRRADIATED WITH X-RAYS. Friedrich Ellinger. Proc. Soc. Exptl. Biol. Med. 74, 616-19 (1950) July

Postirradiation administration of testosterone propionate to mice markedly increased lethal effect of irradiation. NSA 4-5357

2533

VITAMIN P PROTECTION AGAINST RADIATION. Boris Sokoloff, James B. Redd, and Raymond Dutcher. Science **112**, 112-13(1950) July 28.

Vitamin P(CVP compound) isolated from citrus waste fed to rats before and after 800-r x ray dose gave considerable protection. Author believes flavonoids prevent increase in capillary fragility. NSA 4-5358

2534

U. S. Armed Forces Special Weapons Project
RADIOLOGICAL DEFENSE, VOL. III. [nd] 140p. (NP-1609)

This is based on a series of lectures dealing with handling radioactive materials, biological effects of radiation, decontamination, radiation illness and tracer techniques. NSA 4-5363.

2535

A PROTAMINE TITRATION AS AN INDICATION OF A CLOTTING DEFECT IN CERTAIN HEMORRHAGIC STATES. J. Garrott Allen, Peter V. Moulder, Richard M. Elghammer, Burton J. Grossman, Charles L. McKeen, Margaret Sanderson, Willadene Egner, and James M. Crosbie. J. Lab. Clin. Med. **34**, 473-6(1949) Apr. NSA 4-5559

2536

Chicago Univ.
THE EFFECT OF TERRAMYCIN ON POST-IRRADIATION INFECTION IN MICE. Carolyn W. Hammond and C. Philip Miller. [nd] 12p (AECU-873), Ann. N. Y. Acad. Sci. **53**, 303-8(1950).

Preliminary studies suggest that administration of streptomycin together with terramycin may be more effective than terramycin alone in controlling infections caused by drug-sensitive organisms. NSA 4-5560.

2537

Notre Dame Univ.
ELEMENTARY CHEMICAL PROCESSES IN RADIO-BIOLOGICAL REACTIONS. Milton Burton. [nd] 28p. (AECU-889).

Elementary chemical effects of high energy radiation on aqueous solutions containing O₂, or pure organic matter, and on organic matter suspended in aqueous solution are discussed in relation to "target theory." NSA 4-5561.

2538

Brookhaven National Lab.
EFFECTS OF X-RAY, NEUTRON AND CHRONIC GAMMA IRRADIATION ON GROWTH AND YIELD OF POTATOES. A. H. Sparrow and E. Christensen. [nd] 1p. (AECU-898), Ann. J. Botany **37**, 667(1950). NSA 4-5562.

2539

Western Reserve Univ.
THE SYNERGISTIC EFFECT OF PHOSPHORUS³² AND COLLOIDAL GOLD¹⁹⁸ ON SURVIVAL IN MALE ALBINO RATS. Hymer L. Friedell and James H. Christie. June 26, 1950. 19p (NYO-1609), Proc. Soc. Exptl. Biol. Med. **76**, 207-10(1951).

Data indicate colloidal Au¹⁹⁸ and P³² administered as NaHP³²O₄ are synergistic in their killing effect on rats. NSA 4-5563

2540

Atomic Energy Project, Univ. of Calif, Los Angeles.
THE RELATIONSHIP BETWEEN ESSENTIAL FATTY ACID DEFICIENCY AND RADIATION DAMAGE IN THE MOUSE. Arthur B. Decker and James F. Mead. Dec. 1, 1949. 64p (UCLA-52).

Both chronic and acute essential fatty acid deficiency markedly increase mortality of x rayed mice. Such deficiency and radiation damage are similar and each aggravates the other. NSA 4-5565.

2541

EFFECT OF X-RAYS ON THE METABOLISM OF CELL

NUCLEI OF NON-DIVIDING TISSUES. S. R. Pelc. Nature **178**, 359(1956).

Adult mice were given injections of either S³⁵-DL-methionine or C¹⁴-adenine immediately after whole body x ray exposure. Protein synthesis was studied in thyroid, seminal vesicle, tracheal epithelium, nerve cells and epididymis.

2542

Atomic Energy Project, Univ. of Calif., Los Angeles.
METHODS AND BACKGROUND VALUES OF BETA-GAMMA RADIOACTIVITY IN SOME PLANTS FROM NEW MEXICO AND CALIFORNIA. David B. Dunn, Margaret R. Lewis, and Sydney H. Gordon. June 9, 1950. 23p. (UCLA-75). NSA 4-5566.

2543

THE ACTION OF X-RAYS ON THE MEMBRANE OF RED CORPUSCLES. J. Zacek and R. Rosenberg. Compt. rend. Soc. Biol. **144**, 462-4(1950) Mar. (In French).

Blood was x rayed (24,000 r at 80 kv), hemolyzed, dried and examined with electron microscope. Size and shape of cell membrane was unchanged, but ordinary granular surface was replaced in some spots by fine fibrous protein-like structures. NSA 4-5567

2544

COTTON FROM BIKINI CHROMOSOME IRREGULARITIES FOUND IN PLANTS GROWN FROM SEED EXPOSED TO GAMMA RADIATION. Meta S. Brown, J. Heredity **41**, 115-21(1950). May.

Irregularities in chromosome pairing found in cotton plants exposed at Bikini is attributed to changes in chromosome structure. NSA 4-5568.

2545

CYTOLOGICAL AND PHENOTYPICAL EFFECTS INDUCED IN MAIZE BY X-RAYS AND THE BIKINI TEST ABLE ATOMIC BOMB. L. F. Randolph. J. Cellular Comp. Physiol. **35**, Suppl. 1, 103-17(1950) June. NSA 4-5569.

2546

EFFECTS OF ATOMIC BOMB RADIATIONS AND X-RAYS ON SEEDS OF CEREALS. Luther Smith. J. Heredity **41**, 125-30(1950) May. NSA 4-5570.

2547

IMMUNITY CONFERRED BY HYPERGLYCEMIA AGAINST LETHAL DOSES OF X-RAYS. Jean Loiseleur and Georges Velley. Compt. rend. **231**, 182-4(1950) July 10. (In French).

Glucose injection was given to 27 rats prior to irradiation (950 r, 180 kv, 45 min). All except 5 showed no ill effects and gained weight, while all controls died. NSA 4-5571.

2548

THE INACTIVATION BY X-RAYS OF THE VIRUS RESPONSIBLE FOR THE SENSITIVITY TO CO₂ IN DROSOPHILA, Philippe L. Heritier and Nadine Plus. Compt. rend. **231**, 192-4(1950) July 10. (In French). NSA 4-5572

2549

INDUCTION OF MUTATION BY HIGH-ENERGY X-RADIATION PRODUCED BY A 23-Mev BETATRON. Hulda Regehr, T. J. Arnason, and H. E. Johns. Nature **166**, 228-9(1950) Aug. 5.

Drosophila males were exposed to dose of 2000, 5000 or 7000 r of x radiation at 100 r/min. Mutation inductions is documented. NSA 4-5573

2550

INFLUENCE OF LOCAL X-RAY TREATMENT ON THE DEVELOPMENT OF EXTREMITIES OF THE YOUNG AXOLOTL (SIREDON MEXICANUM). V. V. Brunst. J. Exptl. Zool. **114**, 1-35(1950) June.

Study was made of changes in irradiated parts of axolotl body during development. Possibility of stimulating development by means of weak irradiation was investigated. NSA 4-5574.

2551
SEARCH FOR AN EFFECT OF OXYGEN ON THE DIRECT X-RAY INACTIVATION OF BACTERIOPHAGE. H. B. Hewitt. Brit. J. radiology 23, 416-23(1950) July. NSA 4-5575.

2552
Atomic Energy Project, Univ. of Calif., Los Angeles
THE SKELETAL DEPOSITION OF NONRADIOACTIVE STRONTIUM. N. S. MacDonald, R. E. Nusbaum, Florida Ezmirlian, R. Stearns, Clare McArthur, and Patricia Spain. July 7, 1950. 21p (UCLA-80), J. Biol. chem. 188, 137-43(1951).

Chronic effects of strontium lactate in drinking water of growing mice are described. Sr deposition in bones is reviewed. NSA 4-5583.

2553
U. S. Atomic Energy Commission.
A TOMIC ENERGY AND THE LIFE SCIENCES. Washington Printing Office (1949). 203p.

Biological and physical research programs supervised by A. E. C. are outlined NSA 4-5091.

2554
Hanford Works.
SOME PHYSICAL ASPECTS OF THE EFFECTS OF BETA RADIATION ON TISSUE. H. M. Parker. Sept. 10, 1943. Decl. June 20, 1950. 55p. (AECD-2859). NSA 4-5092.

2555
Department of Agriculture.
EFFECTS OF "ALPHATRON" AND OTHER RADIOACTIVE MATERIALS ON GERMINATION AND EARLY GROWTH OF VARIOUS CROPS. E. H. Toole, Vivian K. Toole, J. M. Power, Victor J. Kilmer, and L. T. Alexander. Apr. 24, 1950. 12p. (AECU-852).

Results indicate no consistent trend of any effect either on amount of germination or on early growth of young seedlings NSA 4-5094.

2556
Argonne National Lab
THE SURVIVAL OF MICE UNDER DURATION-OF-LIFE EXPOSURE TO X-RAYS AT VARIOUS DOSE RATES
George A. Sacher. Apr. 1950. 43p (CH-3900).

Survival of two strains of mice is reported for dose rates extending from 20-1000 r/day NSA 4-5095.

2557
Oak Ridge National Lab.
A FACTOR IN THE PLASMA OF THE IRRADIATED RAT WHICH CHANGES THE A/G RATIO Elliot Volkin and Henry L. Kohn July 10, 1950. 16p. (ORNL-734), Arch Biochem 30, 326-32(1951). NSA 4-5096.

2558
ACTION OF IONIZING RAYS UPON ANTIGEN VI OF SALMONELLA TYPHI (INAGGLUTINABLE O AND AGGLUTINABLE VI) A. Jude, P. Bonet-Maury, and P. Servant. Compt. rend. soc. biol. 144, 214-16(1950) Feb. (In French).

Neither inagglutinable antigen O nor agglutinable antigen Vi is destroyed by radiation dosages nearly three times the sterilizing dose. NSA 4-5097

2559
THE ACTION OF RADON RAYS ON THE ANTIGENIC POWER OF SALMONELLA BALLERUP (THE PRODUCTION OF AGGLUTINANT ANTIBODIES) P. Servant, P. Bonet-Maury, and A. Jude. Compt. rend. soc. biol. 144, 216-17 (1950) Feb. (In French)

Antigens Vi and H are thermolabile and antigen O, thermostable. Apparently α rays of radon do not affect

antibody producing powers of antigens Vi, O and H NSA 4-5098

2560
THE ADDITIVE ACTION OF METHYLCHOLANTHRENE AND X RAYS ON THE GUINEA PIG P. Mendeleeff. Compt. rend. soc. biol. 144, 301-2(1950) Feb. (In French).

Four guinea pigs were injected subcutaneously with 30 mg methylcholanthrene and exposed 5-6 days later to 400 r, 85 kv x rays at point of injection Tumors developed in 3 animals, 2 of which were cancerous. NSA 4-5099.

2561
THE BIOLOGICAL SIGNIFICANCE OF THE ROENTGEN A. Mutscheller. J. Investigative Dermatol 14, 471-81 (1950) June

Author studied erythema produced in skin exposed to x ray directed through a layer of ground beef on the skin surface. NSA 4-5100.

2562
SELF-FERTILITY IN FRUIT TREES. HOW IT HAS BEEN PRODUCED AND ITS ADVANTAGES D. Lewis and L. K. Crowe. Discovery 15, 371-374(1954).

An account of genetical causes of self sterility in fruit trees and of the use of x-ray-induced mutations to break down this sterility barrier is given. (from abstract)

2563
DISCUSSION ON POPULATION GENETICS AND RADIATION. Sewall Wright. J. Cellular Comp. Physiol. 35, Suppl. 1, 187-205(1950) June. BA 24-35099.

2564
EFFECTS OF RADIATION ON FUNGI. E. L. Tatum. J. Cellular Comp. Physiol. 35, Suppl. 1, 119-31(1950) June

Discussion of Neurospora's fundamental sensitivity to radiation is presented. NSA 4-5105

2565
THE EFFECT OF X-RAYS ON CHROMOSOME STRUCTURE. Karl Sax. J. Cellular Comp. Physiol. 35, Suppl. 1, 71-81 (1950) June.

X ray effect on Tradescantia chromosomes is discussed NSA 4-5106

2566
EFFECT OF X-RAYS ON PREGNANCY AND OF PREGNANCY ON CANCER (IN CONNECTION WITH A PERSONAL CASE). G. Pinsonneault. L'Union Med. Can. 8, 945-9(1949). NSA 4-5107

2567
HEMATOPOIETIC REACTIONS FOLLOWING REMOTE IRRADIATION OF RABBITS. H. Betz and J. Lecomte. Compt. rend. soc. biol. 144, 303-5(1950) Feb (In French).

Rear paws of 12 rabbits were exposed to 2000 r, body was shielded Animals were sacrificed from 3 hr to 14 days postirradiation. Blood and histologic (spleen, cervical ganglions, bone marrow) changes are described. NSA 4-5108

2568
DISCUSSION ON THE RADIATION SYNDROME. SOME CLINICAL AND BIOCHEMICAL OBSERVATIONS FOLLOWING A SINGLE THERAPEUTIC DOSE OF X-RAYS (REVIEW). Court W. M. Brown and R. F. Mahler. Proc. Roy. Soc. Med. 46, 245-50(1953).

Response to a dose of x rays was studied in 50 patients. First complaints were fatigue, anorexia, and nausea. No significant change was noted in red cell counts or hemoglobin levels. At first white cells increased, later the white cell counts dropped A rise in excretion of sodium, chloride and phosphorus was often accompanied by a rise in the rate of urine flow.

2569

RADIATION INDUCED MUTATIONS IN CHEMICAL REQUIREMENTS IN SALMONELLA TYPHIMURIUM

Harold H. Plough. J. Cellular Comp. Physiol. 35, Suppl. 1, 141-55(1950) June.

Change in antigenicity is also suggested. NSA 4-5110.

2570

SOME PRESENT PROBLEMS IN THE GENETIC EFFECTS OF RADIATION. H. J. Muller. J. Cellular Comp. Physiol. 35, Suppl. 1, 9-70(1950) June. NSA 4-5111.

2571

THE HAZARDS OF RADIATION. P. C. Koller. Discovery 10, 241-9(1949) Aug.

Biological effects of radiation are outlined, including discussion of chromosomal damage and pathological changes. NSA 4-5117.

2572

THE MEDICAL ASPECTS OF ATOMIC WEAPONS. Irwin M. Pochapin. Pennsylvania Med. J. 53, 703-7(1950) July. NSA 4-5118

2573

MEDICAL ASPECTS OF ATOMIC WEAPONS. Washington, National Security Resources Board. 1950. 24p. NSA 4-5119.

2574

RADIOBIOLOGICAL RESEARCH. J. J. Jaklitsch, Jr. Mech. Eng. 72, 17-18(1950) Jan.

The study of long-term effects of atomic bomb radiation at Bikini is described. NSA 4-5120

2575

TRACER IRON DISTRIBUTION STUDIES IN IRRADIATED RATS WITH LEAD-SHIELDED SPLEENS. R. L. Huff, W. F. Bethard, J. F. Garcia, B. M. Roberts, L. O. Jacobson, and J. H. Lawrence. J. Lab. Clin. Med. 36, 40-51(1950) July. NSA 4-5168.

2576

EXPERIMENTS WITH A 6-Mev BETATRON. K. Gund and W. Paul. Nucleonics 7, No. 1, 36-45(1950) July.

Construction of the Betatron is described. Preliminary physical and biological experiments and results are reviewed. Direct comparisons are made between biological effects of fast electrons and x rays. NSA 4-5311

2577

Oak Ridge National Lab.

ACTIVITY IN TISSUES INDUCED BY SLOW NEUTRON BOMBARDMENT. H. J. Curtis and J. D. Teresi. Feb. 25, 1946. Dec. June 27, 1950. 21p. (AECD-2872). NSA 4-4727.

2578

Naval Radiological Defense Lab.

A SEMI-QUANTITATIVE STUDY OF BONE MARROW IN RATS FOLLOWING TOTAL BODY X-IRRADIATION. Robert L. Rosenthal, Bryant I. Pickering, and Leontine Goldschmidt. May 8, 1950. 19p. (AD-217(B)), Blood 6, 600-13(1951).

Method is presented for quantitative enumeration of bone marrow cells by adjusting differential count for degree of cellularity, which is derived from imprint preparations of femoral marrow. NSA 4-4728

2579

AUGMENTATION OF THE CUTANEOUS RADIOSENSITIVITY OF THE RABBIT RESULTING FROM THE ACTION OF INSULIN. Georges Velley and Jean Loiseleur. Compt. rend. 230, 2132-3(1950) June 12. (In French).

Rabbits were x irradiated with doses of 2250 to 3000 r after insulin injection of 0.5 clinical units/kg. Onset of epilation at exposed area was greatly accelerated by insulin. NSA 4-4730

2580

KILLING OF BACTERIUM COLI WITH FAST ELECTRONS

OF A 6-Mev BETATRON. C. Dieckmann and W. Dittrich. Strahlentherapie 81, 215-22(1950). (In German).

In dose range of 500 to 4000 r, 3-Mev electrons were more effective in destroying E. coli than equal doses of x rays (180 kv, 6 ma, 0.27 mm half value layer, 500 r/min) NSA 4-4732.

2581

MEDICAL ASPECTS OF ATOMIC ENERGY. G. H. Henry. Proc. Staff Meeting Hillcrest Memorial Hosp. 8, 172-7 (1950) Mar.

Author presents general description of atomic particles and natural radioactive decay. Basic principles of physics and operation of atomic pile are described; effects of atomic bomb explosion on human body are listed NSA 4-4733.

2582

MODIFICATION OF GLYCEMIA UNDER THE INFLUENCE OF TOTAL X-RAY RADIATION. Marguerite Lourau, and Odette Lartigue. Compt. rend. 230, 1426-8(1950) Apr. (In French).

Hyperglycemia occurring after ingestion of saccharose by guinea pigs after 14 and 48 hr fasts was significantly increased by 500 r total-body x ray dose, glucose tolerance was decreased by irradiation. NSA 4-4734

2583

THE MODIFICATION OF RESISTANCE TO IONIZING RADIATION BY HUMORAL AGENTS. J. B. Graham, and R. M. Graham. Cancer 3, 709-17(1950) July.

Methods of modifying radio-resistance of animals are reviewed and experiments on whole-body irradiated Swiss mice are cited. Substances tested included horse serum, stilbestrol, estradiol, estrone, testosterone and adrenal cortical extract administered before or after irradiation. Radiation sensitivity was reflected in appearance of epithelial cells of the animals and characteristic findings are described. NSA 4-4735

2584

PARTIAL BREAKAGE OF SALIVARY GLAND CHROMOSOMES. B. M. Slizynski. Genetics 35, 279-87(1950) May.

Low dosage x-ray treatment (400-600 r) of D. melanogaster embryos, applied in early development stages, produces in salivary gland chromosomes partial structural changes which are described. Changes affected only a few of the chromonemata of the chromosomes. NSA 4-4736.

2585

PHYSIOLOGICAL GENETICS. D. G. Catcheside. Ann. Rev. Physiol. 12, 47-70(1950).

Author reviews knowledge concerning the gene, its structure, reproduction and method of controlling development and differentiation. Literature of 1947-49 is covered. NSA 4-4737.

2586

RADIATION DAMAGE TO THE GENETIC MATERIAL. II. EFFECTS MANIFESTED MAINLY IN THE EXPOSED INDIVIDUALS. H. J. Muller. Am. Scientist 38, 399-425 (1950) July. NSA 4-4739.

2587

SOME CYTOLOGICAL OBSERVATIONS OF X-RAY ACTION ON TRITICUM MONOCOCCUM. Alberto Garde. Argonomia Lusitana 10, No. 1, 25-73(1948). NSA 4-4740.

2588

SOME RECENT FINDINGS IN RADIOBIOLOGY. Arne Forssberg. Strahlentherapie 81, 161-72(1950). (In German).

This is a review article. NSA 4-4741.

2589

Army Medical Department.

THE TETRAZOLES AS INDICATORS OF RADIATION DAMAGE. Z. S. Gierlach, and A. T. Krebs. Jan. 3, 1950. 14p (NP-1419)

Plant seeds x rayed and treated with tetrazolium salts show that irradiation effect can be detected by changes in reducing power of enzyme systems and measured by amounts of colored formazan formed NSA 4-4743.

2590

XENIA EFFECTS OF IRRADIATING CORN POLLEN IN A NUCLEAR REACTOR. E. F. Frolík and Rosalind Morris. Agronomy J. 42, 293-7(1950) June.

Xenia effects in corn crosses involving tassels exposed in nuclear reactor were compared with those occurring at crosses involving x rayed and nonirradiated tassels NSA 4-4744.

2591

ATTACK OF HYPERTENSION FOLLOWING PLESIOTHERAPY OF A LINGUAL NEOPLASIA. Giandomenico Botti. Radio-terapia, radiobiologia e fisica medica 2, 253-7(1949). (In Italian) NSA 4-4746.

2592

INDIVIDUAL FLUCTUATIONS OF THE THRESHOLD OF ERYTHEMA AND OF THE LATENCY PERIOD AND DURATION OF EARLY ERYTHEMA PRODUCED AT THE RADIATION THRESHOLD. Roderich Helmke. Strahlentherapie 81, 117-22(1950). (In German)

Postirradiation study of 100 persons with healthy skin indicates threshold is 200 to 300 r, latency period, 3 to 20 hr, and duration, 1 to 30 hr. NSA 4-4748

2593

OSTEORADIONECROSIS OF THE JAW Claude S. LaDow. Oral Surg. Oral. Med. Oral Pathol. 3, 582-9(1950) May NSA 4-4749.

2594

SOME CRITICAL REMARKS ON EPILATION OF THE SCALP BY X-RAYS. Gastone Meldolesi. Radiologia 5, 291-302(1949). (In Italian).

In case of very young children infected with ring worm, therapy combining thallium acetate with x rays is recommended. Author studied spinal fluid pressure and content of glucose and of protein and non-protein nitrogen in spinal fluid and blood of the patients. Results indicate that radiation produced congestion of endocranial tissues without altering the blood-brain barrier. NSA 4-4751.

2595

USE OF ANTICOAGULANT (DICUMAROL) IN PREVENTING POST-IRRADIATION TISSUE CHANGES IN THE HUMAN LUNGS; PRELIMINARY REPORT. Stanley H. Macht, and Harry Perlberg, Jr. Am. J. Roentgenol. Radium Therapy 63, 335-41(1950) Mar. NSA 4-4752.

2596

CHEMISTRY OF NEOPLASTIC TISSUE. E. Boyland. Ann. Rev. Biochem. 18, 217-42(1949).

Topics included in review: treatment of cancer by P^{32} and I^{131} , cancer producing properties of radioactive fission products (Pu and Y^{91}), chemical inhibition of skin cancer due to radiation, effect of cosmic radiations on carcinogenesis NSA 4-4756.

2597

NUCLEOPROTEINS, NUCLEIC ACIDS, AND DERIVED SUBSTANCES. J. N. Davidson. Ann. Rev. Biochem. 18, 155-90(1949).

Extensive literature review covering period from November 1947 to October 1948 is presented Effect of x and γ radiation in blocking normal process of conversion of cytoplasmic pentose nucleotides to nuclear DNA is discussed. NSA 4-4802.

2598

THE PERIPHERAL CIRCULATION. O. G. Edholm. Ann. Rev. Physiol. 12, 311-44(1950).

Literature of 1948-49 is reviewed and, discussion of x ray effect on arterial pressure is included NSA 4-4803.

2599

BIOLOGICAL MODIFICATION OF EFFECTS OF ROENTGEN RAYS. I. REDUCED TEMPERATURE. Frederick M. Allen. Am. J. Roentgenol. Radium Therapy 73, 70(1955). Thirty-seven references are reviewed.

2600

University of Chicago Toxicity Laboratory. QUARTERLY PROGRESS REPORT NO. 4 ON RADIO-BIOLOGY. Jan. 15, 1950. 88p. (TID-364).

Includes reports on: γ ray effect on mice and other animals, distribution of phosphorus in irradiated rabbit bone marrow, metabolism and toxicity of radioactive metals, x ray effect on intestinal cathepsins NSA 4-3842.

2601

Atomic Energy Project. Univ. of Calif., Los Angeles. IRRADIATION RESPONSES IN DAPHNIA MAGNA. I. INCREASED RESISTANCE TO X-IRRADIATION UNDER LOW OXYGEN TENSION Edward F. Held and Albert W. Bellamy. Apr. 20, 1950. 10p. (UCLA-69).

D. magna x rayed under conditions of O_2 depletion show marked increase in radioresistance which is evident from survival curves and productivity records. NSA 4-3843.

2602

CHROMOSOMAL REARRANGEMENTS FROM EXPOSURE TO RADIATION A. E. Longley Maize Genetics Coop. News Letter (Cornell) 24, 7-8(1950) Mar. 17

An analysis of chromosomal arrangements resulting from exposure of corn seeds to the Bikini explosion and to control x-ray treatment is presented. NSA 4-3845.

2603

EFFECT OF X-RAY RADIATION ON HYPERSENSITIVENESS. Leo H. Crip, Lloyd D. Mayer, and Sheldon G. Cohen. J. Allergy 21, 269(1950) May.

Authors recount their own experiences in evaluating effects of x ray on collagen diseases, Arthus phenomenon, Schultz-Dale reaction, and production of precipitins in experimental animals. They believe that interference with the R-E system accounts for depressed precipitin titres and other phenomena. NSA 4-3847.

2604

EXPERIMENTAL HYPERSENSITIVITY IN THE RABBIT. Louis Schwab, Frederick C. Moll, Thomas Hall, Henry Brean, Marjorie Kirk, Clinton Van Zandt Hawn, and Charles A. Janeway. J. Exptl. Med. 91, 505-26(1950) May 1.

X ray inhibition of antibody formation, relation of complement and serologic sequences relation between complement, serologic sequence and histologic changes are discussed. NSA 4-3848.

2605

GENETIC EFFECTS OF RADIATIONS D. G. Catcheside. Advances in Genetics 2, 271-358(1948).

Comprehensive review of recent data concerning influences of radiation in genetical processes is presented. NSA 4-3849.

2606

HISTOLOGICAL CHANGES PRODUCED BY A SINGLE LARGE INJECTION OF RADIOACTIVE PHOSPHORUS (P^{32}) IN ALBINO RATS AND IN C3H MICE. B. Grad and C. E. Stevens. Cancer Research 10, 289-96(1950) May.

Destructive effects of P^{32} are most marked in lymphatic organs and bone marrow, small intestine, granulosa of ovarian follicles and mammary tumors. NSA 4-3850.

2607

IRRADIATION EXPERIMENT. H. C. Eyster. Maize Genetics Coop. News Letter (Cornell) **24**, 15-17(1950) Mar. 17.

Sweet corn kernels, irradiated with slow neutrons and γ rays from a Ra-Be source behind paraffin, produced phenotypically normal plants. Self-pollination produced progeny, all of which showed variation, some variants being further transmissible as bona fide mutants.

NSA 4-3852

2608

IRRADIATION OF SMALL VOLUMES BY CONTAINED RADIOISOTOPES. Paul I. Richards and Benjamin A. Rubin. Nucleonics **6**, No. 6, 42-9(1950) June.

Author considers problem of radiation dose where the average path length of the emitted β particle is a significant fraction of the dimensions of the volume being irradiated internally, a problem pertinent to radioactive decay in small organisms. The fraction of ionizing energy escaping from a slab is calculated for low energy radiation and for very energetic radiation and is plotted as a function of S/R where S is slab thickness and R is range. Other special cases are also considered. NSA 4-3853.

2609

RESPONSE OF FIELD GROWN TOMATOES TO RADIOACTIVE MATERIALS. R. E. Larson, B. L. Pollack, and H. K. Fleming. Agr. Expt. Station, State College, Pa., Progress Rep. No. 27, 1-3(1950) Mar.

Tomato plants showed no significant response to fertilization with α -emitting materials. NSA 4-3855

2610

EPILATION BY X-RAYS. H. K. Zink. Strahlentherapie **80**, 399-406(1949). (In German). NSA 4-3857

2611

PERFORATION OF A GASTRIC ULCER FOLLOWING INTENSIVE RADIATION THERAPY. William Feiring, and Morris L. Jampol. New England J. Med. **242**, 751-3 (1950) May 11. NSA 4-3858.

2612

THE NATURE AND THERAPY OF RADIATION SICKNESS. A. M. Brues. Chicago Med. School Quart. **11**, 105-8 (1950) Apr. NSA 4-3861.

2613

PATHOPHYSIOLOGICAL EFFECTS OF TOTAL BODY IRRADIATION. Elizabeth E. Painter. Chicago Med. School Quart. **11**, 96-9(1950) Apr.

Various physiological changes representing direct and indirect effects of large doses of radiation delivered to the whole body of animals are described and discussed. A table of LD₅₀ doses for various species is included. Effects of relatively small (25r-200r) single doses in various species are also described and discussed.

NSA 4-3862.

2614

Radiation Lab., Univ. of Calif.
SUMMARY OF THE RESEARCH PROGRESS MEETING OF MARCH 16, 1950. Henry P. Kramer. Apr. 7, 1950. 6p (UCRL-647).

Topics include short-term effect of At²¹¹ on blood picture in rats. NSA 4-3972.

2615

SUPPRESSION OF LOCAL TISSUES REACTIVITY (SHWARTZMAN PHENOMENON) BY NITROGEN MUSTARD, BENZOL, AND X-RAY IRRADIATION. Robert Mettler Becker. Proc. Soc. Exptl. Biol. Med. **69**, 247-50(1948) Nov.

Shwartzman phenomenon produced by meningococcus in rabbits is completely suppressed by pretreatment with nitrogen or benzol as well as by x-ray irradiation. NSA 4-2522

2616

SURVIVORS OF BOMBING OF HIROSHIMA THREE YEARS LATER. Frederick George Novy, Jr. Arch. Dermatol. and Syphilol. **61**, 379-83(1950) Mar.

After examination of atomic explosion survivors for radiation skin injury it was concluded that in no case could burns be unquestionably attributed to irradiation injury. NSA 4-2523

2617

THE CLINICAL PATHOLOGIST IN AN ATOMIC AGE. Shields Warren. Am. J. Clin. Path. **20**, 1-2(1950) Jan. NSA 4-2525

2618

COMPLICATIONS DUE TO RADIUM TREATMENT OF COLLUM CARCINOMA AND THEIR SIGNIFICANCE FOR SUCCESSFUL TREATMENT. Friedrich Gauwerky. Strahlentherapie **80**, 51-70(1949). (In German).

Total of 590 cases of collum carcinoma were analyzed for complications due to radium treatment. Where inflammatory processes developed, changes for successful treatment were greatly reduced even in otherwise mild cases. NSA 4-2526.

2619

CONCERNING LOCAL INJURIES THROUGH IRRADIATION AS A CONSEQUENCE OF THE TREATMENT OF COLLUM CARCINOMA. H. Drescher. Strahlentherapie **80**, 99-106 (1949). (In German).

Observations on 1,039 patients treated with radiation therapy are reported. Injuries of bladder and rectum occurred in 26 (2.5%). Other changes were also observed and are described. Increasing the usually tolerated dose of 7000 r to the bladder to 8500 r to obtain better therapeutic results failed to induce x ray ulcers, carcinoma or spontaneous fractures of femoral neck. NSA 4-2527.

2620

DANGER FROM RADIATION AND THE BLOOD PICTURE. Lothar Diethelm and Wolfgang Hilscher. Rontgen Blatter **2**, 145-63(1949).

In an extensive statistical study of blood data on individuals subjected to radiation exposure up to 10 yr, it was found that leucocytes, reticulocytes and hemoglobin were sensitive but eosinophils, monocytes and erythrocytes were not affected. NSA 4-2529

2621

DELAYED INJURIES OF THE CRANIUM AFTER X-RAY THERAPY OF INTRACEREBRAL TUMORS. Alfred Vogt. Strahlentherapie **80**, 165-74(1949). (In German).

Radiogenous fibroses developed in two patients 5 to 6 yr after x ray treatment for hypophyseal lesions. Both patients were relieved of their original symptoms, by x ray therapy and were able to return to work, demonstrating that the possibility of radiation-induced fibrosis is not a contraindication to radiation therapy for brain lesions where it is otherwise indicated. NSA 4-2530.

2622

PHYSICIANS IN AN ATOMIC WAR. Leon O. Jacobson, R. S. Stone, and J. Garrott Allen. J. Am. Med. Assoc. **139**, 138-40(1949) Jan. 15. NSA 4-2531.

2623

RADIATION CATARACTS. Shields Warren. J. Am. Med. Assoc. **141**, 407(1949) Oct. 8.

Author believes development of radiation cataracts is due not to overestimation of maximum permissible doses but to acute exposure of individuals to doses

of 20 to 100 r during adjustments of machinery and work inside protective barriers. NSA 4-2533.

2624

SARCOMA AND CARCINOMA INTERRELATIONSHIP IN X-RAY TREATED LUPUS VULGARIS. W. Schneider. Strahlentherapie 80, 335-66(1949). (In German).

Nine cases of sarcoma occurring after x ray therapy of lupus vulgaris are described in detail, clinically and histologically NSA 4-2537.

2625

THROMBOCYTOPENIC PURPURA COMPLICATING RADIOACTIVE PHOSPHORUS TREATMENT IN A PATIENT WITH POLYCYTHEMIA VERA Gould A. Andrews. Am. J. Med. 7, 564-8(1949) Oct.

Author suggests P^{32} should be used with caution especially in patients who already have thrombocytopenia. NSA 4-2538

2626

Chicago. Univ. Air Force Radiation Lab
QUARTERLY PROGRESS REPORT NO. 22. Jan. 15, 1957. 113p. (NP-6199).

Includes reports on: toxic effects of various single doses of x radiation given to rats immediately following repeated exposures to 25 and 50 r per day, protective effects of several materials in irradiated rats and mice, survival time of mice exposed to fractionated γ ray irradiation at dosage levels of 0.33, 1.0, 3.0 rep/hr, cage effect on survival of x rayed mice. NSA 11-4226.

2627

INTERPRETATION OF RADIATION RESULTS BASED ON TARGET THEORY. Aadne Ore (Yale Univ., New Haven, Conn.). Radiation Research 6, 27-39(1957). NSA 11-4243.

2628

THE X-RAY DOSE-BODY SIZE RELATIONSHIP IN RADIATION SICKNESS. W. M. C. Brown and R. F. Mahler. Science 118, 271-72(1953).

Following doses of x rays within the range of integral dose of $2\frac{1}{2}$ to 5 megagram roentgens, there is a sudden onset of nausea and fatigue. If the size of the patient is taken into consideration along with the integral dose, a satisfactory correlation can be obtained with the length of the latent period.

2629

THE DIAGNOSIS OF RADIATION INJURY. Richard T. Street and John B. Street. Dental Students Mag. 28, 14-17 34(1950) Feb.

Author presents a general discussion on diagnosis of radiation injury. Blood picture, cell changes, effects of cumulative exposures, superficial lesions, pre-exposure blood counts are briefly considered. NSA 4-2542.

2630

INDIRECT X-RAY IRRADIATION AND THE STATE OF REACTION OF THE SKIN. Margaret Zingsheim. Strahlentherapie 80, 115-20(1949). (In German).

Results of a study to evaluate therapeutic effects of indirect (secondary) irradiation on skin diseases indicate that indirect irradiation of 200 r lowers skin sensitivity. NSA 4-2555.

2631

IRRADIATION OF THE PITUITARY GLAND IN HYPERTENSIVE VASCULAR DISEASE. Maurice M. Best, Walter S. Coe, John Walker Moore, Edsel S. Reed, and Herbert L. Clay. Am. J. Med. Sci. 219, 276-80(1950) Mar.

A group of 25 patients with essential hypertension was treated with 2000 r total dose (200-kv, 50 cm, 2mm Cu) to the pituitary. No significant lowering of blood pressure resulted in group as a whole despite pressure decrease in 12% of the patients NSA 4-2556.

2632

DENTISTRY AND THE ATOMIC ENERGY PROGRAM.

Wm Ward Wainwright. N. Y. J. Dentistry 19, 325-32 (1949).

U^{233} , Pu^{239} and Am^{241} were shown by radioautographs to localize in dental tissues. NSA 4-2583.

2633

ATOMIC PHYSICS AND MEDICINE. M. Wolff. Med. Monatsschrift 3, 804-8(1949) Nov. (In German).

Elementary description of radioactive phenomena, applications in medicine, and medical aspects of devastations caused by the atomic bomb are presented. NSA 4-2592.

2634

MEDICINE IN THE ATOMIC AGE. H. L. Pugh. Diplomate 21, 247-54(1949) Nov.

Research on radioactivity and its effect on medicine are discussed. Clinical applications in therapeutics and diagnostics are reviewed and radiation sickness and precautions are described. NSA 4-2605.

2635

Oak Ridge National Lab.

THE EFFECT OF TOTAL-BODY X-IRRADIATION UPON THE HEMOLYSIN RESPONSE OF THE RAT TO SHEEP ERYTHROCYTES. Henry I. Kohn. Oct. 14, 1949. 15p. (ORNL-391), J. Immunol. 66, 525-33(1951).

Extension data show that x rays given either before or after immunization can inhibit antibody production. Significance of results is discussed. NSA 4-2852.

2636

BIOCHEMICAL MUTANT STRAINS OF NEUROSPORA PRODUCED BY PHYSICAL AND CHEMICAL TREATMENT. E. L. Tatum, R. W. Barratt, Nils Fries, and David Bonner Am. J. Botany 37, 38-46(1950) Jan.

Ultra-violet, x ray, bis- and tris-nitrogen mustards and methylcholanthrene were evaluated in terms of their ability to produce biochemical mutants in Neurospora. Details of procedures and results are presented. Results are evaluated in terms of their implications with respect to the nature of the processes controlling biochemical deficiencies. NSA 4-2854.

2637

BIOLOGICAL EFFECTS OF RADIATION. H. Langendorff, H. Bauer, W. Luther, R. Schulze, and U. Henschke. p. 51-122 of FIAT Review of German Science, 1939-46, Biophysics, Part I. Office of Military Government for Germany, Field Information Agencies Technical, 1948. (In German).

This is a review of work done between 1939 and 1946 including 150 references. NSA 4-2855.

2638

BIOLOGIE Hermann Holthausen. p. 26-54 of FIAT Review of German Science, 1939-1946; Radiology, Diagnostic (senior author). Office of Military Government for Germany, Field Information Agencies Technical, 1947. (In German).

Author presents a summary and guide to recent German literature about general biological effects of radiation. NSA 4-2856

2639

EFFECT OF BODY EXPOSURE TO X-RAYS UPON BONE MARROW. C. Lutwak-Mann, and F. W. Gunz, Biochem. J. 44, 111(1949) No. 2.

Study of rabbits irradiated with 1,000 r x ray dose and of rats with a 500-r dose is described. NSA 4-2857.

2640

THE EFFECT OF RADIOACTIVE PHOSPHORUS ON THE GROWTH OF THE ALBINO RAT. Morton M. Kligerman. Am. J. Roentgenol. Radium Therapy 63, 380-95(1950) Mar.

Five different doses of P^{32} were administered to 5 groups of 21-day old white male rats and to 5 groups of 42-day old rats. Doses were 44, 132, 400, 1,200 and 3600 μ c/Kg body weight. A detailed description of the

effect of various doses on growth of the animals is presented. NSA 4-2858

2641

EFFECTS OF TRANSPLANTATION OF BONE MARROW INTO IRRADIATED ANIMALS. Paul E. Rekers, Molly P. Coulter, and Stafford L. Warren. Arch. surg. **60**, 635-67(1950) Apr.

Transplantation of normal marrow to intramedullary marrow sites was not very beneficial to irradiated animals (dogs, rabbits). Transplants of bone and marrow failed to survive. Transplantation of normal marrow to normal or irradiated spleen or liver was also without benefit. NSA 4-2859

2642

EFFECT OF X-RAYS ON THE MIGRATION OF CELLS FROM ADULT TISSUE EXPLANTS. R. S. Hoffman, and S. H. Wollman. Proc. Soc. Exptl. Biol. Med. **70**, 38-40 (1949) Jan.

Authors conclude that less than 30 r stimulates migration of cells from fresh explants; over 30 r induces gradually more extended latent period. Superimposed inhibition is suggested, which exceeds excitation effect when dosages exceed 1000 r level. NSA 4-2860

2643

MODIFICATION OF THE X-RAY AND ULTRAVIOLET INDUCED MUTATION RATE IN ASPERGILLUS TERREUS BY PRETREATMENT WITH NEAR INFRARED RADIATION C. P. Swanson, Alexander Hollaender, and B. N. Kaufmann. Genetics **33**, 429-37(1948) July.

With respect to x ray induced mutations, infrared pretreatment causes a significantly increased mutation rate through range of doses tested. NSA 4-2861.

2644

NEW FORMS OF EUTORULOPSIS DUBIA CIF. AND RED. OBTAINED THROUGH THE ACTION OF X-RAYS. Elisa Corberi. Boll. soc. ital. biol. sper. **25**, 526-28(1949). (In Italian).

X irradiated Eutorulopsis produced new forms with altered pigmentation. The new forms resembled the parent strain with respect to proteolysis of gelatin and fermentation of sugars but differed in that they produced less catalase and had altered oxidative metabolism. NSA 4-2862.

2645

PRODUCTION OF MALIGNANT TUMORS IN RATS WITH RADIOACTIVE PHOSPHORUS. Simon Koletsky, Frederick J. Bonte, and Hymer L. Friedell. Cancer Research **10**, 129-38(1950) Mar.

Of 19 white male Wistar rats (weight 150g) given one injection of 4.5 μ c/g of P^{32} , the LD_{50} dose, 9 developed malignant neoplasms. Of 15 similar rats given a dose of 1.5 μ c of P^{32} /g every 3 weeks for a total dose of 9 or 12 μ c/g, 4 were discarded and 4 of the remaining 11 developed neoplasms. Of the total of 13 neoplasms, 3 were squamous cell carcinoma (face), 10 were osteogenic sarcomas (jaw, 4, spine; 2, tibia; 2, femur and pelvis; 1 each). Total tumor incidence was approximately 40%. Histology of the lesions and of non-tumorous but proliferating bone is described. NSA 4-2864

2646

THE EFFECTS OF INFRARED TREATMENT ON THE PRODUCTION OF X-RAY INDUCED CHANGES OF THE CHROMOSOMES OF TRADESCANTIA. C. P. Swanson. Am. J. Botany **34**, 590(1947).

2647

QUANTITATIVE ASPECTS OF THE PROTECTIVE ACTION OF CYSTEINE AGAINST X-RADIATION. D. E. Smith, H. M. Patt, E. B. Tyree, and R. L. Straube. Proc. Soc. Exptl. Biol. Med. **73**, 198-200(1950)Feb.

Authors conclude from study of rats that protection is roughly proportional to amount of cysteine given. NSA 4-2866.

2648

QUANTUM PHYSICS AND STATISTICS IN BIOLOGY. M. Schon, B. Rajewsky, K. Sommermeyer, and H. Friedrich-Freska. p. 1-49 of FIAT Review of German Science, 1939-1946: Biophysics, Part I. Boris Rajewsky and Michael Schon (senior authors). Office of Military Government for Germany, Field Information Agencies Technical, 1948. (In German).

Reviews includes sections on: quantum theoretical features of biological problems; target theory; energy migration in molecular complexes and structural units, forces influencing composition of biological structural units. NSA 4-2867.

2649

Chicago Univ.

REDUCTION OF MORTALITY FROM X-RADIATION BY TREATMENT WITH ANTIBIOTICS. C. Phillip Miller, Carolyn W. Hammond, and Marianne Tompkins. [nd] 6p. (AECU-738); Science **111**, 719-20(1950).

Streptomycin alone or with penicillin reduced the 30-day mortality of mice after 450-r total-body x irradiation. Chloramphenicol was less effective. NSA 4-2869.

2650

THE INCIDENCE OF BACTEREMIA IN MICE SUBJECTED TO TOTAL BODY X- RADIATION. C. Phillip Miller, Carolyn W. Hammond, and Marianne Tompkins. [nd] 9p. (AECU-739); Science **111**, 540-1(1950).

Bacteremia was most frequent during the period of greatest mortality and its incidence tended to parallel the death rate among mice receiving single total body x ray doses in excess of the $LD_{50/30}$. In almost all instances, the bacteria were species comprising part of the normal flora of the lower intestinal tract of the strain of mice studied. NSA 4-2870

2651

BALLISTIC ROENTGENTHERAPY. Gaston Daniel. J. Radiol. Electrol. **29**, 486-90(1948). (In French).

Author discusses possibility of stray radiation as a cause of many radiation reactions. NSA 4-2873.

2652

CALCULATIONS FOR MAXIMUM PERMISSIBLE EXPOSURE TO THERMAL NEUTRONS. Walter S. Snyder. Nucleonics **6**, 46-50(1950)Feb.

Critical flux of thermal neutrons is believed to lie between 1,712 and 1,951 neutrons/cm²/sec. NSA 4-2874.

2653

ABSORPTION EFFECTS IN VOLUME IRRADIATION OF MICROORGANISMS. Harold J. Morowitz. Science **111**, 229-30(1950) Mar. 3.

From target theory, a relation was derived giving percentage of organisms, suspended in a medium, which would survive irradiation of a given dosage. Corresponding expression was derived for radiation absorbing suspending materials, and for the case in which organisms are constantly stirred. NSA 4-2123.

2654

ACTION OF ROENTGEN IRRADIATION OF THE SPLEEN ON EASILY EXTRACTED BLOOD IRON. C. Scartozzi and G. Silvestri. Patologia Sperimentale **36**, 65-80(1948). (In Italian).

A daily x ray dose of 21 or 28r to the spleen of rabbits for 3 consecutive days caused an elevation of easily extractable plasma Fe which persisted over a period of 15-25 days. A single dose of 110r 140 days after the initial radiation produced a decrease in the easily extractable Fe beginning 8 days after exposure and persisting

for 45 days. Irradiation of liver or muscle instead of spleen had little effect. NSA 4-2124.

2655

CONCERNING INDIVIDUAL DIFFERENCES IN THE X-RAY SENSITIVITY OF HUMAN SKIN, EXAMINED BY THE APPEARANCE OF AN ERYTHEMA. Roderich Helmke. Strahlentherapie 80, 585-90(1949). (In German).

There was an individual variation range of 100 r among men and women for appearance of early erythema following 200-400 r x ray dose, variation range of 50 r in men and 75 r in women for primary erythema. NSA 4-2125.

2656

THE CYTOLOGICAL CHANGES THAT OCCUR IN THE ANTERIOR PITUITARY GLANDS OF RATS INJECTED WITH VARIOUS DOSES OF I^{131} AND THEIR SIGNIFICANCE IN THE ESTIMATION OF THYROID FUNCTION. R. C. Goldberg and I. L. Chaikoff. Endocrinology 46, 91-104 (1950) Jan.

Changes occurring in the anterior pituitaries of rats after injection of 300 μ c I^{131} (or more) are not the result of direct injury to the pituitary but are secondary to thyroid destruction. A dose of 18 μ c produced no detectable cytological effect in the pituitary. The histological picture of the thyroid and pituitary after the doses used is described. NSA 4-2126.

2657

EFFECTS OF IRRADIATING MAIZE POLLEN IN A NUCLEAR REACTOR ON F_1 PLANTS. E. F. Frolik and Rosalind Morris. Science 111, 153-4(1950) Feb. 10. NSA 4-2129.

2658

THE EFFECT OF X-IRRADIATION ON TISSUE RHODANATE. M. C. Bowman and W. R. Franks. Acta Univ Intern. contra Cancrum 6, 765-7(1949).

Nembutal did not affect either rhodanate activity or respiration and glycolysis of mouse brain grey matter; x-irradiation did not inhibit rhodanate activity in the liver homogenate in vitro but was lethal to mice in 10 days. NSA 4-2130.

2659

EFFECTS OF REPEATED X-RADIATION OF THE WHOLE BODY ON THE DEVELOPMENT OF TUMORS IN RATS DUE TO FEEDING p-DIMETHYLAMINOAZOBENZENE. Cornelia Hoch-Ligeti. Brit. J. Cancer 3, 562-9(1949) Dec.

All nonirradiated rats receiving p-dimethylaminoazobenzene developed hepatic tumors, tumor growth was retarded or inhibited in rats given soft radiation. Hepatic tumors were slightly retarded in rats treated with penetrating rays; skin tumors developed in 2 of these. NSA 4-2131.

2660

THE EFFECT OF X-RAY IRRADIATION ON THE PITUITARY BODY OF INFANTILE RATS TREATED WITH α -ESTRADIOL MONOBENZOATE. A. Baudins, L. Claesson, and A. Westman. Acta Endocrinologica 1, 133-40(1948).

Under the influence of estrogen, the pituitary of the infantile rat is sensitive to radiation doses (1-1,000 r) which fail to affect gland of normal infantile rats. NSA 4-2132.

2661

EPILATION IN THE NON-IRRADIATED MEMBER OF PARABIOTICALLY UNITED RATS. Donald C. Van Dyke and Rex L. Huff. Proc. Soc. Exptl. Biol. Med. 72, 266-9 (1949) Oct. NSA 4-2133

2662

EPITHELIOMA AND PAPILLOMA ARISING ON RECENTLY IRRADIATED SKIN; REPORT OF THREE CASES. J. Walter. Brit. Med. J. No. 4648, 273-4(1950) Feb. 4. NSA 4-2134.

2663

EXPERIMENTS RELATIVE TO THE ANTIPHLOGISTIC EFFECT OF X-RAYS. B. Wald and V. Varteresz. Radiologia Clin. 17, 348-62(1948) Nov.

Anti-inflammation effect of x rays were found to be due to reversible temporary paralysis of capillary endothelium, thereby preventing exudation. NSA 4-2135.

2664

FETAL TOLERANCE TO ROENTGEN RAYS. A CASE REPORT. Arthur A. Hobbs, Jr. Radiology 54, 242-6 (1950) Feb.

Author reports a case of a pregnant woman with advanced, metastatic breast cancer who received a total dose of 125r to the mid pelvis in order to terminate pregnancy when she refused surgical intervention. The pregnancy was terminated by delivery, one month later, of an apparently normal child. Fetal age is considered to be the factor responsible for the failure to induce abortion by x radiation. NSA 4-2136.

2665

FURTHER STUDIES ON THE RELATION BETWEEN RADIATION EFFECTS, CELL VIABILITY AND INDUCED RESISTANCE TO MALIGNANT GROWTH. VI. ANOMALOUS RADIOSENSITIVITIES OF ANALOGOUS MOUSE MAMMARY ADENOCARCINOMAS. Anna Goldfeder. Radiology 54, 93-114(1950) Jan. NSA 4-2137.

2666

A HISTOPATHOLOGIC STUDY OF RADIATION INJURIES OF THE SKIN. H. A. Teloh, M. L. Mason, and M. C. Wheelock. Surg. Gynecol. Obstet. 90, 335-48(1950) Mar.

Authors conclude that therapy of benign cutaneous or subcutaneous lesions by irradiation, with potential production of more severe irradiation dermatitis, is not justified unless it is carried out by a roentgenologist trained in limitations and potentialities of such therapy. NSA 4-2138.

2667

HISTOPATHOLOGICAL CHANGES INDUCED IN THE NORMAL THYROID AND OTHER TISSUES OF THE RAT BY INTERNAL RADIATION WITH VARIOUS DOSES OF RADIOACTIVE IODINE. R. C. Goldberg, I. L. Chaikoff, Stuart Lindsay, and D. D. Feller. Endocrinology 46, 72-90(1950) Jan.

The development of changes in the thyroid of rats given single doses of I^{131} ranging from 300 to 875 μ c is described in terms of histopathological changes in the glands at 3 days, 1, 5, 6 and 8 months after injection. Organs and tissues other than thyroid were also studied histologically. NSA 4-2139

2668

IRRADIATION OF MIXED TISSUES. W. H. Love. Nature 165, 227-8(1950) Feb. 11.

Erroneous conclusions may result from use of given formula for calculating tissue dose when two different tissues are included in irradiated area. NSA 4-2140.

2669

THE QUESTION OF X-RAY ATROPHY OF THE TESTES. Eberhard Günsel. Strahlentherapie 80, 467-74(1949). (In German).

Thermolabile testes of rats, exposed to hot water baths of 40-45°C, developed the same type of atrophy as that observed after high radiation doses. Other x ray effects described. NSA 4-2141

2670

RADIOBIOLOGICAL ADDITIVITY OF VARIOUS IONIZING RADIATIONS. Raymond E. Zirkle. Am. J. Roentgenol. Radium Therapy 63, 170-75(1950) Feb.

Additivity of fast neutrons and γ rays is assumed to be complete, i. e., mechanisms of action of radiations

are identical in their most essential feature, promotion of the same determinative events, but are not necessarily alike otherwise. The author includes a summary showing the degree of additivity (found in his experimental studies and studies by others) for combinations of α , β , γ , fast-neutron and x rays on the mouse, bean roots, *Drosophila* eggs, and pupae and on human skin. Incomplete additivity indicates some difference in the mechanism of action of the radiations. NSA 4-2142

2671
SULFOCYANATE, TOCOPHEROL AND X-RAYS. A. Herve and Z. M. Bacq. Compt. rend. soc. biol. **143**, 1158-9(1949)Aug. (In French).

Protection by cyanide against x ray effects in mice is due to action of CN-ion. Protection is limited in the sense that it is weak if x ray dose is increased, and is very weak if injection is made as late as 15 min after irradiation. NSA 4-2143.

2672
TENTATIVE DOSE UNITS FOR MIXED RADIATIONS. H. M. Parker. Radiology **54**, 257-62(1950)Feb.

Report concludes that energy absorption dose in irradiated tissue should be stated in ergs/g in scientific reports. NSA 4-2144

2673
THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF CELL MEMBRANE PERMEABILITY. Ladislaus Neu. Strahlentherapie **79**, 141-63(1949). (In German).

By applying laws of classical mechanics, author attempts to explain and coordinate certain features of cell membrane permeability including changes after x irradiation NSA 4-2145.

2674
PULMONARY CANCER PRODUCED BY RADIOACTIVE EMANATIONS. M. S. Vesin. Arch. maladies profess. med. travail et securite sociale **9**, 280-3(1948). (In French).

Effects of radioactive emanations on lungs of mine workers are described. NSA 4-2148

2675
THE ACUTE RADIATION SYNDROME IN MAN. Shields Warren and John Z. Bowers. Ann. Internal Med. **32**, 207-16(1950)Feb.

Pathogenesis, histopathology, symptomatology, clinical course, laboratory findings, complications, sequelae, therapy and prognosis of acute radiation syndrome in man are discussed. NSA 4-2149.

2676
ON IRRADIATION SICKNESS. K. Stetala and P. Ermala. Annales Chirurg. Gynaecol. Fenniae **37**, Suppl. 1, 1-59 (1948).

Relationship between irradiation sickness and mobile visible blood lipid is discussed in this report based on 65 cases. NSA 4-2150.

2677
RADIATION SICKNESS. W. Warner Watkins. Arizona Med. **7**, 17-21(1950)Feb.

Changes in radiation techniques for treatment of various diseases and in consequent incidence of radiation illness from 1900 to present are described. NSA 4-2151.

2678
TREATMENT OF LEUCOPENIA DUE TO IRRADIATION WITH VITAMIN B₆. F. Rovello and L. Ferri. Haematologica **32**, 319-32(1948). (In Italian)

In 10 patients treated with x rays for different types of tumors, decrease in number of leucocytes was controlled by administration of pyridoxine (B₆), 100 mg daily. NSA 4-2152.

2679
CHANGES IN THE PROTHROMBIN LEVEL IN WOMEN WITH CANCER TREATED BY IRRADIATION. E. Soykova-

Pachnerova and O. Soyka. Casopis Lekaru Ceskych **88**, 169-71(1949). (In Czech). NSA 4-2159

2680
Radiation Lab., Univ. of Calif.
SUMMARY OF THE RESEARCH PROGRESS MEETING OF OCTOBER 27, 1949. Henry P. Kramer. Jan. 25, 1950 6p. (UCRL-564).

Results of irradiation of microorganisms with deuterons and α particles are reviewed. NSA 4-2339.

2681
New York Operations Office.
THE NEGATION OF SQUID EMBRYO TROPISMS BY X-RADIATION. Roberts Rugh. Jan. 16, 1950. 18p. (NYOO-1502). NSA 4-2503.

2682
Oak Ridge National Lab.
CHROMOSOMAL INTERCHANGES INDUCED IN *TRADESCANTIA* MICROSPORES BY FAST NEUTRONS FROM URANIUM FISSION. Norman H. Giles, Jr., and Alan D. Conger. Feb. 28, 1950. 11p. (ORNL-586), J. Cellular Comp. Physiol. **35** (Suppl. 1) 83-8(1950).

Linear relationship was found to exist between neutron dose and chromosome interchange frequency, confirming previous evidence that fast neutron-induced interchanges are one-hit phenomena. NSA 4-2504.

2683
ABSTRACTS OF PAPERS ACCEPTED FOR PRESENTATION AT THE FORTY-FIRST ANNUAL MEETING OF THE [AMERICAN PHYTOPATHOLOGICAL] SOCIETY, NEW YORK CITY, NEW YORK, DECEMBER 28-30, 1949. Phytopathology **40**, 1-33(1950)Jan.

Continuous γ irradiation of tomato plants and cultures of *Fusarium lycopersici* are described. NSA 4-2505.

2684
RETENTION OF RADIOACTIVE IODINE IN THYROID CARCINOMAS HISTOPATHOLOGIC AND RADIO-AUTOGRAPHIC STUDIES L. D. Marinelli. Amer. J. Roentgenol **58**, 17(1947).

2685
THE ACTION OF RADIOACTIVE PHOSPHORUS IN *DROSOPHILA*. Johanna Blumel. Science **111**, 205-6 (1950)Feb. 24.

Drosophila melanogaster and *D. virilis* were maintained on a culture medium containing P³² (approximately 265,000 cpm/ml). The distribution of radioactivity in the flies 12 days after exposure was determined and hatchability and development of offspring hatched in the radioactive solution were observed. Data on mutation production are also included. NSA 4-2507.

2686
ANALYSIS BY RADIATION OF BIOLOGICAL ELEMENTARY STRUCTURES. Gerhard Schubert. Strahlentherapie **80**, 1-16(1949). (In German).

Author reviews radiation effect on genes, bacteriophages, and viruses. NSA 4-2508.

2687
BIOLOGICAL RADIATION EFFECTS OF FAST ELECTRONS ON GERMINATING BARLEY. W. Dittrich, W. Paul, M. Riedel, and G. Schubert. Strahlentherapie **80**, 17-34 (1949). (In German).

With increased dosages, inhibition of germinal growth became greater and percentage of coleoptiles breaking through soil was smaller, length of growth of leaf was retarded. NSA 4-2509.

2688
EFFECT OF LARGE DOSES OF X-RAYS ON THE DISTRIBUTION OF ALKALINE PHOSPHATASES IN SOME ORGANS OF THE MOUSE. L. Arvy, J. A. Boiffard, and M. Gabe. Compt. rend. soc. biol. **143**, 233-4(1949).

Histological changes in adult white mice given 2,000 r whole-body x ray doses are described. Gomori technique showed characteristic shifts in alkaline phosphatase in cells of spleen, intestine and kidney. NSA 4-2511

2689

ADRENAL ASCORBIC ACID AND HISTOLOGICAL CHANGES IN MALE AND FEMALE RATS AFTER HALF-BODY X-RAY IRRADIATION Bernard C. Wexler, Richard Pencharz, and Sydney F. Thomas. *Am. J. Physiol.* 183, 71-4(1955). NSA 10-1174

2690

EFFECTS OF X-IRRADIATION ON PLASMODIUM GALLINACEUM AND PLASMODIUM LOPHURAE INFECTIONS IN YOUNG CHICKS. B. E. Bennison and G. Robert Coatney. *J. Natl. Malaria Soc.* 8, 280-9(1949) Dec.

X-rayed chicks showed significantly higher parasite counts than unirradiated controls. Parasite counts of irradiated quinine-treated chicks (inoculated with P. gallinaceum) were slightly higher than those of unirradiated quinine-treated controls. NSA 4-2513.

2691

LETHAL INJURIES OF DROSOPHILA EGGS BY X-RAYS AND FAST ELECTRONS FROM A 6-Mev BETATRON. H. Fass, G. Hohne, W. Paul, and G. Schubert. *Naturwissenschaften* 36, 381-2(1949). (In German).

Lethal dosage curves are given for Drosophila eggs, aged 3, 4 and 7.5 hr exposed to x rays and 3-Mev electrons. Relative biological effectiveness of electrons as compared to x rays is found to be 1.0, 0.4, and 0.8 respectively for the 3 age groups. NSA 4-2515.

2692

THE NATURE OF RADIATION INJURY TO AMPHIBIAN CELL NUCLEI William R. Duryee. *J. Natl. Cancer Inst.* 10, 735-96(1949) Dec.

Cellular radiation damage is apparently a triple phenomenon and includes primary physical or radiochemical changes in cytoplasm; chemical metabolic processes which allow protoplasmic nuclear toxins to form or accumulate in cytoplasm and transmission of toxic substances into nucleus. NSA 4-2516

2693

ON THE INTERPRETATION OF THE DOSE-FREQUENCY CURVE IN RADIOGENETICS. I. Opatowski. *Genetics* 35, 56-9(1950) Jan.

Author feels that apparent linearity of experimental data on dependence of mutation frequency upon the administered dose cannot be considered as proof that mutation is caused by a single primary event. NSA 4-2517.

2694

PREGNANCY FOLLOWING PELVIC IRRADIATION Alan M. Giles. *J. Obstet. Gynaecol. Brit. Empire* 56, 1041-3 (1949) Dec.

Failure of radium irradiation to prevent pregnancy in certain cases leads author to believe that patients treated by this method should be followed up for minimum period of 12 mo and in event of failure to induce menopause, contraceptive measures should be advised. NSA 4-2518

2695

THE PROBLEM OF RADIOTOXINS. II. Zacek, Jan, VI. Klimecky, and D. Motacek. *Spisy Lekarske Fakulty Masarykovy Univ.* 22, 8(1948).

Rat erythrocytes were irradiated with 6,030 r and injected subcutaneously into healthy animals as 5 cc suspensions to determine severity and nature of radio-toxic effects (leukopenia). Radiotoxins were found to be formed only in intact, live erythrocytes, probably by complex chain reactions. NSA 4-2519

2696

THE HEMATOLOGY OF IONIZING RADIATION. E. P.

Cronkite. *Atomic Med*, Chap. VIII. p.103-22, New York, Thomas Nelson and Sons. Publ. (1949).

2697

QUANTITATIVE INFERENCES CONCERNING THE GENETIC EFFECT OF RADIATION ON HUMAN BEINGS. Robley D. Evans. *Brit. J. Radiol.* 23, 175-83(1950) Mar. NSA 4-2521.

2698

NUCLEAR PHYSICS AND MEDICINE. Gerhard Schubert. Göttingen, Muster-Schmidt. 1948(2nd Edition.) 344p. (In German).

This compendium covers general principles of nuclear physics as applied to medical research; biological effects of ionizing radiations; apparatus and measuring devices. NSA 4-359.

2699

Radiation Lab., Univ. of Calif. BIOLOGICAL STUDIES OF RADIATION EFFECTS. EFFECTS OF TOTAL BODY X-IRRADIATION ON BLOOD COAGULATION IN THE RABBIT. (PRELIMINARY STUDY). Robert L. Rosenthal and Agnes L. Benedek. [nd] 7p. (AECU-592; UCRL-414); *Am J. Physiol.* 161, 505-14(1950).

After single total-body x ray exposures of 200-1000 r, rabbits show coagulation impairment characterized by thrombocytopenia, diminished clot retraction, increased clotting time of recalcified plasma and increase clotting times after addition of heparin or toluidine blue. NSA 4-377.

2700

Argonne National Lab. FURTHER STUDIES ON THE MODIFICATION OF SENSITIVITY TO X-RAYS BY CYSTEINE. I. TIME COURSE OF THE PROTECTION AND COMPARISON OF CERTAIN RELATED SUBSTANCES. H. M. Patt, D. E. Smith, E. B. Tyree, and R. L. Staube. [nd] 1p. (AECU-599; UAC-148); *Proc. Soc. Exptl. Biol. Med.* 73, 1852 (1950). NSA 4-378.

2701

Argonne National Lab. FURTHER STUDIES OF THE MODIFICATION OF SENSITIVITY TO X-RAYS BY CYSTEINE. II. X-RAY-CYSTEINE DOSAGE RELATIONSHIPS. D. E. Smith, H. M. Patt, E. B. Tyree, and R. L. Straube. [nd]. 1p. (AECU-600; UAC-145); *Proc. Soc. Exptl. Biol. Med.* 73, 18-21(1950).

Above 800 r, cysteine protection of rats decreases as amount of radiation increases. Above 800 r, (1) 950 mg/kg, cysteine dose affords 13-20% greater protection than (2) 475 mg/kg. LD₅₀ is raised from 725 r for controls to 1060 r by (2) and 1220 r by (1). NSA 4-379.

2702

Atomic Energy Project, Univ. of Rochester. STUDIES ON THE ABSORPTION AND DISTRIBUTION OF VITAMIN A IN X-IRRADIATED RATS. R. L. Bennett, Vera C. Bennett, Alpha Shaver, and Theresa Grachus. Aug. 25, 1949. 17p. (AECU-604; UR-90); *Proc. Soc. Exptl. Biol. Med.* 74, 439-43(1950). NSA 4-380

2703

Oak Ridge National Lab. ON THE MODIFICATION OF THE TOXICITY OF X-RAYS BY IMMUNIZATION. Henry L. Kohn. Oct. 27, 1949. 9p. (AECU-610; ORNL-386).

After injection with sheep erythrocytes, 2 strains of rats showed rise of 50-75 r in LD₅₀ of 250 kv x rays, while a 3rd strain showed a fall of 25 r. This injection

prevented rise of albumin-globulin ratio which invariably occurs postirradiation in nonimmunized rats. NSA 4-381

2704

Atomic Energy Project. Univ. of Rochester. EFFECT OF X-IRRADIATION ON THYROID FUNCTION IN RATS. John B. Hursh, Jack B. Mohney, and Priscilla A. Van Valkenburg. Aug. 24, 1949. 29p. (AECU-615; UR-89); Radiology 57, 411-18(1951).

Rats were x rayed over the thyroid area with total doses of 1000, 3000 and 6000 r. Thyroid function was tested by I^{131} uptake, and post mortem protein bound I^{131} analysis. Thyroid glands were also studied histologically. NSA 4-382

2705

Columbia Univ.

THE IMMEDIATE AND DELAYED MORPHOLOGICAL EFFECTS OF X-RADIATIONS ON MEIOTIC CHROMOSOMES. Roberts Rugh. Nov. 1, 1949. 20p. (AECU-649; CUF-3); J. Cellular Comp. Physiol. 36, 185-203(1950).

Mitotic and meiotic stages in spermatogenesis of *Triturus pyrrhogaster* were studied immediately and 48 hr after 5,000 to 50,000 r x-ray dose. Chromosome changes are described. NSA 4-383

2706

HEREDITARY EFFECTS PRODUCED IN MAIZE BY RADIATIONS FROM THE BIKINI ATOMIC BOMB. I. STUDIES ON SEEDLINGS AND POLLEN OF THE EXPOSED GENERATION. E. G. Anderson, A. E. Longley, C. H. Li, and K. L. Retherford. Genetics 34, 639-46 (1949) Nov.

Maize plants grown from seed exposed at Bikini showed effects slightly less than those of an experimental lot exposed to 15,000 r. NSA 4-386

2707

MORPHOLOGICAL ASPECTS OF THE REGENERATION OF NERVES SECTIONED AND SUBJECTED TO THE ACTION OF X-RAYS. Gillo Gastaldi. Rivista Sperimentale di Freniatria 73, 5-41(1949) June 30. (In Italian).

Rabbits and guinea pigs received local irradiation daily (80r/day for total dose of 160-720r) over the area of hemisection of the sciatic nerve, beginning immediately after sectioning. A control animal was studied for each irradiated animal and received only nerve section. Animals were sacrificed in pairs from the second to the 19th day after nerve section and the progress of repair was studied histologically. Among postirradiation effects exhibited by rabbits and guinea pigs were accentuated leucocyte migration, accentuated phagocytic activity and prolonged disorientation of nerve fibres. NSA 4-388

2708

PHYSIOLOGICAL EFFECTS OF RADIATIONS; EXTENT OF DAMAGE TO LIVING TISSUES. Franklin Hutchinson. Yale Sci. Mag. 24, 9-10, 18, 28, 30(1949) Nov.

This is a general review and discussion of hazards and dangers of ionizing radiation. NSA 4-389

2709

PRODUCTION OF RADIOACTIVITY IN ANIMAL TISSUES BY HIGH-ENERGY X-RAYS. W. V. Mayneord, J. H. Martin, and D. A. Layne. Nature 164, 728-30(1949) Oct. 29.

Authors describe their experiments to determine amount of induced radioactivity it is possible to produce in rat tissues with x rays, and biological significance of this phenomenon. They conclude that induced radioactivity does not explain biological effects of x rays on tissues. Calculated rate of energy absorption from x ray beam gives a value of 0.93 ergs/g sec. In contrast energy absorption from disintegration of O_2 is 0.4×10^{-4} ergs/cc/sec. Even if C disintegration is included, rate of absorption of energy due to activation would be only

of the order of 0.01 per cent of that due to electron recoil and pair absorption. NSA 4-391

2710

RADIATION-ITS BIOLOGICAL EFFECTS AND PROBLEMS. J. R. Martin. Mech. Eng. 71, 893-8(1949) Nov. NSA 4-392.

2711

RADIOBIOLOGICAL EXPERIMENTS ON DROSOPHILA PUPAE, USING FAST ELECTRONS AND X-RAYS. Wolfgang Dittrich, Wolfgang Paul, Gotthold Salz, and Gerhard Schubert. Z. Naturforsch 4b, 226-9(1949) Aug.-Sept. (In German).

LD_{50} is somewhat larger for fast electrons than that for x rays. Authors observed that in the "formal" target region the most probable number of hits is smaller for fast electrons than for x rays. NSA 4-393

2712

STUDIES CONCERNING THE EGG-WHITE BODIES OF THE BONE MARROW. IV. REPORT: THE CHANGES IN THE EGG-WHITE FRACTION OF THE BONE MARROW AFTER ROENTGEN IRRADIATION. Yutaka Nihei. Tohoku J. Exp. Med. 49, 233-8(1948) Oct. 11. (In German).

Large x ray doses apparently seriously injure egg-white bodies in irradiated and shielded marrow of dogs which have 4000 r of x rays applied to one thigh from which marrow samples are taken for comparison with samples from non-irradiated thigh. NSA 4-394

2713

SURVIVAL CURVES OF HAPLOID AND DIPLOID YEASTS SUBMITTED TO X-RAYS. Raymond Latarjet and Boris Ephrussi. Compt. rend. 229, 306-8(1949) July 25. (In French).

A haploid and a diploid strain derived from the same parent strain of *Saccharomyces cerevisiae* received various x ray doses and lesions were observed microscopically and counted after 20 hours of incubation. Lesions of haploid yeasts are all irreversible; diploid yeasts show frequent cases of restoration and further colony production. Survival curves were sigmoid for diploid yeasts, simple exponential for haploids, confirming authors' hypothesis that previously observed sigmoid curves (two-hit) might be due to the diploid nature of the yeasts studied. NSA 4-395.

2714

X-RAY EFFECTS IN FRUIT TREES. I. Granhall, A. Gustafsson, Fr. Nilsson, and E. J. Olden. Hereditas 35, 269-79(1949).

Results of irradiating scions of apples, pears and cherries with 500 to 25,000 r indicate that this method may be usable for production of better fruit of increased size, flavor, resistance to disease and other desirable qualities. NSA 4-396.

2715

ATOMIC ENERGY IN CLINICAL MEDICINE. Henry J. Klaunberg. Gen. Practice Clinics 6, 435-92(1949) Sept.-Oct. NSA 4-397

2716

THE CONTRIBUTION OF THERAPEUTICS IN IRRADIATION SICKNESS. J. A. Salva, and M. Badell. Med. Clinica 13, 30-3(1949) July. (In Spanish).

Effects of the antihistamine, Phenergan, on relief of radiation sickness is described. NSA 4-398

2717

THE INFLUENCE OF THE SPLEEN ON HEMATOPOIETIC RECOVERY AFTER IRRADIATION INJURY. L. O. Jacobson, E. L. Simmons, W. F. Bethard, E. K. Marks, and M. J. Robson. Proc. Soc. Exptl. Biol. Med. 73, 455-9(1950) Mar.

Protective effect of spleen shielding on postirradiation recovery of mice was studied. NSA 4-3282

2718

INFLUENCE OF X-RAYS ON LIMB REGENERATION IN

URODELE AMPHIBIANS. V. V. Brunst. *Quart. Rev. Biol.* 25, 1-29(1950) Mar.

Mode of action of x rays in inhibiting limb regeneration in urodeles, source of cells for regenerating blastema, and influence of x rays on growth and differentiation in regenerative process are reviewed. NSA 4-3283.

2719

ON THE MUTATION OF THE TOBACCO MOSAIC VIRUS. I. Opatowski. *J. Gen. Physiol.* 33, 171-6(1949) Nov.

X irradiation induced mutations of tobacco mosaic virus with doses of 0-49,000 r. Mutation rates of 0.079-5.275% were analyzed on basis of ionization theory. NSA 4-3285.

2720

SOME EFFECTS OF X-RADIATION ON WATER AND ELECTROLYTE METABOLISM IN THE RAT. Abraham Edelman. (nd) 1p. (AECU-261). *Fed. Proc.* 8(1), 39 (1949).

Intake of distilled H₂O, 1% NaCl solution, and food, and excretion of urinary Na, K, Cl and H₂O by rats were determined daily before and after exposures to 100, 250, 800 and 1000 r of x rays. (Appears in its entirety in NSA). NSA 3-502.

2721

TIME-DOSE STUDY OF BIOCHEMICAL RESPONSES OF RATS TO X-RADIATION. N. North and L. F. Nims. (nd) 1p. (AECU-266). *Fed. Proc.* 8, 119-20(1949).

Time-dose study of biochemical responses of adrenal-pituitary system in fasted rats following whole body x irradiation indicates a pattern of changes comparable to that following other stresses. (Appears in its entirety in NSA). NSA 3-503.

2722

Brookhaven National Lab.

THE EFFECT OF ABSORBED RADIOACTIVE PHOSPHORUS (P³²) ON THE GENETICS OF *E. COLI*. Benjamin A. Rubin and Paul Steinglass. (nd) 1p. (AECU-269).

The intent of this study was to determine whether the genetic effects of P³² could be accounted for by β -ionization alone. A mathematical basis was developed for the detection of the mutagenic effect of chemical transmutation in the presence of ionizing radiation. In order to fulfill the requirements of the theoretical calculation, experiments were designed to produce great differences in the amounts of radioactive material taken up by the bacteria. This was achieved by varying the concentration of total phosphorus but maintaining a constant P³² level. A quantitative genetic effect was sought in the ability of the organisms to synthesize certain metabolites, utilize carbohydrates, and resist antibacterial agents. Results indicate that an effect beyond that attributable to ionization was present. The data, however, were complicated by the necessity for post treatment before mutants could be detected. The most effective post treatment was fractional heat killing, which sometimes caused great increases in mutation rate. The significance of this necessity may be related to the "nuclear" organization of bacteria since it was noted that the kinetics of the heat killing did not resemble a first order reaction but indicated the presence of multiple genetic and heat sensitive loci in each organism. Cultures grown in P³² and subsequently reduced with heat to about 1% of the original population had a total of more mutants than a culture before either treatment. (Entire report). NSA 3-504

2723

OBSERVATIONS OF THE BLOOD OF CYCLOTRON WORKERS. M. Ingram and S. W. Barnes. (nd) 3p. (AECU-334). *Phys. Rev.* 75, 1765-6(1949).

Two types of unusual cells in blood of cyclotron personnel are described, early mononuclear cells and lymphocytes with bilobed nuclei. The latter are present in statistically significantly increased numbers. NSA 3-507

2724

THE ATOMIC BOMB'S EFFECTS ON PLANTS AND SOILS Francis M. Journin. *Fertilizer Review* 23, No. 4, 7-11, 14; No. 5, 7-9, 11-3(1948).

Author investigated claims that crop yields after the bombing of Nagasaki and Hiroshima were accelerated. Increased yields are believed to be the result of extensive fertilization, not of irradiation. NSA 3-508

2725

BIOLOGICAL DEEP-DOSE MEASUREMENTS OF ELECTRON RADIATION OF FIVE MILLION VOLTS. R. Glocker, K. Gund, H. Langendorff, and F. Wachsmann. *Strahlentherapie* 78, 321-6(1949). (In German).

Measurement of effects on eggs of *Drosophila*. NSA 3-509

2726

THE BLOOD CHANGES IN ROENTGEN PERSONNEL. J. Bourret. *Deut. med. Wochschr.* 74, 447(1949) Apr. 8. (In German).

Results of six-year semi-annual blood checkup of roentgen personnel described. NSA 3-510

2727

CONCERNING INFORMATION OF A COLD-AGGLUTINATION IN VITRO AFTER ROENTGEN RADIATION OF BLOOD SERUM. Adolf Frank and Waldemar Punin. *Klin. Wochschr.* 27, 121-2(1949) Feb. 15. (In German). NSA 3-511

2728

EFFECT OF URETHANE COMBINED WITH X-RAYS ON CHICK FIBROBLASTS. Edith Paterson and Mary V. Thompson. *Nature* 163, 563(1949) Apr. 9.

Authors conclude that x ray action is incomplete at time of irradiation and is partly reversible and that urethane produces effects similar to those of x rays and partially reverses x ray effects when the two are combined. NSA 3-512.

2729

EFFECT OF X-RAYS ON THE INCORPORATION OF C¹⁴ INTO DESOXYRIBONUCLEIC ACID. G. Hevesy. *Nature* 163, 869-870(1949) June 4. NSA 3-513.

2730

FURTHER STUDIES ON SENSITIVITY OF CHROMOSOMES TO IRRADIATION AT DIFFERENT MEIOTIC STAGES IN OOCYTES OF *SCIARA*. Martha L. Bozeman and Charles W. Metz. *Genetics* 34, 285-314(1949) May.

Chromosome sensitivity to 1,100 r x ray dose is almost zero for a long period preceding breakdown of nuclear membrane at the beginning of the first meiotic division. It then reaches a peak in anaphase, decreasing in late anaphase when mitotic activity is arrested, pending fertilization. Different types of chromosome rearrangements differ greatly in frequency. Author believes that data suggest the intervention of a cytoplasmic agent that reaches the chromosomes after nuclear membrane has broken down. Other possible interpretations are also discussed. NSA 3-514

2731

Naval Radiological Defense Lab.

HISTOCHEMICAL STUDIES ON THE EFFECT OF TOTAL BODY X-IRRADIATION ON THE ALKALINE PHOSPHATASE, RIBO- AND DESOXYRIBONUCLEIC ACID CONTENT OF RAT LIVER CELLS. N. L. Petrakis, F. M. Ashler, and R. L. Ferkel. June 2, 1949. 18p. (AD-126(b)). NSA 3-515.

2732

FIBROSIS OF THE LUNG FOLLOWING ROENTGEN IRRADIATION FOR CANCER OF THE BREAST. J. E. Leach, J. H. Farrow, F. W. Foote, and W. W. Wawro. *Am. J. Roentgenol.* 47, 740-7(1942).

Results indicated a marked diminution of the vital capacity caused by the fibrosis itself. Fixity of the chest wall, compensatory pulmonary emphysema and hyperirritable Hering-Breuer reflexes were observed.

2733

ON THE EFFECTIVE CROSS SECTION OF PROTONS AND α -RAYS, AS COMPARED WITH THE RADIATION-SENSITIVE VOLUME, IN ELEMENTARY RADIO-BIOLOGICAL REACTIONS. Kurt Sommermyer. Z. Naturforsch. 3b, 57-9(1948) Jan.-Feb. (In German). NSA 3-517

2734

Naval Radiological Defense Lab.
PERFORMANCE STUDIES ON ANIMALS EXPOSED TO EXTERNAL RADIATION. I. SOME EFFECTS OF SUBLETHAL TOTAL BODY IRRADIATION UPON THE PERFORMANCE OF EXHAUSTIVE SWIMMING TESTS. D. J. Kimeidorf, D. C. Jones, T. A. Gonzalez, J. L. Lee, and M. C. Fishler. Apr. 29, 1949. 21p. (AD-117(B)).

Ability of rats to perform tests was greatly decreased by 600 r total-body x ray exposure NSA 3-518

2735

PHARMACOLOGICAL REACTIONS OF SERA AND DRUGS IRRADIATED WITH ROENTGEN RAYS OF VARYING WAVELENGTH. David I. Macht and Marcus Ostro. Am. J. Roentgenol. Radium Therapy 61, 534-42(1949) Apr. NSA 3-519

2736

SOME BIOCHEMICAL EFFECTS OF IONIZING RADIATIONS. Samuel Schwartz. Bull. Univ. Minn. Hos and Minn. Med. Found. 20, 617-654(1949) June 3.

Biochemical changes found after excessive radiation exposure in humans and animals are described. NSA 3-522.

2737

CONCERNING THE USE OF POTASSIUM IODIDE AS A PROTECTIVE MEASURE TO THOSE PERSONS WHO ARE EXPOSED TO RADIOIODINE IN THE ATMOSPHERE. Charles H. Perry. June 3, 1949. 7p. (AECU-306).

Limitations on use of potassium iodide are outlined. NSA 3-535.

2738

ATOMIC DANGER FROM THE RADIATION POINT OF VIEW. Lucien Mallet. J. Radiol. Electrol. 29, 631-4 (1948). (In French).

General information given on lethal and pathological effects of the atomic bomb is presented. NSA 3-537.

2739

BIBLIOGRAPHY ON RADIATION PROTECTION. H. H. Goldsmith. Nucleonics 4, 62-9(1949) June.

References are included under these headings: general biological effects of radiation, blood changes, radiation sickness, atomic bomb effects, tolerance doses and dosage measurements, monitoring, health protection, dust monitoring and hazards, laboratory designs. NSA 3-538

2740

SPECIES OF ALOE (OTHER THAN ALOE VERA) IN THE TREATMENT OF ROENTGEN DERMATITIS. L. J. A. Loewenthal. J. Investigative Dermatol. 12, 295-8(1949) May.

Aloe arborescens and *A. mutabilis* are presented as having a beneficial effect on radiodermatitis comparable to that of *A. vera*. Two cases of radiodermatitis treatment are reported. NSA 3-547

2741

CANCER: RADIATIONS, VIRUS, ENVIRONMENT. (VOL. II). J. Maisin. Casterman, Paris, France. 1949. 306p.

Discussion is presented on effects of cutaneous contact with x rays, inhalation and ingestion of radioactive substances, and related topics. NSA 3-550

2742

ROENTGEN THERAPY FOR HYPERHIDROSIS. J. Borak, J. J. Eller, and W. D. Eller. Arch. Dermatol. and Syphilol. 59, 644-52(1949) June.

Properly applied roentgen therapy seems to be the best method of treating excessive perspiring, use of unfiltered rays is the most important reason for failure of such therapy. NSA 3-580

2743

THE STUDY OF CONNECTIVE TISSUE REACTION TO RADIATION. THE SIEVE OR CHESS METHOD. B. Jolles. Brit. J. Cancer 3, 27-31(1949) Mar.

Results of irradiating tumors through Pb sieve are described. Connective tissue reaction occurs in protected areas (under Pb) as well irradiated areas and there are visible effects on cells not directly irradiated. Detailed description of connective tissue and vascular changes is given. NSA 3-581

2744

TREATMENT OF SECONDARY AMENORRHOEA WITH LOW DOSAGE IRRADIATION OF OVARIES AND PITUITARY GLAND. P. Lyon Playfair and Alan Booth. J. Obstet. Gynaecol. Brit. Empire 56, 260-8(1949) Apr.

Of 21 cases of secondary amenorrhoea treated by small dosage irradiations, 66.6% regained normal periodicity; in 9.5% periodicity was improved, and in 23.9% treatment failed. NSA 3-587

2745

DOSAGE-MORTALITY IN RATS GIVEN TOTAL BODY ROENTGEN IRRADIATION. W. G. Clark and R. P. Uncapher. Proc. Soc. Exptl. Biol. Med. 71, 214-6(1949) June. NSA 3-903.

2746

THE KILLING OF COLON BACILLI BY X-RAYS OF DIFFERENT WAVELENGTHS. R. W. G. Wyckoff. J. Exptl. Med. 52, 769-780(1930).

X-ray beams of wavelengths lying in range between $4\text{\AA}$ and $0.5\text{\AA}$ all kill *B. coli* in semilogarithmically linear fashion.

2747

RELATION OF PREGNANCIES TO INDUCTION OF OVARIAN TUMORS BY X-RAYS. J. Furth. Proc. Soc. Exptl. Biol. Med. 71, 274-7(1949) June.

Results show mice exposed to 50-200 r of x rays can have one or several pregnancies and still be liable to development of ovarian tumors in a stock in which this neoplasm is practically nonexistent. NSA 3-905.

2748

Naval Medical Research Inst.
THE RESPONSE OF THE PERIPHERAL BLOOD OF SWINE TO WHOLE BODY X-RAY RADIATION IN THE LETHAL RANGE. E. P. Cronkite, F. W. Ullrich, D. C. Eltzholtz, C. R. Sipe, and P. H. Schork. Apr. 7, 1949. 12p. (NM-007-039-Report 21). NSA 3-906.

2749

STUDIES OF THE EFFECT OF ROENTGEN RAYS ON HEALING OF WOUNDS. III. HISTOLOGICAL CHANGES IN SKIN WOUNDS IN RATS FOLLOWING POSTOPERATIVE IRRADIATION WITH VERY SMALL AND MODERATE DOSES. E. A. Pohle, G. Ritchie, and W. W. Moir. Radiology 52, 707-13(1949) May.

No consistent difference in healing time between irradiated and non-irradiated portions of wound were detected macroscopically or histologically in white rats. NSA 3-907

2750

THE PROBLEM OF PLANTAR RADIODERMATITIS. A. H. Montgomery, R. M. Montgomery, and D. C. Montgomery. N. Y. State J. Med. 49, 1664-7(1949) July 15.

Treatment of plantar radiodermatitis may be surgical or conservative with view toward healing the area and preventing ulcer formations. Reconstructive surgery is advised for all cases with ulceration in an area of 0.4 cm or more. NSA 3-911.

2751

STUDIES OF THE EFFECT OF THE PROTRACTION OF X-RADIATION BY 12 FRACTIONATIONS ON THE ERYTHEMA REACTIONS. H. Schottelndreyer. Brit. J. Radiology 22, 386-92(1949) July.

Three women patients being treated for gynecological carcinoma or inflammation of the adnexa were observed in fractionation study. NSA 3-914.

2752

EFFECTS OF RADIATION THERAPY ON THE URINARY EXCRETION OF NIACIN AND RIBOFLAVIN IN PATIENTS WITH MALIGNANT DISEASES. RELATIONSHIP TO RADIATION SICKNESS. J. L. Jarvis and D. Cayer. Radiology 52, 574-8(1949) Apr.

Group of 30 patients was studied; good results obtained by use of B vitamin complex in radiation disease therapy. NSA 3-915

2753

STUDIES OF THE EFFECTS OF FLAVONOIDS ON ROENTGEN IRRADIATION DISEASE. I. PROTECTIVE INFLUENCE OF RUTIN IN IRRADIATED DOGS. J. B. Field and P. E. Rekers. Am. J. Med. Sci. 218, 1-15 (1949) July. NSA 3-916

2754

ANTIHISTAMIC OINTMENTS OF SKIN PROTECTION IN RADIATION THERAPY. M. P. Mains. Radiology 52, 579-581(1949) Apr.

Use of aquaphor base with benadryl and pyribenzamine is advocated for treatment of radiodermatitis caused by release of histamine and histamine-like substances. NSA 3-917.

2755

EFFECT OF ROENTGEN THERAPY ON MOUSE ENCEPHALITIS. W. A. Tanner and J. E. McConchie. Radiology 53, 101-3(1949) July.

No significant difference in survival was apparent between treated animals and inoculated controls. NSA 3-919

2756

THE PRESENT STATUS OF THE HEMORRHAGIC ASPECTS OF RADIATION INJURY. E. P. Cronkite, D. P. Jackson, G. V. LeRoy and R. T. Lempie. Proc. Intern. Soc. Hematol. 144, 449-50(1951).

A serious, often fatal, hemorrhagic state is a frequent complication of radiation injury due to large single doses of ionizing radiation. Aside from thrombocytopenia, the pathogenesis of this hemorrhagic state is very obscure.

2757

Atomic Energy Project, Univ. of Calif., Los Angeles. TABULATION OF AVAILABLE DATA RELATIVE TO RADIATION BIOLOGY. Andrew H. Dowdy. Feb. 1, 1949. 48p. (AECU-353).

Data on various subjects relating to radiation effects are given in tabular form for humans, rats, mice, guinea pigs, dogs, fruit flies and grasshoppers. NSA 3-1036.

2758

Atomic Energy Project, Univ. of Calif., Los Angeles. THE RESPONSE OF THE GUINEA PIG TO 200 R ACUTE WHOLE BODY X-IRRADIATION. Thomas J. Haley and D. Harriette Harris. July 1, 1949. 10p. (AECU-357), Science 111, 88-90(1950).

The guinea pig is similar to other animals in its response to x rays and for many purposes is much more suitable for studies than are the mouse and rat. NSA 3-1037

2759

THE ACTION OF RADIATION ON LIVING CELLS. Radiology 52, 428-30(1949) Mar. Editorial.

Effects of various amounts of radiation on normal tissues and tumors through inhibition of mitosis and

destruction of chromosomes are discussed and pertinent literature is cited. NSA 3-1038

2760

BIOLOGICAL REACTIONS CAUSED BY ELECTRIC CURRENTS AND BY X-RAYS. J. Th. Van der Werff. Elsevier Publishing Company, Amsterdam and London. 1948. 203p.

Author proposes that in all living organisms, parts are continuously being destroyed, then regenerated. A beam of radiation is thought to change dissimulation coefficient and thereby the assimilation process. Mathematical basis for theory is included. NSA 3-1039

2761

EFFECTS OF CONTINUOUS RADIATION ON CHICK EMBRYOS AND DEVELOPING CHICKS I. GROWTH, AND BONE II. BONE MARROW, LYMPHOID TISSUE, AND PERIPHERAL BLOOD. Shields Warren and Frank J. Dixon. Radiology 52, 714-29, 869-80(1949) May and June

Author presents an extensive description of effects of P³² irradiation. NSA 3-1040

2762

EFFECT OF RADIATION ON HEMOPOIESIS. IS THERE INDIRECT EFFECT? J. S. Lawrence, W. N. Valentine, and A. H. Dowdy. Blood 3, 593-611(1948).

Twenty six cross-circulation experiments using one normal and one irradiated cat in each pair, were performed in which cross circulation was established at various times after irradiation of the one cat or prior to irradiation in which case one cat was shielded. Detailed blood studies carried out on both partners for a period of 28 days after cross-circulation fail to support the concept of an indirect effect of radiation. NSA 3-1042

2763

THE LETHAL DOSE OF TOTAL-BODY X-RAY IRRADIATION IN SWINE John L. Tullis, Carl F. Tessmer, Eugene P. Cronkite, and F. W. Chambers, Jr. Radiology 52, 396-400(1949) Mar.

LD₅₀₋₃₀ for swine was found to be 275 r. NSA 3-1043.

2764

RELATIONSHIPS BETWEEN CHEMICAL AND BIOLOGICAL EFFECTS OF IONIZING RADIATIONS. Raymond E. Zirkle. Radiology 52, 846-55(1949) June.

Author discusses the nature of connecting events occurring in latent period which intervenes between absorption of energy from ionizing radiation and the biological effects produced by the radiations. NSA 3-1045.

2765

TUMOROUS GROWTHS IN THE PITUITARY AND TRACHEA FOLLOWING RADIOTOXIC DOSAGES OF I¹³¹. Aubrey Gorbman. Proc. Soc. Exptl. Biol. Med. 71, 237-40(1949). June.

Doses of 10, 50, 80, 100, 160, 200, 300, 400, 500 or 1,000 mc of I¹³¹ were given to 158 mice. Changes in pituitary glands and tracheas were observed and are described. NSA 3-1046

2766

Argonne National Lab. PLUTONIUM AND YTTRIUM CONTENT OF THE BLOOD, LIVER, AND SKELETON OF THE RAT AT DIFFERENT TIMES AFTER INTRAVENOUS ADMINISTRATION. Jack Schubert, Marium P. Finkel, Marcia R. White, and Gertrude M. Hersch. May 19, 1949. Decl. July 19, 1949. 16p. J. Biol. Chem. 182, 635-42(1950) NSA 3-1047

2767

Los Alamos Scientific Lab. THE USE OF X-RAYS TO DETERMINE THE MITOTIC AND INTERMITOTIC TIME OF VARIOUS MOUSE TISSUES. Norman P. Knowlton, Jr., and William R. Widner. (nd) 22p. (AECU-366), Cancer Research 10, 59-63(1950).

Mitotic time was found to vary from 20 to 36 min in 7 mouse tissues studied. Mitotic index varies inversely with intermitotic time; the shorter the intermitotic time, the greater the radiosensitivity of the tissues. NSA 3-1051

2768

STRUCTURAL DIFFERENCES IN BONE MATRIX ASSOCIATED WITH METABOLIZED RADIUM. Frank E. Hoecker and Paul G. Roofe. *Radiology* 52, 856-65 (1949) June.

From this study with rats it is concluded that a consideration of tissue dose due to α particle bombardment and resultant tissue reaction in sublethal dose region may offer a basis for a theory of production of bone sarcomas in chronic Ra poisoning. NSA 3-1053

2769

Atomic Energy Project, Univ. of Calif., Los Angeles. THE EFFECT OF SEVERAL ANTIHISTAMINIC DRUGS ON MORTALITY DUE TO X-IRRADIATION. Thomas J. Haley and D. Harriette Harris. July 18, 1949. 23p. (AECU-362), Stanford Med. Bull. 8, 1-7(1950).

Drugs investigated were synergistic with radiation and increased its lethality for guinea pigs. Drugs caused pronounced leukocytosis in normal guinea pigs, also gall bladder rupture and enlargement of common bile duct. NSA 3-1054.

2770

ATOMIC RADIATION EFFECTS; THE RELEASE AND NEUTRALIZATION OF HUMORAL TOXIC AGENTS. R. deRohan Barondes and David I. Levine. *Military Surgeon* 105, 153-60(1949) Aug.

Methods and measures for combatting toxic agents released in body during radiation exposure are described. Immediate effects of strong radiation, low dose effects, radiation resistance and carcinogens are also discussed NSA 3-1055

2771

ENDOCRINE FACTORS IN HYPERTENSION, TREATMENT BY ROENTGEN IRRADIATION OF THE PITUITARY AND ADRENAL REGIONS. James H. Hutton, James T. Case, Ernest C. Olson, Warren W. Furey, Stanley Fahlstrom, William L. Culpepper, and Earl E. Madden. *Radiology* 52, 819-28(1949) June.

Of 85 patients followed, 70.4% showed improvement after three or more x ray treatments and no evidence of x ray damage was noted. NSA 3-1066

2772

THE SEQUENCE OF MORPHOLOGICAL CHANGES PRODUCED IN CELLS BY X-RAYS AND RADON. G. Iasswoine. *Ann. Roentgenol. et Radiol.* 2, 357-65(1927).

Cytoplasm is considered to be the site of primary damage and to be more sensitive than the nucleus.

2773

BIOPHYSICS AND QUANTUM THEORY. H. A. Bomke. *Naturw. Rundschau* 2, 49-57(1949) Feb. (In German). NSA 3-1169.

2774

EFFECT OF ENVIRONMENTAL TEMPERATURE ON THE RESPONSE OF MICE TO WHOLE-BODY ROENTGEN RADIATION. Willie W. Smith, Benjamin J. Highman, J. R. Mitchell, and Henry C. Blount, Jr. *Proc. Soc. Exptl. Biol. Med.* 71, 489-501(1949) July.

Net result of sufficiently cold environment is to lower the resistance of mice to lethal x ray action, preirradiation subjection to cold environment favors survival. NSA 3-1171

2775

Naval Radiological Defense Lab. THE EFFECT OF WHOLE BODY X-IRRADIATION UPON THE TOTAL NITROGEN, TOTAL PROTEIN AND REFRACTIVE INDEX OF RAT PLASMA, INTERIM

REPORT. James D. Hauschildt and Helen Supplee. June 13, 1949. 11p. (AD-131(B)).

Marked decrease was observed during 2-4 day post-irradiation period in plasma refractive index, plasma protein and plasma nitrogen of rats given 650 r. NSA 3-1172.

2776

INHIBITION OF PLANT GROWTH BY IRRADIATION. II. SENSITIVITY AND DEVELOPMENT. Henry Quastler and Marianne Baer. *J. Cellular and Comp. Physiol.* 33, 349-63(1949) July.

Growing bean seedlings were more sensitive to x rays than were dry seeds. Most sensitive type of response was elicited with doses of 1,500-3,500 r for seedlings, equivalent to 29,000-66,000 r delivered to dry seeds. NSA 3-1173.

2777

Department of Agriculture.

1948 FIELD RESULTS WITH CERTAIN RADIOACTIVE MATERIALS AS PLANT STIMULANT. May 1949. 45p. (M-4376).

Alphatron (containing Ac and dolomitic limestone), RaBr in dolomitic limestone and $\text{UO}_2(\text{NO}_3)_2$ used in field tests had no apparent effects, either beneficial or harmful on plant growth. NSA 3-1174

2778

RADIORESISTANT CELLS IN CERTAIN RADIOSENSITIVE TISSUES OF SWINE EXPOSED TO ATOMIC BOMB RADIATION John L. Tufts. *Arch. Path.* 48, 171-7(1949) Aug.

Morphological changes were noted in lymph nodes, bone marrow, intestinal epithelium, gonads, spleen, thymus, tonsils, lymphoid aggregations in bowel wall and lymphocytes in peripheral blood stream of swine after irradiation. Stem cells (reticular cells, primordial ova, etc.) of highly radiosensitive organs were comparatively radioresistant. NSA 3-1175

2779

THE TREATMENT OF DIPHTHERIA CARRIERS WITH SMALL DOSES OF ROENTGEN RAYS. J. Th. Van der Werff. *Nederland. Tijdschr. Geneesk. Haarlem* 3, No. 38, 2900-3(1948). (In Dutch).

Within two weeks after x irradiation with 200 r to both lateral fields of nasopharynx and larynx cultures from 90% of 110 patients were negative for the diphtheria bacillus. Negative culture rate without treatment was usually 30%. NSA 3-1188

2780

Oak Ridge National Lab.

MUTANTS OF *BACILLUS SUBTILIS* THAT REQUIRE THREONINE OR THREONINE PLUS METHIONINE. Howard J. Teas. Aug. 15, 1949. 32p. (AECU-405).

Study of nutrition of 12 *B. subtilis* mutants, as regards amino acid requirements, indicates that homoserine is a precursor of threonine and methionine in *Neurospora*. One mutant reverted to wild type with frequency of 3×10^{-7} after a dose of 90,000 to 100,000 r of x rays. NSA 3-1319

2781

Atomic Energy Project, Univ. of Rochester. SUMMARY OF MOUSE GENETICS WORK. Donald R. Charles. (nd) 2p. (AECU-378).

Occurrence of mutations in sperm of mice x rayed daily, and importance of similar mutations when occurring in humans was investigated. Extent and duration of chromosome damage produced by single x ray doses of 58 to 229 r are described. NSA 3-1326

2782

Los Alamos Scientific Lab.

THE VALUE OF BLOOD COUNTS IN INDIVIDUALS EXPOSED TO IONIZING RADIATION. Norman P. Knowlton, Jr. (nd) 25p. (AECU-397).

Ten men exposed to 0.2 r of γ rays/wk for 117 wks had small significant decrease in white blood cell count, absolute neutrophils and absolute lymphocytes. Routine blood count is considered best clinical test available for detecting radiation injury. NSA 3-1327

2783

EFFECT OF HIGH-VOLTAGE X-RAYS AND CATHODE RAYS ON VITAMINS (RIBOFLAVIN AND CAROTENE). Samuel A. Goldblith and Bernard E. Proctor. *Nucleonics* 5, 50-8(1949) Aug.

Riboflavin is radiosensitive to cathode and x rays, carotene radiosensitive to cathode rays. Destruction of both increased with dilution of solutions, indicating an indirect action of the radiations. NSA3-1339

2784

Columbia Univ.

HISTOLOGICAL EFFECTS ON THE EMBRYO FOLLOWING X-RADIATION. Roberts Rugh. *J. Morphol* 85, 683-95 (1949). (AEC-2596).

Amblystoma punctatum larvae were given 15,000 r x-ray dose and studied histologically. Tissues most radioresistant are cartilage and muscle, most radio-sensitive, central nervous system and related sense organs. NSA 3-3

2785

Atomic Energy Project, Univ. of Rochester.

EXPERIMENTAL RADIATION PATHOLOGY Thomas B. Barnett. (nd) Decl. May 31, 1949. 12p. (AEC-2614).

Brief descriptive review of characteristic alterations observed in certain radiosensitive mammalian organs postirradiation is presented. NSA 3-4

2786

Argonne National Lab.

THE EFFECT OF TOTAL-BODY X RADIATION ON A PRE-EXISTING INDUCED ANEMIA IN RABBITS. III. HISTOPATHOLOGICAL STUDIES. Matthew H. Black, Leon O. Jacobson, Edna K. Marks, and Evelyn Gaston. June 1946. 45p. (AECU-229), NNES Div. IV, Vol. 22B, chap. 12.

Changes in the blood and hematopoietic tissues of rabbits receiving whole body exposure to 800 r of x rays are described in detail. The more immature erythroblasts appeared to have a greater ability to withstand the radiation than did more mature cells of the series, in contradiction to the commonly held belief that more immature and more rapidly dividing cells are more radiosensitive. NSA 3-5.

2787

Oak Ridge National Lab.

THE EFFECT OF TOTAL BODY X-RADIATION ON THE ACTIVITY OF SEVERAL ENZYMIC SYSTEMS OF RAT SPLEEN. C. E. Carter. Apr. 26, 1949. 24p. (AECU-231).

Of the enzymes studied, ribonuclease shows most striking postirradiation alteration, depressions of activity were found 24 hr after 100-r dose. After 500 r exposure, no evidence of recovery was found in spleen ribonuclease activity after 12 days. NSA 3-6

2788

ACTION OF THE SEMI-CARBAZONE OF ADENOCROME ON PETECHIAE CAUSED BY X-RADIATION. A. Herve and J. Lecomte. *Arch. intern. pharmaco. dynamique* 79, 109-12(1949) Apr. 15. (In French).

Cutaneous purpura was greatly reduced but survival time was not significantly increased in mice that received whole body exposure to 400 r of x ray for four consecutive days. NSA 3-7

2789

EFFECTS OF NEUTRON RADIATION ON THE HUMAN

TESTES: A CASE REPORT. John N. Robinson and Earl T. Engle. *J. Urol.* 61, 781-4(1949) Apr.

Following accidental exposure of one man to neutrons, testicular biopsies and semen analysis were performed. Results are presented. Spermatogenesis was absent three weeks after exposure but had begun to return between 12-15 months post-exposure. NSA 3-8

2790

EFFECT OF RADIOACTIVE PHOSPHORUS (P^{32}) IN THE CULTURE MEDIUM ON GROWTH AND VIABILITY OF *PHOMOPSIS CITRI* AND *DIPLODIA NATALENSIS*. Erston V. Miller and Jerome J. Wolken. *Science* 109, 492-3 (1949) May 13.

Activity of these fungi which are pathogenic for plants, was seriously impaired by P^{32} treatment. NSA 3-9

2791

GENETIC RECOMBINATIONS LEADING TO PRODUCTION OF ACTIVE BACTERIOPHAGE FROM ULTRAVIOLET INACTIVATED BACTERIOPHAGE PARTICLES. S. E. Luria and R. Dulbecco. *Genetics* 34, 93-125(1949) Mar.

Experiments determining amount of adsorption by bacteria of bacteriophages activated or inactivated under several conditions are described. Observations relative to genetic mechanisms of phages after x irradiation are included. NSA 3-10

2792

IMPROVEMENT IN STREPTOMYCIN-PRODUCING STRAINS OF *STREPTOMYCES GRISEUS* BY ULTRAVIOLET AND X-RAY ENERGY. George M. Savage. *J. Bact.* 57, 429-41(1949) Apr. NSA 3-11

2793

A NEW THEORY OF MUTATION AND THE ORIGIN OF CANCER. Leonell C. Strong. *Yale J. Biol. and Med.* 21, 293-9(1949) Mar. NSA 3-12

2794

THE PRODUCTION OF CHROMOSOME INTERCHANGES IN *DROSOPHILA VIRILIS*. William K. Baker. *Genetics* 34, 167-92(1949) Mar.

Conclusions are that percentages of *D. virilis* sperm with interchanges postirradiation are not proportional to x ray dose. Relationship varies still further at different temperatures. Restitution of broken chromosome ends is assumed to be random. NSA 3-13

2795

STUDIES ON X-RAY MUTATIONS IN THE WHITE AND FORKED LOCI OF *DROSOPHILA MELANOGASTER*. I. A STATISTICAL ANALYSIS OF MUTATION FREQUENCIES. G. Bonnier and K. G. Luning. *Hereditas* 35, 163-89(1949).

Results of control experiments indicate a nonlinear relationship between mutations and dose. NSA 3-14

2796

Univ. of Rochester, School of Medicine and Dentistry. BIOLOGICAL STUDIES WITH POLONIUM, PLUTONIUM, AND RADIUM. PART I. DISTRIBUTION AND EXCRETION OF POLONIUM Robert M. Fink, Editor NNES Div. VI. Vol. 3, Pt. 1, Chapter 1, 2, 3.

Results of extensive studies on distribution and excretion of polonium, plutonium and radium in rats, rabbits and on five human patients with malignant disease are described in detail in these three chapters. NSA 3-15

2797

RADIOACTIVE MATERIALS AND THEIR MEDICAL USES. S. B. Osborn. *Pharm. J.* 162, 289-91(1949) Apr. 16. NSA 3-67.

2798

ON THE POSSIBLE AMOUNT OF RADIOACTIVE POISONING BY FISSION PRODUCTS OF U^{235} . Hans Thirring. *Acta Phys. Aust.* 2, 379-400(1949) (In German). NSA 3-192.

2799

Argonne National Lab.

THE EFFECT OF X-RAYS ON IMMUNITY. William H. Tahaferro and Lucy Graves Tahaferro. NNS Div. IV, Vol. 22B, Chap. 18.

This is a review article with 158 references. NSA 3-197

2800

Los Alamos Scientific Lab.

THE EFFECT OF LETHAL DOSES OF X-RAYS ON CHILLED AND THYROIDECTOMIZED ANIMALS. Louis H. Hempelmann, Theodore T. Trujillo, and Norman P. Knowlton, Jr. (nd) 15p. (AECU-239).

Survival rate of new born rats was increased by preexposure chilling (2-5°C.). Lowering environmental temperature of adult mice postexposure decreased 30-day survival. Adult rats were not protected against radiation effects by thyroidectomy. NSA 3-196

2801

Oak Ridge National Lab.

RELATION OF GAMMA-RAY DOSAGE RATE TO MITOTIC EFFECT IN THE GRASSHOPPER NEUROBLAST. J. Gordon Carlson, Mary Louise Snyder, and Alexander Hollaender. May 31, 1949. 13p. (AECU-243). J. Cellular Comp. Physiol. 33, 365-72(1949). NSA 3-198

2802

THE APPLICATIONS OF PLANT GROWTH REGULATORS INCLUDING RADIATIONS TO RESEARCH IN PHARMACOGNOSY. H. W. Youngken, Jr. Am. J. Pharm. Education 13, 141-9(1949) Jan. NSA 3-199.

2803

DEGENERATIVE AND REGENERATIVE CHANGES IN THE THYROID GLAND FOLLOWING HIGH DOSAGES OF RADIOACTIVE IODINE. Aubrey Gorbman. Trans. N. Y. Acad. Sci. 2, 201-3(1949) Apr.

Under conditions of the experiment, 200 μ c or more of I^{131} caused complete thyroid destruction in mice. Doses of 100 μ c permit survival of small bits of atypical thyroided tissue, which show no trend toward regeneration even after 400 days. NSA 3-200.

2804

THE EFFECT OF ADRENOCORTICOTROPIC HORMONE AND X-RAY ON THE AMOUNT OF CIRCULATING ANTIBODY. Edward E. Fischel, Marjorie LeMay, and Elvin A. Kabat. J. Immunol. 61, 89-93(1949) Jan.

To determine whether x rays and adrenocorticotrophic hormone are able to cause an anamnestic response in circulating rabbit anti-ovalbumin, rabbits received either 25 mg of 75% potent ACTH subcutaneously or 50 r total body x ray dose. Bleeding times, leukocyte counts and antibody levels were determined after treatment. The serum anti-ovalbumin content was unchanged or diminished in all animals, i.e. no anamnestic response was demonstratable. NSA 3-201

2805

THE EFFECT OF LOCAL ROENTGEN IRRADIATION ON THE BIOLOGICAL BEHAVIOR OF A TRANSPLANTABLE MOUSE CARCINOMA I. INCREASED FREQUENCY OF PULMONARY METASTASIS. Henry S. Kaplan and Edwin D. Murphy. J. Natl. Cancer Inst. 9, 407-13(1949) Apr. - June. NSA 3-202

2806

EFFECTS OF REPEATED LOW DOSES OF NEUTRONS ON THE ESTROUS CYCLE OF THE WHITE RAT. James L. Leitch, Douglas M. Gay, and George A. Neville. Am. J. Roentgenol. Radium Therapy 61, 530-3(1949) Apr.

Daily dose of 3 n were given to 23 rats 6 days/wk until 111 n had been delivered. Slight weight loss and retardation of growth occurred. Main effect was disruption of estrous cycle. NSA 3-203

2807

HISTOLOGICAL AND HISTOCHEMICAL STUDY OF THE

SKIN OF THE GUINEA PIG TREATED WITH X-RAYS.

J. Frederic. Arch. biol. (Liege) 60, 79-101(1949). (In French).

Particular attention was paid to histological changes in x irradiated epidermis and especially to -SH containing substances in the skin and paws of guinea pigs irradiated with 3000, 2000 or 1,500 r. Sequence of changes observed is illustrated. NSA 3-204

2808

PRELIMINARY OBSERVATIONS ON THE BIOLOGICAL EFFECTS OF RADIATION ON THE LIFE CYCLE OF *TRICHINELLA SPIRALIS*. Joseph E. Alicata and George O. Burr. Science 109, 595-6(1949) June 10.

One gram packets of trichinous rat meat were placed between radiocobalt tubes in refrigerator at 4°C. Dose of 2000 r of γ rays was delivered over each 24 hr period. Dose intensity and temperature applied were not lethal to trichinal larvae encysted in meat. Under proper dosage, female worms were rendered sterile and unable to complete life cycle. NSA 3-205

2809

RADIATION EFFECTS ON THE SKIN AND THEIR TREATMENT. Arthur R. Woodburne and Osgood S. Philpott. J. Michigan State Med. Soc. 48, 461-79(1949). Apr. NSA 3-206

2810

THE ROLE OF THE SPLEEN IN RADIATION INJURY. Leon O. Jacobson, E. L. Marks, E. O. Gaston, M. Robson, and R. E. Zirkle. Proc. Soc. Exptl. Biol. and Med. 70, 740-2(1949) Apr.

Authors describe hematological and histopathological changes in mice after a whole body dose of 600 r of x rays or 600 r of x rays to whole body except spleen which is protected by lead box enclosing all but the pedicle. NSA 3-207.

2811

Naval Radiological Defense Lab.

SENSITIVITY OF THE ABDOMEN OF THE RAT TO X-RADIATION. V. P. Bond, M. N. Swift, A. C. Allen, and M. C. Fishler. Apr. 6, 1949. 16p. (ADB-92). Amer. Jour. Physiol. 161(2). 323-30(1950).

Authors present a comparison of mortality, survival time, body weight change and clinical picture of rats x irradiated with abdomen shielded and with abdomen not shielded. NSA 3-208.

2812

SUPPRESSION OF GASTRIC ACIDITY WITH BETA PARTICLES OF P^{32} . Norman Simon. Science 109, 563-4 (1949) June 3.

By means of a special applicator, P^{32} in total doses of 1800-25,000 equivalent roentgens was applied to mucosa of Heidenhain stomach pouches in a total of 5 dogs for period of 2-6 hrs. Various degrees of decreased acidity developed without change in general condition or blood counts. NSA 3-209

2813

THE CLINICAL SYNDROME OF IRRADIATIONS BY THE ATOMIC EXPLOSION. P. E. Genaud. Presse. med. 57, 443-4(1949) May 21. (In French). NSA 3-226.

2814

ON THE "ATOMIC DISEASE". R. Levent. Gaz hopitaux 122, 114-5(1949) Mar. 5. (In French).

Author presents a general survey of data on pathological effects of atomic bomb explosions. NSA 3-227

2815

THE PATHOGENESIS OF IRRADIATION SICKNESS. Shields Warren. Chicago Med. Soc. Bull. 51, 957-9 (1949) May 28.

Radiation sickness syndrome is discussed as it applies to mass radiation by atomic weapons. NSA 3-228.

2816

PATHOGENESIS AND THERAPY OF RADIATION ILLNESS.

E. P. Cronkite. *Med. Ann. Dis. Columbia* 18, 239-42 (1949) May. NSA 3-229.

2817

THE RADIATION SYNDROME. Elizabeth E. Painter and Austin M. Brues. *New Eng. J. Med.* 240, 871-6(1949) June 2. NSA 3-230

2818

HYPERTENSION TREATED BY IRRADIATION OF THE ADRENALS; WITH REPORT OF TWENTY-THREE CASES. Arthur S. Alexander and Richard W. Young. *New Orleans Med. Surg. J.* 101, 536-41(1949) May. NSA 3-243

2819

SOME FACTORS INFLUENCING RESPONSE OF CANCER TO RADIATION. Constance A. P. Wood. *J. Amer. Med. Assoc.* 140, 513-20(1949) June 11.

Author discusses factors involved in treatment of cancer by radiation especially tumor differentiation and tumor biology in general. Therapeutic regimens for several cases of epithelioma of the oral cavity are presented NSA 3-260

2820

Naval Radiological Defense Lab.
LUMINOUS BACTERIA AS A POSSIBLE RADIATION DOSIMETER. J. P. Dyson. Mar. 9, 1949. 23p. (ADH-79).

Bacteria failed to show any response to x irradiation in the range of 0 to 2000 r. NSA 3-444

2821

RETENTION OF RADON BY THE MOUSE. I. EXPERIMENTAL DETERMINATION OF BIODECAY AND ENERGY ABSORBED. Joanne Weikel Holcroft and Egon Lorenz. *Nucleonics* 5, 63-71(1949) Sept.

Results of experimental studies show that elimination rate, at least for the 1st hour, differed according to route of administration used and was generally higher for intravenous than for other methods. Amount of fat present in animal influenced radon retention only after intraperitoneal injections. NSA 4-12

2822

RETENTION OF RADON BY THE MOUSE. II. METHOD OF ESTIMATING BIODECAY FROM EXPERIMENTAL DATA. Jerome Cornfield. *Nucleonics* 5, 68-75(1949) Oct.

Method for estimating radon disintegration from experimental data is described. NSA 4-13

2823

ANDROGENESIS, A DIFFERENTIATOR OF CYTOPLASMIC INJURY INDUCED BY X-RAYS IN HABROBRACON EGGS. Anna R. Whiting. *Biol. Bull.* 97, 210-20(1949) Oct NSA 4-17

2824

BIOLOGICAL EVALUATION OF 20 MILLION VOLT ROENTGEN RAYS. III. RECESSIVE SEX-LINKED LETHALS IN DROSOPHILA MELANOGASTER. Wilbur M. Luce, Henry Quastler, and Lester S. Skaggs. *Am J. Roentgenol. Radium Therapy* 62, 555-8(1949).

Results from conventional x ray therapy machines are compared with those from the betatron. Betatron has mutagenic effectiveness about 70% that of conventional machines. NSA 4-18

2825

CIRCULATING ANTIBODIES AND THE ALARM SYNDROME BROUGHT ON BY X-IRRADIATION. J. Lecomte and P. Fischer. *Compt. rend. soc. biol.* 143, 878-9(1949) June. (In French).

Destruction of lymphocytes which accompanied alarm syndrome caused by x rays (200 r applied to hind legs) was accompanied by simultaneous increase in amount of circulating antibody. NSA 4-20

2826

CYANIDE AND A LETHAL DOSE OF X-RAYS. A. Herve

and Z. M. Bacq. *Compt. rend. soc. biol.* 143, 881-3 (1949) June. (In French).

NaCN injection reduced mortality of mice from 100% to 30% for an x-ray dose of 500-600 r, 230 kv, 0.25 mm Cu filter, focal distance of 50 cm, rate of 30 r/min. NSA 4-21

2827

EARLY REACTIONS FOLLOWING ROENTGEN RAY EPILATIONS. I. Zuger. *Arch. Dermatol. and Syphilol.* 60, 722-5(1949) Nov.

Radiation reactions of 312 children to 300 r x ray dose treatment for ringworm of scalp included: restlessness, nausea, vomiting, headache, loss of appetite and elevated temperature. NSA 4-22

2828

EFFECTS OF BETA RAYS ON CENTRAL NERVOUS TISSUES. Berry Campbell and Rosalind Novick. *Proc. Soc. Exptl. Biol. Med.* 72, 34-8(1949) Oct.

Gross morphological changes evoked in neurons and glial cells of nervous system of cat by high β -ray doses are described. NSA 4-23.

2829

EXPERIMENTAL INVESTIGATIONS CONCERNING ROENTGEN EFFECTS AND CHEMICAL EFFECTS ON PLANT MITOSIS. K. Hohl. Stuttgart, Georg Thieme Verlag 1949. 87p. (In German).

Special effects of some agents in the production of plant anomalies are discussed; effective groups are outlined and described. NSA 4-24

2830

HEMATOLOGIC STUDIES IN HIROSHIMA AND A CONTROL CITY TWO YEARS AFTER THE ATOMIC BOMBING. Fred M. Snell, James V. Neel, and K. Ishibashi. *Arch. Internal Med.* 84, 569-604(1949) Oct.

Erythrocyte count, hemoglobin, hematocrit and lymphocyte count of irradiated subjects were significantly reduced. Eosinophil count and plasma protein values were slightly higher. NSA 4-26

2831

ON THE SENSITIZATION OF TISSUES TO X-RAYS. E. E. Umanski, B. M. Varshavskii, and V. P. Kudokotsev. *Doklady Akad. Nauk. S.S.S.R.* 65, 581-3(1949). (In Russian).

Attempts were made to increase radiosensitivity of organs or tumors using fluorescein, neutral red, and congo red. NSA 4-27

2832

ON "PETEOSTHOR" AND ITS COMPONENTS. I. FIRST REPORT ON THE EFFECT OF THORIUM X ON TUBERCLE BACILLI (TBB) IN VITRO. Ludwig Popp and Hermann Egelhaaf. *Zentr. Bakt. Parasitenk.* 154, 49-56(1949). May 15. (In German) NSA 4-28.

2833

SUPRARENAL CORTEX REACTIONS FOLLOWING THE ADMINISTRATION OF X-RAYS FROM A DISTANCE IN THE RABBIT. E. Nizet, C. Heusghem, and A. Herve. *Compt. rend. soc. biol.* 143, 876-7(1949) June. (In French).

Experimental results show that x rays produce increased loss of lipids from suprarenal cortex; loss occurs much more rapidly than during periods of emotional stress and persists for shorter time. NSA 4-31.

2834

RAPID MODIFICATION OF THE OLIGODENDROGLIA AFTER THE APPLICATION OF X-RAYS TO THE HIND LEGS OF THE RABBIT. M. A. Gerebtzoff and A. Herve. *Compt. rend. soc. biol.* 143, 880-1(1949) June.

NSA 4-30

2835

THE TIME FACTOR IN LETHAL EFFECTS OF TOTAL ROENTGEN IRRADIATION IN TRITON. V. V. Brunst and E. A. Sheremetieva-Brunst. *Am. J. Roentgenol. Radium Therapy* 62, 550-4(1949) Oct.

Lethal effect of total-body irradiation on the adult animals was not dependent on distribution of dosage in time. The triton apparently accumulates even small doses during a long period of protracted or fractionated treatment. NSA 4-32.

2836

X-RADIATION OF EGGS OF RANA PIPIENS AT VARIOUS MATURATION STAGES. Grace Saunders Rollason. Biol. Bull. 97, 169-86(1949) Oct.

Egg fertilized during the second maturation division (20 min. after fertilization) were the most sensitive of three stages tested for radiosensitivity by counting cleaved eggs, gastrulae, neurale, hatched embryos and normal tadpoles after x ray doses ranging from 100-41, 600 r. Types of abnormalities were similar to those resulting from irradiation of sperm. NSA 4-33.

2837

X-RAY TOLERANCE OF LIVING CELLS AS MEASURED BY CYTOPLASMIC STREAMING. Charles J. Bishop, Victor D. McLaughlin, and Donald F. Tapley. Can. J. Research 27, 262-8(1949) Oct.

Stamen hairs and pollen tubes of (1) T. paludosa, diploid species, and (2) T. virginiana, tetraploid species, were used for study. Stamen hairs of both species stopped streaming after 700,000 r; in pollen tubes, streaming was stopped by 250,000 r in (1) and 200,000 r in (2). NSA 4-34

2838

THE ATOMIC BOMB AND HAZARDOUS RADIATION.

Donald H. Hale. Armed Forces Chem. J. 3, No. 5 18-19, 38, 40(1949). NSA 4-35

2839

ATOMIC DEFENSE-A CONSTRUCTIVE APPROACH

Richard D. Wolfe. Military Engr. 41, 417-20(1949) Nov.-Dec. NSA 4-36

2840

HOW MUCH RADIOACTIVE SUBSTANCE IS A MAN PERMITTED TO TAKE WITHOUT HARMFUL RESULTS?

Walter Rave. Naturw. Rundschau 2, 326-8(1949) July. (In German). NSA 4-37

2841

RADIATION BURNS, INCLUDING VOCATIONAL AND ATOMIC EXPOSURES. TREATMENT, AND SURGICAL PREVENTION OF CHRONIC LESIONS. James Barrett Brown, Frank McDowell, and Minot P. Fryer. Ann Surg. 130, 593-607(1949) Oct. NSA 4-38

2842

EFFECT OF ATROPINE ON ACUTE IRRADIATION SICKNESS IN MICE. John C. Larkin. Am. J. Roentgenol. Radium Therapy 62, 547-9(1949) Oct.

Results indicate that ionizing radiations produce multiple injurious reactions. The particular effect which atropine produces does not alter the most important of the radiation reactions since protection afforded by this drug is incomplete. NSA 4-43.

2843

TREATMENT OF RADIATION DISEASE BY A SYNTHETIC ANTIHISTAMINIC DRUG. J. A. Salva and M. Badell. Presse med. 57, 888(1949) Oct. 8.

Several drugs are considered for use in treating radiation disease including benadryl, neoantergan and phenergan. NSA 4-44.

2844

ATOMIC MEDICINE. C. F. Behrens, ed. New York, Thomas Nelson and Sons. 1949. 448p.

Contents include: radiobiology and pathology; hematology of irradiation, radiation illness; detection and measurement of radiations, atomic disaster planning; tracer methods; radioisotopes of medical interest, radiation effects in dentistry, research in atomic medicine. NSA 4-48

2845

CHANGES IN THE COAGULABILITY OF THE BLOOD

AFTER RADIATION THERAPY. THE RESULTS OF STUDIES USING THE MODIFIED WAUGH-RUDDICK TEST FOR INCREASED COAGULABILITY. Seymour B. Silverman. Am. J. Roentgenol. Radium Therapy 62, 541-6(1949) Oct. NSA 4-52.

2846

EFFECT OF SOFT X-RAYS ON VITAMINS (NIACIN, RIBOFLAVIN, AND ASCORBIC ACID). Bernard E. Proctor and Samuel E. Goldblith. Nucleonics 5, 56-62 (1949) Sept.

Vitamins affected indirectly; each was more sensitive in higher dilutions. Pure solutions of niacin riboflavin and ascorbic acid were used in the study. NSA 4-107

2847

Monsanto Chemical Co.

INFLUENCE OF TOTAL SURFACE BETA IRRADIATION ON THE GROSS METABOLIC PATTERN OF RATS.

Elizabeth Anderson. July 30, 1946. Decl. Aug. 23, 1948. 20p. (AECD-2228; MonH-122), National Nuclear Energy Series IV, Vol. 22E, Page 8.

Food intake, weight of feces, water intake and volume of urine, body weight, specific gravity of urine and presence or absence of urine albumen were followed in rats given total surface irradiation of 5,000, 7,500 and 10,000 rep of β rays. NSA 1-1086.

2848

THE EFFECT OF X-RAY ON MORTALITY, WEIGHT, LENGTH, AND COUNTS OF ERYTHROCYTES AND HEMATOPOIETIC CELLS IN FINGERLING CHINOOK SALMON, ONCORHYNCHUS TSCAWYTSCHA WALBAUM. Helshaw Bonham, Lau'en R. Donaldson, Richard F. Foster, Arthur D. Welander, and Allyn H. Seymour. Growth 12, 107-21(1948) June.

Effect of x ray doses of 100 to 5000 r are described. NSA 1-1087.

2849

THE BIOLOGICAL EFFECTS OF RADIATIONS Howard J. Curtis, p. 1-51 of ADVANCES IN BIOLOGICAL AND MEDICAL PHYSICS. VOLUME II. John H. Lawrence and Joseph G. Hamilton, eds, New York, Academic Press, Inc. 1951.

Author discusses the physical properties as well as the measurement of α rays, β rays, x rays, gamma rays, neutrons, and neutrinos. Physiological effects are also discussed. There is a review of the effects of penetrating radiation and β radiation. Reference is made to the different susceptibilities and responses to damage by various cells.

2850

RESUSCITATION OF HEAT-INACTIVATED SEEDS WITH X-RADIATION. Richard S. Caldecott and Luther Smith. J. Heredity 39, 195-8(1948) July.

Einkorn and barley seeds were protected against radiation effects by heat treatment given immediately after exposure. NSA 1-1089.

2851

SOME OBSERVATIONS ON THE NATURE OF RADIATIONS EMITTED BY X-RAY TUBES. Jean Manoukhine. Compt. Rend. 227, 56-8(1948) July 5. (In French).

Spleens of four patients were irradiated with: (1) air-type x ray tube, (2) Securix type, and (3) Standard type. Only in case of (1) was leucocytolysis observed. Irradiation by (2) or (3) depressed splenic activity. Coolidge Standard tube also had depressant action. NSA 1-1090.

2852

DEMONSTRATION OF ALTERED VASCULAR FUNCTION IN THE ROENTGEN IRRADIATED ISOLATED, PERFUSED RABBIT EAR. H. J. Heite and W. Schrader. Strahlentherapie 97, 395-402(1955). (In German).

Three-33 days after irradiation of the rabbit ear in situ with 10,000 r, the isolated ears were tested for

vascular susceptibility to arterenol and for tendency to edema formation. Significance of the observations is discussed and is compared with observations following phlogogenic excitants.

2853

ISOTOPES AND RADIATION HAZARDS. Frank Howarth. *Lancet* 255, 51-3(1948) July 10.

Effect of various isotopes and their radiations on skin, blood and sperm are discussed. Author concludes that in human experimentation, there is no excuse for use of isotopes when ordinary chemical procedures will suffice. NSA 1-1116.

2854

THE ANTIBODY RESPONSE IN CASES OF RADIATION LYMPHOPENIA, AND IN THE RETICULOSES. R. Winston Evans. *J. Pathol. Bacteriol.* 60, 123-30(1948) Jan.

Antibody response was tested in 30 patients with radiation induced lymphopenia and in control group (17) with normal blood lymphocyte levels. *B. paratyphosum* A(H) was used as antigen. Lower level of antibody production were recorded in patients with low lymphocyte counts. NSA 1-1179

2855

INFANTILE BLOOD SYSTEM. *Science News Letter* 54, 146(1948) Sept. 4.

Findings from a study of material collected at Nagasaki and Hiroshima indicate plasma cells like those of lesions in multiple myelomas are formed during postirradiation bone marrow regeneration. Recovery of red blood cell, granulocyte and lymphocyte production is described. NSA 1-1180

2856

UNUSUAL REMISSION AFTER RADIOPHOSPHORUS THERAPY IN A CASE OF "ACUTE PLASMA CELL LEUKEMIA." Edwin D. Bayrd and Byron E. Hall. *Blood* 3, 1019-23(1948) Sept.

The case of patient suffering from acute plasma cell leukemia, considered phase of multiple myeloma is described. Following treatment with penicillin, whole blood and P^{32} the patient recovered; after 1 yr no evidence of disease could be found. NSA 1-1198

2857

Argonne National Lab.

THE HISTOLOGICAL EFFECTS OF X-RAYS ON CHICKENS WITH SPECIAL REFERENCE TO THE PERIPHERAL BLOOD AND HEMOPOIETIC ORGANS. Raymond Murray, Mila Pierce, and Leon O. Jacobson. Mar. 2, 1948. Decl. Sept. 17, 1948. 69p. (AECD-2303, CH-3873).

Chickens 3-11 wk old were exposed to 200 kv x rays, receiving doses of 2-1200 r. Dramatic decrease in cellular blood constituents were seen in 3 and 5-week-old chicks after 600 r and 800 r, respectively. Numerous degenerating cells were seen on dry smears. NSA 1-1237

2858

Argonne National Lab.

EFFECTS OF X-RAYS ON TISSUE METABOLISM. E. S. Guzman Barron. Oct. 29, 1946. Decl. Sept. 17, 1948. 22p. (AECD-2316; CH-3654). National Nuclear Energy Series Div. IV, Vol. 22B, Chapter 16.

Rats were exposed to 900 r to 100 r x ray dose. Respiration of all tissues and oxidation of substrates requiring sulfhydryl enzymes was diminished immediately postirradiation; thymus was the only exception. Oxidation of pyruvate, succinate, d-amino acids and l(+) glutamate was inhibited in tissues. NSA 1-1238

2859

Argonne National Lab.

ACUTE HISTOPATHOLOGICAL EFFECTS OF SINGLE DOSES OF SLOW NEUTRONS ON MICE. R. Snider.

Feb. 5, 1947. Decl. Sept. 15, 1948. 15p. (AECD-2326; CH-3766).

Author reports studies of histopathology of: liver, pancreas, thymus, bone, cartilage, mesenteric lymph node, heart, lung, kidney, bone marrow, adrenal, ovary, fallopian tube, stomach, duodenum, ileum, colon, peripheral nerve, autonomic ganglia and skeletal muscle in CF₁ female mice after 400 n (slow neutrons). NSA 1-1239

2860

Argonne National Lab.

ADDITIVITY OF FAST NEUTRONS AND GAMMA RAYS IN THEIR ACUTE LETHAL ACTION ON MICE. R. E. Zirkle, J. R. Raper, E. F. Riley, and G. E. Stapleton. June 5, 1945. Decl. Sept. 17, 1948. 19p. (AECD-2328, CH-2571). NSA 1-1240

2861

EFFECTS OF RADIATION ON HEMOPOIESIS. John S. Lawrence, Andrew H. Dowdy, and William N. Valentine. *Radiology* 51, 400-13(1948) Sept. NSA 1-1241

2862

THE EFFECTS OF RADIATION ON VACCINIA VIRUS, AND ON BACTERIOPHAGES. M. H. Salaman. *Brit. Radiol.*, Supplement No. 1, 29-34(1947).

Effects of γ -, x-, and α -radiation on vaccinia include: loss of infectivity for rabbits, effect on phages, loss of power to lyse the sensitive bacterium. NSA 1-1242

2863

INFLUENCE OF AGE ON SUSCEPTIBILITY OF MICE TO THE DEVELOPMENT OF LYMPHOID TUMORS AFTER IRRADIATION. Henry S. Kaplan. *J. Nat. Cancer Inst.* 9, 55-6(1948) Aug.

Mice were found to have maximal susceptibility to lymphatic leukemias and lymphosarcomas at 1 month of age following irradiation with 1,000 r, (12 consecutive daily doses at 125 kv, 5 milliamperes, 30 cm, 3 mm added filtration, 42 r/min, 84 r/day). NSA 1-1243

2864

CONTENT OF STEROID HORMONES IN SUPRARENAL BLOOD OF IRRADIATED RABBITS. L. V. Orlova and V. M. Rodionov. (Inst. of Biological and Medical Chemistry Acad. of Medical Sciences U.S.S.R.). *Med. Radiol.* 2, No. 2, 54-9(1957). NSA 11-7059

2865

MODIFICATION OF X-RAY EFFECTS ON BARLEY SEEDS BY PRE- AND POST-TREATMENT WITH HEAT. Luther Smith and R. S. Caldecott. *J. Heredity* 39, 173-6(1948) June.

The frequency of chromosomal bridges, a measure of frequency of induced chromosomal aberrations, in root tips of Himalaya barley was reduced by half when seeds were heat-treated immediately before or after x raying. NSA 1-1245

2866

SOME EFFECTS OF RADIANT ENERGIES ON THE EYE. Cortez F. Enloe, *Sight-Saving Rev.* 18, 77-83(1948).

Retinal changes and hemorrhage that were observed in people subjected to atomic bombing are believed by author to have been directly related to deficiency in blood elements, and not directly related to radiation effects. NSA 1-1247

2867

Atomic Energy Project, Univ. of Rochester.

ORAL CONDITIONS UPON CHRONIC EXPOSURE TO UF₆. Peter P. Dale. Aug. 1945. Decl. Oct. 5, 1948. 5p. (AECD-2329).

Thorough physical, medical and dental examinations of 10 volunteers chronically exposed to UF₆ for 6 mo disclosed normal findings. Data indicated substantial uranium storage in dental root tips and alveolar bone deposited by systemic or hematogenous route. NSA 1-1248

2868

OBSERVATIONS OF BURN SCARS SUSTAINED BY ATOMIC BOMB SURVIVORS. Melvin A. Block and Masao Tsuzuki. *Am. J. Surg.* 75, 417-33(1948) March.

Relatively high incidence of scar keloid and hypertrophic scar formation of severe degree in atom bomb survivors does not seem a specific effect of the explosion. Probably similar results could be expected in burns of same severity from other causes. NSA 1-1249.

2869

VETERINARY ASPECTS OF ATOMIC EXPLOSION. Wayne O. Kester and Everett B. Miller. *J. Am. Vet. Med. Assoc.* 63, 325-9(1948) Oct.

Conditions likely to be found by a veterinarian in area where an atomic bomb had been exploded are presented. NSA 1-1269.

2870

STUDY BY THE NEWER RENAL FUNCTION TESTS OF AN UNUSUAL CASE OF HYPERTENSION FOLLOWING IRRADIATION OF ONE KIDNEY AND THE RELIEF OF THE PATIENT BY NEPHRECTOMY. A. H. Dean and J. C. Abels. *J. Urol.* 52, 497-501(1944).

After partial body irradiation of a 20-yr old female for a tumor of the upper quadrant of the abdomen, a variety of abnormalities began to appear. Tests showed the left kidney to be deficient in all activities. After removal of the sclerosed kidney the blood pressure returned to normal and vascular lability also appeared normal.

2871

THE USE OF ADRENAL CORTICAL HORMONE IN RADIATION SICKNESS. Friedrich Ellinger. *Radiology* 51, 394-9(1948) Sept.

Influence of desoxycorticosterone acetate on effect of x rays (500 r) on spleen, bone marrow and adrenal cortex of mice was studied. NSA 1-1315

2872

REDUCTION OF MORTALITY IN SWINE FROM COMBINED TOTAL BODY RADIATION AND THERMAL BURNS BY STREPTOMYCIN. H. J. A. Baxter, J. A. Drummond, L. G. Stephens Newshan and R. G. Randall. *Ann Surg.* 137, 450(1953).

A flash burn known to cause 20% mortality in swine resulted in 90% mortality when coupled with x ray dose of 400 r. The increased mortality could be prevented by administration of streptomycin (500 mg daily).

2873

THE REACTION OF THE PLEURA AND LUNGS TO ROENTGEN RAYS. A. U. Desjardins. *Am. J. Roentgenol.* 16, 444-8(1926).

Inflammatory reaction of pleura and lungs to irradiation may occur following local exposure to radium or roentgen rays. Symptoms of pleuropneumonitis appear after 2 to 4 weeks. The acute phase subsides in 1 to 3 weeks, but cough and dyspnea may persist. Symptoms may disappear in a short time, but return if the patient receives further roentgen irradiation.

2874

EFFECT OF RADIATION FROM RADIUM IN THE DEVELOPMENT AND GROWTH OF LOWER FUNGI. J. Dauphin. *Compt. rend.* 138, 154-6(1904). (In French).

2875

Oak Ridge National Lab.

THE EFFECT OF LOCAL BETA IRRADIATION FROM AN EXTERNAL SOURCE UPON THE GROWTH OF THE BONES AND SOME OTHER TISSUES OF RATS. M. N. Cupp, H. Kohn, and G. E. Stapleton. July 22, 1948. *Decl.* Aug. 16, 1948. (AECD-2219).

One-day-old rats were subjected to one-half (anterior or posterior) body irradiation by beta rays of P^{32} . Changes were seen only in part directly irradiated (skin dose,

1700-2000 rep to trunk, roughly half this to extremities of irradiated half). Skeletal growth was inhibited in the exposed half as shown by the various measurements of body parts at 200 days of age. No effect was observed in parenchymatous organs. NSA 1-893.

2876

THE DISTRIBUTION OF THE IONS RESULTING FROM THE IRRADIATION OF LIVING CELLS. L. H. Gray. *Brit. J. Radiol.*, Supplement No. 1, 7-15(1947). NSA 1-894

2877

EFFECTS OF RADIATION ON GERM CELLS; DOMINANT LETHALS AND HEREDITARY PARTIAL STERILITY. D. E. Lea. *Brit. J. Radiol.*, Supplement No. 1, 120-41(1947).

Experimental data on induction of dominant lethals by x rays and neutrons in *Drosophila*, *Habrobracon*, mouse, rat, guinea pig, rabbit, and frog, and on induction of viable chromosome structural changes in *Drosophila* and mouse reviewed. NSA 1-895

2878

EFFECTS OF X-RAYS ON THE BLOOD CELLS OF THE CHICK. E. Roberts, L. E. Card, and G. L. Clark. *Biodynamica* 6, 165-76(1948) June.

Decrease in lymphocyte count and decrease in resistance of baby chicks to pullorum disease caused by *Salmonella pullorum* follows x ray exposure of 360 r or 720 r (total dosage over period of 120 to 6 min.). NSA 1-896.

2879

THE EFFECT OF X-RAYS ON THE LYMPHATIC NODULE, WITH REFERENCE TO THE DOSE AND RELATIVE SENSITIVITIES OF DIFFERENT SPECIES. P. P. H. De Bruyn. *Anat. Record* 101, 373-405(1948) July.

Guinea pigs, rabbits, and rats were irradiated (200 kvp x rays, 0.5 mm Cu and 1.0 mm Al). Results suggest intensity of damage to lymph node is related to absolute dosage and is independent (at LD_{50-30}) of species in those species studied. NSA 1-897

2880

THE INDUCTION OF CHROMOSOME STRUCTURAL CHANGES BY RADIATION; DETAILED QUANTITATIVE INTERPRETATION. D. E. Lea. *Brit. J. Radiol.*, Supplement No. 1, 75-83(1947).

Author presents observations and deductions based on his analysis of quantitative data of frequency and types of chromosome aberrations obtained when *Tradescantia* microspores are irradiated at early prophase of 1st haploid mitosis. NSA 1-898

2881

THE IRRADIATION OF VIRUSES. P. Bonet-Maury. *Brit. J. Radiol.*, Supplement No. 1, 21-9(1947).

Action of α and x rays on viruses described. NSA 1-899

2882

THE NATURE OF VIRUSES AND THE IRRADIATION OF PLANT VIRUSES. Roy Markham. *Brit. J. Radiol.*, Supplement No. 1, 16-20(1947).

Size, appearance, behavior and composition of viruses are described. Plant virus of known size was irradiated and used to inoculate leaves. Number of lesions resulting from irradiated and unirradiated virus are compared. NSA 1-900

2883

LETHAL EFFECT OF ABSORBED RADIOISOTOPES ON PLANTS. J. W. T. Spinks, E. Cumming, R. L. B. Irwin, and T. J. Arnason. *Can. J. Research* 26C, 249-62(1948). June.

Approximate lethal dose of P^{32} and Sr^{90} solutions used on wheat, barley and sunflower seeds was found to be 1.4 microcuries. NSA 1-901

2884

OBSERVATIONS ON CROSSING OVER INDUCED BY X-RAYS

IN THE MALES OF DROSOPHILA. D. R. Parker. Genetics 33, 304-10(1948) May. NSA 1-902

2885

SIMULATED HIGH ALTITUDE FOLLOWING WHOLE-BODY RADIATION OF MICE. Willie W. Smith, Robert Dooley, and Edwin C. Thompson. J. Aviation Med. 19, 227-37(1948) Aug.

Mice exposed to single doses of 400 to 500 r were subjected to simulated high altitudes of 20,000 to 25,000 feet while circulating leukocytes, platelets and erythrocytes were undergoing reduction. Course of blood cell count depression and recovery of blood elements were unaltered by altitude. NSA 1-903.

2886

TIME-INTENSITY FACTORS IN X-IRRADIATION. PART II. THE INFLUENCE OF THE DOSAGE RATE. Edith Paterson and M. V. Thompson. Brit. J. Radiol. 21, 414-19(1948) Aug.

From experiments on chick fibroblasts grown in vitro and x rayed with dose levels of 10,000-12,000 r, it was concluded that in comparisons between high dosage-rate irradiation given over short time and low dosage rate given over longer period, the operative factor is over-all time. NSA 1-904

2887

Oak Ridge National Lab.

THE EFFECT OF RUTIN UPON THE RESPONSE OF THE RAT TO TOTAL BODY X IRRADIATION. Henry I. Kohn, P. W. Robinett, and M. N. Cupp. June 7, 1948. Decl. July 22, 1948. 13p. (AEC-2176).

Rutin given prior to 250-kv x ray dose did not affect: LD₅₀ survival following two sublethal exposures, coagulation time, thrombocyte counts, total white cell count, or hemorrhage into lymph nodes and gastro-intestinal tract. NSA 1-905

2888

Atomic Energy Project, Univ. of Rochester.

URANIUM TOLERANCE AND CITRATE EXCRETION. Janet Grunschow and Walter Mann. Apr. 15, 1948. Decl. Aug. 10, 1948. 18p. (AEC-2212, UR-23), National Nuclear Energy Series Div. VI, Vol. 1, Pt. IV, Chapter 23.

In rats and dogs made tolerant by repeated injections of uranium, excretion of urinary citrate was increased. NSA 1-907

2889

Pondville Hospital, Walpole, Mass.

ACUTE NECROSIS AND MALFORMATION OF DEVELOPING MAMMALIAN BRAIN CAUSED BY X-RAY. Samuel P. Hicks. 9p. (AECU-949), Proc. Soc. Exptl. Biol. Med. 75, 485-9(1950).

Irradiation of pregnant rats and mice with 200 or 600 r, total-body x ray exposure, results in acute necrosis of rapidly growing parts of fetal brain, spinal cord and retinas. After 150 r, damage was less and was followed after 2 days by malformations in neuroblast zones. NSA 4-6692.

2890

New York Medical College.

A NEW CONCEPT AND STUDIES OF CAPILLARY HEMORRHAGIC DIATHESIS. Alfred L. Copley. (nd) 9p. (AECU-950).

On basis of observations including radiation-induced hemorrhage in rabbits, mice, rats and hamsters, a new concept of capillary hemorrhagic diathesis was developed and is presented in schematic form. New blood coagulation phase was found. NSA 4-6693

2891

Brookhaven National Lab.

CORN GRASS, A DOMINANT MONOGENIC SPONTANEOUS MUTANT AND ITS POSSIBLE SIGNIFICANCE AS AN

ANCESTRAL TYPE OF CORN. W. R. Singleton. (nd) 1p. (AECU-953); Genetics 35, 691-2(1950).

Attempts to induce reverse somatic mutations in corn grass by x rays, P³², or Co⁶⁰ were unsuccessful. NSA 4-6694

2892

Columbia Univ.

REPORT ON STUDIES OF THE EFFECT OF X-RAY IRRADIATION ON THE RABBIT'S LENS. Ludwig von Sallmann. Apr. 1, 1950. 4p. (NYO-1508). NSA 4-4128

2893

Oak Ridge National Lab.

CHANGES IN CELL AND PLASMA VOLUMES PRODUCED BY TOTAL BODY X-RADIATION. R. H. Storey, L. Wish, and J. Furth. May 16, 1950. 15p. (ORNL-687), Proc. Soc. Exptl. Biol. Med. 74, 242-4(1950).

After 1000 r of x rays, rabbits exhibited large drop in total erythrocyte volume beginning on the 3rd post-exposure day. There was at first a slight concomitant plasma volume drop followed by a rise. Similar changes occurred in mice after 575 r. NSA 4-4129

2894

Oak Ridge National Lab.

STUDIES ON THE MECHANISMS OF THE OXYGEN EFFECT ON THE RADIOSENSITIVITY OF TRADESCANTIA CHROMOSOMES. Norman H. Giles, Jr., and Herbert Parkes Riley. May 24, 1950. 17p. (ORNL-688); Proc. Natl. Acad. Sci. 36, 337-44(1950).

Presence or absence of O₂ during actual x ray exposure rather than during postirradiation period is the important factor in increasing radiosensitivity of *Tradescantia* chromosomes. Increased sensitivity is due to production of more initial breaks, not to effect on reunion of broken ends. NSA 4-4130

2895

ATOMIC ENERGY IN THE SERVICE OF PLANT

AMELIORATING. R. DeVriese. Tuinbouw-Berichten 14, 28-9(1950). (In Dutch).

Mutations produced in tulips by neutrons and x irradiation are described. NSA 4-4131.

2896

THE EFFECT OF IONIZING RADIATIONS ON THE BROAD BEAN ROOT. VII. THE INHIBITION OF MITOSIS BY ALPHA RADIATION. L. H. Gray and John Read. Brit. J. Radiol. 23, 300-3(1950) May.

A dose of 12-137 rad of α particle radiation was delivered over a period of 20-90 min. to broad bean roots in radon solutions. Mitoses were counted in roots fixed 3 hrs. after exposure and compared with number in unexposed roots and roots exposed to neutrons and γ rays. Results suggest that the effect of α rays and neutrons may be due to a single recoil proton or α particle. Relative efficiencies of γ rays, neutrons and α rays were 1:2. 1:0.6 for mitotic inhibition and 1:9:9 for lethal effect. NSA 4-4133

NSA 4-4133

2897

THE INFLUENCE OF ADRENAL CORTICAL HORMONES ON SENSITIVITY OF MICE TO IONIZING RADIATION.

J. B. Graham, R. M. Graham, and A. J. Graffeo. Endocrinology 46, 434-40(1950) May.

Adrenal cortical extract given 10 days prior to irradiation increases survival rate in both sexes, but given immediately before irradiation raises female mortality and does not alter survival rate under any other conditions. NSA 4-4134

2898

THE LETHAL EFFECTS OF FAST ELECTRONS FROM A 6-Mev BETATRON ON *BACTERIUM COLI* COMM. C.

Dieckmann, W. Dittrich, H. Reich, and G. Schubert. Naturwissenschaften 37, 140-1(1950). (In German).

Electrons were 40% more efficient than 180-kev x rays in killing bacteria. NSA 4-4135

2899

ON THE EFFECT OF METHYLTHIOURACIL AND X-RAYS ON THE THYROID GLAND. C. Montag. *Strahlentherapie* 81, 1-38(1950). (In German).

Thyroid glands of rats were irradiated with 1500 r of x rays. Histological changes are described. NSA 4-4136

2900

MEDICINE AT THE CROSSROADS. R. H. Draeger and S. Warren. *U. S. Naval Med. Bull.* 47, 219-25(1947).

Author reports on the study of animals used in Bikini tests. Goats, pigs and rats were chosen to determine effect on personnel, because they react similarly to man. The majority of early deaths were due to air blast. Fur of the animals protected them from flash burns. First animals to die showed atrophy of lymphoid tissue. Varying degrees of leukopenia were observed.

2901

ROENTGEN IRRADIATION OF DESOXYRIBOSENUCLEIC ACID. II. PHYSICOCHEMICAL PROPERTIES OF DESOXYRIBOSENUCLEIC ACID FROM IRRADIATED RATS. G. Limperos and W. A. Mosher. *Am. J. Roentgenol. Radium Therapy* 63, 691-700(1950) May.

Pre-irradiation injection to thiourea did not inhibit splitting off of purine bases from DNA in thymus of rats, but did inhibit depolymerization to some extent. NSA 4-4138

2902

THE ROLE OF THE SPLEEN IN RADIATION INJURY AND RECOVERY. L. O. Jacobson, E. L. Simmons, E. K. Marks, M. J. Robson, W. F. Bethard, and E. O. Gatson. *J. Lab. Clin. Med.* 35, 746-70(1950) May.

Effect of 1025 r on blood and blood-forming tissue of spleen-shielded mice is compared to effect on unprotected animals. The nature of the protective action of the spleen is discussed in light of the extensive data presented. NSA 4-4139

2903

STUDIES OF ELECTROPHORETIC SERUM PROTEIN PATTERNS IN SUBJECTS TREATED WITH PITUITARY-ADRENAL CORTICAL HORMONES, NITROGEN MUSTARD, OR X-RADIATION. Julian Frieden and Abraham White. *Yale J. Biol. and Med.* 22, 395-406(1950) May.

Serum protein levels of carcinoma patients and dogs were unchanged after x irradiation and nitrogen mustard therapy. NSA 4-4140

2904

DAMAGE TO RIBS EXPOSED TO X-RAYS IN THE CASE OF MAMMARY EPITHELIOMA. V. Svab. *Casopis Lekaru Ceskych* 88, 931-5(1949). (In Czech).

Pathological changes observed in ribs of 8 patients irradiated for breast cancer are reported and described. NSA 4-4143

2905

FACIAL HEMIATROPHY, SEQUEL TO THE TREATMENT OF AN EXTENSIVE NEVUS FLAMMEUS (PORT-WINE MARK) WITH X-RAYS AND RADIUM. Tibor Benede. *Military Surgeon* 106, 466-9(1950) June.

Author advises against therapy for nevus flammeus, especially irradiation, and cites case history of facial hemiatrophy in support of his argument. NSA 4-4144.

2906

LESSONS FROM OPERATION CROSSROADS. C. A. Erickson. *Chicago Med. School Quart.* 11, 91-5(1950) Apr.

Author describes effects of air and underwater explosions of atomic bomb at Bikini. NSA 4-4145

2907

MEDICAL ASPECTS OF THE EFFECTS OF ATOMIC

EXPLOSION. J. N. B. Crawford. *Can. Med. Assoc. J.* 62, 529-34(1950) June. NSA 4-4146

2908

THE ROLE OF THE DOCTOR IN ATOMIC DEFENSE. Shields Warren. *Chicago Med. Soc. Bull.* 52, 1051-3 (1950) June 10.

This discussion is the text of speech reviewing general medical problems that would arise in event of atomic detonation in air, on ground or under water. NSA 4-4149

2909

Atomic Energy Project, Univ. of Rochester. PILOT EXPERIMENTS ON INDICATIONS OF RADIATION SICKNESS AND COMPARISON OF LETHAL DOSES OF X-RAYS FOR RATS AND DOGS AT INTENSITIES OF 160 r PER HOUR AND WHEN DELIVERED IN 24 HOURS. George W. Casarett. Apr. 17, 1950. 88p. (UR-113).

Data suggest that decreased intensity of single x ray doses may result in decreased mortality; dose producing severe signs of radiation sickness will produce considerable mortality. NSA 4-4151

2910

APPLICATION OF THE SODIUM SALT OF α -OXYBENZYL-PHOSPHINIC ACID IN LONG IRRADIATION WITH X-RAYS. K. Hohl. *Praxis (Bern)* 38, 568-9(1949). (In German).

Phoselit inhibited toxic side effects of x-irradiation, body wt. restoration in particular being accelerated. Phoselite also increased glycogenesis, acting as H-donor in oxidation reduction process. NSA 4-4152

2911

FAILURE OF FOLIC ACID TO INFLUENCE LETHAL RADIATION ILLNESS IN SWINE. Eugene P. Cronkite, John L. Tullis, Carl Tessmer, and F. W. Ullrich. *Proc. Soc. Exptl. Biol. Med.* 73, 496-7(1950) Mar.

No differences were noted in response of 8 swine, 4 treated with intramuscular injections of folic acid, 4 untreated following 400 r total body irradiation. NSA 4-4153.

2912

LOW DOSAGE PITUITARY-OVARIAN IRRADIATION IN SECONDARY AMENORRHEA AND ASSOCIATED STERILITY. Charles J. Collins. *Southern Med. J.* 43, 527-31(1950) June

Cases of 70 patients treated for functional menstrual irregularities with x rays are reviewed. Supplementary therapy, dangers, and possible harmful effects are discussed. NSA 4-4165.

2913

ON IODINE EXCRETION IN THE ROENTGEN-IRRADIATION ORGANISM. I. Arkussy. *Strahlentherapie* 31, 806-811 (1929). (In German).

Author observed change in iodine excretion in 70 patients with malignant tumors after therapeutic x irradiation. Effect is attributed to direct action of radiation on tumor tissue; degree depending upon degree of tissue decomposition. Iodine excretion is less after radiation of carcinoma than after radiation of lympho-granuloma, ovaphoroma, seminoma, and lymphosarcoma. BA 6-7246.

2914

RADIOACTIVE TRACERS IN ANTISERA. F. D. S. Butement. *J. Chem. Soc. (London) Suppl.* No. 2, 408-10(1949).

It was found possible to introduce I^{131} into the globulin fraction of an antiserum without destroying its specific agglutinating properties, if mean number of iodine atoms/globulin molecule was limited to about 3. NSA 4-4213

2915

COSMIC RADIATION AND ITS BIOLOGICAL EFFECTS. Victor F. Hess and Jakob Eugster. New York, Fordham Univ. Press. 1949. 173p.

Book deals with various aspects of cosmic radiation discovery, distribution, time variations, interactions with matter, biological effects, experiments with bacteria, plants, rabbits, and mice. NSA 4-4307

2916

THE EFFECT OF OXYGEN ON THE FREQUENCY OF X-RAY INDUCED CHROMOSOMAL REARRANGEMENTS IN *TRADESCANTIA* MICROSPORES. Norman H. Giles, Jr., and Herbert Parkes Riley. Proc. Natl. Acad. Sci. U. S. 35, 640-6(1949) Nov.

Frequency of aberrations was strikingly reduced when N₂ replaced air and increased when O₂ replaced air as medium during irradiation. Number of aberrations in O₂ was five times that in N₂. Frequencies were also reduced when exposures were made in atmosphere of helium or argon. NSA 4-385.

2917

PRELIMINARY STUDIES OF THE EFFECTIVENESS OF LOCAL IRRADIATION IN THE INDUCTION OF LYMPHOID TUMORS IN MICE. Henry S. Kaplan. J. Natl. Cancer Inst. 10, 267-70(1949) Oct.

X-irradiation failed to cause a significant increase in the normal occurrence of lymphoid tumors in mice. NSA 4-390

2918

STUDIES ON THE REVIVESCENCE OF THE THYMUS. VII. THYMAL-PANCREATIC RELATIONSHIPS. ACTION OF INSULIN ON THE PROCESS OF REVIVESCENCE OF THE IRRADIATED THYMUS. Luigi Viale and Cesare Ravazzoni. Arch. "E. Maragliano" patol. e clin. 4, 293-304(1949). Mar.-Apr.

In guinea pigs whose thymus glands were irradiated with single dose of 85 r, then treated with insulin for 10 days, starting 10 days postirradiation, revivescence of irradiated thymus was unmodified. NSA 3-2074

2919

CHEMICAL COMPOSITION OF IRRADIATED BONE MARROW. Albert A. Dietz and Bernhard Steinberg. Arch. Biochem. 23, 222-8(1949) Sept.

Dose of 3,000 r unfiltered x rays was delivered in field of 380 cm² over legs on right side of anesthetized rabbits at rate of 160 r/min. rest of body lead-shielded. Irradiated marrow showed an increase in lipid, decrease in H₂O, residue, non-protein sulfur, total lipid and non-protein nitrogen. NSA 3-2978

2920

Naval Medical Research Institute, Bethesda. THE EFFECT OF TOTAL BODY X-RADIATION, ANTISTINE, AND PYRIBENZAMINE ON THE PHAGOCYTIC FUNCTIONS OF THE RETICULO-ENDOTHELIAL SYSTEM IN RABBITS INJECTED INTRAVENOUSLY WITH RADIOACTIVE COLLOIDAL GOLD. Jack Barrow, John L. Tullis, and F. W. Chambers, Jr. July 25, 1949. 31p. (NM-007-039 Report No. 24), Am. J. Physiol. 164, 822-31(1951).

Thorotrast retarded almost completely the uptake of Au¹⁹⁸, while x rays and antihistamine did not retard and histamines did not accelerate phagocytosis. NSA 3-2079

2921

Naval Medical Research Institute, Bethesda. THE EFFECT OF TOTAL BODY X-RADIATION ON 17-KETOSTEROID EXCRETION IN DOGS. G. H. Lawrence, June 14, 1949. 15p. (NM-007-039 Report No. 22).

Significant increase in urinary excretion of 17-ketosteroids was shown by all of 11 dogs after minimal lethal dose of 1000 kv total-body x rays. Increase between 5th to 12th day was followed by fall to normal by 30th to 40th day. NSA 3-2080.

2922

INCREASED METABOLIC RATE IN RATS AFTER X-IRRADIATION. Leonard B. Kirschner, C. Ladd Prosser,

and Henry Quastler. Proc. Soc. Exptl. Biol. Med. 71, 463-7(1949) July. NSA 3-2081

2923

MUTANTS PRODUCED BY X-IRRADIATION OF SPORES OF *CHAETOMIUM GLOBOSUM* AND A COMPARISON WITH THOSE PRODUCED BY ULTRAVIOLET IRRADIATION. J. M. Ford and D. P. Kirwan. J. Gen. Physiol. 32, 647-53(1949) July 20.

Production of mutants from x rays was consistent with five quantum hits. Form of mutant curves indicates that more quantum hits are required than the two quantum hits consistent with ultraviolet experiments. NSA 3-2082

2924

ON THE RELATIONSHIP BETWEEN VITAMINS AND THE THYMUS. I. THE THYMUS AND VITAMIN A. D. Scopinaro and L. Viale. Arch. "E. Maragliano" patol. e clin. 3, 655-60(1948) May-June. (In Italian).

The thymus of 10 guinea pigs were x rayed (85 r). Between 10th and 20th day postirradiation a 5,000 I. U. dose of vitamin A was administered. Revivescence process was observed to be almost the same in treated and untreated groups. NSA 3-2083

2925

ON THE RELATIONSHIPS BETWEEN VITAMINS AND THE THYMUS. II. THE THYMUS AND VITAMIN B₁. D. Scopinaro and L. Viale. Arch. "E. Maragliano" patol. e clin. 3, 661-7(1948) May-June.

Treatment with vitamin B₁ did not seem to modify revivescence process in thymus of guinea pigs x irradiated with 85 r. Some necrotic lesions localized in medullary portion of the gland. NSA 3-2084

2926

NEW EXPERIMENTAL RESEARCHES ON RESTORATION IN RADIOBIOLOGY. Paul Lamarque and Pierre Betoulhiers. Compt. rend. 229, 308-10(1949) July 25. (In French).

Eggs of *Bombyx mori* were irradiated with x and γ rays. Postirradiation recovery of those incubated immediately after exposure and those refrigerated for 24 hr postirradiation was the same. NSA 3-2085

2927

Naval Medical Research Institute, Bethesda. THE SEQUENCE OF CELLULAR RESPONSE TO INJURY IN MICE EXPOSED TO 1100 r TOTAL BODY X-RADIATION. Jack Barrow and John L. Tullis. July 6, 1949. 45p. (NM-007-039 Report No. 23). NSA 3-2086

2928

SOME EFFECTS OF P³² ON THE DEVELOPMENT OF DROSOPHILA. T. J. Arnason, R. L. Irwin, and J. W. T. Spinks. Can. J. Research 27, 186-94(1949) Aug.

P³² dosage of 1.30 rutherford/ml prevented transformation from larval to pupal stage, no adults emerged from solutions containing concentrations of 0.65 rd/ml or higher. Concentration expected to be LD₅₀ up to adult stage: 0.120 rd/ml. NSA 3-2087

2929

TREATMENT OF RADIO-LESIONS CAUSED BY THE ATOMIC EXPLOSION. P. E. Genaud. Semaine Hopitaux Paris 25, 2391-5(1949) July 30.

Secondary radiation effects on some tissues and organs are described and therapy is outlined. NSA 3-2088

2930

ISOTOPES IN BIOLOGY AND MEDICINE. USES AND RADIATION HAZARDS. E. E. Painter. Am. Practitioner 4, 34-7(1949) Sept. NSA 3-2092

2931

BETA RAY BURNS OF HUMAN SKIN. Norman P. Knowlton, Jr., Edgar Leifer, John R. Hogness, Louis H. Hempelmann, Loren F. Blaney, Dan C. Gill, William R. Oakes, and Charles L. Shafer. J. Am. Med. Assoc. 141, 239-46 (1949) Sept. 24.

Four cases of β -ray burns of hands are reported and methods of treatment are presented. NSA 3-2097.

2932

Kyoto Imperial University

REPORT OF HEMATOLOGICAL OBSERVATIONS IN THE ATOMIC BOMB SUFFERERS IN NAGASAKI CITY ONE YEAR AND FOUR MONTHS AFTER THE BOMBING.

T. Kikuchi, G. Wakisaka, T. Yoda, H. Yamada, and K. Miki. (nd). 12p. (NP-306).

From results of hematological examinations of 172 atomic bomb sufferers and 45 controls it was concluded atomic bomb sufferers in Nagasaki have returned to normal in majority of cases. NSA 3-2102

2933

Kyoto Imperial University.

HEMATOLOGICAL OBSERVATIONS IN THE ATOM BOMB SUFFERERS IN HIROSHIMA CITY ONE YEAR AFTER THE BOMBING (SECOND REPORT). T. Kikuchi, et al. (nd) 11p. (NP-305).

Hematological observations made on 510 victims of atomic bombing one year later are compared to 173 healthy Japanese as controls. NSA 3-2098.

2934

A NEW DRUG IN THE TREATMENT OF RADIATION SICKNESS. John W. Beeler, Jan H. Tillisch, and Walter C. Popp. Proc. Staff Meetings Mayo Clinic 24, 477-83 (1949) Sept. 14.

Combination of dramamine and pyroxidine is concluded to be a valuable therapeutic aid in control of radiation sickness. NSA 3-2099

2935

[Japan]

OBSERVATIONS ON BOTH THE BLOOD PICTURE AND BONE-MARROW IN ATOMIC BOMB SUFFERERS IN NAGASAKI WITH SPECIAL REFERENCE TO NISHIYAMA DISTRICT. R. Ishigami, T. Kikuchi, M. Fukase, Y. Yamasoba, and T. Sawada. Feb. 1947. 24p. (NP-304).

Blood picture (173 cases) and bone marrow studies (11 cases) in atomic bomb victims within radius of 1 kilometer for bombing center are described. NSA 3-2100

2936

Tokyo Imperial University.

THE RADIOACTIVITY OF THE ATOMIC BOMB FROM THE MEDICAL POINT OF VIEW. Masanori Nakaidzum. (nd) 10p. (NP-302). NSA 3-2101

2937

THE RESPONSE OF TISSUE TO TOTAL BODY IRRADIATION. John L. Tullis. Am. J. Path. 25, 829-52(1949) Sept.

Radiation effects on swine are described. Author emphasizes that the most primitive hematopoietic stem cells, the reticular cells, are relatively radioresistant and efforts to reduce radiation mortality should not be considered hopeless. NSA 3-1829

2938

STUDIES ON THE MECHANISMS OF ACTION OF IONIZING RADIATIONS. V. THE EFFECT OF HYDROGEN PEROXIDE AND OF X-RAY IRRADIATED SEA WATER ON THE RESPIRATION OF SEA URCHIN SPERM AND EGGS. E. S. Guzman-Barron, Veronica Flood, and Betty Gasvoda. Biol. Bull. 97, 51-5(1949) Aug.

The results of experiments on the sea urchin sperm respiration rate after the addition of hydrogen peroxide to the medium and after x-irradiation of the medium are presented. The hydrogen peroxide to the medium and after x-irradiation of the medium are presented. The hydrogen peroxide was used at concentrations of 0.01-0.0001 M in a 1:200 sperm solution; x-ray dosages of 50,000-200,000 r were given. Total inhibition by hydrogen peroxide occurred at 0.001 M concentration; the inhibition decreased with peroxide concentration and approached zero at 0.0005 M. When sea water was irradiated with 200,000 r, at 60%

sperm inhibition occurred; 50,000 r produced a 10% inhibition, while the addition of catalase, previous to the sperm addition and after irradiation, had no effect on the inhibition. Since the sea water irradiated with 200,000 r gave no positive test for hydrogen peroxide it is postulated that inhibition is not due to the action of H_2O_2 but to stable organic peroxides. NSA 3-1830.

2939

STUDY OF THE REVIVESCENCE OF THE THYMUS.

V. THYMAL-ADRENAL RELATIONSHIPS. THE ACTION OF ADRENALINE ON THE REVIVESCENCE OF THE IRRADIATED THYMUS. Luigi Viale and Cesare Ravazzoni. Arch. "E. Maragliano" Patol. e clin. 3, 1171-80(1948). (In Italian).

From studies on guinea pigs it was concluded that the revivescence process for thymus (postirradiation with 85r) is remarkably enhanced by administration of adrenalin. NSA 3-1831

2940

STUDY OF THE REVIVESCENCE OF THE THYMUS.

VI. THYMUS-THYROIDAL RELATIONSHIPS. THE ACTION OF THYROXIN ON THE PROCESS OF THE REVIVESCENCE IN THE IRRADIATED THYMUS. Luigi Viale and Cesare Ravazzoni. Arch. "E. Maragliano" Patol. e clin. 3, 1181-94(1948) Sept. Oct. (In Italian) NSA 3-1832

2941

Tokyo Imperial University.

CLINIC OF THE ATOMIC BOMB RADIATION SICKNESS. Kanshi Sassa. (nd) 30p. (NP-303).

Clinical observations made on over 10,000 patients suffering from radiation sickness as result of atomic explosions at Hiroshima and Nagasaki are summarized. NSA 3-1838

2942

PATHOLOGY OF ATOMIC BOMB CASUALTIES. Averil A. Liebow, Shields Warren, and Elbert DeCoursey. Am. J. Path. 25, 853-1028(1949). Sept.

Effects of atomic explosions at Nagasaki and Hiroshima are described in detail. Pathological changes due to mechanical, thermal, and ionizing radiation energies are described in extensive detail and illustrated with many photographs. NSA 3-1839

2943

RADIODERMATITIS AND NECROSIS. Thomas D. Cronin and Raymond O. Brauer. Surgery 26, 665-72(1949) Oct.

Pathology and treatment of radiation necrosis and dermatitis are described. NSA 3-1840

2944

Army Medical Department.

WHAT YOU SHOULD KNOW ABOUT THE ATOMIC BOMB.

A MESSAGE FROM THE SURGEON GENERAL. R. W. Bliss. (nd) 50p.

Pamphlet contains information from a series of lectures comprising a course in atomic medicine. Topics include: nuclear physics, biological effects of nuclear radiation, various aspects of atomic explosion, public health aspects. NSA 3-1841

2945

Argonne National Lab.

OBSERVATIONS ON LUNG PATHOLOGY FOLLOWING THE INHALATION OF RADIOACTIVE CERIUM. Hermann Lisco and M. P. Finkel. (nd) 1p. (AECU-510; UAC-46).

Ce^{144} was administered to rats as aerosol (CeO_2) in doses ranging from 3.2-200 μ c/animal. Results of histological examination of lungs are described. NSA 3-1794

2946

Brookhaven National Lab.

INCREASED SEED GERMINATION FOLLOWING X-RAY TREATMENT OF POTATO TUBERS. A. H. Sparrow and E. Christensen. July 12, 1949. 3p (AECU-484).

Plants from seeds of Katahdin potatoe tubers exposed to 150 and 350 r, 160 kvp x rays, showed much higher percentage germination and much faster germination than plants of seeds from untreated tubers. NSA 3-1811

2947

Argonne National Lab.

INFLUENCE OF A CONDITIONING INJECTION OF ESTROGEN ON THE HEMATOLOGIC AND ORGAN WEIGHT RESPONSE TO X-IRRADIATION. Harvey M. Patt, Marguerite N. Swift, Robert L. Straube, Ella B. Tyree, and Douglas E. Smith. (nd) 1p. (AECU-487, UAC-38); Federation Proc. 8, 124(1949)

Estradiol benzoate (0.166 mg I. M. injection 5-15 days preexposure) greatly enhances radioresistance of mice. Progesterone and testosterone are ineffectual. Effect of estradiol on organ wts., blood counts and microscopic anatomy were studied. NSA 3-1812

2948

Argonne National Lab.

ANALYTIC STUDY OF EFFECTS OF VARIOUS PATTERNS OF X-IRRADIATION ON SURVIVAL. George A. Sacher, John Sackis, and Austin M. Brues. (nd) 1p. (AECU-488; UAC-39). Federation Proc. 8, 136(1949).

Sixteen hundred mice were treated with 250 kv total-body x rays according to various dosage patterns effects on mortality are described and interpreted mathematically. Results indicate lines along which a calculus of radiation mortality may be developed for arbitrary time patterns of exposure. NSA 3-1813

2949

Argonne National Lab.

ANALYSIS OF LYMPHOMA INDUCTION BY X-RAYS IN MICE. George A. Sacher and Austin M. Brues. (nd) 1p. (AECU-493, UAC-62).

Female mice were treated with total-body x rays using single and daily fractionated dosages between 400 and 1200 r total dose. Incidence of lymphoma was determined and studied as a function of the time and treatment. NSA 3-1814

2950

Argonne National Lab.

AGE AND LYMPHOMA INCIDENCE IN CF-1 MICE. Austin M. Brues, Miriam P. Finkel, Hermann Lisco, and George A. Sacher. (nd) 1p. (AECU-494, UAC-63).

In two large groups of female mice maintained throughout life as controls for radiation experiments, susceptibility to lymphoma and lymphatic leukemia was approximately doubled at intervals of 75 days. NSA 3-1815

2951

Argonne National Lab.

FURTHER STUDIES ON THE CLOTTING DISTURBANCE IN THE DOG EXPOSED TO 450 r X-RADIATION. J. Garrott Allen, Katherine Lathrop, and Margaret M. Sanderson. (nd) 12p. (AECU-496, UAC-56)

Data are presented suggesting the possible heparinoid nature of the anticoagulant found in blood after irradiation. NSA 3-1816.

2952

Argonne National Lab.

SHRINKING AND SWELLING AFTER ALPHA IRRADIATION OF VARIOUS PARTS OF LARGE ERYTHROCYTES. Ralph Buchsbaum and Raymond E. Zirkle. (nd) 8p. (AECU-501, UAC-114) Proc. Soc. Exptl. Biol. Med. 72, 27-9(1949).

Erythrocytes from *Amphiuma* and man were irradiated in vitro with polonium α particles. Cells shrank, swelled and hemolyzed. Local irradiation of a part of a cell resulted in shrinkage only in exposed portion. NSA 3-1817

2953

Argonne National Lab.

PERIPHERAL VASCULAR REACTIONS IN THE WING OF THE BAT AFTER TOTAL-BODY X-IRRADIATION.

Douglas E. Smith, George Svihla, and Harvey M. Patt. (nd) 1p. (AECU-506, UAC-40).

Microscopic observations and cinema microphotographs were made of vascular beds in wing of living intact bat (*Myotis lucifugus*) before and after total-body x-irradiation of up to 60,000 r. Doses of 10,000-60,000 r caused leukocytes to adhere to blood vessel walls and caused aggregation of rbc into clumps and stagnation of blood. NSA 3-1818

2954

Argonne National Lab.

OXYGEN CONSUMPTION AND WATER BALANCE IN THE X-IRRADIATED FROG. Harvey M. Patt, Marguerite N. Swift, and Ella B. Tyree, (nd) 1p. (AECU-507, UAC-41), Federation Proc. 8, 124(1949).

Frogs irradiated with 300 r were studied with regard to O_2 consumption postirradiation and H_2O uptake and dehydration after irradiation. NSA 3-1819

2955

Argonne National Lab.

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF BETA RADIATION AS SHOWN BY THE RADIOTOXICITY OF Na^{24} FOR MICE. Robert H. Snyder, and Walter E. Kisielewski. (nd) 10p. (AECU-523, UAC-91); Radiology 54, 743-9(1950).

Ratio of x ray to β ray effectiveness was found to be approximately 1.4. NSA 3-1820

2956

Argonne National Lab.

INFLUENCE OF ESTROGENS ON THE ACUTE X-IRRADIATION SYNDROME. H. M. Patt, R. L. Straube, E. B. Tyree, M. N. Swift, and D. E. Smith. (nd) 27p. (AECU-524, UAC-92), Am. J. Physiol. 159, 269-80 (1949).

Protective influence of pretreatment with estradiol benzoate in male mice is confirmed. Estrogen protective effect was demonstrated in female mice. Bengestrol, but not progesterone and testosterone, was also effective. Additional findings are outlined. NSA 3-1821

2957

Argonne National Lab.

INFLUENCE OF THE LEVEL OF ADRENAL CORTICAL STEROIDS ON SENSITIVITY OF MICE TO X-IRRADIATION. R. L. Straube, H. M. Patt, E. B. Tyree, and D. E. Smith (nd) 9p. (AECU-529, UAC-102).

Survival of x-irradiated mice appears independent, within certain limits, of amount of adrenal cortical steroids present. NSA 3-1823

2958

DEGENERATION OF SPERMATOGONIA OF THE MOUSE FOLLOWING EXPOSURE TO X RAYS, AND STAGES IN THE MITOTIC CYCLE AT WHICH CELL DEATH OCCURS. Eugene F. Oakberg. J. Morphol. 97, 39-54(1955). NSA 10-2583

2959

Argonne National Lab.

THE EFFECT OF SPLEEN PROTECTION ON MORTALITY FOLLOWING X-IRRADIATION. Leon O. Jacobson, Edna K. Marks, Melba Robson, and Raymond E. Zirkle. (nd) 5p. (AECU-535; UAC-111); J. Lab. Clin. Med. 34, 1538-43(1949).

Groups of mice were exposed to single dosages of 600, 700, 900, 975, 1050 and 1200 r total-body, 250-kv x rays with or without spleen shielded. Found LD_{50} for spleen-shielded mice is nearly twice that of non-spleen-shielded animals. NSA 3-1825

2960

Argonne National Lab.

THE EFFECT OF X-RADIATION ON THE METABOLIC

PROCESSES OF THE RESTING CELL. Theodore N. Tahmisian. (nd) 24p. (AECU-539, UAC-128), J. Exptl. Zool. 112, 449-64(1949).

X-ray dosages of 10,000 to 200,000 r do not completely inhibit respiration in diapause grasshopper embryo (*M. differentialis*). Respiratory, morphological, and cytological studies showed anabolic enzymes of nuclear materials to be more radiosensitive than catabolic enzymes. NSA 3-1826

2961

THE INFLUENCE OF ENERGY ABSORPTION AND ELECTRON RANGE ON DOSAGE IN IRRADIATED BONE. F. W. Spiers. Brit. J. Radiol. 22, 521-33(1949) Sept.

Author suggests that for 200-250 kv x-radiation, tolerance dose of soft tissue elements in bone may be only one half that of soft tissues in other situations, for medium voltage and superficial x rays relative tolerance may be no more than one-third for short wavelengths (1 Mev). Ionization in living elements in bone approaches that in other soft tissues only with short wavelengths (1 Mev). NSA 3-1827

2962

MECHANISM OF INDUCTION OF OVARIAN TUMORS BY X-RAYS. Louis Lick, Arthur Kirschbaum, and Harry Mixer. Cancer Research 9, 532-6(1949) Sept.

Results of experiments to determine whether x rays induce tumors in mice in presence of normal ovarian function are presented and discussed. NSA 3-1828

2963

Atomic Energy Project, Univ. of Rochester. THE INFLUENCE OF INFECTION ON THE HEMATOLOGICAL EFFECTS AND MORTALITY FOLLOWING MID-LETHAL X-RADIATION. L. R. Bennett, Paul E. Rekers, Marion Kresge, and Joe W. Howland. May 24, 1949. 16p. (AECU-421, UR-76).

Infection appeared to be definitely related to mortality in dogs surviving 1st 2 postirradiation weeks. No direct correlation was found between leucocyte level and bacteremia. NSA 3-1635

2964

Atomic Energy Project, Univ. of Calif., Los Angeles. STUDIES IN THE HYALURONIDASE-HYALURONIC ACID SYSTEM. II. THE REACTION OF X-IRRADIATED HYALURONATE WITH HYALURONIDASE. Robert E. Brooks and Herman Schneiderman. July 14, 1949. 22p. (AECU-425; UCLA-36).

Results suggest any damage resulting from x irradiation of the hyaluronidase-hyaluronic acid system is due more to reduction in viscosity of hyaluronic acid than to x-ray action on enzyme. NSA 3-1636

2965

INCREASED RADIORESISTANCE OF RED BONE MARROW AFTER ANOXIA. Jerome A. Schack and Robert C. MacDuffee. Science 110, 259-60(1949) Sept. 9.

Hyperplasia of red marrow produced by exposure to low oxygen tension increased resistance of erythroid elements of mouse bone marrow to subsequent x ray exposure. NSA 3-1639

2966

THE INDIRECT EFFECT OF X-RAYS ON THE SYNTHESIS OF NUCLEIC ACID IN VIVO. Barbara E. Holmes. Brit. J. Radiology 22, 487-91(1949) Aug.

Synthesis of thymo- and ribo-nucleic acid in Jensen rat sarcoma was studied in irradiated and other tumors in a previously irradiated animal. Dose delivered to the irradiated tumors was 2000 r x rays. P^{32} was used as a tracer in nucleic acid studies. NSA 3-1640

2967

MORPHOLOGICAL AND BIOLOGICAL CHARACTERISTICS OF X-RAY INDUCED TRANSPLANTABLE OVARIAN

TUMORS. Talia Bali and Jacob Furth, Cancer Research 9, 449-72(1949) Aug. NSA 3-1641.

2968

RADIOACTIVE SUBSTANCES ACT, 1948. London, H. M. Stationery Office. 1948. 12p.

Act covers powers of British Minister of Supply in relation to radioactive substances, control of their import and export, sale, supply, control of use of irradiating apparatus for therapeutic purposes, safety regulations involving their use. NSA 3-1642

2969

TREATMENT OF RADIO-NECROSIS BY THE APPLICATION OF ALUMINUM SHEETS. Giulio Tori. Boll. Soc. Ital. Biol. Sper. 25, 74-6(1949) Jan.-Feb.

Application of aluminum sheets or powdered aluminum to necrotic ulcers produced by x irradiation produced results that are considered satisfactory. Further use of aluminum in therapy of radiation ulcers is encouraged. NSA 3-1643

2970

Los Alamos Scientific Lab. THE EFFECT OF VITAMIN B_{12} ON THE LEUKOPENIA INDUCED BY RADIATION. Robert E. Carter, Elizabeth Busch, and Verda Strang. (nd) 14p. (AECU-416, LADC-694); Blood 5, 753-7(1950).

Crystalline vitamin B_{12} , administered in single and multiple intramuscular doses, had no effect on leucopenia induced in rats by 400 r of 250 kv x rays. NSA 3-1644

2971

CYSTEINE PROTECTION AGAINST X IRRADIATION. H. M. Patt, E. B. Tyree, R. L. Straube, and D. E. Smith. Science 110, 213-14(1949) Aug. 26.

Cysteine, but not cystine, administered to rats prior to x irradiation in nearly completely lethal dose range greatly diminishes lethality. Effectiveness of cysteine as a radiation protective agent varied with time of administration relative to time of irradiation, with cysteine dosage and with pH of the cysteine solution injected. NSA 3-1645

2972

Radiation Lab., Univ. of Calif., Berkeley. THE CONTROL OF POLYCYTHEMIA BY MARROW INHIBITION. John H. Lawrence. Aug. 9, 1949. 26p. (AECU-456; UCRL-410).

Author presents a detailed evaluation of P^{32} therapy. Treatment of 121 patients and the therapeutic results are described. NSA 3-1647.

2973

EXPERIMENTAL STUDY OF THE INFLUENCE OF GENERAL IRRADIATION BY X-RAYS ON A TRANSPLANTABLE RAT CHLOROMA. Guerin. Bull. l'assoc. franc. l'etude cancer 36, 71-6(1949). (In French).

Findings indicate x rays act not only on the developing tumor, but also on production of leukemia-like manifestations. NSA 3-1649

2974

BIOLOGICAL EFFECTS OF ROENTGEN RAYS ON VARIOUS WAVE-LENGTHS. V. V. Brunst and E. A. Sheremetieva-Brunst. Am. J. Roentgenol. Radium Therapy 62, 252-6 (1949) Aug.

Doses of 500-10,000 r were administered to tails of 510 tritons (*Triton cristatus*). In series (1) unfiltered, low voltage x rays were used, in series (2), high voltage x rays. Some biological effects of (1) and (2) were the same but there were major differences in structure of regenerated portions due to tissue absorption of (1). NSA 3-1509.

2975

EXPERIMENTAL RADIO-NECROSIS OF THE BRAIN IN RABBITS. Dorothy S. Russell, C. W. Wilson, and

Katharine Tansely. *J. Neurol. Neurosurg. Psychiatry* **12**, 187-95(1949) Aug.

Brain necrosis is produced in the rabbit brain approximately 100 days after a single surface dose of 2850 r of 200 Kv x rays to an area 3 x 4 cm over the cranium, and after a somewhat longer period following a dose of 2440 r. Histology of the brain lesions at various stages in their development is described. Once established, the lesions tended to extend rapidly, involving non-irradiated parts of the brain. Major changes were observed in blood vessels and glia. Neurones were affected only secondarily and meninges and their blood vessels escaped injury. NSA 3-1510

2976

MODIFICATION OF THE FREQUENCY OF CHROMOSOMAL REARRANGEMENTS INDUCED BY X-RAYS IN *DROSOPHILA*. IV. POST-TREATMENT WITH NEAR INFRARED RADIATION. Berwin P. Kaufmann and Katherine Wilson. *Genetics* **34**, 425-36(1949) July. NSA 3-1511

2977

ON A NEW PROCEDURE FOR OBTAINING EXPERIMENTAL INTERSEXUALITY IN THE BIRD EMBRYO. Etienne Wolff and Berthe Salzgeber. *Compt. rend. soc. biol.* **143**, 532-3 (1949) Apr.

Chick embryos x rayed with a dose of (650-1,500 r) delivered either to the total body or to the gonads. Intersexuality of gonads and of male genital tract occurring postirradiation is the same as that produced by injection of feminizing hormones or ovarian grafts. NSA 3-1512

2978

THE PRODUCTION OF DOMINANT LETHALS WITH X-RAYS IN AGED *DROSOPHILA MELANOGASTER* SPERM. Oistern Stromnaes. *Genetics* **34**, 462-74(1949) July.

Sperm of *D. melanogaster* irradiated (2,219 to 2,308 r, 200 kv, 1 π Al, 0.25 Cu, 31-41 cm) after aging 1-23 days. X ray sensitivity increased with age of both sperm and eggs. Age effect noted only in sperm from early-developing males. NSA 3-1513

2979

STUDIES ON THE MECHANISM OF ACTION OF IONIZING RADIATIONS. IV. EFFECT OF X-RAY IRRADIATION ON THE RESPIRATION OF SEA URCHIN SPERM. E. S. Guzman Barron, Betty Gasvoda, and Veronica Flood. *Biol. Bull.* **97**, 44-50(1949) Aug.

Respiration of sperm was studied at various sperm dilutions after x ray doses of 100-20,000 r. NSA 3-1514

2980

CONCERNING HEALTHY OFFSPRING AFTER RADIUM-RADIATION OF THE MALE GONADS. Juraj Korbler. *Radiologia Clin.* **18**, 240-4(1949) July. (In German).

Birth of a healthy child whose father had been apparently sterilized by x ray therapy is reported. Examination of the father indicated regeneration of damaged gonadal tissue. NSA 3-1518

2981

THE CONTROL OF POLYCYTHEMIA BY MARROW INHIBITION. A TEN-YEAR STUDY ON 172 PATIENTS. John H. Lawrence. *J. Am. Med. Assoc.* **141**, 13-18 (1949) Sept. 3.

Results of treatment by sodium radiophosphate, of patients with polycythemia are described. NSA 3-1519

2982

RADIOTHERAPY FOR PARKINSON'S DISEASE. J. P. May and R. Adam, *Semaine Hopitaux Paris* **25**, 2330-3 (1949) July 20. (In French).

Results of treatment of 12 cases of 4 types of Parkinson's disease with radiotherapy are presented. NSA 3-1524

2983

PLANT INJURY FROM P³². G. Dion, C. F. Bedford,

R. J. St. Arnaud, and J. W. T. Spinks. *Nature* **163**, 906-7(1949) June 11.

Two rows of Saskatchewan wheat were treated with inactive fertilizer and one row with P³² fertilizer. Fertilizer was applied to give 12, 24 and 48 lb P₂O₅/acre. Two dilutions of tracer were used, 25 mc or 260 mc/gm of phosphorus. No harmful effects from P³² were apparent. NSA 3-520

2984

Washington Univ., Applied Fisheries Lab. EFFECTS OF X-RAYS UPON THE FRESH-WATER SNAIL, *RADIX JAPONICA*. Kelshaw Bonham. May 16, 1949. 33p. (AECU-309).

Mortalities significantly higher than in controls were observed in groups of snails receiving 10,000 r or more. Egg masses were retarded in development by 1,000 r and 10,000 r. Crawling activity of newly hatched young was inhibited by 10,000 r. NSA 3-505

2985

Brookhaven National Lab.

THE EFFECT OF ADRENALECTOMY UPON SURVIVAL OF RATS AFTER X-RADIATION. Abraham Edelman. (nd). 3p. (AECU-325); *Am. J. Physiol.* **167**, 345-48(1951).

Bilaterally adrenalectomized rats exposed to 650 r, whole body x radiation survived 4.1 days compared to 7.8 days for adrenalectomized controls. NSA 3-506

2986

Argonne National Lab.

EFFECTS OF Sr⁸⁹ AND X-RADIATION ON GOATS. Marguerite N. Swift, C. Ladd Prosser and Edward S. Mika. June 1946. 74p. (AECU-108; CH-3888).

Thirty-day LD₅₀ for intramuscularly injected Sr⁸⁹ lies between 1.0 and 1.5 μ c/g (for goats). LD₅₀₋₃₀ for total-body x rays is about 350 r. Some indication of greater depression of leucocyte count following x rays was observed. NSA 2-1175

2987

Argonne National Lab.

THE EFFECT OF TOTAL-BODY X-IRRADIATION ON THE PERIPHERAL BLOOD AND BLOOD-FORMING TISSUES OF THE RAT. S. Phyllis Stearner, Eric L. Simmons and Leon O. Jacobson. Dec. 1, 1948. 43p. (AECU-112, ANL-4100(Rev.)).

Five days after splenectomy, rats were exposed to doses of 600 r and 100 r of x rays. Changes in blood counts and hematopoietic tissues of these rats are described and compared with changes in similarly irradiated, non-splenectomized rats. NSA 2-1176

2988

EFFECT OF ROENTGEN RAYS UPON BARTONELLA-INFECTED AND NORMAL RATS. Dorothy Neuhof Nauman. *Am. J. Roentgenol. Radium Therapy* **61**, 95-7(1949) Jan.

Rats were given single continuous exposures of 300-1000 r to determine whether *B. muris* infection affects resistance of rats to x rays. Infected rats were slightly less radioresistant than normal rats. NSA 2-1177

2989

EFFECTS OF RADIATION ON NORMAL TISSUES. III. EFFECTS OF RADIATION ON THE BLOOD AND THE HEMOPOIETIC TISSUES INCLUDING THE SPLEEN, THE THYMUS, AND THE LYMPH NODES. S. Warren and C. E. Dunlap. *Arch. Pathol.* **34**, 562-608 (1942).

Routine radiation therapy seldom produces permanent or dangerous modifications in the blood. Sufficient irradiation will cause a decrease in the number of cells in the blood-forming organs. Large doses may lead to hypoplasia.

2990

THE METABOLIC PROPERTIES OF THE FISSION

PRODUCTS AND ACTINIDE ELEMENTS. Joseph G. Hamilton. *Revs. Mod. Phys.* 20, 718-728(1948). NSA 2-1181

2991

Radiation Lab., Univ. of Calif.
OPALESCENCE OF SERUM AFTER TOTAL BODY RADIATION AS A PROGNOSTIC SIGN OF DEATH. Robert L. Rosenthal. *Jan. 14, 1949*. 6p. (AECU-105;UCRL-273), *Science* 110, 43-4(1949).

After 200 kv x rays, marked opalescence was noted in serum and plasma of rabbits which subsequently died. NSA 2-1263

2992

ATOMIC ENERGY DEVELOPMENT, 1947-1948. Washington, Government Printing Office. 1948 213p.

This annual report describes some aspects of U. S. Atomic Energy Commission's program in production of fissionable materials, military application of nuclear power and research activities in physical and biological sciences. NSA 2-1283

2993

USE OF RADIOACTIVE PHOSPHORUS IN PLANT NUTRITIONAL STUDIES. R. Scott Russell and R. P. Martin. *Nature* 163, 71-2(1949) Jan. 8.

Young barley plants were treated with P^{32} in the form of phosphate, varying from 0.5 to 50 mc/liter of culture solution over period of 4-6 days. Results suggest that radiation damage may be a greater hazard in tracer experiments than was formerly supposed. NSA 2-1299

2994

THE BIOLOGIC EFFECT OF IRRADIATION BY RADIOACTIVE IODINE. Bengt N. Skanse. *J. Clin. Endocrinol.* 8, 707-16(1948) Sept.

This study was made to determine minimal amount of I^{131} which may interfere with normal thyroid function and its actual effect on thyroid function. So-called "tracer" doses of I^{131} may alter normal thyroid functions in chicks. Thyroid functions vary in their sensitivity to irradiation from this isotope. NSA 1-1350

2995

THE COLLECTION OF RADIOACTIVE IODINE BY THE HUMAN FETAL THYROID. Earle M. Chapman, G. W. Cornet, David Robinson, and R. D. Evans. *J. Clin. Endocrinol.* 8, 717-20(1948) Sept.

From a study of fetuses of pregnant women given tracer doses of I^{131} it appears that the human fetal thyroid does not take up iodine in 1st 12 wk of life. NSA 1-1351

2996

EFFECT OF RADIATION OF GERM PLASMA. Ira I. Kaplan. *Urol. and Cutaneous Rev.* 52, 608(1948) Oct.

Author reports 2 cases in which sperm-forming function was restored and cites statistics of 402 cases wherein ability to reproduce was unharmed in women treated with radiation. NSA 1-1384

2997

RESPONSE OF KALANCHOE TUBIFLORA TO X-RADIATION. Edna L. Johnson. *Plant Physiol* 23, 544-56 (1948) Oct.

As a result of 2500 r irradiation, a branching which delayed time of blooming occurred in 20% of K. tubiflora plants. NSA 1-1385

2998

THE DEPOSITION OF URANIUM IN BONE. PART I. ANIMAL STUDIES. W. F. Neuman, M. W. Neuman, and B. J. Mulryan. *J. Biol. Chem.* 175, 705-9(1948).

Large portion of injected uranium was found to accumulate in bone (rats and rabbits). Growth activity and bone deposition of uranium as directly related in the rat. More uranium was found in bones of young rats than in those of older animals. Lower concentration of uranium

was found in bone of rabbits than of rats of corresponding age. NSA 1-1386

2999

THE DEPOSITION OF URANIUM IN BONE. PART II. RADIOAUTOGRAPHIC STUDIES. M. W. Neuman and W. F. Neuman. *J. Biol. Chem.* 175, 711-14(1948) Sept.

Rat radioautographs show U^{233} to be deposited only in mineral portions of bone and particularly concentrated on surfaces adjacent to circulation and in areas of calcification. NSA 1-1387

3000

THE DEPOSITION OF URANIUM IN BONE. PART III. THE EFFECT OF DIET. W. F. Neuman, M. W. Neuman, Edna R. Main, and B. J. Mulryan. *J. Biol. Chem.* 175, 715-19(1948) Sept.

Neither alkaline nor acidic diet had an effect on removal of uranium from bone of rats, while rachitogenic diet increased removal. NSA 1-1388

3001

PROTECTION AGAINST RADIATION HAZARDS AND MAXIMUM ALLOWABLE EXPOSURE VALUES. Karl Z. Morgan. *J. Ind. Hyg. Toxicol.* 30, 286-93(1948).

Table gives daily tolerance values (MPE) for γ radiation, α particles, β particles, fast neutrons and thermal neutrons. NSA 1-1412

3002

ATOMIC ARTILLERY. Maurice Elie Nahmias. Paris, Librairie Polytechnique C. Beranger. 1947. 201p. (In French).

Book reviews advances made in such fields as: modern techniques for acceleration of ionized particles; electronic projectiles and x rays, electron microscope, biological action of radiations; radioactivity in biology; nuclear chemistry, astrophysics and cosmic rays, atomic bomb and industrial use of atomic energy. NSA 1-1436

3003

RUTIN TREATMENT OF CAPILLARY FRAGILITY. *Nutrition Revs.* 6, 301-3(1948) Oct.

It is concluded that under certain circumstances rutin has definite antihemorrhagic tendency. Positive results with dogs are cited. NSA 1-1473

3004

HEMATOLOGICAL COMPLICATIONS FOLLOWING THERAPEUTIC TREATMENT WITH RADIOACTIVE PHOSPHORUS. *Semana Med. (Buenos Aires)* 55, No. 2852, 538(1948) Sept. 9. (In Spanish).

P^{32} treatment of 49 patients suffering from various blood disorders is described. NSA 1-1494

3005

THE SIMULTANEOUS DISAPPEARANCE OF TREATED AND UNTREATED TUMORS AFTER IRRADIATION. A. J. Delario. *Am. J. Roentgenol. Radium Therapy* 60, 207-12 (1948) Aug.

Author cites cases from literature of patients with apparently hopeless cases of malignant growths in which cures resulted after seemingly inadequate procedures. Possible experiments for the observations are proposed. NSA 1-1496

3006

Argonne National Lab.
HEMATOLOGICAL STUDIES ON PATIENTS TREATED BY TOTAL BODY EXPOSURE TO X-RAYS; A REPORT OF STUDIES UP TO JUNE 30, 1946. B. V. A. Low-Beer and R. S. Stone. Feb. 1948. Dec. 22, 1948. 89p. (AEC-2348; CH-3863); National Nuclear Energy Series, Div. IV, Vol. 20, Part B, Paper 3.

Changes observed in 29 patients given total-body x-ray exposure include decrease in absolute lymphocytes, decrease in absolute lymphocytes, decrease in nuclear

lobes/100 neutrophils, increase in absolute monocytes, occasional decrease in erythrocyte count and hemoglobin concentration. Radiation was administered in daily doses of 5, 10, 15, 20, 30 or 50 r and total doses were approximately 100 r or 300 r. NSA 1-1528

3007

Oak Ridge National Lab.

INHERITANCE OF MUTATIONAL CHANGES INDUCED BY RADIATION IN PARAMECIUM AURELIA. R. F. Kimball. Oct. 1, 1948, 27p (ORNL-175) Anat. Rec. 99(4), 47(1947).

It is concluded that reduced vigor observed in exautogamous progeny of irradiated paramecia is an expression of micronuclear mutations induced by β and x radiation. NSA 1-1529.

3008

THE EFFECT OF ROENTGEN IRRADIATION ON ANTIBODY FORMATION IN RABBITS. Charles G. Craddock, Jr. and John S. Lawrence. J. Immunol. 60, 241-54(1948) Oct.

Rabbits were exposed to 250 r whole body x irradiation and given (1) pre- or (2) post-irradiation injections of antigen. Antibody production was markedly decreased in (2) but not in (1). NSA 1-1530

3009

THE GASTROSCOPIC PICTURE IN POST-IRRADIATION GASTRITIS. Eddy D. Palmer. Am. J. Roentgenol. Radium Therapy 60, 360-7(1948) Sept

Results of gastroscopic studies of 12 patients developing post-irradiation gastritis after intensive radiation treatment for malignant disease are reported. NSA 1-1531.

3010

WHAT EVERY MEDICAL OFFICER SHOULD KNOW ABOUT THE ATOMIC BOMB. PART VI. PATHOLOGIC ANATOMY OF RADIATION EFFECTS OF ATOMIC EXPLOSION. Bull. U. S. Army Med. Dept. 8, 422-8(1948) June.

Radiation effects of an atomic explosion on skin, pituitary, adrenals, heart, lungs, genitourinary system, gastrointestinal tract, spleen, lymph nodes, bone marrow, and reticuloendothelial system are reviewed. NSA 1-1532

3011

Argonne National Lab.

TOLERANCE CONCENTRATION OF RADIOACTIVE GASES IN AIR. G. Failla. Feb. 15, 1944, Dec. 1, Oct. 28, 1948. 11p. (AECD-2362, CH-1347; A-1897).

Relation of lung cancer to prolonged inhalation of radioactive gas is discussed. NSA 1-1597

3012

WHAT EVERY MEDICAL OFFICER SHOULD KNOW ABOUT THE ATOMIC BOMB. PART VIII. PUBLIC HEALTH ASPECTS OF ATOMIC EXPLOSION. Bull. U. S. Army Med. Dept. 8, 431-3(1948) June.

Precautions to be taken with food and water in radiation-contaminated area are described. NSA 1-1599

3013

RADIATION-INDUCED HEMORRHAGIC DISEASE IN CHICKENS. Frank J. Dixon. Proc. Soc. Exptl. Biol. Med. 68, 505-7(1948) July - Aug.

Results of a study of chickens given a dose of P^{32} which caused 25% mortality within 17 days indicate that the chicken is relatively radioresistant when compared with mammals. Hemorrhagic manifestations of radiation injury were much less severe than those reported for lethally irradiated mammals. Complete blood studies are reported. NSA 1-1696

3014

WHAT EVERY MEDICAL OFFICER SHOULD KNOW ABOUT THE ATOMIC BOMB. PART VII. DETECTION OF

OVEREXPOSURE TO IONIZING RADIATION. Bull. U. S. Army Med. Dept. 8, 428-31(1948) June. NSA 1-1697

3015

Oak Ridge National Lab.

THE INDUCTION OF MUTATIONS IN PARAMECIUM AURELIA BY BETA RADIATION. R. F. Kimball. Oct. 29, 1948 26p. (AECU-7, ORNL-174) Anat. Rec. 99(4), 47(1947).

Beta radiation from an external P^{32} source in doses up to 13,000 rep has no immediate marked effect upon vegetatively multiplying P. aurelia. NSA 1-1760

3016

United Nations Atomic Energy Commission

AN INTERNATIONAL BIBLIOGRAPHY ON ATOMIC ENERGY, SCIENTIFIC ASPECTS, VOLUME II. PARTS III (THE BIOLOGICAL AND MEDICAL EFFECTS OF HIGH ENERGY RADIATION) AND IV. (ISOTOPES IN BIOLOGY AND MEDICINE). (1948).

This bibliography includes references on: effects of high energy radiations on chemical compounds, micro-organisms, cells, genetics, physiology and on isotopes in biology and medicine. NSA 1-1761

3017

THE CYTOGENETIC EFFECT OF SONIC ENERGY APPLIED SIMULTANEOUSLY WITH X-RAYS. Alan D. Conger. Proc. Natl. Acad. Sci. U. S. 34, 470-4(1948) Oct.

Simultaneous treatment with sonic energy and x rays increases the yield of induced chromosomal aberration 1.3 times over that caused by same amount of x rays alone. NSA 1-1762

3018

Atomic Energy Commission

HISTOPATHOLOGY OF IRRADIATION. William Bloom, ed. New York, McGraw-Hill Book Company, Inc. 1948. 808p. (National Nuclear Energy Series, Div. IV, Vol. 22 I)

This summary volume covers numerous experiments relative to histological effects of acute and chronic irradiation on several species. Pertinent chapters are included as separate references in this bibliography. NSA 1-1763

3019

X-IRRADIATION OF THE HYPOPHYSECTOMIZED RAT H. M. Patt, M. N. Swift, E. B. Tyree, and R. L. Straube. Science 108, 475-6(1948) Oct. 29.

Hypophysectomy of rats 1 wk prior to 750 r x ray exposure appeared to potentiate x ray toxicity. Initial, intermediate and terminal adrenal changes resulting from exposure were apparently prevented by the operation. Under these conditions, extent of splenic and thymic involution was unaltered, despite enhanced x ray toxicity. NSA 1-1764

3020

Argonne National Lab.

STUDIES OF THE METABOLISM AND TOXIC ACTION OF INJECTED RADIUM. PART II. THE HEMATOLOGICAL EFFECTS OF PARENTERALLY ADMINISTERED RADIUM, A COMPARISON OF PLUTONIUM AND RADIUM EFFECTS. Leon O. Jacobson and Eric L. Simmons. June 1946. Dec. Nov. 3, 1948. 103p. (AECD-2372, CH-2884), National Nuclear Energy Series, Div. IV, Vol. 22H, Paper 41.

Effects of parenteral administration of radium chloride on hematological constituents of peripheral blood of rats, mice and rabbits were studied NSA 1-1765.

3021

Atomic Energy Commission.

THE PHARMACOLOGY AND TOXICOLOGY OF URANIUM COMPOUNDS. Carl Voegtlin and Harold C. Hodge, eds.

McGraw-Hill Book Company, Inc. 1949. 1084p. (National Nuclear Energy Series, Div. VI. Vol. 1, Parts I and II)

Research on toxicity of uranium compounds and mechanism of uranium poisoning is summarized. Pertinent chapters are included as separate references in this bibliography. NSA 1-1768.

3022

INFLUENCE OF RADIOACTIVE ELEMENTS ON PLANT LIFE. A. A. Drozhkov. Translated by Boris Pregel from *Nauka i Zhizn'* 3, (1947) (NP-331, AEC-tr-816).

Stimulating effect of radium and thorium on plant growth is reported. Most beneficial dosage for plants growing in water and sandy soils is 10^{-9} - 10^{-11} g Ra, 10^{-4} and 10^{-6} g Thorium/liter of nutritive solution/kg of sand. NSA 1-1770

3023

WHAT EVERY MEDICAL OFFICER SHOULD KNOW ABOUT THE ATOMIC BOMB. PART X. PROTECTION AGAINST ATOMIC BOMBS. Bull. U. S. Army Med. Dept. 8, 511-17 (1948) July.

Important effects of atomic bomb against which protection must be developed are listed. NSA 1-1825

3024

Brookhaven National Lab.

COMPARISON OF IONIZING RADIATION EFFECTS ON TWO ACTIVITIES OF XANTHINE OXIDASE. PROGRESS REPORT. Jan. 1 - March 31, 1956. D. J. Fluke, BNL-388.

3025

Atomic Energy Project, Univ. of Rochester.

STUDIES OF THE EFFECTS OF FLAVONOIDS IN ROENTGEN IRRADIATION DISEASE. II. COMPARISON OF THE PROTECTIVE INFLUENCE OF SOME FLAVONOIDS AND VITAMIN C IN DOGS. John B. Field and Paul E. Rekers. Jan. 19, 1949. 18p. (AECU-149, UR-57), J. Clin. Invest. 88, 746-51 (1949).

Of those dogs given a 350-r x ray dose and treated with rutin, 11% died, with hesperidin, 16%, with epimerized d-catechin 10%, with homoeriodictyol, none of 5, with morin, none of 6, compared to 60% mortality of untreated controls. NSA 2-1434

3026

DANGERS OF IRRADIATION OF HYPERTROPHIED LYMPHOID TISSUE OF THE NASOPHARYNX. Milford D. Schulz and Laurence L. Robbins. Trans. Am. Acad. Ophthalmol. Otolaryngol., 243-252 (1949).

Eleven cases are cited to demonstrate dangers involved in irradiation. Degenerative changes may not appear for many years. Multiple doses are more hazardous than single applications. NSA 2-1443

3027

EFFECT OF ROENTGENOTHERAPY ON URINARY 17-KETOSTEROID EXCRETION IN ANKYLOSING SPONDYL-ARTHRITIS. Roland A. Davison, Peter Koets and William C. Kuzell. J. Clin. Endocrinol 9, 79-88 (1949) Jan.

Urinary 17-ketosteroid excretion was found to be increased in spondylarthritis of ankylosing type in both male and female patients. Roentgenotherapy seemed to stimulate excretion and was followed by a relative decrease after therapy was discontinued. NSA 2-1444

3028

ATOMIC ENERGY IN MEDICINE. John Z. Bowers. Diplomat 21, 39-46 (1949) Feb.

Activities of the division of biology and medicine of the Atomic Energy Commission are summarized. A detailed account of effects of atomic explosion on human beings is presented. NSA 2-1452

3029

THE TREATMENT OF RADIATION SICKNESS WITH

ADRENAL CORTICAL HORMONE (DESOXYCORTICOSTERONE ACETATE). A PRELIMINARY REPORT ON FIFTY CASES. Friedrich Ellinger, Bernard Roswit, and Samuel M. Glasser. Am. J. Roentgenol. Radium Therapy 61, 387-96 (1949) Mar.

Only 3 of 50 patients given DCA for radiation sickness failed to respond to the therapy. In 37 cases complete relief from nausea and/or vomiting was obtained. NSA 2-2019.

3030

Atomic Energy Project, Univ. of Rochester.

THE DEPOSITION OF URANIUM IN BONE. PART IV. IN VITRO ADSORPTION STUDIES. W. F. Neuman, M. W. Neuman, E. R. Main, and B. J. Mulryan. Mar. 10, 1948. Decl. Aug. 11, 1948. 15p. (AECU-2215; M-2) J. Biol. Chem. 179, 325-33 (1949). National Nuclear Energy Series, Div. VI, Vol. 1, Pt. IV, Chapter 24.

Bone ash and fresh bone were equilibrated with uranium in bicarbonate buffer under various conditions, especially those considered to simulate conditions existing in an animal during uranium poisoning, and transfer of uranium from solution to bone phase was studied. NSA 1-908

3031

PROBLEMS OF MEDICAL CARE IN THE ATOMIC AGE. Harold C. Lueth. Illinois Med. J. 94, 93-9 (1948) Aug.

Author feels invention of atomic bomb portends social change and is a threat to physical well-being as was invention of gunpowder. Medical profession's problem of developing plans for medical care in an atomic age are discussed. NSA 1-944

3032

EFFECT OF HIGH-VOLTAGE X-RAYS AND CATHODE RAYS ON VITAMINS (NIACIN). Bernard E. Proctor and Samuel A. Goldblith. Nucleonics 3, No. 2, 32-43 (1948) Aug.

X rays in total dosages of 125,000 to 850,000 r did not destroy niacin in concentrations of 100 micrograms/ml, but cathode rays destroyed as much as 49% within short period of 15 sec. at 10 microamperes. NSA 1-1036

3033

THE EFFECT OF URETHANE ON THE NUCLEAR MORPHOLOGY OF CELLS OF THE GRANULOCYTE SERIES AS OBSERVED IN MARROW CULTURES AND LEUKEMIC BLOOD. Edwin E. Osgood and I. T. Chu. Blood 3, 911-17 (1948).

Authors conclude that either P³² or total body x irradiations in small regularly spaced doses is far superior to urethane in treatment of leukemias. NSA 1-1038

3034

ADVANCES IN BIOLOGICAL AND MEDICAL PHYSICS, VOL. 1. John H. Lawrence and J. G. Hamilton. New York, Academic Press. 1948. 484p.

Topics discussed include: heavy and radioactive isotopes in medicine; nitrogen and carbon isotopes, artificial radioactivity, health physics; study of iron and hemoglobin metabolism, P³² applications, iron metabolism; atomic bomb effects on Japanese; nucleic acid metabolism. NSA 1-1051.

3035

ON THE FERMENTATION PROPERTIES OF *EUTORULOPSIS DUBIA* CIF. AND RED. SUBMITTED TO X-RAY ACTION. R. M. Cioffi and C. Walter. Boll. soc. ital. biol. sper. 25, 529 (1949). (In Italian).

A form of *E. dubia* differing in pigmentation from the normal was tested to find if modification was due to altered metabolism. Tests demonstrated identical action on glycocoll of both normal and irradiated forms. NSA 4-2863

3036

BIOLOGICAL AND PHOTO-CHEMICAL EFFECTS OF HIGH ENERGY, ELECTROSTATICALLY PRODUCED ROENTGEN RAYS AND CATHODE RAYS. Cecil G. Dunn, William L. Campbell, Harvey Fram, and Ardelia Hutchins. *J. Appl. Phys.* 19, 605-16(1948) July.

Authors report on: lethal action of high voltage x rays on pure cultures of microorganisms and on those found in spices, apple juice, milk, soil, water and catgut structures. Preliminary data on cathode rays are included. NSA 1-733

3037

COSMIC RADIATION AND CANCER MORTALITY. P. A. Morris and W. J. Nickerson. *Experientia* 4, 251-5(1948) July 15.

Authors attempt to correlate fluctuations in intensity of cosmic radiation with cancer incidence or mortality. Radiation at various locations of geomagnetic latitude and geographic latitude are plotted against cancer mortalities per 10^5 of population. NSA 1-734

3038

EFFECT OF DEUTERON IRRADIATION OF THE SKIN. G. Schubert, W. Riezler, and V. Dubrausky. *Strahlentherapie* 76, 417-24(1947).

Results of study using guinea pigs indicate that accidental skin damage from deuterons has good tendency to heal. Possible therapeutic implications of the observations with report to treatment of certain skin diseases are discussed. NSA 1-735.

3039

EFFECT OF LOW DOSAGE ROENTGEN RADIATION ON THE GONADOTROPIC FUNCTION OF THE HYPOPHYSIS OF THE MATURE AND IMMATURE FEMALE ALBINO RAT. John H. Freed, Edmond J. Farris, Douglas P. Murphy, and Eugene P. Pendergrass. *J. Clin. Endocrinol.* 8, 461-81(1948) June.

Low dosage radiation produced only a transient effect on normal pituitary function and had no apparent harmful effect on either mature or immature rats. NSA 1-736.

3040

THE EFFECT OF THE SMALLEST X-RAY DOSES. R. Pape. *Wien. klin. Wochschr.* 60, 40(1948). NSA 1-737.

3041

THE EFFECT OF WAVE-LENGTH UPON RADIO-LESIONS PRODUCED IN THE MOUSE. A. Lacassagne. *Atomes et radiations* 1, 91-8(1947). *Proc. Roy. Soc. Med.* 39, 605-12(1946).

Localized irradiation over the dorso-lumbar region in mice was carried out with 2 wave lengths of x rays (K radiation of Mo and L radiation of Ag) and with U-V. Only Mo K rays produced deep skin lesions, 3000 r causing epilation without ulceration although there was complete sterilization of the ovary and destruction of kidney tubules. NSA 1-738

3042

THE EFFECTS OF X-RAYS ON THE LYMPHATIC ORGANS OF NORMAL AND ADRENALECTOMIZED RATS. L. Halberstaedter and M. Ickowicz. *Radiol Clin.* 16, 240-57(1947).

A series of normal and adrenalectomized rats were irradiated with an X-ray dose of 2000 r. Histologic reactions are reported concerning the pycnotic reaction in thymus, spleen, and mesenteric lymph node within a few hours following the irradiation. It was found that: (a) The greater the volume dose, the stronger the pycnotic reaction. (b) Following irradiation of one part of the body, an indirect influence is demonstrable in the non-irradiated part of the body. (c) Adrenalectomy diminishes the X-ray effect, especially the indirect effect. (d) Thymus, spleen, and mesenteric lymph node do not react to X ray with equal pycnotic intensity, especially if the effect is an indirect one. NSA 1-739.

3043

EXPERIMENTS ON THE MECHANISM OF THE BIOLOGICAL ACTION OF FAST NEUTRONS USING THE SUMMATION METHOD FOR LETHAL EFFECTS IN MICE (WITH A SECTION ON DOSIMETRY OF FAST NEUTRONS). J. S. Mitchell. *Brit. J. Radiol.* 20, 368-80(1947).

Normal and adrenalectomized rats received a single localized x ray dose of 2000r. Histological studies within a few hours after exposure showed pyknosis of cells in spleen, thymus, and mesenteric lymph nodes. The reaction was greater with greater volume-doses and occurred in shielded as well as exposed lymphatic tissue. Adrenalectomy decreased the indirect effects. The 3 types of lymphatic tissue differ in the intensity of their reaction, thymus being the most sensitive. NSA 1-740.

3044

THE HISTAMINE HYPOTHESIS OF BIOLOGICAL RADIATION EFFECTS. F. Ellinger. *Schweiz. med. Wochschr.* 81, 61-5(1951) (In German).

The author evaluates experimental and clinical evidence demonstrating the distribution of pharmacologically active substances that are formed locally or released from irradiated cells. The importance of histamine, acetylcholine and adenosine compounds as mediators of radiation effects is discussed. Histamine is considered to be the most likely chemical mediator of both local and systemic effects of radiation.

3045

INTRACELLULAR GROWTH OF BACTERIOPHAGE STUDIED BY ROENTGEN IRRADIATION. Raymond Latarjet. *J. Gen. Physiol.* 31, 529-44(1948) July 20. NSA 1-742

3046

IRRADIATION OF BIOLOGICAL MATERIALS BY HIGH ENERGY ROENTGEN RAYS AND CATHODE RAYS. J. C. Trump and R. J. Van de Graaff. *J. Appl. Phys.* 19, 599-604(1948) July.

High energy cathode rays and x rays offer a new and effective means of producing biological, bactericidal and chemical changes on a practical scale. NSA 1-743

3047

LESIONS OF THE URINARY TRACT FOLLOWING RADIOTHERAPY FOR CARCINOMA OF THE CERVIX UTERI. T. J. D. Lane. *Brit. J. Urol.* 20, 67-71(1948) June.

Complications following radiation treatment of carcinoma of cervix mimic the natural progress of disease itself. Literature review includes two case histories. NSA 1-744

3048

PHOTOCHEMICAL PROCESSES AT THE CELL BORDERS AS PRIMARY PROCESSES IN IRRADIATION. E. Heintz Graul. *Klin. Wochschr.* 24/25, 789-91(1947). NSA 1-745

3049

PHYSIOLOGICAL EFFECTS OF THE ATOMIC BOMB. *Atomes* 3, 244(1948) July. (In French).

Radiation effects on survivors of Nagasaki and Hiroshima bombings are discussed briefly. NSA 1-746

3050

CLINICAL, PATHOLOGICAL, AND HEMATOLOGICAL EFFECTS OF CHRONIC NEUTRON RADIATION. J. O. Ely, M. H. Ross, Roger G. Metcalf, Frank A. Inda, Thomas B. Barnett, and George W. Casarett. p. 419-497 of BIOLOGICAL EFFECTS OF EXTERNAL RADIATION (NRES VI-2). Henry A. Blair, ed. New York, McGraw Hill Book Co., Inc. 1954.

Animals were given neutron radiation of 0.012, 0.06, 0.11, and 17 n/day 6 days a week, for a year. Results: no clinical effects, except with 1.7 n/day. Pathological effects included: hypoplasia of the spleen, atrophic changes in the gonads, hemorrhage; high

incidence of spontaneous infectious diseases and a high incidence of neoplasmas. Changes in peripheral blood were limited to depression of lymphocyte counts and late depression of erythrocyte counts.

3051

RADIATION REACTION IN THE LUNGS OF THE HUMAN. R. B. Englestad. *Acta Radiol.* **18**, 32-44(1937).

The author discusses 36 cases of pulmonary lesions in man, 21 cases of breast cancer, 10 cases of cancer of the esophagus and 4 cases of pulmonary metastasis. The radiation reaction frequency was 5.4% in breast cancer, and 20.4% in cancer of the esophagus.

3052

THE FORMATION OF MALIGNANT TUMORS IN MICE BY DEUTERON-BOMBARDED METHYLCHOLANTHRENE. B. F. Barnes, F. C. Freytag, W. M. Garrison, and I. Rosenfeld. *Science* **108**, 82(1948) July 23.

C-57 mice were injected subcutaneously with various amounts of regular or irradiated methylcholanthrene. Results show significant increase in size of tumor produced by the irradiated material. NSA 1-751.

3053

Argonne National Lab.

CLINICAL PHYSIOLOGY OF DOGS INJECTED WITH PLUTONIUM. E. Painter, et al. June 1946. Decl. June 3, (AECD-2042; CH-3858). NSA 1-42.

3054

Calif. Univ., Radiation Lab.

STUDIES WITH COLLOIDS CONTAINING RADIOISOTOPES OF YTTRIUM, ZIRCONIUM, COLUMBIUM, AND LANTHANUM, PART II. THE CONTROLLED SELECTIVE LOCALIZATION OF RADIOISOTOPES OF YTTRIUM, ZIRCONIUM, AND COLUMBIUM IN THE BONE MARROW, LIVER, AND SPLEEN. E. L. Dobson, et al. Apr. 21, 1948. Decl. June 16, 1948. 16p. (AECD-2044, UCRL-92) *Jour. Lab. and Clin. Med.* **34**(3), 305-12(1949).

Studies with several colloids containing radioisotopes of zirconium, columbium, and yttrium have shown that the biological distribution of such materials depends upon the nature of the colloidal particles. Colloids of zirconium of relatively large particle size show rapid disappearance from the blood stream (half-life = 30 seconds to 1 minute), and are deposited primarily in the liver and spleen. Colloids of intermediate particle size, both of zirconium and yttrium, disappear much more slowly from the blood stream (half-life = 30 minutes to 80 minutes) and are deposited primarily in the bone marrow and spleen, the liver acquiring only 1/3 the specific activity of marrow. Both types of colloids once deposited show no significant change in distribution pattern, at least over 2 to 4 week period, and only slow excretion from the body. NSA 1-43.

3055

THE DISTRIBUTION AND EXCRETION OF INJECTED URANIUM. W. F. Neuman, R. W. Fleming, Alexander L. Dounce, A. B. Carlson, J. O'Leary, and B. Mulryan. *J. Biol. Chem.* **173**, 737-48(1948) Apr.

Distribution and excretion of injected uranium was studied in rats, rabbits, cats. NSA 1-46

3056

DETERMINATION OF THE THORON CONTENT OF AIR AND ITS BEARING ON LUNG CANCER HAZARDS IN INDUSTRY. R. D. Evans and L. Goodman. A. M. A. *Arch. Ind. Health* **22**, 89-99(1940).

Consideration of all available quantitative evidence suggests that long continued breathing of air containing 10^{-9} curies per liter results in high incidence of lung cancer. A recommendation of 10^{-11} curies as M. P. C. for safe working conditions is made.

3057

US AEC PROGRESS. *Sci. American* **178**, 24(1948) June.

New developments in the program of medical and economic applications of atomic energy are reviewed, including the use of radioactive cobalt. NSA 1-205

3058

INVESTIGATIONS ON THE EXPERIMENTAL INDUCTION OF MUTATIONS IN ANTIRRHINUM MAJUS. II. (SEED AND SEEDLING TREATMENT WITH ROENTGEN RAYS AND CHEMICALS. Hans Stubbe. *Z. Induk. Abstamm. u. Vererbh.* **56**, 202-32(1930). (In German).

Seeds and seedlings of two races of Antirrhinum majus were exposed to x rays and organic chemicals. Mutations appeared in F_1 without plan or clear relation to dose. Within each race the same general mutant forms appeared, no matter what the treatment. BA 6-9159

3059

EFFECT OF X-RAYS ON GROWTH OF H. ORIENTALIS. G. Scaglia and O. Businco. *Arch. fisol.* **29**(1): 48-87 (1930).

Upon irradiation with increasing dosages of x rays, 1 or more examples of each group showed greater development than controls. Some dosages delayed development of other members of same group. Possibility of hypersensitivity of plant protoplasm to x rays is considered. BA 6-9349

3060

ON THE EFFECT OF COMBINED X- AND ULTRAVIOLET RADIATION (EXPERIMENT ON THE CORNEA OF SALAMANDER LARVAE). Karl Steiner. *Strahlentherapie* **39**(3), 500-6(1931).

Reactions to x rays and ultraviolet occurred concomitantly, never having a cumulative effect (sensitization), but only one of summation. BA 6-9414

3061

HEPATOSPLENOGRAPHY. ROENTGENOLOGIC DEMONSTRATION OF PARENCHYMA OF THE SPLEEN AND LIVER BY A NEW INTRAVENOUS COLLOIDAL CONTRAST MEDIUM (THOROTRAST). Silvije Kadrnka. *Fortschr. Gebiete Rontgenstrahlen* **44**(1), 9-15(1931).

Thorotrast (25% thorium dioxide with 22% thorium metal diluted with glucose) was injected intravenously in increasing doses of 0.10 or 0.05 g thorotrast/kg followed by x-ray examination 24 hrs later. Appearance of organs and effects of contrast media are described. BA 6-9432

3062

THE EFFECT OF X- AND ULTRAVIOLET RAYS ON THE BLOOD SEDIMENTATION RATE. J. Leitner. *Fortschr. Gebiete Rontgenstrahlen* **41**(4), 743-7(1930).

In 43 experiments *in vitro* no clear effect on sedimentation rate or regularity in marked disturbances of blood corpuscles was noted following ultraviolet or x irradiation. BA 6-9501

3063

LUTEINIZATION AND MASCULINIZATION. E. Steinach and H. Kun. *Pflugers Arch. ges. Physiol.* **227**(3), 266-78 (1931).

X irradiation of female guinea pigs produced complete luteinization of ovaries and development of masculine attitude. Author believes ovaries develop a hormone acting specifically by masculinization, located in lutein tissue. BA 6-9854

3064

IRRADIATION OF THE OVARIES OF GUINEA-PIGS AND ITS EFFECTS ON THE OESTROUS CYCLE. Ida T. Gether. *Am. J. Anat.* **48**(1), 99-137(1931).

Long exposures with filtered x rays and short exposures with unfiltered x rays caused degeneration of follicles and their egg cells, usually without ovulation and formation of typical corpus luteum. Oestrous cycles continued but were irregular in length. BA 6-9977

3065

UNIVERSAL ATTRACTION AND VITAL ENERGY. A STUDY IN THEORETICAL ASTROBIOLOGY. E. Budai. Rev. pathol. comparee et hyg. gen. 30, 398-9, 712-23 (1930). (In French).

Relation of biological phenomena to astronomical influences is discussed. BA 6-12070

3066

THE SECRET OF LIFE COSMIC RAYS AND VITAL RADIATION. Georges Lakhovsky. Paris, Gauthier-Villars et Cie. 1929. 261p. (In French).

The author discusses his views on the relation of radiant energy to vital phenomena. BA 6-12078

3067

THE INFLUENCE OF QUANTITY AND QUALITY OF RADIATION ON THE BIOLOGIC EFFECT. T. C. Evans. p. 393-413 of Symposium on Radiobiology. Chapter 20 J. J. Nickson, ed. New York, John Wiley and Sons. 1953.

3068

POSSIBLE TECHNIQUES IN DIRECT-ELECTRON-BEAM TUMOR THERAPY. W. H. Bostick. Physical Review 77, 564-5(1960). NSA 4-1882

3069

RELATION BETWEEN THE X-RAY DOSAGE AND THE FREQUENCY OF PRIMARY NON-DISJUNCTIONS OF X-CHOMOSOMES IN DROSOPHILA VIRILIS M. Demerec and J. G. Farrow. Proc. Natl. Acad. Sci. U.S. 16(11) 711-14(1930).

At low dosages the increase in percentage of primary non-disjunctions is almost proportional to dosage. Between 1200 and 200 r increase is smaller and fertility of treated flies declines. Results suggest that flies showing non-disjunctions are killed in larger proportion than are regular offspring. BA 6-12536

3070

THE EFFECT OF X-RAYED MALES UPON MUTATION FREQUENCY IN DROSOPHILA. B. B. Harris. J. Heredity 20(6) 299-302(1929).

No correlation was found between production of mutations in spermatozoa and their viability or duration of functional capacity after x irradiation. Both gene and chromosome mutations are more readily produced (by x rays) in mature spermatozoa than in immature cells. BA 6-12541

3071

X-RAYS AND SOMATIC MUTATIONS. J. T. Patterson. J. Heredity 20(6), 260-67(1929).

Production of chromosome breaks is one of the main biological effects of irradiation. Somatic modifications like those caused by gene mutations are also produced by breaks in chromosomes of heterozygous individuals. BA 6-12554

3072

THE PRODUCTION OF GYNANDROMORPHS IN DROSOPHILA MELANOGASTER BY X-RAYS. J. T. Patterson. J. Exptl Zool. 60(2), 173-203(1931).

Effect of x raying germ cells on the production of mosaics, including sex mosaics or gynandromorphs was studied. By treating germ cells of one parent, frequency of gynandromorphs was increased 3x over that in untreated controls. Effects of irradiating the sperm are compared with effects of irradiating ova. Author concludes that if there is a gene for sex it must lie at some point on the x chromosome between the loci for singed and forked or their normal allelomorphs. BA 6-12555

3073

EFFECT OF ROENTGEN RAYS ON THE ORIGIN OF GENOVARIATIONS IN DROSOPHILA FUNEBRIS. E. A. Timofeeva-Resovskaja. Zhur. Eksptl'. Biol. 6(1), 9-14 (1930).

Males of D. funebris inbred for 30 generations were x rayed (about T4 Muller's dose) and crossed with normal females. In general irradiation very significantly stimulated gene mutations. The apparently low incidence of detectable lethals is attributed to difficulty in detecting them (absence of markers). BA 6-12569.

3074

REVERSE SOMATIC GENOVARIATIONS OF A DEFINITE GENE IN OPPOSITE DIRECTIONS UNDER THE INFLUENCE OF ROENTGEN RAYS. N. V. Timofeev-Resovskii. Zhur. Eksptl. Biol. 5(1), 25-31(1929).

Eggs and pupae of white and sc w^e ec and also F₁ pupae of the cross w/WQ x sc w of D. melanogaster were x irradiated in this study. Reverse somatic mutations in progeny are described. Mortality of x irradiated eggs and pupae was extremely high. BA 6-12570

3075

REVERSE GENOVARIATIONS AND VARIABILITY OF THE GENE IN OPPOSITE DIRECTIONS. N. V. Timofeev-Resovskii. Zhur. Eksptl'. Biol. 6(1), 3-8(1930). (German summary).

Both sex-linked and autosomal reverse mutations were obtained by x raying, showing that recessive mutations are not due simply to absence of formerly present genes and that effect of x rays is not destructive (shown by Muller). BA 6-12571

3076

IS THERE AN "AFTER-EFFECT" OF X-RAYS ON GENOVARIATION? N. V. Timofeev-Resovskii. Zhur. Eksptl. Biol. 6(2), 79-83(1930).

Studies on D. melanogaster showed no evidence for an after-effect of x-rays on mutation frequency. BA 6-12572

3077

X-RAYS AND PARASITIC WASPS. P. W. Whiting. J. Heredity 20(6), 268-76(1929).

X ray treatment of adult Habrobracon juglandis had little if any effect on duration of life or general vitality. Effects on fertility are described. BA 6-12573

3078

EFFECT OF RADIUM ON SEED GERMINATION. G. Mezzadrol and E. Vareton. Atti. accad. nazl. Lincei Rend. Classe. sci. fis. mat. e Nat. 12(1/2), 73-80(1930).

Dry seeds of various grains and legumes were exposed to RaBr₂ and germinated. Short duration of irradiation stimulated, longer irradiation injured the seeds. BA 6-12867

3079

EFFECT OF ACTIVATED FLUORESCENIN ON GROWING BEANS. Sylvia B. Wigoder. Brit. Med. J. 2(3641), 643 (1930).

Experiments on Vicia faba indicate that the intensifying effect of "activated" fluorescein on x rays is negligible. BA 6-12870

3080

EFFECT OF IRRADIATION ON MITOSIS IN MALIGNANT TUMORS. Nora Andreis. Arch. ital. anat. e istol. patol. (Milan) 2(2), 369-92(1931). (In Italian).

Histologic examination in 56 cases of malignant tumors treated with x rays and Ra indicates that irradiation retards karyokinetic process without restoring it to normal type and probably has more effect on number than on type of mitoses. BA 6-12896

3081

ON THE QUESTION OF INTENSITY DISTRIBUTION OF ROENTGEN RAYS IN THE BODY IN DEEP ROENTGEN RAY THERAPY. I. CRITICAL REVIEW AND PRINCIPLES. M. Dorneich. Strahlentherapie 38(4), 591-622(1930). (In German).

Intensity distribution of x rays within phantom and its measurement is discussed. BA 6-12898

3082

THE STIMULATIVE EFFECT OF RONTGEN RAYS UPON THE GLANDS OF INTERNAL SECRETION. A REVIEW OF THE LITERATURE. Murray B. Gordon. *Endocrinology* 14(6), 411-37(1930). BA 6-12899

3083

RADON EFFECT ON INTERMEDIATE DISTRIBUTION OF PHOSPHOROUS. (AS OBSERVED IN THE BLOODSTREAM OF THE DOG.) Nina Kotschneff and Anna Arapoff. *Strahlentherapie* 36(2), 360-7(1930). (In German).

Introduction of 10-30 millicuries of radon into bloodstream, stomach, intestine and gall bladder of dog during fasting or digestion reduced inorganic P in all vascular regions. BA 6-12900.

3084

ACTION OF X-RAYS ON THE CENTRAL NERVOUS SYSTEM B. N. Mogil' nitskii, and L. D. Polkiashuk *Izvest. Akad. Nauk S.S.S.R. Otdel. Fiz-Mat. Nauk* 1930(9), 883-96 (1930).

Fifty rabbits and two dogs were irradiated over the head with a large single x ray dose or several smaller doses and morphological changes in the brain were observed. Major effects were (1) altered reaction of mesenchymal elements to injected trypan blue or saccharated Fe, (2) endothelial proliferation and (3) fat accumulation. The hemato-encephalic barrier appears to be formed by blood vessels and capillaries and by mesoglia. BA 6-12903

3085

THE BIOLOGICAL EFFECTS OF SHORT RADIATIONS Charles Packard. *Quart. Rev. Biol.* 6(3), 253-80(1931).

Literature on the biological effect of x rays and radium is reviewed. Bibliography contains 125 references. BA 6-12904

3086

X-RAY EPILATION AND ERYTHEMA-DOSE FOR DOG SKIN. Alois Pommer and Walter Mahling. *Arch. wiss. u. prakt. Tierheilk.* 64(1), 35-60(1931).

First effect of x irradiation on hairless skin appeared after a dosage of 180 r (120kv, 4 m A, 1 mm. A1, 50 cm). Loosening of hair growing on shaved skin was observed following 300 r and on normal (hairy) skin following 600 r. Epilation dosages are given. BA 6-12905.

3087

THE EFFECT OF X-RAYS ON THE POTENTIAL DIFFERENCE ACROSS FROG'S SKIN. M. M. D. Williams. *Protoplasma* 9(1), 1-8(1930).

Small x ray doses increase the potential difference of frog skin in proportion to dose. Larger or lethal dose first increase then decrease the potential until death ensues BA 6-12906.

3088

THE RETICULOENDOTHELIAL SYSTEM AND HOMO-TRANSPLANTATION. B. E. Bruda, and W. M. Kreiner *Deut. Z. Chir.* 228(6), 421-3(1930).

Ovaries of normal female rats were grafted into 12 irradiated and 6 non-irradiated rats. Better healing of implants occurred following x irradiation and is attributed to inhibition of the reticulo-endothelial system. BA 6-13061.

3089

ON THE ORIGIN OF THE AUTOMATINE. H. Zwaardemaker and Ph. Arons. *Arch. Weerl. sci.* 3C-12(4), 520-8(1928)

Automatine is the active automatic cardiac substance formed from inactive automatinogen. β rays from K convert automatinogen to automatine which locates in nodal tissue and exerts a chronotropic action on heart. BA 6-13226.

3090

REVIVAL OF HEARTS WITH SOFT X RAYS AFTER STOPPAGE INDUCED BY REMOVAL OF PERMEABLE POTASSIUM SALTS. H. Zwaardemaker and T. P. Feenstra. *Strahlentherapie* 36(2), 368-9(1930). (In German).

Pulsation of isolated hearts of frogs and eels was restored by soft x rays in an average time of 10 min between critical stoppage and beginning of pulsation. BA 6-13227

3091

STUDIES IN THE VARIABILITY OF TUBERCLE BACILLI. III. INFLUENCE OF X-RAYS UPON DISSOCIATION. Christine E. Rice and Guilford B. Reed *Can. J. Research* 5(7), 122-9(1931).

X ray treatment of cultures of a rapid growing strain of bovine tubercle bacillus, tending to change from R to S, promoted the change to a considerable degree. Stable R cultures were unaffected. Larger doses have a lethal effect. BA 6-13821

3092

SOME GENETIC EFFECTS OF IRRADIATION IN PLANTS L. J. Stadler. *J. Heredity* 21(1), 3-19(1930).

Ninety percent of visible mutations in barley were recognizable in seedling stage. No dominant mutations were found. Studies using maize wheat and oats are described. BA 6-15240

3093

RECOVERY FOLLOWING GENETIC DEFICIENCY IN MAIZE. L. J. Stadler. *Proc. Natl. Acad. Sci. U. S.* 16(11), 714-20(1930).

Deficiency is defined as loss or inactivation of a part or of a whole chromosome; recovery as the return to normal activity of previously deficient genes. These phenomena are described in x irradiated maize. BA 6-15241

3094

A MUTUAL TRANSLOCATION INVOLVING THE FOURTH AND THE X CHROMOSOMES OF DROSOPHILA. Homer R. Bolen. *Am. Naturalist* 65(700), 417-22(1931). BA 6-15249.

3095

TYPES OF VISIBLE VARIATIONS INDUCED BY X-RAYS IN DROSOPHILA. H. J. Muller. *J. Genetics* 22(3), 299-334(1930). BA 6-15287

3096

DOES X-RAY TREATMENT PRODUCE A GENETIC AFTER EFFECT? N. V. Timofeev-Resovskii. *J. Heredity* 22(7), 221-23(1931).

No pronounced "after-effect" of x-ray treatment upon mutability was found in experiments with *D. melanogaster*. (Number of lethal mutations was tested for immediately after irradiation and, in flies found to be mutations-free, in a subsequent test). BA 6-15296

3097

THE EFFECTS OF X-RAYS AND RADIUM ON SPECIES OF THE GENUS NICOTIANA. T. H. Goodspeed. *J. Heredity* 20(6), 243-59(1929).

Heavy x or γ ray irradiation of dry or soaked seed has a retarding but no lethal influence on germination and early seedling growth. Light dosage proves immediately or ultimately lethal to all germinating seed or young seedlings. Older seedlings often exhibit great deformity after irradiation. BA 6-15619

3098

ON THE DEPRESSANT EFFECT OF HIGH X-RAY DOSES ON MITOSIS IN *VICIA FABA EQUINA*. O. Jungling and H. Langendorff. *Strahlentherapie* 38(1), 1-10(1930).

X irradiation of *V. f. equina* roots disturbs the course of cell division. Small doses reportedly accelerate mitosis while large doses depress it. BA 6-15621

3099

INFLUENCE OF RADIUM ON THE PRODUCTION OF ZYGOSPORES IN *MUCOR SPINOSUS* VAN TIEGHEM (*ZYGONHYNCHUS SPINOSUS*). A. Sartory, R. Sartory and J. Meyer. *Compt. Rend. Acad. Sci.* 186(15), 1010-12 (1928).

Irradiation in dosages of 5 mc/cm² occasioned sexual phenomena. Other phenomena, similar to those previously encountered in studying action of Ra upon lower fungi, were also observed. BA 6-15627

3100

CELLULAR WAVES. COLLECTION OF EXPERIMENTAL STUDIES. Georges Lakhovsky. Paris, G. Doin and Cie. 1931. 319p. (In French).

This is a reissue, in French, of 33 papers from French and Italian journals dealing with relations of radiant energy to plant and animal life, and to their clinical effects upon man, especially in cancer. BA 6-15733.

3101

EXPERIMENTAL INVESTIGATION OF THE EFFECT OF X RAYS ON THE EYE OF RABBITS. Rauno Aulamo. Klin. Monatsbl. Augenheilk. 86(4), 473-82(1931).

Single doses of 2-10 erythema doses of soft x rays were applied to left eye in 8 rabbits, and 1-13 E. D. of hard rays to 11, both groups having the bodies lead-shielded. Changes occurring in all those exposed to soft x-rays and in 6 of those exposed to hard x rays are described. BA 6-15738

3102

ACTION OF ROENTGEN RAYS AND RADIUM ON THE GASTROINTESTINAL TRACT, EXPERIMENTAL DATA AND CLINICAL RADIOTHERAPY. Arthur U. Desjardins. Am. J. Roentgenol. 26(1), 145-90, (2) 335-70, (3) 493-510(1931).

Author presents a summary with critical analysis and evaluation of published material on experimental and clinical studies in the field. BA 6-15741.

3103

ACTION OF ROENTGEN RAYS AND RADIUM ON THE EYE AND EAR, EXPERIMENTAL DATA AND CLINICAL RADIOTHERAPY. Arthur U. Desjardins. Am. J. Roentgenol. 26(4); 639-79; (5) 787-819; (6) 921-42(1931).

Author presents a summary with critical analysis and evaluation of published material on experimental and clinical studies in the field. BA 6-15742

3104

A METHOD OF CONTROLLING THE DESTRUCTIVE ACTION OF THE ROENTGEN RAY ON LIVING TISSUE. Archibald P. Evans. Arch. Phys. Therapy, X-Ray, Radium 10(4), 158-67(1929).

Author describes use of high oscillating electric circuit for neutralizing effect of x rays on colloid systems. BA 6-15745.

3105

MESOTHORIUM IRRADIATION OF FIBROBLASTS IN VITRO. Albert Fischer. Strahlentherapie 40(1), 54-96(1931).

Effects of irradiating fibroblasts with mesothorium (equivalent to 5 and 40 mgm of radium) are described. Radiation effect has a latent period. Cultures irradiated at low temperatures had greater decrease in growth than those exposed at body temperature. BA 6-15746

3106

ALTERATIONS IN TRANSCAPILLARY EXCHANGE AND HEMODYNAMICS IN MONKEYS SUBJECTED TO WHOLE BODY X-RADIATION. C. B. Ferrell, M. D. Turner, and R. R. Overman. Federation Proc. 13, 43(1954).

The results indicated that the plasma volumes of the x-irradiated animals were elevated over those of the controls both in 24 and 48 hr post-exposure studies, and at both the 400 and 500 r dose levels. The disappearance rate of Na²⁴ from the vascular system of the experimental animals is consistently increased over the controls.

3107

THE EFFECTS OF HIGH VOLTAGE CATHODE RAYS ON

THE GERMINAL EPITHELIUM OF THE RAT. Victor C. Jacobsen. Arch. Pathol. 9(5): 967-83(1930).

Germinal epithelium of adult male rats was exposed to cathode rays from Coolidge cathode ray tube, 200,000-250,000 volts, 1 ma, for .5 to 30 sec. From effects it is concluded that x-ray effects are due to electrons or cathode rays set free in tissues. BA 6-15750

3108

INFLUENCE OF VARIOUS AGENTS (X-RAYS, RADIUM, HEAT, ETHER) UPON MITOSIS IN TISSUE CULTURES. Tage Kemp and Jens Juul. Acta. Pathol. Microbiol. Scand. 7(3), 279-308(1930).

Tissue cultures of fibroblasts from chick embryos were exposed to Ra and x rays in various doses, to ether vapor and to heating to 50° for various periods. Effects on mitosis are described. BA 6-15751

3109

ON THE INFLUENCE OF WEAK X-RAYS ON OVARIES ON OFFSPRING OF WHITE MICE. A. I. Krupski and M. F. Eisenberg. Strahlentherapie 30(3), 527-43(1928).

Doses of 12, 24, and 36% erythemas units were delivered to ovarian tissues of mice. Three generations of offspring were observed to be normal. Six children of x ray technicians were found to be normal. Question of what intensity of radiation is dangerous discussed. BA 6-15752

3110

RADIOBIOLOGICAL STUDIES ON SEA URCHIN EGGS. H. Langendorff and M. Langendorff. Strahlentherapie 42(4), 793-9(1931). (In German).

First, second and third segmentation stages of sea urchin eggs were exposed to various x-ray doses. In 2nd and 3rd segmentation divisions the cell was least sensitive during metaphase. BA 6-15755

3111

THE DIFFERENTIAL ACTION OF X-RAYS ON TISSUE, GROWTH, AND VITALITY. II. THE BIOLOGICAL REACTIONS TO X-RADIATION IN RELATION TO A PHENOMENON TERMED ANTAGONISM. III. THE BIOLOGICAL REACTION TO X-RADIATION IN RELATION TO THE AREA OF TISSUE IRRADIATED. IV. THE BIOLOGICAL REACTION TO X-RADIATION IN RELATION TO TIME. Warnford Mopett. Proc. Roy. Soc. (London) B107(751), 293-312(1930).

A reaction of hypertrophy and atrophy in chick allantoic membrane is maximal following x-irradiation with energies in a narrow range of frequencies. Prior dose of mixed frequencies or simultaneous dose of frequencies outside the exciting band prevent or depress the reaction. Threshold dose for allantoic membrane reaction varies inversely as the square of the exposed summation of stimuli from adjacent areas which may appear to be unaffected. Similar laws hold for reaction of rat skin to soft mixed x radiation. BA 6-15757.

3112

THE ACTION OF X-RAYS ON THE SEGMENTATION OF THE OVUM AND ON ELEMENTARY MORPHOGENETIC PROCESSES IN *B. VULGARIS*. Francesco Olivieri. Riv. Radiol. e Fis. Med. 1(5); 5-30(1929).

Irradiation of *B. vulgaris* eggs during segmentation interfered with development; during gastrulation effects were limited to enterovitellic portion, susceptibility or resistance being induced in some areas, stimulation in others; during neural groove stage, there was no interference in morphogenesis. BA 6-15758.

3113

SKIN TOLERANCE DOSE AND RADIATION QUALITY. A. Reisner and Th. C. Neeff. Strahlentherapie 34(2), 313-39(1929). (In German).

Dependence of skin tolerance dose on wave length of x ray radiation used (measured in half-value thickness of Cu and r units) was investigated by a series of observations on skin erythema on skin of thigh in women. BA 6-15761.

3114

THE PHYSIOLOGICAL AND CYTOLOGICAL EFFECTS OF PENETRATING X-RAYS UPON THE CAT AND RABBIT. S. Russ, Samson Wright, H. A. Bulman and L. H. Clark. *Proc. Roy. Soc. Med.* 23(12): 1671-88 (1930).

Clinical changes in cat and rabbits following lethal x irradiation are described, including effects on alimentary canal, intestines, stomach, liver, kidney, respiratory tract, spleen, blood, and bone marrow. BA 6-15762

3115

THE DETECTION AND ESTIMATION OF RADIUM IN LIVING PERSONS III. THE NORMAL ELIMINATION OF RADIUM. Herman Schlundt and G. Failla, *Am. J. Roentgenol.* 26(2): 265-71 (1931).

Cases of two girls who had contracted Ra poisoning are described. After 12 yrs both were still radioactive. Rate and mode of Ra elimination is described. BA 6-15763

3116

EXPERIMENTAL INVESTIGATION OF ROENTGEN RAY INDUCED INJURY OF PROGENY. P. Schugt. *Strahlentherapie* 28(3), 546-67 (1928). (In German).

In studies on mice histological ovarian damage was produced by a dose of 54 r. Females were irradiated with doses ranging from 9 r to 140 r and then mated to normal males. One pregnancy soon after exposure was studied and a second pregnancy $3\frac{1}{2}$ - $4\frac{1}{2}$ mo. after exposure. Ovaries were studied histologically. Author also studied fetuses *in utero* after sacrificing the mother. BA 6-15764

3117

SELECTIVE ACTION OF X-RAYS ON THE BLOOD CELLS OF THE CAT. Samson Wright and H. A. Bulman. *Lancet* 217(5527), 217-19 (1929).

Following lethal x ray doses, death results in 5-12 days. After sub-lethal doses lymphocytes show early and marked decrease in numbers, polymorphonuclear leukocytes decrease more slowly. Red cells and platelets decrease slowly, recover gradually. BA 6-15768

3118

EFFECTS OF RADIOACTIVE COLLOIDAL GOLD (Au^{191}) ON GUINEA PIGS. E. R. Fisher, J. C. Neering, J. B. Hazard and R. A. Hayes. *Am. J. Med. Sci.* 223, 502-11 (1952).

The instillation of radioactive colloidal gold intra-peritoneally in guinea pigs produced effects similar to those of total-body irradiation. There was loss of body weight and hair in all animals. The outstanding morphologic changes were focal hepatic necrosis, hypoplasia of bone marrow, myeloid metaplasia of liver and spleen, and atrophy of testes.

3119

RA EMANATION AND PHYSIOLOGICAL ACTION OF SOME DRUGS. P. Mascherpa and G. Belluzzi. *Boll. soc. ital. biol. sper.* 5(6), 944-46 (1930).

In animals treated with Ra emanation, poisoning following strychnine and morphine was more quickly manifested and more severe than in absence of Ra emanation. BA 6-16198

3120

THE REACTION OF LYMPHOID TISSUE TO ROENTGEN RADIATION. Hachiro Akaiwa and Mitsuzo Takeshima. *Am. J. Roentgenol.* 24(1), 42-6 (1930).

Rabbits received x ray doses of $1/3$, $1/2$ or 1 skin unit dose (Sud) or $1/2$ Sud daily for 5 days or 10 days locally to one knee, the contralateral knee serving as a

control. Animals were killed from 30 min. to 3 wk. after exposure and popliteal nodes were studied histologically. There were three periods of reaction. In the early period (up to 12 hrs.) the irradiated node was increased in size and showed nuclear disintegration, decomposition of germinal centers, infiltration by inflammatory cells, congestion, exudation, and absence of mitotic figures except in the lowest dosage group. The middle period, 12 hr to 5 days, showed phagocytic clearing of debris and the late period, 5 days to 3 weeks, showed fibrosis of the nodes. Similar, but much less extensive changes were noted in the control node. BA 6-16296

3121

SOME OF THE EFFECTS OF X-RAYS ON THE NEURORETICULUM OF DONAGGIO IN NEW-BORN MAMMALS. Gastone Lambertini and Pietro Mainoldi. *Riv. Radiol. e Fis. Med.* 1(4), 3-17 (1929). (Summaries in Fr., Eng., and Gerr).

Neuroreticulum of Donaggio in spinal nerve cells of newborn but not adult dogs is extremely radiosensitive. Appearance of lesions is followed by disintegration of neuroreticulum, appearance of granulosity and vacuolization, lysis and disappearance. BA 6-16333

3122

ACTION OF RADIUM ON AMPHIBIAN EGGS. I. DIFFERENTIAL SUSCEPTIBILITY IN THE VARIOUS STAGES OF DEVELOPMENT. II. SPECIFIC ALTERATIONS AND MALFORMATIONS SECONDARILY DUE TO DIFFERENTIAL SUSCEPTIBILITY IN *R. ESCULENTA*. P. Pasquini and G. Meldolesi. *Atti accad. naz. Lincei Rend. Classe. Sci. fis. mat. e Nat.* 10(5/6), 298-306 (1929). 11(7), 705-12 (1930).

Radiation damage increases with increasing dose, but less than linearly. Small doses cause inhibited cephalogenesis but no histologically detectable effects. Abnormal morphogenesis depends on the developmental stage irradiated, early gastrulation being most sensitive. Later in gastrulation, radiation damages the neural tube selectively. BA 6-17405.

3123

A CASE OF MICROCEPHALY FOLLOWING EMBRYONIC ROENTGEN IRRADIATION. Edgar A. Doll and Douglas P. Murphy. *Am. J. Psychiatry* 9(5), 871-78 (1930).

Murphy had previously published studies on 74 fullterm children irradiated in utero, of whom 25 (33%) were defective at birth, 17 being microcephalic. Here, with Doll, he reports the case of microcephalous child, irradiated before birth, born of superior parents and with 2 brothers and a sister above average in mentality. BA 6-17418.

3124

THE EFFECTS OF INCREASING X-RAY VOLTAGES ON THE PRODUCTION OF LETHAL MUTATIONS IN *DROSOPHILA MELANOGASTER*. Frank Blair Hanson, Florence Heys, and Elizabeth Stanton. *Am. Naturalist* 65(697): 134-43 (1931).

The mutation rate increases with the increase of x ray voltages from 40-99 KV. Secondary β -rays are responsible for the mutations. BA 6-18169

3125

DOMINANT EYE-COLORS IN *DROSOPHILA*. Elvene W. Van Atta. *Am. Naturalist* 66(702), 93-5 (1932).

Dominant mutations were induced by x irradiation. BA 6-18185.

3126

A NOTE ON THE VISCOSITY CHANGES PRODUCED IN EGG ALBUMIN BY X RAYS. J. A. V. Fairbrother. *Brit. J. Radiol. (N.S.)* 1: 121-5 (1928).

K rays of Mo decreased the viscosity of albumin solutions by as much as 40%. The change was not reversible.

Coagulation was delayed in irradiated egg albumin heated to 61°.

3127

CHEMICAL REACTION OF ORGANIC COMPOUNDS WITH X-RAY ACTIVATED WATER. H. Fricke, E. J. Hart and H. P. Smith. *J. Chem. Phys.* 6, 229-40(1938) CA 32-5301

3128

RELATION OF CHEMICAL, COLLOIDAL AND BIOLOGICAL EFFECTS OF ROENTGEN RAYS OF DIFFERENT WAVE LENGTHS TO THE IONIZATION WHICH THEY PRODUCE IN AIR. I. ACTION OF ROENTGEN RAYS ON SOLUTIONS OF OXYHEMOGLOBIN IN WATER. H. Fricke and B. W. Petersen. *Am. J. Roentgenol. and Radium Therapy* 17 611-20(1927).

Oxyhemoglobin exposed to x rays of 0.248Å, 0.527Å or 0.754Å was transformed to methemoglobin and possibly other substances. A somewhat greater dose of the longer wave length x rays is required to bring about the reaction BA 2-9685

3129

ACTION OF X RAYS ON LACTATE, GLUCOSE, CITRATE AND SUCCINATE DEHYDROGENASES. R. E. Havard. *Brit. J. Radiol.* 8: 787-92(1935).

Author studied effect *in vitro* irradiation of lactate dehydrogenase prepared from muscle, and glucose and citrate dehydrogenase in minced fresh liver.

3130

EXPERIMENTAL RESEARCH ON THE EFFECT OF FRACTIONAL IRRADIATION ON SUBCUTANEOUS WALKER CARCINOMAS OF THE RAT UNDER INCREASED OXYGEN PRESSURES. Gunther Gruber and Harry Wieland. *Strahlentherapie* 100, 241-52(1956). (In German)

The report deals with experimental investigations into the irradiation of subcutaneous Walker carcinomas of rats with respiration under increased oxygen partial pressures. The authors have found that single irradiation produces an increase of the irradiation effect like that of Gray and collaborators and that of Schubert and collaborators. Furthermore, the effect could be strengthened considerably by means of fractionated irradiation. At a pressure of $P_{O_2} = 2$ at, and with a fractionation of 4 times 1000 r, the effect of x rays was 3 times as high as that of one single irradiation of the same quantity in air. The authors discuss the results and recommend the use of this method in human tumor therapy. NSA 10-11016

3131

REDUCTION OF OXYGEN TO HYDROGEN PEROXIDE BY THE IRRADIATION OF ITS AQUEOUS SOLUTION WITH X RAYS. H. Fricke. *J. Chem. Phys.* 2: 556(1934).

3132

A MICROSCOPIC STUDY OF THE EFFECTS OF X-RAYS ON THE OVARIOLES. Edward McCrady, Jr. *Proc. Penna. Acad. Sci.* 4, 79-91(1930).

Greatest effect of x rays on adult females, (*H. juglandis*), was destruction of the most actively dividing cells, causing degeneration of ovaries and sterility. BA 6-18188

3133

STUDY OF THE ACTION OF X-RAYS ON THE DEVELOPMENT OF PLANTS. S. Lallemand. *Arch. Anat. Hist. et Embryol.* 10 1/2: 1-233(1929).

Effects of x rays on *Phaseolus vulgaris*, *Brassica napus*, *Lens esculata*, *Panicum miliaceum*, *Lepidium sativum*, and *Triticum sativum* studied using X rays of 0.13-0.25Å. BA 6-18459

3134

RESISTANCE OF THE SPLEEN IRRADIATED IN THE ORGANISM AND ISOLATED FROM IT. ITS DEVELOPMENT IN CULTURES IN VITRO. A. H. Roffo. *Bol. Inst. Med. Exptl.* 22, 3-28(1929).

Spleens of day-old rats were removed and irradiated either 1, 3, 5, 6, 7 or 8 days after removal, then cultured. (Irradiation of 200 KV, 4 ma, no filter, 30 min.) Cultures of irradiated spleens grew as well as those of non-irradiated controls, those held 6 days before irradiation, gave better growth than controls. Data are given from similar studies of rats and chicks BA 6-18472

3135

BIOLOGICAL EFFECTS OF RADIATION. VOL. II. NEW YORK, UNITED NATIONS PUBLICATIONS. 1956. 413p. ON THE EARLY REACTIONS OF THE ORGANISM TO IRRADIATION AS DEPENDENT ON THE SITE OF APPLICATION. G. M. Frank. *Proc. of the Intern. Conf. on the Peaceful Uses of Atomic Energy*, Geneva, 1955 11, 93-104(1956).

Author refers to hemodynamic, hemolytic, histological and electroencephalographic changes observed after irradiation.

3136

IMPORTANCE OF CHRONOLOGICAL DISTRIBUTION OF THE DOSES IN RADIUM THERAPY. G. Carlo Segale and Alessandro Vallebona. *Pathological* 20(446), 622-33 (1928).

Experiments on transplants of rat sarcoma and on growth of *Milium paradoxum* L. showed greater action when larger doses were given over short period than when small doses were given over a long period. BA 6-18474.

3137

EXPERIMENTAL INVESTIGATION OF THE EFFECT OF ROENTGEN RAYS UPON THE VEGETATIVE NERVE. I. THE GENERAL ACTION OF X-RAYS, ESPECIALLY THE RELATION WITH BLOOD PRESSURE. II. PHARMACOLOGICAL INVESTIGATION OF THE EFFECTS OF IRRADIATION ON THE INFERIOR MESENTERIC GANGLION UPON THE UTERINE MOTION. III. EFFECT UPON THE VASCULAR NERVE (THE IRRIGATING EXAMINATION ON THE AURICLE OF RABBIT.) IV. HISTOLOGICAL INVESTIGATION OF THE EFFECT OF IRRADIATION OF THE INFERIOR MESENTERIC GANGLION ON THE FEMALE GENITALS. V. CLINICAL OBSERVATIONS. S. Suzuki. *Japan J. Obstet. and Gynecol.* 14(3), 207-13, 214-17; (5), 405-9; 410-15; 416-20(1931). BA 6-18476

3138

THE RELATIONSHIP OF TYPE OF RADIANT ENERGY TO ITS ACTIVATION OF VITAMINS IN YEAST. Louis H. Jorstad. *J. Lab. Clin. Med.* 16(12), 1169-74(1931).

Results show that Cooper-Hewitt lamp, quartz light, and low voltage x ray cause activation of vitamins A and D in brewer's yeast fed to rats along with deficient diet. BA 6-18530.

3139

VASCULAR EFFECTS IN THE HAMSTER CHEEK POUCH AFTER IRRADIATION. G. P. Fulton, B. R. Lutz, D. L. Jofte, and F. W. Maynard. *Anat. Record* 115, 448-57(1953).

Dense capillary networks developed around Sr^{90} beta-emitting glass beads implanted in the hamster cheek pouch. At 24 hours, 140 μ c beads produced increased vascularity, platelet thromboembolism, sticking of leukocytes to endothelium, edema and petechial hemorrhages.

3140

IRRADIATION OF THE THYROID IN EXPERIMENTAL INFECTIONS. Marino Lapenna. *Arch. Radiol. (Napoli)* 5(1), 220-34(1929).

Rabbits and guinea pigs were inoculated with typhoid, paratyphoid A or B, Friedlander bacillus, anthrax, *Staphylococcus aureus*, tubercle bacilli, or various fungi and x-rayed on thyroid or thigh. Results suggest defensive powers of thyroid may be heightened by x rays. BA 6-18877

3141

METHODS OF HEMOSTASIS. Vara Lopez. *Arch. klin. Chir.* 165(2), 375-82(1931).

Studies on 20 patients and 30 rabbits and dogs showed that transfusion, x raying (100 r to spleen and liver) "zimema" (fibrin ferment), parathyroid extract and Ca gave very good hemostatic results. Other preparations gave only limited result. BA 6-18884.

3142

A COMPARATIVE STUDY OF TOXICITIES OF CERTAIN GROUPS OF CHEMICAL SUBSTANCES USED IN CANCER TREATMENT. Leonora Neuffer and Robert J. Norris. Bull. Basic Sci. Research, 2(1), 32-45(1928).

Substances best adapted for use in increasing selective absorption by cancer tissues because of low toxicity and high absorption are described. Studies were made using white mice injected with substances having low toxicity but containing elements of high atomic number. BA 6-18905

3143

EXPERIMENTAL RENAL DISEASE PRODUCED BY X-RAYS, HISTOLOGICAL CHANGES IN THE KIDNEY EXPOSED TO A MEASURED AMOUNT OF UNFILTERED RAYS OF MEDIUM WAVE LENGTH. Adolph Bollinger and J. W. S. Laidley. Med. J. Australia 1(5) 136-46 (1930).

Attempt was made, using dogs, to produce an experimental nephritis which could be standardized and used in diagnostic and therapeutic research. BA 6-19019

3144

GLIA REACTIONS TO ACUTE INFECTIONS. INTOXICATIONS AND X-RAY IRRADIATION. B. N. Mogil' mtskii and V. S. Riazanova. Izvest. Akad. Nauk S.S.S.R. Otdel. Mat. i Estest. Nauk 1931(2), 229-57(1931). (Summary In French).

In acute infections, intoxications and x ray irradiations (rabbits and dogs) proliferation of Hartega elements and of adendritic glia occurred in the cerebrum, along with other changes which are described in detail. BA 6-19059

3145

EFFECT OF RADIATION ON MACROPHAGES. J. C. Mottram. Lancet 220 238-9(1931).

Jensen's rat sarcoma and mouse sarcoma t/63, and surrounding accumulated macrophages were exposed in vivo 1-2 hrs to β radiation. (59 mgm Ra, 2 x 2 cm, 0.12 mm silver). Effects noted after trypan blue injection are described. BA 6-19250

3146

DIRECT AND TRANSMITTED X-RAY EFFECTS ON GROWTH OF TOBACCO CALLUS IN VITRO. Gladys S. King. Am. J. Botany 36, 265-70(1949).

A 4,000 r dose stimulated growth, 10,000 r dose had growth-inhibiting effect. Growth inhibition was more pronounced when dose was raised to 20,000 r and growth period was completely inhibited by 60,000 r, arrest of cell formation occurred after 120,000 r. NSA 2-2076

3147

THE EFFECT OF X-RAYS ON THE MITOTIC ACTIVITY OF THE ADRENAL GLAND, JEJUNUM, LYMPH NODE AND EPIDERMIS OF THE MOUSE. Norman P. Knowlton, Jr. and Louis H. Hempelmann. J. Cellular Comp. Physiol 33, 73-91(1949).

Data are summarized in 7 curves and 4 tables. In general a quantitative relationship between dose and response was observed, although there is lack of correlation between sensitivity of mitotic activity to ionizing radiation and radiosensitivity of different tissues NSA 2-2077

3148

THE INFLUENCE OF THYROID AND THIOURACIL ON MICE EXPOSED TO ROENTGEN RADIATION. Henry C. Blount, Jr. and Willie W. Smith. Science 109, 83-84 (1949).

Experimental results indicate that metabolic activity rather than body temperature is the predominant factor in increasing mortality of x-rayed mice. NSA 2-2078

3149

X-RAY AND ULTRAVIOLET STUDIES ON POLLEN TUBE CHROMOSOMES. II. THE QUADRIPARTITE STRUCTURE OF THE PROPHASE CHROMOSOMES OF TRADESCANTIA. C. P. Swanson. Proc. Natl. Acad. Sci. U. S. 33 229-32 (1947).

Although the chromatid is the functional unit of the chromosome, the pollen-tube chromosomes of Tradescantia show aberrations following irradiation in very early prophase, which are interpreted in terms of $\frac{1}{2}$ -chromatid breaks and rearrangements. BA 22-540.

3150

THE FAILURE OF NON-ISOTOPIC URANIUM TO INHIBIT RESORPTIVE PROCESSES IN RAT FEMUR. W. F. Neuman, M. W. Neuman, and B. J. Mulryan. 1949. Dec1, May 2, 1949. (AECD-2580).

Upon repetition of their previous experiment, authors concluded that previously reported inhibition of resorptive processes of rat skeleton was caused by radiation, not by any specific chemical property of uranium itself. NSA 2-2080

3151

EFFECT OF PLUTONIUM IN THE LIVER. Austin M. Brues. Conf. on Liver Injury, Trans. 7th Conf., 59-61 (1948).

After receiving small doses of plutonium, rats and mice lived for several months but exhibited liver disease, cell damage, and atrophy of liver. Bone carcinomas frequently occurred nearly a year later. NSA 2-2083.

3152

CAN THE DEFENSE MECHANISM OF THE BODY BE INFLUENCED BY ROENTGEN IRRADIATION? REPORT ON A PRELIMINARY CLINICAL INVESTIGATION OF THE PLASMA OR SERUM PROTEIN PATTERN IN RHEUMATOID ARTHRITIS. H. Ney. Ann. Rheumatic Diseases 8, 191-204(1949). NSA 3-2103

3153

THE CYTOLOGY OF NEOPLASM OF THE FEMALE GENITAL APPARATUS BEFORE AND AFTER TREATMENT WITH RADIUM, STUDIED BY THE METHOD OF APPOSITION. Mario Bianchi. Tumori 22, 82-105(1948). (In Italian). NSA 3-2105

3154

PHYSICAL AND BIOLOGICAL BASIS OF BETATRON THERAPY. Gerhard Schubert. Arztliche Forschung 3, 377-86(1949). (In German).

Experiments on a variety of organisms indicate that fast electrons are of lower efficacy than 200 kv x rays, but total qualitative effect seems greater. NSA 3-2109

3155

USE OF RADIUM IN TREATMENT OF HYPERTROPHIC LYMPHOID TISSUE IN THE NASOPHARYNX. Charles H. Dow. Arch. Otolaryngol. 50, 417-28(1949).

Radium therapy was used in treating 74 cases of hypertrophic lymphoid tissue formation in the nasopharynx after adenoidectomy. Two groups were given Ra applications for 8.5 min/treatment or 12 min. Ra β rays stopped mitosis at time of treatment. NSA 3-2114

3156

THE EFFECT OF ROENTGEN AND RADIUM RAYS ON NERVE TISSUES. I. REACTION OF PERIPHERAL NERVES TO ROENTGEN AND RADIUM RAYS. M. N. Meissel. Virchow's Arch. pathol. Anat. u. Physiol. 276(1), 77-94 (1930). (In German).

Irradiation of skin of 35 white mice produced hyperplasia of epithelium and enlargement of subepithelial and intraepithelial nerves. Peripheral nerves are believed to be in unstable equilibrium, changing with changes in surrounding tissue. BA 6-10346

3157

STUDIES ON PRECANCEROUS LESIONS, PARTICULARLY WITH RESPECT TO ROENTGEN CARCINOMAS, II, III. O. Schurch. Z. Krebsforsch. 33(1/2), 1-34, 35-75 (1930). (In German).

Precancerous changes in x-irradiated ears of rabbits are described. Induction of cancer by this means required 2 yr or more of treatment. BA 6-10358.

3158

THE LETHAL ACTION OF SOFT X-RAYS ON MICRO-ORGANISMS. George N. Burger. Bull. Basic Sci. Research, 3, 71-81 (1931).

Soft x rays (2.0-0.5A) were lethal for *Staph. aureus*, *S. albus*, *Saccharomyces cerevisiae*, *B. subtilis*, *B. coli* and *B. tuberculosis* bovine type. Lethal action increased with tube voltage, but not in proportion to total energy emitted by the tube. At 30,000 volts, 100% mortality followed 3-10 min exposure at 3-4 cm. BA 6-21596.

3159

EFFECT OF RADIUM IRRADIATION ON *E. ELEGANS*. L. Halberstaedter and A. Luntz. Arch. Protistenk. 68(1), 177-86 (1929).

Eudorina Elegans was irradiated with various doses of radium radiation delivered at various dose rates to study the effect of the two variables, dose and dose rate, on lethal effect and on the number of colonies produced. BA 6-21599.

3160

EXPERIMENTAL INVESTIGATIONS ON THE FROG TONGUE RELATIVE TO THE EFFECT OF VARIOUS TYPES OF RAYS ON THE BLOOD VESSELS. R. Motojima. Strahlentherapie 30, 343-49 (1928). (In German).

Frog tongue preparations were irradiated with (1) ordinary light, (2) ultraviolet, (3) x-rays, and (4) radium rays to study effect on the vessels. (1) causes decreased flowing velocity, enlargement of vessels, stasis, thrombosis, and edematous changes, (2) changes only superficial capillaries, 3 skin unit dose of (3) produce dilation of small and medium vessels, an effect also produced by γ rays of radium. BA 6-21696.

3161

THE EFFECT OF DIRECT RADIATION OVER THE PRECORDIUM ON THE HEART SIZE, THE HEART MECHANISM AND THE MYOCARDIUM OF RABBITS. B. Gordon, G. F. Strong, and E. S. Emery, Jr. Am. J. Roentgenol. 11, 328-30 (1924).

After a single large dose or moderate fractionated dose delivered through a port over the precordium (total doses ranged from 75-1000 milliamperes minutes), no changes in heart size or histology attributable to a direct radiation effect were observed among 23 rabbits. Any histological changes seen were said to be similar to those in infection and nutritional disturbance. One rabbit developed ventricular extrasystoles after 2 hrs and 5 min of exposure at rate of 15 min once a week.

3162

FURTHER INVESTIGATIONS OF THE FLUORESCENCE OF IRRADIATED CELLS. Paul Wels. Pfluger's Arch. ges. Physiol. 228(6), 671-82 (1931).

Degree of fluorescence in individual egg cells of *Unio* and others was shown by a roughly quantitative measurement to be increased by radiation with x rays and ultraviolet light. Effect increased with duration of radiation and was greater in oxygen than in nitrogen. Increased fluorescence occurs particularly in nucleolus and to less extent in nucleus. BA 6-21703.

3163

THE PRODUCTION, MEASUREMENT AND APPLICATION OF X-RAYS. H. M. Terrill and C. T. Ulrey. New York, D. Van Nostrand Co., 1930. 256p. BA 6-21710.

3164

INVESTIGATIONS CONCERNING THE INFLUENCE OF

ROENTGEN IRRADIATION ON THE RESISTANCE TO CANCER IN WHITE MICE. Aage Wagner. Acta Radiol. 10(6), 539-53 (1929).

Number of successful implantations of carcinoma of low virulence was increased in irradiated as compared with control mice, and proportion of successful implantations varied with dosage of x rays applied, indicating that irradiation lowered resistance to cancer. Author suggests applications of this finding. BA 6-21711.

3165

THE EFFECTS ON THE BLOOD AND THE HEMOPOIETIC ORGANS OF REPEATED SHORT EXPOSURES TO X-RAYS. John Stephens Latta and Orrin C. Ehlers. Am. J. Anat. 47(2), 447-74 (1931).

Authors describe leukopenia, anemia, and hypoplasia of hemopoietic tissues after subjecting 12 rats to series of short x-ray exposures, in most cases totaling 4 1/3 hrs. Progressive changes in hemopoietic organs are described, and evidence is presented pointing to extravascular erythropoiesis, hemoblasts serving as cells of origin (aplastic and regeneration stages). BA 6-22082.

3166

EXPERIMENTAL RENAL DISEASE PRODUCED BY X-RAYS. M. S. S. Earlam and Adolph Bollinger. J. Pathol. Bacteriol. 34(5), 603-34 (1931).

Experimental unilateral renal lesions has been consistently produced in the dog by single direct exposure of the kidney to unfiltered x rays of medium wavelength equivalent to about 1900 r. Well-established x ray nephritis is characterized by N retention, acidosis, hypercholesterolemia, polyuria, uremia, and variable edema. BA 6-22155.

3167

ON THE EFFECT OF ROENTGEN AND RADIUM RADIATION ON METABOLISM IN PATIENTS WITH CANCER OF THE UTERUS. E. C. Gaessler. Strahlentherapie 37(2), 361-77 (1930). (In German).

Metabolism of patients with carcinoma of the uterus was studied before, during, and at various intervals post-irradiation. Graphs are presented for 10 cases, 5 clinically free from carcinoma 6 mo after treatment, others uninfluenced or showing recurrence. BA 6-22173.

3168

CHANGE IN CA CONTENT OF THE BLOOD DUE TO X-RAY THERAPY IN HYPOPHYSIS AFFECTIONS. R. G. Gurevich. Ann. roentgenol. et radiol. (U. S. S. R.) 6(1), 65-70 (1928).

Study of 19 patients showed that in hypophysis affections, Ca content in blood serum increased. No relation was established between amount of Ca in blood and alteration of any particular part of the hypophysis. In 14 patients after x ray therapy, Ca content of blood was decreased. BA 6-22187.

3169

THE STOMACH IN HYPOPHYSIS AFFECTIONS BEFORE AND AFTER X-RAY THERAPY. M. M. Mints. Ann. roentgenol. et radiol. (U. S. S. R.) 6(1), 57-64 (1928).

After x irradiation, 13 acromegaly patients showed decreased gastric secretion and acidity, the decrease remaining stable for many months. In 6 dystrophia adiposogenitalis patients x ray therapy was followed by a more gradual decrease in secretion; acidity was unaffected. BA 6-22278.

3170

THE ERYTHROCYTE SEDIMENTATION RATE IN TUBERCULOSIS OF CERVICAL LYMPH NODES AND ITS CHANGES DUE TO ROENTGEN THERAPY OF THE GLANDS. O. Pikkariainen. Acta. Soc. Med. Fennicae Duodecim 15B, 1-38 (Art. 8) (1931). (In German).

X irradiation (150 to 200 r in 1-3 regions, 6-8 times each) increased erythrocyte sedimentation rate of patients with tuberculosis of cervical lymph nodes. BA 6-22302.

3171

Ca CONTENT IN THE BLOOD IN BASEDOW'S DISEASE AND IN BRONCHIAL ASTHMA AND ITS CHANGE AFTER X-RAY THERAPY. L. R. Protas. Ann. roentgenol et radiol. (U. S. S. R.) 6(1), 71-78(1928).

After x ray therapy, elevated serum Ca of Basedow patients approached normal. In cases of low Ca content prior to exposure, Ca increased, approaching normal. BA 6-22309.

3172

THE QUESTION OF THE HISTOLOGICAL CHANGES IN CARCINOMA DUE TO RADIATION. G. Gambarov. Strahlentherapie 41, 531-542(1931).

Nuclear and cellular degeneration, leukocytic infiltration, connective tissue proliferation, formation of spindle cells and vacuolization of tumor cells were some of the changes observed in basal cells and other cancers studied by serial biopsy during radiation therapy.

3173

CYTOLOGICAL MAP OF THE SECOND CHROMOSOME OF DROSOPHILA MELANOGASTER. T. Dobzhansky. Biol. Zentr. 50(11), 671-85(1930). (In German).

Drosophila treated by x rays produced progeny among which were found 4 translocations involving the 2nd and 4th chromosomes and 10 translocations involving the 2nd and γ chromosomes. Genetic mapping procedure, making use of these translocations, is described. BA 6-24312.

3174

SOMATIC CHANGES INDUCED IN GOSSYPIMUM HIRSUTUM BY X-RAYING SEEDS. W. R. Horlacher and D. T. Killough. J. Heredity 22(8), 253-62(1931).

Dry seeds of different types of American upland cotton were x rayed with varying doses. Germination percentage was lowered only in case of seed 2 yr old. Abnormalities in plants from x rayed seed included variegations in leaf color, and changes from forked leaf toward normal leaf. BA 6-24363.

3175

THE EXPERIMENTAL MODIFICATION OF THE HEREDITY IN CROP PLANTS. II. INDUCED MUTATION. L. J. Stadler. Sci. Agr. 11(10), 645-61(1931).

Mutations induced in maize and barley by irradiation through available x ray range, including ultra soft x rays 2-4Å and Ra rays with extremes of .009.05Å are outlined. Temperature variations from 80-50° have little or no effect on mutation rate. Chlorophyll abnormalities are common; all mutations described are considered to be recessive. No clear case of induced dominant mutation is known. BA 6-24371.

3176

NON-DISJUNCTIONS OBTAINED IN DROSOPHILA VIRILIS BY X-RAY RADIATIONS. Y. Arai. Japan. J. Genet. 6(3/4), 178-9(1930).

Female Y flies were irradiated and crossed with wild-type males, 57% progeny from radiated mothers and 0.03% of control progeny were exceptionals. BA 6-24375.

3177

THE COMPOSITION AND PROPERTIES OF CERTAIN RED AND YELLOW PLANT PIGMENTS. Leonora N. Hilger. Bull. Basic. Sci. Research 3(1), 37-46(1931).

Bleaching effects of visible light, ultra-violet and soft x rays on carotin and red pepper pigment are described. BA 6-24554.

3178

THE EFFECTS OF X-RAYS ON THE GROWTH OF WHEAT SEEDLINGS. Ware Cattell. Science 73, 531-3(1931).

Results of 200,000 measurements of control and irradiated wheat seedlings taken 48 hr after irradiation

showed that each of the 4 growing parts of the seedling is affected to a different degree by the same dose. BA 6-24673.

3179

THE BIOLOGICAL STUDY OF RADIOSENSIBILITY I. THE EFFECT OF X-RAYS UPON THE IMMATURE TISSUES OF PLANT. J. Nakagawa. Japan. J. Obstet. Gynecol. 14(3), 218-14(1931).

Strong, medium, and continued strong irradiation of sprouted Vicia faba seed produced much the same biological changes. Development and growth of root tip was disturbed; there was no formation of root hairs or rootlets, and the tissues of the root tip took on a permanent aspect. BA 6-24679.

3180

INVESTIGATION OF THE HISTOLOGICAL CHANGE IN PLANT SHOOTS CAUSED BY X-RAYS. ESPECIALLY THE EFFECT UPON ARRANGEMENT OF TISSUES IN THE SEED OF VICIA FABA. K. Narimatsu. Japan. J. Obstet. Gynecol. 14(1), 50-8(1931). BA 6-24680.

3181

EFFECT OF X-RAYS ON DEVELOPING CORN. G. E. Snyder. Proc. Penna. Acad. Sci. 4, 32-4(1930).

Dry Golden Bantam seeds were exposed to x rays (31 kv, 8 ma at 15 mm). These preliminary experiments indicate that x radiation produces an accelerated growth which increases with increasing exposure up to 5-10 min. After this, beneficial effects decrease with longer exposure. Definite retardation and cessation of growth occurred with 3 hr exposure. BA 6-24686.

3182

THE EFFECTS OF X-RAYS, CATHODE, AND ULTRA-VIOLET RAYS ON YEAST. Ralph W. F. Wyckoff and Basile J. Luyet. Radiology 17(6), 1171-5(1931).

Preliminary results with S. cerevisiae show that survival ratios with all these radiations follow multiple hit-to-kill relations of similar slopes. Yeasts therefore can be injured without being killed outright. BA 6-24688.

3183

EXPERIMENTAL OBSERVATIONS ON THE ACTION OF RADON ON THE SPINAL CORD. Hugh Cairns and J. F. Fulton. Lancet 219, 16(1930).

Radon seeds (0.3 mm Pt. filter) were applied to dorsal surface of cord outside dura in cats and monkeys. Destruction proceeded in ventral direction, posterior columns being affected first and ventral tracts last. Monkeys are more resistant than cats to the radon implants. BA 6-24772.

3184

ANALGESIC PROPERTIES OF THE X-RAY. L. J. Carter. Radiology 12(1), 27-34(1929). BA 6-24773

3185

THE ACTION OF ROENTGEN RAYS ON THE LARVAE OF BUFO VULGARIS. Francesco Olivieri. Monit. zool. ital. 40(11/12), 442-4(1930).

Toad eggs were x rayed at 3 developmental stages. Segmentation proved to be least resistant to damage. Specific reaction characteristics were apparent in various germ layers during gastrulation. The neural groove stage was most resistant to radiation. Histological changes were dependent on increased ionic dissociation of molecules. Osmotic pressure of cells was increased. BA 6-24779

3186

A MAXIMUM POINT IN AN EFFECT OF PROLONGED X-RAY IRRADIATION UPON DROSOPHILA LARVAE. Robert Tennant, Jr. Science 73, 567-8(1931).

Different lots of larvae were irradiated for periods of 35-245 min. by intervals of 35 min. Maximum prolongation of prepupal period was produced by interval 35-

105 min. Decline, followed by attainment of level plateau, resulted from greater exposures. BA 6-24783

3187

THE INFLUENCE OF THE IRRADIATION OF THE HYPOPHYSIS UPON THE FEMALE GENITALS. S. Suzuki. Japan. J. Obstet. Gynecol. 14(5), 393-99(1931).

In 9 of 15 mature rats, x irradiation of hypophysis in varying total and divided dosages lengthened the sexual cycle. In immature rats, growth and development were markedly checked but no great change in estral period resulted. Result of hypophysis irradiation followed by hysterectomy of female rats is described. BA 6-24911.

3188

THE RADIOSENSIBILITY OF HUMAN LYMPHOSARCOMAS, DETERMINED BY HETEROLOGOUS TRANSPLANTATION. Carl Krebs and Fanny Busch. Acta Radiol. 12(4), 395-400(1931).

Results of study with mice indicates that the lethal x ray dose for lymphosarcoma is 2 E. D., as it is for mouse lymphosarcoma, and that both are much more sensitive than ordinary sarcoma or carcinoma. BA 6-25022

3189

EFFECT OF X RAYS ON SPECIFIC IMMUNE BODIES. Alexander Lusztag. Centr. Bakteriolog., Parasitenk. Abt. I. Orig. 111(4/5), 244-66(1929).

Effect of x rays on specific antibodies depends on: intensity of the rays, duration of radiation in relation to antigen-antitoxin incorporation; specific antigen and antitoxin and on individual sensitiveness to x ray stimulation. In warm-blooded animals, complement may be damaged by irradiation in vitro or in vivo, but precipitins are relatively radioresistant. BA 6-25079.

3190

STUDIES ON THE DETERMINATION OF RADIUM ELEMENTS IN PLANTS. E. Burkser, W. Kondoguri, W. Milgewska, and K. Bronstein. Biochem. Z. 233(1/3), 58-61(1931) In German.

Analyses of various seed and other plant parts for Ra, K, Rb, and Th give highest Ra content in Ruppia, oak leaves, and Hibiscus. Ra, Th and Rb were present in about the amount normally found in sea water. BA 6-34558

3191

THE INHIBITION OF COLONY GROWTH UNDER THE INFLUENCE OF LIGHTS. K. von Berde. Arch. Dermatol. u. Syphilis 158(1), 35-50(1929). (In German).

Effects of direct sunlight, 32 candle power lamps of various colors, a quartz lamp and x-rays on Microsporon audouinii, Achorion schoenleini, Sporotrichon beurmanni and Oidium albicans when grown on ordinary maltose agar and a maltose agar sensitized by addition of eosin or an acridine derivative of tryptaflavin, were studied. Effects of irradiating media before inoculation differed from effects of direct irradiation of the cultures. BA 6-24670.

3192

STUDY OF THE ACTION OF X RAYS ON GERMINATING SEEDS. S. Lallemand. Arch. phys. biol. 8(2), 53-81 (1930). (In French).

X rays (0.13-0.25A) produced in coolidge tube were administered in varying doses. 100 r or less did not accelerate germination of dry or soaked seed, nor growth of seedlings; 100-300 r retards growth, 300 r may cause death. Radiosensitivity is related to the physicochemical structure of cells (hydration, chemical composition). BA 6-24677.

3193

EFFECTS OF β AND γ RAYS OF RADIUM ON THE CHONDRIOSOMES OF PLANT CELLS. P. F. Milovidov. Acad. Tchèque Sci. Bull. Internat. Res. Trav. Pres. Cl. Sci. Math., Mat. et med. 30, 139-49(1929). (In French).

Roots of Pisum sativum were exposed to Ra rays. Results indicate that chondriosomes are much more resistant to these rays than is the nucleus. BA 6-24678.

3194

INVESTIGATION OF THE BIOLOGICAL EFFECT OF CATHODE RAYS. I. INTRODUCTION. B. Rajewsky. Strahlentherapie 42(1), 1-5(1931). (In German).

The essential character of cathode rays and their exact application in biological experiments are discussed. BA 6-24781.

3195

THE EFFECT OF ROENTGEN RADIATION OF THE SYMPATHETICS OF THE EYE. (CONTRIBUTION TO THE QUESTION OF THE EFFECTS OF ROENTGEN RAYS ON THE VEGETATIVE NERVOUS SYSTEM.) Hans Salinger and Rudolf Thiel. Strahlentherapie 42(1), 96-112 (1931). (In German)

Effect of x raying the vegetative nervous system was studied by irradiating superior cervical ganglion and cilio-spinal center in 6 subjects with normal intraocular pressure and 15 with glaucoma (one or more courses of 1/3 ESD per session in not more than 3 sessions at 8-day intervals.) BA 6-24782

3196

PRELIMINARY RESULTS OF EXPERIMENTS IN X-IRRADIATION FOR CARAUSIUS (DIXIPPUS) MOROSUS BR. AND REDT. C. Toumanoff and S. Veretennikoff. Bull. biol. France et Belg. 64(4), 495-510(1930). (In French).

Insects were exposed to Al-filtered 75,000 volt x rays for 10-60 min, distance of 23 cm. Irradiation for 10 min produced no effect, for 20-30 min: variation from no effect to complete castration, for 40 min: growth of young animals was retarded, no effect on older ones. Histological study indicated that sex cells were most sensitive to x rays. BA 6-24784

3197

INFLUENCE OF RADIUM EMANATION AND OF CERTAIN RADIOACTIVE METALS ON EXPERIMENTAL RICKETS. J. Y. Pourbaix Maisin and W. Mund. Bull. acad. roy. med. Belg. 10(7), 430-40(1930). (In French).

Experiments on rats maintained on rickets-producing diet showed equal preventive and curative effects from Ra-irradiated and ultraviolet irradiated ergosterol. Similar experiments with radioactive water and with Ra emanation dissolved in paraffin gave negative results. Results of inhalation of Ra emanation and injection of colloidal uranium and thorium are also described. BA 6-24871.

3198

FATAL PULMONARY FIBROSIS IN AN INDUSTRIAL RADIUM EXPOSURE. T. H. Belt. Frankfurt. Z. Pathol. 42(1), 170-87(1931). (In German).

Author presents the case history of a chemist who filled Ra needles in factory for 4 yr. and developed diffuse interstitial fibrosis of both lungs, apparently as a result of inhaling volatile fractions of the radioactive salts. BA 6-24982.

3199

SERUM REACTION STUDIES ON THE (AMINO ACID) DECOMPOSING ABILITY OF CANCER PATIENTS AND THE CHANGE FOLLOWING THERAPEUTIC RONTGEN RADIATION. Otto Heinrich Bucher. Strahlentherapie 29(1), 71-107(1928). (In German).

Author presents a comprehensive review of various serum reactions used for diagnosis of carcinoma, with discussion of their limitations. Relation of x ray action to the tests is outlined. BA 6-25013.

3200

WILHELM CONRAD RÖNTGEN AND THE HISTORY OF

RÖNTGEN RAYS. WITH A PERSONAL CONTRIBUTION ABOUT W. C. RÖNTGEN BY MARGARET BOVERL. Otto Glasset. Berlin, Julius Springer. 1931. 337p. (In German). BA 7-75.

3201

EXPERIMENTALLY INDUCED ALTERATIONS OF THE MORPHOLOGY OF CHROMOSOMES. G. Lewitzky, A. Araratian, J. Mardjanishvili, and H. Shelpelava. *Am Naturalist* **65**, 564-7(1931).

Exposure of seedlings of *Secale cereale* and *Crepis capillaris* to x rays and of *C. capillaris* to dilute alcohol caused fragmentations, losses of parts, and transpositions of parts of chromosomes. Similar sudden alterations of chromosome morphology may occur in evolution. BA 7-302.

3202

EFFECT OF RÖNTGEN RAYS ON MEIOSIS IN WHEAT. T. W. Plotnikowa. Z. Zucht. Reihe A. Z. Pflanzenzucht. **16**(4), 662-7(1931). (In German).

Heads of wheat undergoing meiosis were x rayed (Coolidge tube with Wolfram anticathode K. V. 50, MA 5, A1 filter 1 mm., 25 cm.) Treated material showed chromatin to be clumped or drawn out to some extent along spindle threads. Chromatin drops were found in plasma. Multinucleated cells and tetrads were variously formed. The observed effects were lethal. BA 7-318.

3203

THE EFFECTS OF X-RAYS ON FERTILITY IN *DROSOPHILA MELANOGASTER* TREATED AT DIFFERENT STAGES IN DEVELOPMENT. W. G. Moore. *Biol. Bull.* **62**(3), 294-305(1932).

Irradiation of adults reduced fertility of males 42%, females 16% corresponding reductions after irradiation of larvae 72-84 hr old: males 28% females 15% larvae 24-36 hr old: m 34%, females 0%. Exposure of early larval stages resulting in appreciable degree of sterility regardless of sex. All reductions in fertility transient. BA 7-389

3204

THE (ANIMAL) EXPERIMENTAL BASIS OF THE QUESTION OF LATE INJURY DUE TO RÖNTGEN RAYS. Ludwig Nurnberger. *Strahlentherapie* **37**(3), 432-90(1930). (In German).

Author finds no proof of late injury by x rays in this. Reviews of the subject. BA 7-391

3205

CONTINUOUS VERSUS INTERRUPTED IRRADIATION AND THE RATE OF MUTATION IN *DROSOPHILA*. J. T. Patterson. *Biol. Bull.* **61**(2), 133-8(1931).

Results of this study indicate that rate of mutation, as measured by number of sex-linked lethals produced, is the same whether treatment is given in one dose or in several fractional doses. BA 7-392.

3206

EXPERIMENTAL HEPATOSPLENOGRAPHY, OSTEOMYELOGRAPHY AND NEPHROGRAPHY INTRODUCTION OF A COLLOID, "THOROTRAST," INTO THE ORGANISM. ANATOMICAL RADIOLOGICAL STUDY. Silviye Kadrnka and Jean Rossier. *Acta Radiol.* **12**(4), 369-87(1931). (In French).

"Thorotrast," in small doses, accumulated in liver and spleen, rendering them opaque to x rays in 8 rabbits receiving the material by intravenous injection. Larger doses, required to show kidney and bone marrow, injured hepatic parenchyma and renal glomeruli. Refrangent granulation was observed in reticulum cells on slides of spleen and liver and marrow. BA 7-557.

3207

INFLUENCE OF RADIATION ON METABOLISM OF REGENERATING RAT LIVER. p.225-36 in CIBA FOUNDATION SYMPOSIUM ON IONIZING RADIATIONS AND CELL METABOLISM. Barbara E. Holmes. Wolstenholme, G. E. W. and C. M. O' Connor, eds.

Little, Brown and Co. Publishers 1956. Influence of Radiation on Metabolism of regenerating Rat Liver. p. 225-236.

DNA and RNA synthesis and the mitotic process were studied in the rat liver exposed to various doses of x ray at various times relative to partial extirpation of the liver. Other studies made on the regenerating tissue included determination of fat content and glucose oxidation. Results were compared with observations on the same biochemical processes in a transplantable mouse carcinoma.

3208

ON THE DISAPPEARANCE OF LYMPHOCYTES FROM THE BLOOD FOLLOWING EXPOSURES TO X-RAYS AND RADIUM. J. C. Mottram. *J. Pathol. Bacteriol.* **34**(6), 800-1(1931).

Evidence is presented demonstrating that, after irradiation, lymphocytes stick in radiated capillaries and later wander into surrounding tissues. BA 7-606.

3209

ANATOMICAL AND FUNCTIONAL CHANGES IN THE RÖNTGEN RADIATED KIDNEY. R. Enger and P. Preuschoff. *Virchow's Arch. pathol. anat. u. Physiol.* **283**(2), 489-512(1932). (In German).

Both kidneys of 4 dogs were exposed to 5.8-21 E. D. in 16 mo. as successive doses of 60-140% E. D. at intervals of 8 days to 3 mo. Clinical signs and progressive changes in kidney function studies are described. Two dogs developed blood pressure elevations. Histological changes observed at autopsy included contraction of kidneys, tubular changes and occasionally hyalinization of glomeruli and endarteritis. BA 7-757.

3210

BLOOD CHANGES IN THE LEUKEMIAS AND THE LYMPHOMATA AND THEIR BEARING ON ROENTGEN THERAPY. Raphael Isaacs. *Am. J. Roentgenol.* **24**(6), 648-56(1930).

Author concludes that roentgen irradiation stimulates primitive myeloblasts and lymphoblasts to rapid reproduction. Myelocytes and small lymphocytes are stimulated to finish their life history and then die or are excreted. Latent period between exposure and loss of cells represents period of maturation and development of cells to senility. Interpretations of other observations are also presented. BA 7-1012

3211

RESISTANCE OF DENGUE VIRUS. R. L. Holt, Wm. D. Fleming, and J. H. Kintner. *Philippine J. Sci.* **46**(4), 601-9(1931).

Aedes aegypti shows much greater resistance to effects of ultraviolet or x ray than does man. Unlike some bacteria and fungi, dengue virus is apparently not adversely affected by relatively large amounts of x ray or ultraviolet, giving little therapeutic promise for the radiations. BA 7-1283

3212

THE CYTOLOGICAL EXPRESSION OF CHANGES IN GENE ALIGNMENT PRODUCED BY X-RAYS IN *DROSOPHILA*. H. J. Muller and T. S. Painter. *Am. Naturalist* **63**, 193-200(1929).

Descriptions of frequently-occurring translocations and their detection by genetical tests are presented. BA 7-2605.

3213

PARALLEL CYTOLOGY AND GENETICS OF INDUCED TRANSLOCATIONS AND DELETIONS IN *DROSOPHILA*. T. S. Panter and H. J. Muller. *J. Heredity* **20**(6), 287-98(1929).

X rayed chromosomes show a marked tendency to break in one or more places and unite more or less randomly with other fragments. Inversion deletion, duplication and translocation are described. BA 7-2610.

3214

THE EFFECTS OF X-RAYS, ULTRA-VIOLET LIGHT, AND HEAT IN PRODUCING SALTANTS IN CHAETOMIUM COCHLIOIDES AND OTHER FUNGI. Hugh Dickson.

Ann. Botany (London) 46, 389-405(1932).

Development of Mucor genevensis, Phycomyces blakesleeana and C. cochliodes after various treatments is described. Effect of separate ions produced by rays on particular nuclear constituents is suggested as a possible cause of saltation. BA 7-2643

3215

COMPARISON OF THE BIOLOGICAL EFFECT OF RÖNTGEN AND GAMMA RAYS. R. Braun. Strahlentherapie 38(1), 11-18(1930). (In German).

Anaerobic cultures of Ascaris eggs were irradiated with x and γ rays (radium). Equal doses of x rays and radium applied to legs of 12 patients elicited the same type of skin reaction for the two types of radiation. BA 7-2890.

3216

TISSUE RESPIRATION AFTER RÖNTGEN RADIATION. EXPERIMENTAL STUDIES OF LIVER AND KIDNEY. J. Heeren and J. Pansdorf. Strahlentherapie 42(2), 307-27 (1931). (In German).

Rats and mice were irradiated over the abdomen (185 KV, 5 ma., 0.5 mm Cu filter, 30 cm T.S.D., 100% erythema or 550 r, 19 min.). Increased oxidation of liver and kidney in Ringer's solution, not in horse serum, was observed after exposure. (Measured by Warburg technique). BA 7-2891.

3217

STUDIES OF THE EFFECT OF ROENTGEN RAYS ON THE TIME OF THE FIRST CLEAVAGE IN SOME MARINE INVERTEBRATE EGGS. I. RECOVERY FROM ROENTGEN-RAY EFFECTS IN ARBACIA EGGS. P. S. Henshaw. Am. J. Roentgenol. Radium Therapy 27(6), 890-98(1932).

Interval between fertilization and 1st cleavage was prolonged by x irradiation before fertilization. Delay is a function of dose. A recovery process with an exponential rate begins immediately after exposure. Recovery rate is independent of magnitude of radiation effect. BA 7-2892.

3218

EFFECT OF RADIUM EMANATION ON THE HISTOCYTE IN THE LIVER OF THE WHITE RAT. G. M. Higgins and J. C. T. Rogers. Am. J. Pathol. 8(3), 355-65(1932).

Gold radon seeds, 3 mm long and 0.6 mm in outside diameter implanted in liver of rats destroyed parenchymal cells and local histocytes, and interrupted the characteristic foreign body reaction pattern observed in control lesions produced by non-radioactive gold seeds. Various stages of reaction to radon seeds are described. BA 7-2893

3219

ON A DIVERGENCE BETWEEN THE BIOLOGICAL AND GAMMA RAY EFFECTIVENESS OF RADIUM TUBES. S. Russ and G. M. Scott. Lancet 222, 82-3(1932).

Electroscopic measurement and comparison of radiation from 3 tubes of Ra having walls of Pt 2 mm, 0.6 mm and 0.3 mm thick respectively, showed widely different γ ray activities. Differences in biological effects are believed due to differences in β rays emitted from Pt containers due to bombardment by γ rays. BA 7-2896

3220

STUDIES ON THE EFFECT OF RÖNTGEN RAYS ON BIOLOGICAL TISSUES. RÖNTGEN MEASUREMENT STUDY OF THE MECHANISM OF THE BIOLOGICAL EFFECT OF RÖNTGEN RAYS. J. Schechtmann and W. Klupfel. Strahlentherapie 43(4), 792-5(1932). (In German).

Frog eggs were x irradiated (400 to 72,000 r) 10 min. - 2 hr after fertilization. While 400 r considerably

affected vital processes and killed eggs within 24 hrs, none of the doses given stopped cell division instantaneously. BA 7-2897

3221

EXPERIMENTAL OBSERVATIONS WITH LOW DOSE RADIATION. W. R. Spurrell. Brit. J. Exptl. Pathol. 12(6), 402-7(1931).

Mouse skin, rabbit lung and experimental embryomata in rabbits were exposed to doses of Ra radiation below traumatic limit. No evidence of any increase in growth activity as a result of treatment was found. The tissues selected for study had all been found capable of a hyperplastic response to other agents. BA 7-2899

3222

LIVER FUNCTION AND BLOOD FERMENTS. I. ON BLOOD AMYLASE IN EXPERIMENTAL HEPATIC DAMAGE. Tokusaburo Tomioka. J. Gastroenterol 3(9), 1093-1106 (1928/29). (In Japanese).

After experimental hepatic damage in rabbits provoked by chloroform, CCl_4 , P, x rays, and ligation of common bile duct, blood amylase increased slightly, then fell below normal. BA 7-3035.

3223

LIVER FUNCTION AND BLOOD FERMENTS. III. ON THE BLOOD CATALASE IN EXPERIMENTAL HEPATIC DAMAGE. Tokusaburo Tomioka. J. Gastroenterol. 3(11), 1391-1440(1928/29).

Partial excision of the liver, x rays, ligation of common bile duct and P poisoning in rabbits decreased blood catalase; chloroform and CCl_4 increased it. The observed phenomena may be provoked by altered metabolism following changes in hepatic functions. BA 7-3035.

3224

THE EFFECT ON A SUBSEQUENT PREGNANCY AFTER X-RAYING ONE OVARY OF A RAT FOLLOWING REMOVAL OF THE NORMAL OVARY DURING THE COURSE OF GESTATION. R. I. Pencharz and J. A. Long. Am. J. Anat. 50(1), 1-8(1932). BA 7-3130

3225

CICATRIZATION AND REGENERATION. Jacques Millot. Paris, Armand Colin. 1931. 202p. (In French).

Historical review of literature on regeneration is presented, followed by survey of experimental work on regeneration in various phyla. Regenerative process is correlated with histological changes in wound healing. Effects of external factors, including radiations, are described. BA 7-3154

3226

THE INCREASED METABOLISM OF THE SARTORIUS MUSCLE OF THE FROG FOLLOWING EXPOSURE TO ROENTGEN RADIATION. Wallace O. Fenn and W. B. Latchford. Am. J. Physiol. 99(2), 454-62(1932).

In 22 of 25 experiments a permanent 31% increase in O consumption was seen in frog sartorius muscles in vitro after intense irradiation with high-voltage unfiltered x rays. Possibility of contraction was excluded by careful insulation and recorded measurements of muscle length during exposure. Observed effect was probably the result of injury to muscle rather than a specific effect upon oxidation. BA 7-3261.

3227

HETEROLOGOUS TRANSPLANTATION FROM MAN TO RÖNTGEN RADIATED ANIMALS. C. Krebs and F. Busch. Z. Krebsforsch. 34(2/3), 234-44(1931). (In German).

A number of allegedly successful attempts at hetero-transplantation of human malignant tumors to intensively x rayed rats and mice are described. Growths so obtained, although they showed definite infiltration into tissues of new host, were of temporary character, and were ultimately absorbed. BA 7-3458

3228

THE EFFECT OF RADIATION ON THE RESISTANCE OF CHICKENS TO FOWL CHOLERA. D. D. Donahue. *Am. J. Hyg.* 15(1), 206-31(1932).

Chickens exposed to x rays for 15-30 min and inoculated 1 hr later with *Pasteurella avicida* were less resistant to the disease than were controls. BA 7-3558.

3229

EFFECTS OF HEAD X-IRRADIATION IN RABBITS ON AORTIC BLOOD PRESSURE, BRAIN WATER CONTENT AND CEREBRAL HISTOLOGY. H. B. Gerstner, P. M. Brooks and F. S. Vogel. *Federation Proc.* 15, 72-73 (1956).

During the 3 hour post-irradiation period, severe epileptoid seizures were observed. Continuous blood pressure recording revealed a marked hypotension developing about 30 min after the start of irradiation. The specific gravity of the irradiated brains was 1.0345 as compared with 1.0363 for non-irradiated controls. Water content was 80.4% as opposed to 78.4%.

3230

EFFECT OF X-RADIATION ON THE SPERMATOGENESIS OF *LEPISMA DOMESTICA*. R. N. Mukerji. *Proc. Roy. Soc. (London)* B105, 429-45(1929).

Golgi bodies and archiplasma of male germ cells swell and fuse and mitochondria of spermatids are destroyed by x irradiation. Sperm are the most resistant of germ cells, and a few apparently normal ones may persist. BA 7-5121.

3231

THE BAROID MUTATION IN *DROSOPHILA MELANOGASTER*. T. Dobzhansky. *Genetics* 17(4), 369-92(1932)

New mutation from wild-type to bar occurring in X chromosome of x-rayed wild-type male are described. New allelomorph (baroid) behaves as recessive allelomorph of wild type and of bar; appearance is associated with translocation involving breakage of X chromosome at locus of bar, breakage of 2nd chromosome near locus of vestigial, and exchange of fragments. BA 7-5130.

3232

RAY INTENSITY AND BIOLOGICAL EFFECT. (STUDIES ON PROTOZOA BY MEANS OF VITAL STAINS.) Carl Hoffmann. *Strahlentherapie* 43(1), 140-59(1932). (In German).

Excessive intracellular storage of certain stains (produced by the effect of x rays on *Opalina ranarum*) was studied for various conditions of radiation. No qualitative, quantitative or chronological differences in effect produced by equal doses of hard or soft rays were noted. Author assumes equal quantities of x rays of different wave lengths produce identical biological effects. BA 7-5356.

3233

SKIN REACTIONS TO INTRAMUSCULAR INJECTION OF RADIUM-E. P. Zadik. *Dermatol. Wochschr.* 94(12), 415-16(1932). (In German).

Following intramuscular injection of bismuth isotope Radium E, small round areas of pigmentation appear at site of injection after several weeks. Pigmented areas are similar to those found after local applications of x or γ rays without erythema. BA 7-5359

3234

PROTECTIVE MEASURES AGAINST DANGERS RESULTING FROM THE USE OF RADIUM, ROENTGEN AND ULTRA-VIOLET RAYS. Hermann Wintz and Walther Rump. *League of Nations, Geneva, Switzerland, 1931.* 114p. BA 7-5421

3235

HISTOLOGICAL STUDIES ON THE EFFECT OF RÖNTGEN RAYS ON THE HEMATOPOIETIC ORGANS. Masateru

Takaizumi and Yuji Ono. *Trans. Japan. Pathol. Soc.* 18, 161-5(1928).

X rays have a destructive effect on hematopoietic organs, particularly on lymphatic and myelocytic cells. Erythrocytes and erythroblasts are somewhat resistant. Regeneration begins a few weeks after exposure and is promoted by transfusion. After partial body exposure, the shielded marrow shows compensatory activity. Detailed descriptions of changes in hematopoietic and other organs are presented. BA 7-5862.

3236

THE INFLUENCE OF X-RAY LESIONS OF THE INTESTINAL MUCOSA ON ABSORPTION OF GLUCOSE AND OTHER SUGARS. K. W. Buchwald. *J. Exptl. Med.* 53(6), 827-33 (1931).

Sublethal x ray dose (5 ma. 140 kvp, 2.5 mm, Al, 25 cm. S.T.D.) was applied over abdomen of rats and over thorax for control purposes. 20 hr postirradiation, glucose absorption rate was reduced 19.4%, 40 hr postirradiation the rates of glucose, fructose and mannose absorption were diminished 56.5%, 36.6% and 60%, respectively. Despite decrease in absolute amounts absorbed, relative rate of absorption of the three remained nearly unchanged. BA 7-5898

3237

CONTRIBUTION TO THE STUDY OF THE EXPERIMENTAL PRODUCTION OF MALIGNANT TUMORS BY MEANS OF RADIOACTIVE SUBSTANCES. Fr. Daels and R. Biltris. *Bull. assoc. Franc. etude cancer* 20(1), 32-77(1931). (In French).

Malignant tumors were produced by introduction of foci of irradiation (paraffin plugs or glass tubes of, or threads containing Ra) into several hundred experimental animals (white rats, white mice, guinea pigs). BA 7-5910.

3238

ON THE EFFECT OF LIVER DAMAGE ON SERUM AMYLASE. Tanichi Kameo. *Fukuoka Ikwaigaaku Zasshi* 25(3), 514-22(1932). (Japanese with German Abstract)

By injecting rabbits with hepatotoxin or by radiating the liver region (hip in control) with hard rays it was found that the amylase in the serum distinctly decreased, a shorter exposure increased it. BA 7-5949.

3239

BIOCHEMICAL INVESTIGATION OF THE BLOOD IN CASES OF EXPERIMENTAL DISTURBANCE OF LIVER FUNCTION. I. LIVER FUNCTION AND CARBOHYDRATE METABOLISM. Tsunejiro Sawada. *Japan. J. Gastroenterol.* 2(4), 191-202(1930).

Following experimental liver damage, including that due to x-irradiation, blood sugar curves were studied after administration of 5 gm of glucose per Kgm body weight (rabbits). BA 7-6040.

3240

THE EFFECT OF "LOW-VOLTAGE" X-RAYS ON THE ELECTROPHORETIC MIGRATION VELOCITY, VIABILITY AND pH OF *ESCHERICHIA COLI* SUSPENSIONS. K. P. Dozois, R. P. Tittsler, M. W. Lisse, and W. P. Davey. *J. Bacteriol* 24(2), 123-32(1932).

Total radiation from Coolidge x ray tube at 30 Kv (no filters), with exposures as great as 3000 ma minutes at 15.2 cm. target-culture distance, produced no detectable changes in electrophoretic migration velocity, viability or pH of aqueous suspensions of *E. coli*. BA 7-6406.

3241

EFFECT OF IRRADIATION FROM P^{32} ON GLYCOLYSIS OF RAT LIVER. J. D. Perkinson and C. C. Irving. *Radiation Research* 5, 589(1956).

Anaerobic glycolysis was measured in livers of male rats 2, 24, 48, 72, and 96 hours, and 1 and 2 weeks

after intraperitoneal injection of P^{42} in doses ranging from 0.5 $\mu\text{C/g}$ body wt. to 10.0 $\mu\text{C/g}$. Dose of 5 $\mu\text{C/g}$ depressed liver respiration about 35% and inhibited anaerobic glycolysis 50% within 24 hours after injection. Results suggest that the observed effect on respiration may be secondary to effect on glycolysis or that both changes are secondary to some other, more fundamental, change.

3242

THE INFLUENCE OF ULTRA-VIOLET RAYS, X RAYS AND TEMPERATURE ON THE GERMINATION OF ZEA Mays. R. C. Malhotra. J. Indian Botan. Soc. 11(1): 1-27(1932).

Short exposures of dry seed of Golden Bantam and Shawnee to ultraviolet (253 m μ wave length) increased % germination and subsequent growth. Results were not uniform. Harmful effect occurred following all x ray exposures. BA 7-7794.

3243

EFFECTS OF ELECTROMAGNETIC WAVES ON FUNGI. Frank H. Johnson. Phytopathology 22(4), 277-300(1932).

X rays apparently had no effect on the fungi C. Dryophila, F. batatatis and S. bataticola. Gamma and β rays slightly retarded growth and development. More than 1500 cultures of the 3 fungi were studied to identify and compare effects of γ rays, x rays, Schumann rays, U-V visible light, infra-red and Hertzian waves. BA 7-7845.

3244

STUDY OF THE ACTION OF X RAYS ON THE DEVELOPMENT OF PLANTS. S. Lallemand. Arch. Electr. Med. 38, 28-33, 126-40, 179-90, 232-9, 256-66, 349-61, 468-75, 516-23 (1930). (In French).

Beans, lentils, turnips, cress and millet were exposed to various x ray doses in study of germination, growth, lethal dose, and temperature effects. BA 7-7847

3245

THE ACTION OF RADIOACTIVITY ON THE GERMINATION OF BULBS. D. Montet. Compt. rend. 194, 1093-5(1932). (In French).

Four hyacinth bulbs exposed every 4 days to emanations from radioactive water germinated more quickly the greater the dosage, sprout growth was also accelerated. Tulip bulbs grown in earth containing 0.5 gm uranium oxide/1500 gm. soil grew more rapidly than those in earth containing 5 or 10 gm/1500 gm and more rapidly than those in soil with no added radioactivity. BA 7-7848

3246

IN SUPPORT OF CASPARL'S NECROHORMONE HYPOTHESIS AS A NATURAL LAW. Y. Nakashima. Z. Krebsforsch. 35(4), 365-71(1932). (In German).

Author postulates that effects of secondary biological reactions induced by x rays show wave-like chronological variations. Such variations in serum content and excretion of Ca, N and K salts in x rayed animals are described. BA 7-8079

3247

THE EFFECT OF X-RAYS ON THE GASEOUS METABOLISM OF A CLADOCERAN. Vasil Obreshkove and A. J. King. Physiol. Zool. 5(3), 457-71(1932).

X rays (of relatively soft and intermediate range, average wave length 0.712 A; 164, 251, 327 and 404 r/min at 30 KV and 1 hr exposure) were applied to Simocephalus vetulus. With increasing intensity of radiation, there was a proportional decrease in gaseous metabolism. BA 7-8080.

3248

A CHANGE IN THE MORPHOLOGY OF A CLADOCERAN EFFECTED BY X-RAY TREATMENT. Vasil Obreshkove and A. J. King. Physiol. Zool. 5(3), 472-8(1932).

In every individual (S. vetulus x rays produced) invagination of the upper portion of the brood chamber. Radiosensitivity is believed to be related to degree of cellular activity with regard to secretory processes. BA 7-8081

3249

EFFECT OF SPINAL X-RAY IRRADIATION AT THE LEVEL OF THE 6TH, 7TH, AND 8TH DORSAL VERTEBRAE, ON GASTRIC SENSATION AND SECRETION. Carlo Chinaello. Clin. Chirur. 34(4), 371-85(1931).

In 5 of 8 patients, free HCl was markedly increased by spinal irradiation: pepsin was unaffected. In 2 cases HCl increased, total acidity remained unchanged. BA 7-8326

3250

BISMUTH AS A VEHICLE IN TUMOR TREATMENT. P. Zadik. Z. Krebsforsch. 35(1), 78-88(1931). (In German).

Water-soluble Bi salts show elective deposition in tumor tissues as does Radium-E. By suitable apparatus author believes it may be possible to use deposited Bi to absorb gaseous radium emanation. Trypan-blue, isamin-blue, and rose-bengal might be used similarly. BA 7-8625

3251

THE OCCURRENCE OF MALIGNANCY IN RADIOACTIVE PERSONS. A GENERAL REVIEW OF DATA GATHERED IN THE STUDY OF THE RADIUM DIAL PAINTERS, WITH SPECIAL REFERENCE TO THE OCCURRENCE OF OSTEOGENIC SARCOMA AND THE INTERRELATION OF CERTAIN BLOOD DISEASES. Harrison S. Martland. Am. J. Cancer 15(4), 2435-2516(1931). BA 7-8655.

3252

ON THE ANALYSIS OF TUMOR RESISTANCE. I. ENZYME STUDIES. II. RELATION BETWEEN LIPASE ACTIVITY, CYTOLOGICAL REACTION AND AUTOLYSIS. N. Waterman. Z. Krebsforsch. 34(4), 313-332(1931). (In German).

Author proposes that the cancer cell has increased permeability, increased electrical conductivity and decreased polarization, and that all these can be reversed by increasing Ca^{++} concentration or by irradiation. The properties are attributed to intracellular lipid levels and to active or available lipases. Organ extracts (especially of spleen) can induce tumor resistance in recipient animals and are believed to owe their effectiveness to their high level of lipases. X rays also influence the enzyme level and activity.

3253

EFFECT OF WEAK DOSES OF RADIATION ON THE SUPRARENAL GLANDS OF THE MALE RAT. J. LaFargue, J. Schiller, E. Tyan and S. Pitoy. Ann. Endocrinol. (Paris) 14, 422-24(1953).

Authors describe an increase in volume of adrenal cortex with doses less than 800 r in mice.

3254

X-RADIATION AND REGENERATION IN AMBLYSTOMA. Elmer G. Butler. Science 74, 100-1(1931).

Daily x ray exposures of 3-5 min (65 KV, 7 MA, 25 cm focal distance) inhibit regeneration of forelimb of Amblystoma at any stage of limb development, growth continues but not differentiation. Unmutilated appendages differentiate normally under the same x ray exposures. BA 7-9446.

3255

HEREDITARY RADIUM-INDUCED VARIATIONS IN THE TOMATO. E. W. Lindstrom. J. Heredity 24(4), 128-37(1933).

Six heritable, recessive variants were induced by radium-needle treatment (4 arose from irradiation of young growing tips, 2 from radiated seeds). Of these, 3 affected chlorophyll characters, 2 morphological characters and 1 caused sterility and stunting of entire plant. BA 8-159

3256

EXPERIMENTS ON THE CONTROL OF SEED-BORNE

DISEASES BY X-RAYS. W. R. Tascher. J. Agr. Research 46(10), 909-15(1933).

Wide range in tolerance of fungi in culture to X rays was noted. Decreasing order of tolerance of fungi used: *F. moniliforme*, *C. acremonium*, *G. saubinetii*, and *D. Zeae*. X ray treatment failed to kill parasite-infested seeds. Some control of parasite was noted when germinating seeds were used. BA 8-345.

3257

THE RELATION OF INTENSITY OF RADIUM RADIATIONS TO TISSUE REACTION USING A SEGMENT OF A GROWING MOUSE TAIL AS A BIOLOGICAL INDICATOR. Halsey J. Bagg and C. Robert Halter. Am. J. Roentgenol. Radium Therapy 27(1), 1-13(1932).

Variation of time factor in β radiation did not alter effect of equal doses. Similar effects were obtained with γ rays except for cases where lower intensities were used. Differences are probably due to arrested tissue growth during long treatment. Intensity was varied by ratios of 920:1 to 9:1. Tissue changes used as major criteria of effect were; linear growth, constriction, epilation and amputation. BA 8-520.

3258

THE RELATIVE EFFECTS PRODUCED BY 200 kv. ROENTGEN RAYS, 700 kv. ROENTGEN RAYS, AND GAMMA RAYS. III. COMPARISON BASED ON EFFECTS ON *DROSOPHILA* EGGS AND ON WHEAT SEEDLINGS. P. S. Henshaw, C. T. Henshaw, and D. S. Francis. Am. J. Roentgenol. Radium Therapy 29(3), 326-33(1933).

Roentgen rays of 165 KU and 700 KV were equally effective in producing mortality in *Drosophila* eggs, but γ rays were 32% more effective in producing effects on wheat seedlings. BA 8-522.

3259

THE RELATIVE EFFECTS PRODUCED BY 200 KV. ROENTGEN RAYS, 700 KV. ROENTGEN RAYS, AND GAMMA RAYS. IV. COMPARISONS BASED ON CHANGES PRODUCED IN MAMMALIAN TISSUES WITH 200 KV. ROENTGEN RAYS AND GAMMA RAYS. Halsey J. Bagg and C. Robert Halter. Am. J. Roentgenol. Radium Therapy 29(3), 334-42(1933).

Biological changes in the rabbit ear and growing mouse tail exposed to 200 KV x rays on radiation from a radon bulb varied from epilation to tissue necrosis in this study which was part of a series designed to study the effects of long vs. short wave length x rays. BA 8-522.

3260

THE RELATIVE EFFECTS PRODUCED BY 200 KV. ROENTGEN RAYS, 700 KV. ROENTGEN RAYS, AND GAMMA RAYS. V. COMPARISON BASED ON THE PRODUCTION OF ERYTHEMA IN HUMAN SKIN. James J. Duffy, Robert F. McNattin, Murray M. Copeland, and Edith H. Quimby. Am. J. Roentgenol. Radium Therapy 29(3), 343-5(1933).

Production of erythema on human skin does not agree with results of experiments studying other biological effects or with standard ionization chamber, indicating that skin is more resistant to shorter wave length (higher voltage) radiation. (This is one in a series of related experiments.) BA 8-522

3261

THE RELATIVE EFFECTS PRODUCED BY 200 KV. ROENTGEN RAYS, 700 KV. ROENTGEN RAYS AND GAMMA RAYS. VI. COMPARISON BASED ON CLINICAL OBSERVATION. Robert F. McNattin. Am. J. Roentgenol. Radium Therapy 29(3), 346-51(1933).

Clinical impression is that skin is more resistant to shorter wave length radiation but malignant tissue is not. Selective action of radiation for the 2 tissues is more marked at higher voltages. BA 8-522

3262

THE RELATIVE EFFECTS PRODUCED BY 200 KV. ROENTGEN RAYS, 700 KV. ROENTGEN RAYS, AND GAMMA RAYS. VII. CORRELATION OF EXPERIMENTAL RESULTS. G. Failla. Am. J. Roentgenol. Radium Therapy 29(3), 352-67(1933).

Although isolated biological effects show no differential action of radiation with respect to wave length, author feels this fact does not warrant the generalization that such action does not exist. BA 8-522.

3263

THE SKIN REACTIONS PRODUCED BY ALTERATIONS OF HEAT AND X-RAY AT VARIOUS TIME INTERVALS. James A. Hawkins. J. Exptl. Med. 53(3), 405-11(1931).

Effect of heat (below burn intensity) or soft x rays (suberythermal dose) alone on guinea pig abdomen was slight scaling of skin. Both agents given within 3 hr caused well-marked, persistent burns, within 24 hr, scaling of skin, more marked than that resulting from either agent alone. BA 8-523

3264

ON THE EFFECT OF RÖNTGEN RAYS ON THE ABILITY OF TUMORS TO STORE IODINE AND BISMUTH. THE QUESTION OF COMBINED RÖNTGEN-CHEMOTHERAPY OF MALIGNANT TUMORS. Gosta Jansson. Acta Radiol. 13(5), 533-50(1932). (In German).

Storage of I and Bi was observed in Jensen's sarcoma and Flexner's carcinomata implanted in rats and irradiated (1-3 and 3-5 E. D., i-4 mm Al filter.) Storage of I was decreased 24 hr after large doses; storage of Bi, was increased. BA 8-524

3265

RADIUM STERILIZATION OF THE FEMALE ALBINO RAT (*MUS NORVEGICUS*). Douglas P. Murphy. Surg. Gynecol. Obstet. 49(4), 440-6(1929).

Single exposures of each ovary to 450 millicurie hr or more resulted in permanent sterility in 74% of rats studied. BA 8-526

3266

IRREVERSIBLE MUCOUS MEMBRANE AND VASCULAR CHANGES OF THE URINARY BLADDER IN GYNECOLOGICAL RÖNTGEN AND RADIUM THERAPY. B. Ottow. Zentr. Gynakol. 56(28), 1722-9(1932) (In German).

Basic pathological changes produced in urinary bladder by irradiations (X and Ra) were essentially the same as those in other organs. X ray damage was more uniform but less intense than that produced by radium. BA 8-527.

3267

THE PATHOLOGY OF TOTAL BODY RADIATION IN DOGS WHICH DIED FOLLOWING EXPOSURE TO A LETHAL DOSE. C. A. Gleiser. Am. J. Vet. Research 15, 329-35(1954).

In irradiated dogs there was widespread destructive hemorrhagic and degenerative changes within the lymphoid elements, with practically no evidence of attempts at regeneration. There was also generalized evidence of a hemorrhagic tendency, manifested in the form of petechial, ecchymotic and massive hemorrhages.

3268

THE TIME FACTOR IN THE BIOLOGICAL ACTION OF X-RAYS. I. INVESTIGATIONS ON *DROSOPHILA* EGGS. Rolf Sievert and Arne Forssberg. Acta Radiol. 12(6), 535-51(1931).

Drosophila eggs were x irradiated with 83-220 r given in 3600-2 secs. Death rate was dependent only on total r for intensities over 5 r/min. Some evidence of slight periodic fluctuations of radio-sensitivity with time was observed. BA 8-530.

3269

THE BIOLOGICAL RESPONSE TO GAMMA RAYS OF RADIUM AS A FUNCTION OF THE INTENSITY OF RADIATION. F. G. Spear and L. G. Grimmet. *Brit. J. Radiol.* **6**, 387-404(1933).

Tissue cultures of embryo fowl choroid and sclera were γ -irradiated (3.6 gm Ra), intensity varied by changing target-tissue distance. Biological effect (dose requested to reduce all division by 40%) increased with intensity to a certain critical value, beyond which it remained practically constant. BA 8-531.

3270

X-RAY EXPERIMENTS IN EGG DEVELOPMENT OF *G. VIRIDULA* (COLEOPTERA, CHRYSOMELIDAE). (Russian with German Summary). G. S. Strelin. *Vestnik Rentgenol i Radiol.* **8**(3), 219-22(1930).

Eggs (510 sets) of *G. viridula* were given various x ray exposures. Large doses retarded or killed larvae (lethal dose varies with species). Shortening of normal development period was not observed. BA 8-532.

3271

THE EFFECTS OF ROENTGEN RAYS ON CYTOLOGY AND ABSORPTION FROM EXPERIMENTAL ABSCESSSES. Edwin T. Thorsness. *Am. J. Roentgenol. Radium Therapy* **28**(1), 81-6(1932).

Marked decrease in size was noted in early-irradiated experimental abscesses of rabbits as compared with non-irradiated or those over 5 days old. Absorption of particulate material (but not of true solutions) was markedly increased by early irradiation. BA 8-533.

3272

DEMONSTRATION OF LEUKOCYTE-ATTRACTING MATERIAL IN HUMAN LEUKEMIC BLOOD. C. Hallauer. *Z. ges. exptl. Med.* **76**(3/4), 577-86(1931). (In German).

Leukemic sera stimulate migration of leukocytes in cultures of bone marrow, spleen and blood (positive chemotaxis). Proteoses stimulating such action are absent in aleukemic sera and in x irradiated leukemic sera. Author believes the agents present in leukemic sera are eliologic agents in production of leukemia. BA 8-1030

3273

CHANGE OF BLOOD GROUP IN PATIENTS AFTER X-RAY THERAPY. B. G. Milhailovs'kii. *Ukrainisches Zentr. Blutgruppenforsch* **3**(4), 312-30(1929).

A study was made of 121 patients (malignant growths, benign tumors, bronchial asthma, Basedow's disease, eczema, psoriasis) before and after x irradiation. In a case of lympho-sarcoma, change from blood group I to III is reported to have occurred. BA 8-1196.

3274

ON THE INFLUENCE OF METALLIC RADIATIONS ON THE VIABILITY OF MICROBIAL CULTURES. Humbert Boucher. *Compt. rend. soc. biol.* **109**(15), 1377-8(1932). (In French).

Radiation of Au, Sn and Hg did not attenuate agar cultures of *B. coli*, *Staph.* or anthrax bacillus. Sn and Au prolonged vitality of *B. coli* and *Staph.* BA 8-1460.

3275

SUSCEPTIBILITY OF THE OMENTUM OF RABBITS TO A SINGLE ERYTHEMA DOSE (400 r) OF ROENTGEN RAYS. Nicholas A. Michels. *Am. J. Anat.* **52**(3), 333-95(1933).

Rabbits were sacrificed 5-96 hours after external irradiation over the omental area. Observations on whole-mount preparations showed: destruction of lymphoid cells at 5-45 hours, marked leukocytic infiltrations, disintegration of pseudo-eosinophils (5-18 hr), massive and diffuse hemorrhage (18-65 hr), blood stasis, tortuosity, occlusion and degeneration of capillaries and endothelial

reversion to mesenchyme. This was followed by lymphoid hypertrophy and profuse regrowth of capillaries filled with locally formed lymphocytes (65-77 hr) and progressive growth of connective tissue elements, progressing to fibrosis. BA 8-1923.

3276

NATURE AND SIGNIFICANCE OF STRUCTURAL CHROMOSOME ALTERATIONS INDUCED BY X-RAYS AND RADIUM. Thomas Harper Goodspeed and Priscilla Avery. *Cytologia* **1**(3), 308-27(1930).

Chromosome reorganizations observed in 2nd and 3rd generation progenies derived from X and Ra irradiated *Nicotiana tabacum* are discussed. BA 8-2690.

3277

TRANSLOCATIONS INVOLVING THE SECOND AND FOURTH CHROMOSOMES OF *DROSOPHILA MELANOGASTER*. T. Dobzhansky. *Genetics* **16**(6), 629-58(1931).

Four translocations involving the 2nd and 4th chromosomes were found in progeny of x rayed males. In each instance, a section of 2nd chromosome became broken off and reattached to 4th chromosome. One of the translocations produces a viable duplication. BA 8-2724.

3278

A NEW TYPE OF TRANSLOCATION IN *DROSOPHILA MELANOGASTER*. Marcus M. Rhoades. *Genetics* **16**(5), 490-504(1931).

A translocation involving 2nd and Y chromosomes was produced by x irradiation of a male fly. Observations relative to this translocation are presented in detail. BA 8-2739

3279

THE EFFECTS OF X-RADIATION OF LARVAE IN *HABROBRACON*. Anna R. Whiting and Carey H. Bostian. *Genetics* **16**(6), 659-80(1931).

Treatments of 730-4378 r of x rays given to homozygous male and female larvae. Observations were made of effects on survival, fertility and structural abnormalities induced by the irradiation. BA 8-2747

3280

DOUBLE CATARACT FROM THE APPLICATION OF X RAYS TO THE FACE. B. Adamantiadis and Uranie Rangabi. *Ann. Oculistique* **169**(8), 627-32(1932). (In French).

Patient received 20 H units of x rays filtered through 2 mm Al and 2 mm linen directed to face. Eyeballs were protected by lead. Subsequent cataract development is described. BA 8-3026.

3281

THE EFFECT OF RÖNTGEN RAYS ON THE RETINA. Wolfgang Hoffmann. *Z. Augenheilk.* **73**(4/5), 214-32(1931). (In German).

Two eye tumor cases are described. In both, irradiation of eye by intense hard rays produced degeneration of retinal cells. Previous results had indicated that retina was insensitive. BA 8-3027

3282

THE EFFECT OF GAMMA RAYS UPON THE METABOLISM OF TISSUES IN CULTURE. Barbara E. Holmes. *Brit. J. Radiol.* **6**, 461-7(1933).

Tissue cultures of embryo kidney were γ irradiated (300 mg Ra) for periods of 14 hr and studied during subsequent 34 hr. Utilization of glucose was inhibited, N metabolism was unaffected, gross appearance of cells was unchanged. BA 8-3028

3283

STUDY OF HETEROTRANSPLANTATION OF MOUSE LYMPHOSARCOMA. C. Krebs and M. Thrane. *Z. Krebsforsch.* **36**(1), 49-58(1932). (In German).

Authors report successful implantation of mouse lymphosarcoma into rats, following general x irradiation.

Growth persisted throughout the life of animals. Tumors were successfully re-inoculated into mice but not into untreated rats. BA 8-3569.

3284

THE NERVE NET OF DONAGGIO OF NEWBORN MAMMALS UNDER SPECIAL EXPERIMENTAL CONDITIONS. Gastone Lambertini. *Monit. zool. ital.* 40(11/12), 371-7 (1930). (In Italian).

Newborn dogs were given 8 H. E. D. of x rays in cervicodorsal region. Neurofibrillae of nerve cells were found to be radiosensitive. Lesions were manifest by lysis or of coagulation. BA 8-3571.

3285

II. APLASIA OF MARROW AND FATAL INTOXICATION IN DOGS PRODUCED BY ROENTGEN RADIATION OF ALL BONES. Samuel S. Shouse, Stafford L. Warren, and George H. Whipple. *J. Exptl. Med.* 53(3), 421-35 (1931).

Observations on behavior, clinical signs, symptoms, blood changes and autopsy findings in typical cases lethal irradiation of dogs are reported. A dose of 1050 ma min. was uniformly fatal. Doubling this dose did not appreciably hasten death. BA 8-3598.

3286

ON THE INDEPENDENCE OF GROWTH INHIBITION FROM METABOLIC ACTIVITY IN MALIGNANT CELLS. F. Eichholtz, W. Keil, and L. Kluge. *Biochem. Z.* 260(1/3), 139-42(1933). (In German).

Growth inhibition by x rays does not affect metabolism of rat sarcoma. Tumor growth rate is independent of its metabolism, respiration, fermentation, and its arginase, histidase, phosphatase, and lactic acid content. Anterior pituitary hormone did not affect rat sarcoma. BA 8-3624.

3287

THE PRODUCTION OF OSTEOGENIC SARCOMATA AND THE EFFECTS ON LYMPH NODES AND BONE MARROW OF INTRAVENOUS INJECTIONS OF RADIUM CHLORIDE AND MESOTHORIUM IN RABBITS. F. R. Sabin, C. A. Doan, and C. E. Forkner. *J. Exptl. med.* 56(2), 267-89 (1932). BA 8-3660

3288

ON THE DECREASE IN AGGLUTINATION TITRE UNDER THE INFLUENCE OF RADIUM EMANATION. Stephen Sterling-Okuniewski and Tadeusz Kaweck. *Bull. intern. acad. polon. sci. Classe Med.* 1931(1/2), 1-4(1931). (In German).

Seventy percent of agglutinating human sera submitted to Ra emanations showed definite weakening in agglutinating power as compared with unexposed sera. Change in serum was stable. BA 8-3757

3289

FURTHER OBSERVATIONS ON THE EFFECT OF X-RAYS ON REGENERATION IN AXOLOTL. E. Ia. Lichko. *Compt. rend. acad. sci. USSR. Ser. A.* 1932(3), 65-70 (1932).

X raying (88 r) of 9 mo. old axolotls prior to limb amputation, prevented regeneration. In other studies, connective tissue areas regenerated despite exposure. BA 8-4566.

3290

FURTHER STUDIES ON THE GENETICS OF ABNORMALITIES APPEARING IN THE DESCENDANTS OF X-RAYED MICE. C. C. Little and B. W. McPheters. *Genetics* 17(6), 674-88(1932).

Embryological development of abnormal eyes or limbs in descendants of x rayed mice is described. The aberration originates as blebs of colorless fluid in 7-9 mo. embryos, later becoming filled with extravasated blood and causing arrest in development of the part of the embryo affected. BA 7-10186

3291

GENETIC AND CYTOLOGICAL STUDIES ON X-RADIATION INDUCED DOMINANT EYE COLORS OF DROSOPHILA. E. A. Van Atta. *Genetics* 17(6), 637-59 (1932). BA 7-10192.

3292

POLARITY AND THE PRODUCTION OF ADVENTITIOUS GROWING POINTS IN MARCHANTIA POLYMORPHA. Hugh Dickson. *Ann. Botany (London)* 46, 683-701(1932).

Adventitious buds were produced by action of ultraviolet and x rays, by drying and by plasmolysing solutions. At any x-ray dose, number of gemmae with 1, 2, 3 etc. buds, took form of Poisson series. Alternative hypotheses offered to explain observed x ray effects, one based on target theory and one on inherent differences in radio-sensitivity of cells of different ages. BA 7-10313.

3293

ON THE ALLEGED STIMULATING ACTION OF X-RAYS UPON PLANTS. Edna L. Johnson. *Am. J. Botany* 18(8), 603-14(1931).

X ray exposures failed to stimulate growth (height, dry and green wt used as indicators) of tomato, sunberry, and vetch. Early report of x ray induced growth increase of tulip bulbs and potatoe tubers over controls was unconfirmed in further study. BA 7-10335

3294

THE EFFECTS OF ULTRAVIOLET, X-, AND CATHODE RAYS ON THE SPORES OF MUCORACEAE. Basile J. Luyet. *Radiology* 18(5), 1019-22(1932).

Author presents a statistical study of injurious effects of cathode rays, copper-K x rays ($\lambda = 1.537\text{\AA}$) and ultraviolet on spores and growing mycelium of *R. nigricans* (+). "Multiple-hits-to-kill" curves were obtained. Swollen giant spores were produced by cathode and x rays. Radiosensitivity of yeast cells and mucoraceae spores were compared. BA 7-10339.

3295

ON THE VARIATIONS IN MANIFESTATION OF LESIONS PRODUCED BY X-RAYS IN SEEDS AS A FUNCTION OF ENVIRONMENTAL TEMPERATURE AFTER IRRADIATION. S. Angel. *Compt. rend. soc. biol.* 93, 1671-2(1925). (In French).

3296

A NOTE ON THE X RAY ABSORPTION OF TISSUES. Warnford Moppett. *J. Cancer Research Comm. Univ. Sydney* 4(2), 98-100(1932).

Using mixed radiation (140 kv constant potential, 1 mm, Al 3 mm glass filter) and thermoelectric indicator of total x ray energy, steak showed 9.5% (mean) higher absorption than water. Absorption coefficient μ , was 0.29 for steak, 0.89 for compact bone. BA 7-10416.

3297

A CASE ILLUSTRATING THE EFFECTS OF PROLONGED ACTION OF RADIUM. Joan M. Ross. *J. Pathol. Bacteriol.* 35(6), 899-912(1932).

A Ra needle escaped from a carcinomatous breast and was buried in the myocardium for 3 yr causing considerable degeneration and fibrosis, and also apparently a hemangio-endothelioma of the liver. BA 7-10417.

3298

ERYTHROCYTE SEDIMENTATION RATE IMMEDIATELY BEFORE AND AFTER RÖNTGEN RADIATION. (CLINICAL STUDY OF 100 PATIENTS.) Edmund Christiani. *Strahlentherapie* 43(1), 126-39(1932). (In German).

Sedimentation rate in 100 patients after x irradiation showed: no change in about half; acceleration in many; slowing, rarely. Observed changes permit no conclusions relative to x ray effect on ESR. BA 7-10432

3299

FURTHER STUDIES ON THE RÖNTGENOLOGICAL DEMONSTRATION OF THE PLACENTA IN ANIMAL

EXPERIMENTS. K. Ehrhardt. Zentr. Gynakol. 56(14), 847-51(1932). (In German).

Author concludes from results of injecting thorotrast into mice and rabbits that the placenta is almost as good a storage organ as the reticuloendothelial system of liver and spleen. Effects of thorotrast before and after conception are described. BA 7-10579.

3300

CHANGES IN BLOOD LACTIC ACID AFTER RÖNTGEN RADIATION OF NORMAL AND PATHOLOGICAL TISSUES. J. Heeren and R. Hummel. Strahlentherapie 42(4), 784-92(1931). (In German).

Changes in blood lactic acid after irradiation of normal (thigh) and neoplastic tissue in tumor patients is described. In 20 patients, blood lactic acid increased 6-8 mm after irradiation of neoplasm; not after irradiation of normal tissue. BA 7-10981

3301

EXPERIMENTS ON THE SUSCEPTIBILITY OF TUMOURS AND TUMOUR CELLS TO RADIATION. J. C. Mottram. Acta Radiol. 12(1), 1-7(1931).

Sarcoma and carcinoma tissue of rats and mice were irradiated 87-254 mm with γ radiation in vitro (110 mgm Ra Br, 2 x 2 cm, 0.12 mm Ag + 3 mm Pb), then implanted into rats. No decided differences in susceptibility of the 2 tissues to γ radiation found, embryo rat skin showed same susceptibility. BA 7-11024

3302

ROSETTE FORMATION IN THE EYES OF IRRADIATED HUMAN EMBRYOS. Isadore Golstein and David Wexler. Arch. Ophthalmol (Chicago) 6(4), 591-600(1931).

Fetuses of 5 patients receiving 85-90% E. D. of 200 KV x rays during 2nd mo. of pregnancy, exhibited rosette formation and incompletely developed ectodermal portions of eye; other regions being unaffected. Reaction appears to be a specific result of irradiation given at this critical period of fetal development. BA 7-11991.

3303

POSSIBILITIES OF NATURAL RADIATIONS FROM THE GREAT BEAR LAKE PITCHBLLENDE DEPOSITS ON GENE MUTATIONS. W. C. Broadfoot. Science 75, 334-5 (1932).

Author suggests that effects of radiations from these deposits be tested on plants and animals since their uranium oxide content is 27.88-83.90%. Equivalent radium content = 70.79-213 mgm/ton. BA 7-12656

3304

ARE "PROGRESSIVE" MUTATIONS PRODUCED BY X-RAYS? J. T. Patterson and H. J. Muller. Genetics 15(6), 495-577(1930).

Evidence is presented from specially planned experiments on *Drosophila* relative to the effect of x rays on germinal material. Other experimental results are included. BA 7-12674.

3305

COSMIC RAYS AND CELL MULTIPLICATION (GERMINATING SEEDS). V. Rivera. Atti. r. accad. Nazl. Lincei, Rend., Classe sci. fis. mat. e nat. 11(5), 527-30(1930). (In Italian).

Petri dishes containing seeds of various plants on moist filter paper were put in bronze containers and sunk to depths of 30, 60, 90 and 112 m in a lake to eliminate all cosmic radiations. All examples germinated equally well. BA 7-12847.

3306

DEVELOPMENT OF PLANTS UNDER LEAD SCREEN. V. Rivera. Atti. accad. nazl. Lincei, Rend., Classe sci. fis. mat. e nat. 11, 718-720(1930). (In Italian).

Seeds of various kinds were germinated in lead chambers with walls 1.5-150 mm thick. Slightly better germination

was obtained in the thick chambers than in the thin ones and in controls. Authors conclude that all short waves (3800-.0004A) depress germination. BA 7-12848

3307

ON THE EFFECT OF RÖNTGEN RADIATION ON THE HEALING OF EXPERIMENTAL FRACTURES IN RABBITS. Wolfgang Latten. Arch. klin. Chir. 163(3), 427-51(1930). (In German).

Author obtained no unequivocal proof that x rays (10-90% E. D.) promoted callus formation on fractured tail vertebrae, nor was there any indication of an injurious action, regardless of dose. Study is based on observations of fractures of tail vertebrae in 40 irradiated rabbits, 18 controls. BA 7-12945.

3308

REGARDING THE QUESTION OF THE EFFECT OF X-IRRADIATION ON THE CENTRAL NERVOUS SYSTEM. (EXPERIMENTAL STUDIES.) B. N. Mogilnitsky and L. D. Podljaschuk. Fortschr. Gebiete Röntgenstrahlen 40(6), 1096-1108(1929). (In German).

Doses of 3/4-10 1/2 E. D. x rays through 3 mm Al or 0.5 mm Zn + 1 mm Al, 120-180 kv were applied in 1 or 2 fields to head of dogs and rabbits and to spinal cord of rabbits. Effects are described. Both age and constitution were found to influence x ray effects on brain. BA 7-12946.

3309

RÖNTGEN RAY EFFECTS ON THE RETICULOENDOTHELIAL SYSTEM AND ITS RELATIONSHIP TO RÖNTGEN SICKNESS. Albert Schöning. Strahlentherapie 33(1), 55-69(1929). (In German).

Uptake of congo red by the R-E system was slowed after x irradiation with carcinoma doses. The less congo red absorbed by the R-E system, the shorter the sickness after radiation. BA 7-12949

3310

HYPOPHYSIS AND BONE CALLUS. A. Spinelli and Ferdinando Talia. Arch. Radiol. 6(4/5), 748-62(1930).

Fractures of forelegs in dogs receiving stimulatory treatment of hypophysis (1/4 E. D. on temples alternately, one dose/wk) showed precocious formation of the osseous callus, more rapid callus growth and greater osteoblastic formation and periosteal thickening. BA 7-12950.

3311

THE PRESENCE OF COMPOUND CHROMOSOMES IN THE PRIMARY SPERMATOCYTES OF *CIRCOTETIX VERRUCULATUS* (ORTHOPTERA). Edwin R. Helwig. Science 76, 352(1932).

Numerous multiple chromosome forms were observed in *C. verruculatus* after x irradiation. BA 7-15122

3312

A NOTE ON THE DISAPPEARANCE OF THE MITOTIC PHASES FROM IRRADIATED TISSUE CULTURES. Wm. H. Love. Med. J. Australia 19(Vol. 1, No. 24), 829-30 (1932).

Assuming that number of cells entering mitosis per unit of time is constant, author presents equations and diagram representing rate of disappearance of various phases and diminution in number of mitotic figures after radiation. BA 7-15125

3313

THE CONSTITUTION OF PRIMARY EXCEPTIONS OBTAINED AFTER X-RAY TREATMENT OF *DROSOPHILA*. E. G. Anderson. Genetics 16(4), 386-96(1931).

Virgin females (*ScCvVi/e c g*) were x rayed; then mated to bar males, and exceptional daughters produced were bred to determine their x constitution. Relatively high values for homozygosity of garnet and forked are believed to be due to non-disjunction at both maturation divisions after x ray treatment. BA 7-15190.

3314

A STUDY OF THE EFFECT OF X-RAY RADIATION ON OCCURRENCE OF ABNORMAL INDIVIDUALS, MUTATION RATE, VIABILITY AND FERTILITY OF THE PARASITIC WASP, *HABROBRACON JUGLANDIS* (ASHMEAD). W. F. Dunning. *Genetics* **16**(6), 505-31(1931).

X radiation increased mutation rate at 4 loci: orange, reduced, bar and eyeless in directly x rayed individuals. For several generations, descendants of x rayed individuals showed greater proportions of eye and somatic abnormalities. Greater x ray doses had greater effects. BA 7-15193.

3315

GENE NUMBER, KIND, AND SIZE IN *DROSOPHILA*.

John W. Gowen and E. H. Gay. *Genetics* **18**(1), 1-31 (1933).

Adult males of *D. melanogaster* were exposed to monochromatic x rays from Cu and Cr for 8 different durations. Mathematical analysis of data indicates a minimum of 14,380 loci and an average gene size of 1×10^{-18} cm. BA 7-15196

3316

EFFECTS PRODUCED BY AGING AND X-RAYING EGGS OF *DROSOPHILA MELANOGASTER*. J. T. Patterson, Weldon Brewster, and A. M. Winchester. *J. Heredity* **23**(8), 325-33(1932).

X irradiation increases % of infertility, primary non-disjunction and breakage of x-chromosome, when applied to mature eggs aged in ovaries of virgin females. The nearer eggs are to maturity, the more susceptible they are to x rays, as regards production of these phenomena. BA 7-15213

3317

MUTANTS IN *HABROBRACON*. P. W. Whiting. *Genetics* **17**(1), 1-30(1932).

Author presents a brief description of 36 mutant types, 24 reported for first time. Striking increase in mutations due to x raying is noted. BA 7-15225.

3318

ACTION OF α RAYS ON *POLYTOMA UVELLA*. DETERMINATION OF TARGET SIZE CORRESPONDING TO PRINCIPLE LESIONS OBSERVED. F. Holweck and A. Lacassagne. *Compt. rend. soc. biol.* **107**(21), 812-14 (1931). (In French).

Irradiation of *P. uvela* by α rays of polonium (originally 1670 U. E. S., sending 1α particle per μ^2 every 64 sec), at distance of 15 mm caused 4 types of lesions which are described. Data are analyzed in terms of target theory. BA 7-15432

3319

ON SOME CELLULAR REACTIONS TO X-RADIATION. E. G. Butler. *J. Exptl. Biol.* **9**(1), 107-116(1932).

Steps in recovery of cells of developing neural tube (chick embryos, following single non-lethal x ray dose are described. Changes occurred in both mitotic and resting cells. BA 7-15520

3320

RADIO-SENSITIVITY FROM THE CHEMICAL VIEW-POINT. G. Harker. *J. Cancer Research Comm. Univ. Sydney* **4**(3), 109-17(1932).

On basis of chemical reactions studied, author postulates that biological changes produced in living tissues by therapeutic x radiation may be due to initiation of catalytic changes which can proceed once they are started. BA 7-15522

3321

THE EFFECT OF GAMMA-RAY IRRADIATION UPON THE GROWTH OF A PROTOZOAN, *BODO CAUDATUS*. Muriel Robertson. *Quart. J. Microscop. Sci.* **75**(3), 511-41(1932).

B. caudatus grew less rapidly when in presence of Ra. Growth capacity of irradiated strain was slightly impaired for 32 days postirradiation. Development of impairment during daily growth - period is traced. BA 7-15527

3322

EXPERIMENTAL CASTRATION OF FEMALES OF *GAMMARUS* AND ITS REPERCUSSIONS ON THE DEVELOPMENT OF OOSTEGITES. M. L. Le Roux, *Compt. rend.* **193**(19), 885-7(1931). (In French).

Prepubertal Ra-Ba irradiation of female *Gammarus pulex* caused failure of vitellogenesis (egg-laying) to appear. Postpubertal irradiation caused egg-laying to cease. Ovaries were not destroyed but were arrested in development. BA 7-15766.

3323

THE ORIGINATION OF PLANES OF DISCONTINUITY IN THE LENS. Hans Goldmann. *Graefes' Arch. Ophthalmol.* **122**(1), 198-218(1929). (In German).

Planes of discontinuity in lens surface in rats may be caused by x rays due to direct injury to surface of lens. Long latent period of roentgen cataract is demonstrated. Injury to lens fibers occurs in epithelial cell stage, visible changes follow much later. BA 7-15811

3324

EXPERIMENTAL STUDY ON HEART FUNCTION. 1. INFLUENCE OF EXPOSURE TO ULTRA-VIOLET RAY, ROENTGEN RAY AND RADIUM RADIATION ON THE FUNCTION OF EXTIRPATED TOAD HEART. Masanori Oana. *Japan. J. Exptl. Med.* **10**(2), 73-96(1932).

In controlled experiments under different conditions of perfusion, author found the various radiations studied had no promoting, stimulating or restraining influence on activity of hypofunctioning toad hearts. BA 7-15916.

3325

ON SOME PROPERTIES OF THE RADIATION-SUBSTANCES (WITH WEAK RADIATION). H. Zwaardemaker. *K. Akad. Wetenschap. Amsterdam Proc. Sect. Sci.* **30**(3), 420-22 (1927).

Ra emanations of slight intensity restored the beat in cold-blooded heart arrested by perfusion with Ringer's solution minus K. Activating substance generated can restore beat of a second heart in standstill. Long latency suggests catalytic type of influence. BA 7-15943.

3326

RADIATION-SUBSTANCE AND CARDIAC HORMONES. R. Zwaardemaker. *K. Akad. Wetenschap. Amsterdam Proc. Sect. Sci.* **30**(2), 184-8(1927).

Hearts perfused with solutions lacking K ceases to beat when 1/3 of the original store has been lost. Exposure to variety of irradiations restores the beat. Irradiation is believed to cause formation of activating substances, "automatins", whose energizing effect is demonstrable on a second ventricle. BA 7-15944

3327

CHANGES IN OMENTUM OF RABBITS AFTER SINGLE ERYTHEMA X-RAY DOSAGE. N. A. Michels. *Anat. Record* **52**(Suppl., Feb.), 25(1932).

Transformation of the omentum into a lymphoid organ is described in detail. Changes involve connective tissue cellular infiltration and changes in capillaries and endothelium. BA 7-16990.

3328

PRELIMINARY NOTE ON THE CHROMOSOME ALTERATIONS BY X-RAYS IN *LOXOBLEMMUS ARIC TULUS*, A SPECIES OF GRYLLOID FAMILY. Kazuo Suzuki. *Proc. Imp. Acad. (Tokyo)* **8**(10), 521-23(1932).

Translocation, duplication, inversion, and deletion of the 7 pairs of chromosomes of this cricket are described. BA 7-17705.

3329

EXPERIMENTS ON X-RAYING CULTIVATED PLANTS.

1. WHEAT L. N. Delone. Contrib. Plant Breeding Inst. (Kiev) 4, 3-16(1928).

Historical review of experimental work of mutations as influenced by x rays is presented. Experiments on wheat: Triticum vulgare albidum 0605, T. durum melanopus 069, and T. vulgare ferrugineum No. 100 are described. BA 7-17715.

3330

THE ORIGIN AND HEREDITY OF RADIUM INDUCED PHYTOCARCINOMA. Emmy Stein. Z. induk. Abstamm. -u. Vererbl. 62(1/2), 1-14(1932). (In German).

By radium irradiation of the embryos of Antirrhinum majus, chimeras may form in which the anlagen for tissue deterioration are confined to definite embryonic layers. BA 7-17745.

3331

STUDIES ON QUANTITATIVE INTERPRETATION OF VARIOUS LESIONS PRODUCED IN CELLS BY RADIATIONS. F. Holweck and A. Lacassagne. Compt. rend. soc. biol. 107(21), 814-17(1931). (In French).

Various types of lesions produced in Polytoma uvella by α rays are described, and hypothesis is offered to explain their cause. Lesions caused by α rays striking the karyosome do not affect growth or 1st cell division but do alter chromatin. When the centrosome is injured, division is prevented but growth and motility are unaffected. Observed effects are compared with effects of U-V BA 7-18052.

3332

EFFECT OF X-IRRADIATION UPON GROWTH AND REPRODUCTION OF TOMATO. Edna Louise Johnson. Plant Physiol. 6(4), 685-94(1931).

Irradiation of young tomato seedlings causes marked leaf anomalies in young growth which develops after irradiation. Other effects are also described. BA 7-18053.

3333

RADIUM AND NERVOUS TISSUE: AN EXPERIMENTAL STUDY. E. A. Carmichael and J. Paterson Ross. Proc. Roy. Soc. Med. 23(7), 897-904(1930).

Radon seeds were inserted within or placed on the dura mater, and Ra needles were placed on dura mater (rabbits). Histological studies on animals killed at 3 hour intervals up to 24 hours after exposure are described and include changes in endothelium, WBC emigration, destruction of cortex and hemorrhage treatment of 8 clinical cases of brain tumor gave inconclusive results. BA 7-18211.

3334

PRODUCTION AND BIOLOGICAL ACTION OF VERY LONG WAVE LENGTH X-RAYS. A. Dognon and J. Massa. J. radiol. et electrol. 15(1), 22-32(1931). (In French).

X ray tube follows design of Dauvillier. Variation of intensity of x rays with voltage of tube and thickness of cellophane window was determined. Tube was operated from $2\frac{1}{2}$ to $4\frac{1}{2}$ KV giving wave length of 5 Å. Irradiation of 50 sec with 3 KV and 50 m. a. at distance of 1 cm produces marked superficial erythema, but no lasting lesions. BA 7-18212.

3335

THE EFFECT OF RADON RADIATION UPON ISOLATED ORGANS. S. E. F. Gooding. J. Pharmacol. Exptl. Therap. 44(3), 269-77(1932).

Irradiation from radon increased activity and irritability of certain isolated organs, effect being greater if perfusion fluid was partially deprived of K ions. Irradiation rendered uterus much more sensitive to action of pituitrin. BA 7-18213

3336

ON THE EFFECT OF RÖNTGEN RAYS ON BLOOD GAS AND ALKALI RESERVE IN CANCER BEARING PATIENTS. A. Gremme. Arch. Gynakol. 152(3), 667-78(1933). (In German).

Changes in alkali reserve and CO₂ tension of blood of 5 carcinomatous women following x ray irradiation are described. Shift in CO₂ combining power of blood in these patients seemed dependent upon size of tumor and degree of disintegration. BA 7-18214

3337

INFLUENCE OF QUANTUM SIZE ON THE BIOLOGICAL KILLING EFFECT OF VARIOUS TYPES OF RAYS. II. THE DEPENDENCE OF THE INJURIOUS EFFECT IN ASCARIS MEGALOCOPHALA ON THE KIND OF RADIATION. H. Holthusen and C. Zweifel. Strahlentherapie 43(2), 249-72(1932). (In German).

No qualitative differences in damage to Ascaris eggs were found for x rays of different wave lengths or between x rays and γ rays. Ultra violet and thermal effects differed from effects of x and γ rays with respect to the course of damage and dose-effect curves. BA 7-18216

3338

THE EFFECT OF CATHODE RAYS ON NERVE CELLS AND COMPARISON WITH THAT OF ROENTGEN RAYS. Sadao Honjo. Okayama Igakkai Zasshi 42, 628-44, 1217-28 (1930). (In German). BA 7-18217

3339

STUDIES ON THE CONNECTION BETWEEN THE RADIATION REACTION OF PROTEINS AND OF BIOLOGICAL ORGANISMS. K. Schwerin. Strahlentherapie 31(2), 253-63 (1929). (In German).

Author found, by an ultramicroscopic method using 0.1% pseudoglobulin exposed to Hg quartz lamp, that latent period of effect and extent of effect increased with wave length. When x rays were used, increase of dosage shortened the latent period and augmented maximal effect. Experiments were done to check experiments by others showing that erythema-producing effect varied with wave length. BA 7-18219

3340

ACTION OF RADON SOLUTIONS ON THE LIPOLYTIC POWER OF GUINEA PIG BLOOD. Carlos Vidal. Compt. rend. soc. biol. 109(6), 495-7(1932). (In French).

Daily injection, for 23 days, of 2 cc of solution of 1.3 m μ c of radon in saline decreased the lipolytic power of serum of 7 rabbits and increased that of 3. Solution of 8 m μ c of activity in dist. water to which serum was exposed in vitro increased lipolytic power in 6 of 8 cases, while solution 2.5 m μ c of activity had no effect. BA 7-18220

3341

STRUCTURE, RAYS AND ENZYMES. N. Waterman. Arch. exptl. Zellforsch. Gewebezücht. 11(1/2), 89-92 (1931). (In German).

Biological action of x rays is attributed to change in state of emulsion of protoplasm. Ratio of polarization/resistance, characteristic of each tissue, is alterable by radiation. Periodic increase and decrease of ferment action on change in permeability of protoplasm of an irradiated cell is accompanied by periods of oxidation and reduction. BA 7-18221

3342

MODIFICATION IN THE CATALASE CONTENT OF THE BLOOD IN X-RAY THERAPY OF MALIGNANT TUMORS. Lorenzi Angelo. Tumori 18(3), 201-8(1932).

Catalases in blood of cancer patients were lower than in blood of control cases. After x ray therapy the enzymes dropped considerably probably because of the toxic effect of destroyed tumor cells. BA 7-18581

3343

BASAL METABOLISM OF SOME TUMOR PATIENTS. Dino Donati. Tumori 16(2), 126-58(1930). (In Italian).

Thirteen cases of malignant tumor were studied. In patients with carcinoma and in 2 patients with benign tumors, slight decrease in basal metabolic rate was noted. Rate was increased in cases of sarcoma, lymphosarcoma, and myeloid leukemia. Ra therapy raised metabolic rate 15-20%, x ray therapy, 6-10%. BA 7-18619

3344

RELATION OF X-RAYS TO LYMPHOMATOSIS. J. Furth, R. R. Rathbone, and H. Seibold. Proc. Soc. Exptl. Biol. Med. 30(6), 754-56(1933).

Preliminary paper. BA 7-18629

3345

MALIGNANT TUMORS PRODUCED IN THE RABBIT BY IRRADIATION OF INFLAMMATORY FOCI. A. Lacassagne. Compt. rend. 196(1), 69-71(1933). (In French).

By x irradiating abscess produced with *Streptobacillus caviae*, a sarcoma could be induced in rabbits. No tumor was produced with either agent alone. Irradiation of chronic tubercular abscesses gave no tumors. Irradiation of sterile diatomaceous earth injected subcutaneously into breast of rabbit produced epithelioma and fibrosarcoma. BA 7-18662

3346

A STUDY OF THE HISTOLOGICAL STRUCTURE OF MOUSE OVARIES FOLLOWING EXPOSURE TO ROENTGEN IRRADIATION. Joseph M. Murray. Am. J. Roentgenol. 25(1), 1-45(1931).

Postirradiation effects of: 27 r, no detectable changes, 54 r, changes in primary follicles of 90-215 day-old mice, evident 1 day postirradiation, 150 r or more, structural sterility (primary follicles absent after 2 days, all follicular elements, by 43rd day postirradiation). Dose of 1800 r was lethal for adult mice of this strain 4 days postexposure. BA 7-19598

3347

THE EFFECT OF X-RAYS ON THE DEVELOPING CHICK. J. M. Essenberg. Anat. Record 52(Suppl. Feb.), 12(1932).

Of the 572 eggs which had been x rayed and incubated, 255 died during or shortly after irradiation, 68 embryos continued development for 10-15 days before death occurred, 138 chicks died in the shell at full term without being able to break the shell. Some of those hatched were apparently normal, others had various kinds of deformities. Deformities included: 34 cases of inferior extremity deformities varying from distorted toes to absence of 1 or both feet, 10 cases of paralysis; seven cases of head deformities (cranium and cerebral cortex), 6 miscellaneous cases including acrania, bill, wing and eye malformations and polydactyly. BA 7-19642

3348

THE EFFECTS OF X-RAYS ON REGENERATION IN *TUBIFEX TUBIFEX*. Raymon G. Stone. J. Morphol. 53(2), 389-431(1932).

Inhibition of posterior regeneration by x rays is described and related to lack of cells present in normal regeneration. BA 7-19680

3349

CYTOLOGICAL MAP OF THE X CHROMOSOME OF *DROSOPHILA MELANOGASTER*. Th. Dobzhansky. Biol. Zentr. 52(8), 493-509(1932).

Two translocations involving the X and 2nd or 3rd chromosomes, respectively, and 8 duplications involving sections of the X chromosome were studied genetically and cytologically. Both translocations and all the duplications were obtained in progeny of flies treated with x rays. BA 7-20265

3350

STEP ALLELOMORPHISM IN *DROSOPHILA MELANOGASTER*. I. J. Agol. Genetics 16(3), 254-66(1931).

Author presents an extension of earlier discovery of 2 nonidentical "scute" genes from x ray treatment, and concludes that the gene may be represented by complex organization, composed to separate districts joined with each other, each having a specific action. He includes as allelomorphs those genes which coincide only in one or several districts and which produce a partial reversal to the normal (wild) type compounds. Crossing-over may pass only through, not between, genes since step allelomorphism excludes any space between genes. BA 7-20323

3351

AN X-RAY INDUCED CHROMOSOMAL TRANSLOCATION IN *APOTETIX EURYCEPHALI* HANCOCK (GROUSE LOCUSTS). Robert K. Nabours and W. R. B. Robertson. Proc. Natl. Acad. Sci. U. S. 19(2), 234-39(1933).

From this study it was ascertained that several factors for conspicuous, dominant color patterns of this species, closely linked, are carried by the smallest pair of chromosomes. Following x irradiation, a portion of chromosome carrying 3 closely linked factors was translocated to an entirely different linkage group. BA 7-20363

3352

LETHAL MUTATIONS AND DEFICIENCIES PRODUCED IN THE X-CHROMOSOME OF *DROSOPHILA MELANOGASTER* BY X-RADIATION. J. T. Patterson. Am. Naturalist 66, 193-206(1932). BA 7-20367

3353

EFFECTS OF X-RAYS IN AN INBRED STRAIN OF GUINEA-PIGS. H. H. Strandkov. J. Exptl. Zool. 63(1), 175-202(1932).

Litters sired by x rayed male guinea pigs were smaller than litters sired by control males, and the effect was greater with greater dosage. Author considers most plausible interpretation is that x radiation induced dominant lethal mutations. No visible mutations were observed among progeny of x rayed males through F₃. BA 7-20373.

3354

Chicago. Univ. Dept. of Medicine and Inst. of Radiobiology and Biophysics. THE TREATMENT OF POST IRRADIATION INFECTION. C. Phillip Miller, Carolyn W. Hammond, and Marianne Tompkins. (nd). 16p. (AECU-1816).

Results of experiments indicate that generalized infection, caused by bacteria belonging to intestinal flora, played a significant role in the death of mice exposed to moderate doses of total body x radiation. Antibiotic therapy significantly decreased mortality, streptomycin being the most effective.

3355

EFFECTS OF X-RAYS ON THE LENGTH OF THE VEGETATION PERIOD IN PLANTS. A. V. Doroshenko. Buil. Appl. Botany, Genet. Plant Breeding (Leningrad) 23(2), 511-35(1930). (English Summary).

Author describes the effects of x irradiation of germinated seeds of further development of the plants. BA 7-20675.

3356

THE BIOLOGICAL STUDY OF RADIOSENSIBILITY. II, III. J. Nakagawa. Japan J. Obstet, Gynaecol. 15(4), 304-12(1932).

Peas were grown in sand moistened with solutions of K, Mg, and Ca in concentrations of 0.025, 0.05, 0.1, 0.5, and 1%. When root was 1-2 cm long, plants were x rayed.

Ca, K, and Mg, in order named, increased sensitivity to x rays. Much greater disturbance was caused by salts of heavy metals. BA 7-20679

3357

SOME EFFECTS OF X-RAY IRRADIATION ON RESPIRATION AND DEVELOPMENT. J. H. Bodine and Titus Evans. Proc. Soc. Exptl. Biol. Med. 30(7), 863-4(1933).

This is a preliminary paper describing effects of various intensities of irradiation in oxygen consumption and development of the larvae of the wasp, Sceliphron caementarium. BA 7-20713

3358

ON THE EFFECT OF INTENSE ROENTGEN RADIATION ON ISOLATED SKELETAL MUSCLE. Gundo Boehm. Z. Biol. 92, 45-53(1931). (In German).

X irradiation of isolated cold-blooded muscle with intense, easily absorbed x rays (1.54 A units, 170,000 to 340,000 r, 30 to 60 sec) caused small reversible contraction, after additional doses, irreversible contraction. The contraction was phenomenon independent of excitability of muscle and of lactic acid formation. BA 7-20714

3359

INFLUENCE OF RADIUM EMANATIONS ON HORMONES. I. EMANATIONS AND ADRENALIN. Renzo Agnoli. Arch. intern. pharmacodynamie 41(2), 238-50(1931). (In Italian).

Effects of 1/100,000 and 1/50,000 epinephrine solutions on blood pressure of anesthetized rabbits (recorded from carotid) were not changed materially by exposure of solutions to Ra emanations of various intensities and durations. BA 7-21110

3360

EXPERIMENTAL LIVER DISEASE PRODUCED BY X-RAY IRRADIATION OF THE EXPOSED ORGAN. Adolph Bolliger and Keith Inglis. J. Pathol. Bacteriol. 36(1), 19-30 (1933).

Single x ray dose applied to exposed liver causes extensive necrosis, both superficial and deep. In survivors, cirrhosis and disorganization follow and animal dies 5-16 mo later with jaundice and ascites. Dosage varied from 1880-5250 international γ units. Eleven dogs were irradiated. BA 7-21191

3361

CANCERS AND RADIATIONS. Foveau de Courmelles. Neoplasmes 11, 207-262(1933). (In French).

Critical review of relation between cancer and various irradiations is presented. BA 7-21203

3362

SENSITIZATION OF NEOPLASTIC TISSUE TO X-RAYS BY LOCAL APPLICATION OF INSULIN. F. Gentil and S. F. Gomes da Costa. Compt. rend. soc. biol. 109, 511-12(1932). (In French).

Daily local application of insulin to neoplastic ulceration of the breast caused rapid cicatrization and skin repair and considerable reduction of neoplastic lesion within 6 weeks. Although x raying previously had no appreciable effects, neoplasm responded favorably to even weaker dose after insulin treatment. Neoplastic nodules disappeared and phlyctenae and scar tissue appeared, indicating radiosensitization by insulin. BA 7-21265

3363

CONTRIBUTION TO THE STUDY OF THE INNOCUOUS NATURE OF BCG IN ROENTGEN IRRADIATED GUINEA PIGS. P. Nelis and E. Picard. Compt. rend. soc. biol. 110(16), 31-2(1932). (In French).

Guinea pigs treated 4 times at 8-day intervals with 1500 r after inoculation with 0.001 gm. of virulent tubercle bacilli developed tuberculous lesions. No such lesions appeared in those irradiated after injection of

0.01 to 0.001 gm. of BCG, indicating that x rays do not affect development of tuberculosis or action of BCG in guinea pigs. BA 7-21398

3364

ON A PROCEDURE PERMITTING EXTENSION OF THE USE OF THE TECHNIQUE OF LOCAL IRRADIATION IN THE EMBRYOLOGICAL STUDY OF AMPHIBIAN EGGS. GENERAL RESULTS ON THE EGG OF THE FROG. P. Vintemberger. Compt. rend. soc. biol. 109(3), 208-12 (1932). (In French).

A system of Pb screening is described which permits x-raying (with suppression of most secondary rays) of 1 or 2 blastomeres of the amphibian egg (horizontal or vertical plane of separation of irradiated from shielded blastomeres.) BA 7-22273.

3365

HEREDITARY AND NON-HEREDITARY ABERRATIONS IN X-IRRADIATED HYACINTHS AND TULIPS VIEWED IN THE LIGHT OF THE DIVISION HYPOTHESIS. W. E. Mo de Mol. Natuurw. Tijdschr (Belg.) 14, 70-2(1932). (In German).

Irradiation sterilized some pollen grains, produced retarded development in some, polyploidy in others. Variations associated with tetraploidy or diploidy were heritable, x rays interfered with normal reduction. Radiation may not retard or accelerate all cell parts to the same degree. BA 8-5215

3366

STIMULATIVE EFFECTS OF X-RAYS ON PLANT GROWTH. Charles A. Shull and John W. Mitchell. Plant Physiol. 8(2), 287-96(1933).

From a few preliminary experiments, authors conclude that under appropriate conditions of treatment, (use of metal screens, high voltage and low amperage and brief exposures) x rays may stimulate growth of wheat, corn, oats and sunflower seedlings. Optimum growth occurs with about 115 r (3 min). Some evidence of increased sugar content and increased respiration of treated seedling was obtained. BA 8-5437.

3367

DIFFERENCES IN THE BIOLOGICAL ACTION OF ROENTGEN RAYS OF DIFFERENT WAVE LENGTHS ON SACCHAROMYCES CEREVISIAE IN THE PRESENCE OF GLUCOSE. V. Gronchi. Soc. Internaz. Microbiol. Boll. Sez. Ital. 3(11), 717-19(1931). (In French).

Yeast in glucose solution was exposed to 3 wave lengths of x rays. Fermentation, as measured by amount of CO₂ liberated, was increased by irradiation. Rate of production of CO₂ was proportional to intensity and increased with decreasing wavelength. BA 8-5462

3368

ACTION OF MONOCHROMATIC X RAYS OF DIFFERENT WAVE LENGTHS ON ASCARIS EGGS. A. Dognon. Compt. rend. 196(6), 437-8(1933). (In French).

Graphs of damage to function of Ascaris eggs for wave lengths of 1.54 and 4 Å showed the longer wave length to be biologically more effective, agreeing with previous work on same material using wave lengths of 0.7-2.25 Å. BA 8-5494.

3369

THE SCIENCE OF RADIOLOGY. Otto Glasser. Springfield, Ill. Charles C. Thomas. 1933. 250p.

Topics included in this history on development of radiology: discovery of x rays and radium; x ray physics, apparatus, dosimetry, therapeutic and diagnostic radiology; Ra physics and dosimetry, Curie therapy, x ray effects on genetic material; biological effects of x and Ra rays. BA 8-5495

3370

ACTION OF X-RAYS ON THE METAMORPHOSIS OF

INSECTS. Mme. Hufnagel and Marcel Joly. Compt. rend. 196(10), 727-9(1933). (In French).

Larvae of *Calliphora erythrocephala* on paraffin in petri dishes were exposed to 20-, 34-, and 86,000 r. External appearance of pupae from irradiated larvae was normal; internal modifications included persistence of larval organs, absence of some normal adult organs. Large larval hypodermal cells, defective adult muscles, disappearance of adult fat tissue, degeneration of larval salivary glands and other changes were noted. BA 8-5496

3371
ANIMAL EXPERIMENTS WITH THORIUM X AND RADIUM IN KIDNEYS AND URETHERS. E. Muhsam. *Strahlentherapie* 44(1), 131-46(1932). (In German).

Regions of necrosis developed in kidney and ureter tissues of dogs where thorium X rods were inserted. No control experiments for comparison with radon were performed. BA 8-5498

3372
EFFECTS OF THE X-RAY ON THE SPLEEN OF POIKILOTHERMS. P. V. Sspovskii. *Vestnik Rentgenol.* 1 Radiol. 8(2), 147-57(1930). (Russian with German Summary)

X ray effects on spleen of frogs and salamanders include: degeneration of erythrocytes, increase in reticulo-endothelial elements, and altered Fe metabolism (related to destruction of red cells), with Fe being deposited in reticular and pigment cells of spleen and in reticular and Kupffer cells of liver. BA 8-5499

3373
ELECTRICAL POTENTIAL MEASUREMENTS IN THE SINUS OF FROG HEARTS AND IN THE BLADDER UNDER VARIOUS EXPERIMENTAL CONDITIONS. Paul Wirz. *Z. Biol.* 93(3), 317-30(1933). (In German).

Radium irradiation reduces sinus potential to minimum of 1-2 mV. BA 8-5873

3374
HEPATITIS AND EXPERIMENTAL CIRRHOSIS DUE TO THORIUM DIOXIDE. Rene Huguennin, Auguste Nemours, and Gur Albot. *Compt. rend. soc. biol.* 108, 879-81(1931). (In French).

Hepatitis, involving cytolysis, atrophy and sclerosis, was caused by injection of Th of hepatosplenography. BA 8-5902

3375
NARCOSIS WITH CHLOROFORM AND RADON. P. Mascherpa. *Boll. soc. ital. biol. sper.* 5(11), 1167-72(1930). (In Italian).

CHCl₃ narcosis follows more promptly in mice kept in atmosphere of Ra emanation. Excitement and narcotic stages supervene more quickly; depth and duration of narcosis increase. Possible effects of Ra on absorption through pulmonary membrane and on CHCl₃ fixation by nerves are suggested as explanations of the observations. BA 8-5913

3376
THE VALUE OF SERUM REACTIONS IN RADIOTHERAPY OF CANCER. E. Cronin Lowe. *Brit. J. Radiol.* 6, 207-18(1933).

Serum reactions observed during course of radiotherapy of cancer patients are believed by the author to parallel or anticipate course of disease. BA 8-6014

3377
EXPERIMENTS WITH ROENTGEN IRRADIATION OF PURE VACCINIA LYMPH AND OF A LYMPH SAMPLE CONTAINED WITH FOOT-AND-MOUTH DISEASE VIRUS. Cark Krebs and H. O. Schmit-Jensen. *Acta Radiol.* 13(3/4), 349-61(1932).

Irradiation of vaccinia lymph with 3,600-36,000 r of x rays did not reduce infectivity in test on 275 children.

Doses of 38,000 and 25,000 r did not free cowpox vaccine of foot-and-mouth virus BA 8-6264

3378
IMPORTANCE OF DURATION OF IRRADIATION AND DOSE OF VIRUS IN THE PRODUCTION OF TOXIC ILLNESS BY INJECTION OF FILTERABLE TUBERCULOSIS VIRUS INTO GUINEA PIGS IRRADIATED WITH X-RAYS. M. Nasta, I. Jovin, and M. Blechmann. *Compt. rend. soc. biol.* 107, 847-8(1931). (In French). BA 8-6271

3379
TRANSMISSION BY PASSIVE TRANSFER OF FATAL TOXIC ILLNESS DUE TO THE FILTERABLE TUBERCLE VIRUS IN THE GUINEA PIG EXPOSED TO X-RAYS. M. Nasta, I. Jovin, and M. Blechmann. *Compt. rend. soc. biol.* 107, 849-51(1931). (In French).

Authors attempted to determine whether death of x rayed animals inoculated with filtrates of urine infected with filterable tubercle bacilli is actually due to virus or to some other substance in the filtrate. Results with guinea pigs indicate toxicity of filtrate is due to virus. X ray treatment appears to cause multiplication of the organisms. BA 8-6272

3380
DETERMINATION IN THE DEVELOPMENT OF AMPHIBIA. (DIFFERENTIAL RADIUM-SUSCEPTIBILITY AND CENTRIFUGATION.) Pasquale Pasquini. *Arch. zool. Ital.* 16(1/2), 501-5(1931).

Author compared results of centrifuging various developmental stages of *Rana* ova and effects of irradiating (radon) corresponding stages. Stages most traumatized by centrifugation were also most radiosensitive. BA 8-7087

3381
THE EFFECTS OF X-RAYS ON ANTERIOR REGENERATION IN *TUBIFEX TUBIFEX*. Raymond G. Stone. *J. Morphol.* 54(2), 303-20(1933).

Removal of anterior segments of *Tubifex tubifex* is followed by regeneration in 18 days in controls; no regeneration occurs in worms x irradiated with 9000 r following removal of segments. BA 8-7107

3382
THE CYTOLOGICAL CHANGES OBSERVABLE IN IRRADIATED BEAN ROOT TIPS. Ruth E. P. Patten and Sylvia B. Wigoder. *Quart. J. Microscop. Sci.* 73(4), 633-50(1930).

Presence of large numbers of abnormal mitotic figures in root tissues of x-rayed *Vicia faba* indicate that exposure seriously deranges mitotic processes started before treatment and prevents initiation of mitosis until after recovery. BA 8-7692

3383
CHLOROPHYLL DEFICIENCIES INDUCED IN COTTON (*GOSSYPIMUM HIRSUTUM*) BY RADIATIONS. W. R. Horlacher and D. T. Killough. *Trans. Texas Acad. Sci.* 15, 33-8(1932).

Yellow, a type devoid of chlorophyll, was induced in 3 different lines of cotton by x-raying dry seeds. Yellow is lethal, death occurring about 2 wk after emergency of seedling, and is inherited as simple recessive. Plants from x rayed dry seed developed large numbers of variegated leaves with chlorophyll-deficient areas. BA 8-7720.

3384
A STUDY ON *DROSOPHILA MELANOGASTER* RELATIVE TO THE NATURE OF THE RONTGEN RAY EFFECT ON THE MUTATION PROCESS. N. W. Timofeeff-Ressovsky. *Z. wiss. Biol. Abt. D. Wilhelm Roux' Arch. Entwicklungsmech. Organ.* 124(3/4), 654-65(1931). (In German).

X rayed X chromosomes free from mutations postirradiation gave no increase in mutation rate subsequently, indicating that mutations are induced only during direct x ray exposure. Comparison between effect of x raying young and old sperm is included. BA 8-7756.

3385
STUDIES ON EXPERIMENTAL INFLUENCING THE GROWTH PHENOMENA IN VEGETATIVE REPRODUCTION AND REGENERATION. Annemarie Harig. Z. wiss. Biol. Abt. E. Planta 15(1/2), 43-104(1931). (In German).

Ra-irradiation inhibited regeneration in Cardamine pratensis leaves which normally produce adventitious roots and shoots in moist air following removal from plant. BA 8-7959.

3386
EXPERIMENTAL OBSERVATIONS ON THE EFFECT OF RADIUM ON A PRECANCEROUS SKIN AREA. W. Cramer. Brit. J. Radiol. 5, 618-30(1932).

A precancerous area was produced in mice by tarring skin for limited period. Applications of Ra delayed and inhibited development of malignancy. In no case did Ra accelerate carcinogenesis. Application of these results to radiotherapy is suggested. BA 8-8016

3387
AUDITORY EFFECTS OF ROENTGEN RAYS IN DOGS. Edward Girden, Elmer Culler, G. L. Clark and K. E. Carrigan. Am. J. Roentgenol. Radium Therapy 30(2) (1933).

Two dogs conditioned to respond to given audible tone were irradiated at intervals with x rays. In both there was transient increase in auditory acuity followed by relapse to normal. BA 8-8018

3388
THE INCREASE IN THE FRAGILITY OF THE RED BLOOD CORPUSCLES AFTER EXPOSURE TO RADIUM. Daphne Goulson. Brit. J. Radiol. 5, 775-9(1932).

Defibrinated human, rat or fowl blood (1 cc) in blood film in preparation 1 cm in diameter, 4 mm high, was exposed at 22° to 2 Ra preparations of 60 mgm each on 4 sq cm area. Exposure for up to 70 hr with 0.12 mm Ag for β radiation and up to 119 hrs with 0.12 mm Ag + 3 mm Pb filters for γ radiation. Increased in fragility was observed after 50-70 hr with β rays in both nucleated and non-nucleated erythrocytes. There was only slight hemolysis after 119 hr of γ radiation. BA 8-8019

3389
THE SKIN ERYTHEMA REACTION TO FRACTIONATED LARGE DOSES OF X-RAYS. Alfred Reisner. Fortschr. Gebiete Rontgenstrahlen 45(3), 293-307(1932). (In German).

Skin erythema reaction after x irradiation (180 kv, $\frac{1}{2}$ mm Cu, 30 cm, 1 mm half value layer and 42 r/min) applied in fractional doses, was studied in detail. Skin tolerance is shown in tables and graphs for various conditions of treatment. BA 8-8021.

3390
STUDIES ON PROTOZOA. IV. LETHAL EFFECTS OF THE X-RADIATION OF A STERILE CULTURE MEDIUM FOR COLPIDIUM CAMPYLOIDES. C. V. Taylor, J. O. Thomas, and M. G. Brown. Physiol. Zool. 6(4), 467-92 (1933).

X irradiation of sterile medium of 10% yeast extract rendered the medium lethal to Colpidium campyloides. X rayed tap or distilled water was also highly toxic to Colpidia. Organic materials, including sheep's blood, agar, gelatin, and bacteria added to tap water before and after its exposure protected Colpidia against toxic action. Role of H_2O_2 in the toxicity is discussed. BA 8-8023.

3391
EXPERIMENTAL RESEARCHES ON THE PRIMARY TUMORS OF THE LUNG IN WHITE MICE TREATED WITH TAR AND X-RADIATION. Luciano Cirio and Giovanni Balestra. Pathologica 23, 755-8(1931).

Of 130 mice treated with tar, 80 were x irradiated in this study of the influence of general and local x irradiation on primary tumors of the lung. No significant difference was seen between irradiated and control groups. BA 8-8664

3392
MELANOPHORES INDUCED BY X-RAY COMPARED WITH THOSE EXISTING IN PATTERNS AS SEEN IN CARASSIUS AURATUS. George Milton Smith. Biol. Bull. 63(3), 484-9(1932).

X raying of goldfishes produced temporary eruption of melanophores, usually without changes in preexisting black patterns. Occasionally degeneration of black patterns was noted. BA 8-9585

3393
ACTION OF X-RAYS ON THE PATHOGENICITY OF A BOTRYTIS. L. Pasinetti. Riv. patol. vegetale 22(7/8), 201-17(1932). (In Italian).

When x rayed cultures of B. cinerea were tested on bean and pea seedlings, no attenuation in pathogenicity was found. Certain doses are believed to cause more rapid growth of mycelium. BA 8-10486

3394
RESEARCH ON VICIA FABA MINOR. EXTERNAL MORPHOLOGY. INTERNAL RADIOEXCITATION AND RADIOLESIONS. BIOLOGICAL ACTION OF HARD, SEMI-SOFT, AND SOFT RÖNTGEN RAYS. Edmondo Ingber. Atti ist. botan. "Giovanni Briosi" e lab. crittogam. univ. Pavia 2, 173-268(1930-31); 3, 95-145, 223-307 (1932). (In Italian).

Seedlings were subjected to 11-550 r of (1) hard x rays and of (2) semi-soft and soft rays. Action of (2) more severe than (1). Doses of 11 r - 88r of hard x rays stimulated growth during 1st 10 days. Larger doses weakened or killed plants, some of the weakened plants demonstrating early flowering and maturation. BA 8-10539

3395
THE BIOLOGICAL ACTION OF HARD, SEMI-HARD AND SOFT X-RAYS. RESEARCHES ON VICIA FABA MINOR. Edmondo Ingber. Atti ist. botan. "Giovanni Briosi" e lab. crittogam. univ. Pavia 3, 9-13(1932). (In Italian). BA 8-10540.

3396
MICRO-THERMO-ELECTRICAL VARIATIONS IN SOME PHYTOPATHOGENIC EUMYCETES. L. Pasinetti. Riv. patol. vegetale 22(7/8), 219-63(1932). (In Italian).

Cultures of Botrytis cinerea and Pythium de baryanum were x rayed (3 ma, 100 kv, 30 cm D.F., no filter) for 5-30 min. Temperatures of irradiated cultures at 24 hr intervals were consistently higher than those of controls. Observations considered to be an indication of stimulation of vital activity. BA 8-10542

3397
AN EXPERIMENTAL COMPARISON OF DIFFERENT CRITERIA OF DEATH IN YEAST. Otto Rahn and Margaret Noble Barnes. J. Gen. Physiol. 16(4), 579-92(1933).

Following exposure to heat, $HgCl_2$, ultraviolet or x rays, yeast cells lost power of: reproduction, fermentation, staining reaction with methylene blue, permeability of plasma membrane and coagulation of protoplasm, in that order. Relative effectiveness of H_2C_2 and heat on rates of loss of the 4 criteria of death differed from that of ultraviolet and x ray. BA 8-10575

3398
THE EFFECT OF SINGLE AND FRACTIONATED DOSES OF SELECTIVELY APPLIED X RAY IRRADIATION ON THE

HISTOLOGIC STRUCTURE OF THE MAJOR SALIVARY GLANDS OF THE RAT. W. G. Shafer. J. Dental Research 32, 796-806(1953).

Histological and clinical changes in salivary glands of animals several months after x irradiation are described. **3399**

EXPERIMENTAL STUDIES ON THE EFFECT OF X-RAY, UPON ANIMALS. ON THE BLOOD PICTURE OF RABBITS EXPOSED TO X RAYS. Katsutochi Oba. Sei-i-kai Zasshi 48(1), 1-18(1929). (In Japanese).

Irradiation effect depends on susceptibility of each rabbit. Common effects: slight decrease in Hg content, decreased erythrocyte count; slight polychromasia and anisocytosis; leucopenia, lymphopenia and relative increase and absolute decrease of pseudoeosinophil leucocytes. BA 8-10627.

3400

MEDICAL USES OF RADIUM. SUMMARY OF REPORTS FROM RESEARCH CENTERS FOR 1932. Radiol Comm. Author. Med. Research Council (Gt. Brit.) Privy Council Med. Res. Council, Spec. Rept. Ser. 186, 5-36(1933). BA 8-10630

3401

EXPERIMENTS ON THE GROWTH AND LONGEVITY OF THE WHITE MOUSE. I. THE INFLUENCE OF INJECTIONS OF THORIUM OLEATE IN OLEIC ACID, AND OF OLEIC ACID ALONE, ON GROWTH AND LONGEVITY. Robertson T. Brailsford, Mary C. Dawbarn, R. G. Thomas, J. W. Walters, and J. D. O. Wilson. Australian J. Exptl. Biol. Med. Sci. 11(2), 99-108(1933).

Oleic acid had no appreciable effect on growth curve of males or females, but mean life duration of males was reduced. Thorium oleate depressed growth and had directly injurious effects as well. BA 8-10719

3402

THE EFFECTS OF X-RAYS ON THE GONADS OF AMPHIBIAN LARVAE. William T. Levine. J. Exptl. Zool. 62(2), 409-31(1932).

Relative resistance to x rays of the 2 types of antagonistic sex indicators in gonad of anurans was studied. High resistance of granulosa cells together with low sensitivity of primary germs cells prevents total sterility or sex reversal. Pattern of response of irradiated larval testes and ovaries is described. (Localized irradiation with 4000-10,000 r or 1500-4000 r.) BA 8-10894

3403

THE EFFECT OF X RAYS ON THE BLOOD AND SPLEEN OF WHITE MICE. A PRELIMINARY INVESTIGATION. G. Bourne. Med. J. Australia 19(Vol. 2, No. 24), 722-3(1932).

Mice were irradiated (Metallix therapy tube, 190 kv) in wooden boxes or fastened to board, some spleen-shielded. Spleen and blood reacted the same, irrespective of spleen shielding. General leucopenia occurred in all mice, also decreased in polymorphs and relative lymphocytosis. BA 8-11131

3404

HISTOLOGICAL CHANGES IN NON-REGENERATING LIMBS OF X-RAYED AMBLYSTOMA LARVAE. E. G. Butler. Anat. Record 54(3, Suppl.), 37-58(1932). (Abstract) BA 8-12165

3405

THE EFFECTS OF X-RADIATION ON THE DEVELOPMENT AND REGNERATION OF THE EARLY FORE-LIMB BUD OF AMBLYSTOMA PUNCTATUM. W. O. Puckett. Anat. Record 54(3, Suppl.), 79(1932). (Abstract) BA 8-12165

3406

EYES OF IRRADIATED HUMAN EMBRYOS; FURTHER OBSERVATIONS. Isadore Goldstein and David Wexler. Arch. Ophthalmol. 7(3), 434-8(1932).

X ray action on embryologic tissues is discussed and mode of origin of rosettes on retina studied by reconstructions from serial sections. Authors conclude that rosettes result not from folding or contraction, but from scattering of formed neuro-epithelial cells into the anterior layer, presumably an x ray effect. BA 8-12194

3407

THE EFFECT OF X-RADIATION ON THE MEIOTIC AND MITOTIC DIVISIONS OF CERTAIN PLANTS. L. H. A. Stone. Ann. Botany 47, 815-26(1933).

X ray effects on meiosis in *T. silvestris* and *R. discolor* and on mitosis in *C. olivieri* are described. Exposure 1-3 mo. prior to meiosis has no serious effect, but exposure 24 hr before division causes destructive changes which are apparent at anaphase. Mitosis stops following treatment, then continues, exhibiting abnormal divisions. BA 8-12800

3408

THE EFFECT OF X-RAYS ON THE LINKAGE OF MENDELIAN CHARACTERS IN THE FIRST CHROMOSOME OF *DROSOPHILA VIRILIS*. Sukeichi Fujii. Japan J. Genet. 8(2/3), 137-49(1933). (Japanese with Eng. Summary).

It is concluded that x raying decreases amount of crossing-over in distal region of 1st chromosome, increases it in proximal region, and has no effect in middle region. Effects appear on 6th day, attain climax 7-9th day, disappear on 16-18th day. BA 8-12870

3409

ON THE LETHAL GENES INDUCED BY X-RAY IN *DROSOPHILA MELANOGASTER*. Daigoro Moriwaki. Japan. J. Genet. 8(4), 248-50(1933). (Japanese). BA 8-12884.

3410

PRODUCTION OF DOMINANT LETHAL GENETIC EFFECTS BY X-RADIATION OF SPERM IN *HABROBRACON*. M. F. Stancati. Science 76, 197-8(1932).

Production of true zygotic dominant lethal effect by x raying of sperm was established for the wasp. Evidence consists of lowering the mean number of progeny per female per vial of females mated to x rayed males, and production of large numbers of small "unisexual" fraternities (distinct from ordinary unisexual fraternities which are regularly larger than bisexual). BA 8-12888

3411

PHYSIOLOGICAL VARIATIONS IN CERTAIN CROP PLANTS FOLLOWING SEED EXPOSURE TO HIGH-VOLTAGE X-RAYS. C. N. Moore and C. P. Haskins. Botan. Gaz. 94(4), 801-7(1933).

Seeds of cotton, tung oil tree (*Aleurites*), snapdragon, phlox and sour orange were exposed dry to unfiltered radiation from Coolidge tungsten-target x ray tube, 200 kv, 30 ma, 50 cm, 300 r/min. Dwarfing, delayed growth, fasciation, tissue inversion and replacement were observed. No histological study was made. BA 8-13033

3412

GROWTH IRREGULARITIES IN HYBRID FREESIAS INDUCED BY X-RAYS. W. P. Morgan. Proc. Indiana Acad. Sci. 41, 139-44(1932).

X rayed corms, (3 min exposures up to 21 min. 105 kv, 30 ma, 16 in., no Al screen) exhibited stimulated lateral bud growth, curled and twisted leaves and stems, split, deformed flowers, uneven chlorophyll distribution. Plants from seeds or bulbs of treated plants were normal. Result of exposing flower buds is described. BA 8-13034

3413

Argonne National Lab., Lemont, Ill. EFFECTS OF SINGLE DOSES OF X-RAYS ON RABBITS. C. W. Hagen, Jr., L. O. Jacobson, R. Murray, and P. Lear. Sept. 9, 1944. Decl. June 4, 1947. 47p. (MDDC-999).

Rabbits were exposed to 200 kvp x rays filtered with 0.5 mm of copper and 1 mm of aluminum; median lethal dose was 790 ± 20 r. Heavy rabbits were more resistant to lethal effects. Clinical effects were most severe at 1 day. 5 to 15 days, and between 35 and 60 days after irradiation. After 800 r, rabbits lost weight for two days. After 400 and 800 r, blood forming tissues showed the most severe damage. Epithelial tissues were less sensitive than hematopoietic tissues. (from authors' summary).

3414

THE PHYSIOLOGICAL EFFECTS OF RADIANT ENERGY. Henry Laurens. New York, Chemical Catalog Co., Inc. 1933 610p. (American Chemical Society Monograph. Ser.)

Author presents an extensive review of literature on effect of all types and combinations of types of radiant energy on all forms of organisms, plant, and animal. Bibliography of 2000 titles given BA 8-13123

3415

EFFECT OF LARGE QUANTA ON THE BIOLOGICAL EFFECT OF VARIOUS DOSES OF RÖNTGEN RADIATION. R. Braun and H. Holthausen. *Strahlentherapie* 34(4), 707-34(1929). (In German).

Authors present a critical review of literature on effect of the energy of absorbed quanta on death rate of various biological objects. Review includes description of experiments with *Ascaris* eggs at various stages. No difference in form of death curves was observed for various qualities of radiation used. (10 kv, Lindemann window, x rays of 0.045, 0.055, and 1.05 mm Cu half value layer.) BA 8-13136

3416

RÖNTGEN THERAPY OF SKIN DISEASES IN DOGS AND CATS. I. THE EVOLUTION OF RÖNTGEN THERAPY IN VETERINARY MEDICINE. Alois Pommer. Wien. *Tierarztl. Monatsschr.* 20, 817-26(1933). (In German).

Author presents a review of experimental work since 1895. BA 8-13138

3417

RELATION OF THE ROENTGEN WAVE LENGTH TO THE BIOLOGICAL EFFECT. J. A. Saralegui and Friedrich Vierheiler. *Am. J. Surg.* 11(1), 97-104(1931).

This is a review, including an attempt to explain some discordant results found in the literature. Difficulties may arise from secondary radiation, inaccurate measurement of radiation intensities, variation in biological material and difficulty of expressing irradiation effects quantitatively. BA 8-13139

3418

RECENT ADVANCES IN RADIUM. W. Roy Ward and A. J. Durden Smith. London, J. and A. Churchill. 1933. 324p. BA 8-13141

3419

THE COMBINED EFFECTS OF COLLOIDAL SILVER AND HIGHLY FILTERED ROENTGEN RADIATION UPON THE HEMATOPOIETIC SYSTEM IN DOGS. Samuel A. Shouse and Stafford L. Warren. *J. Exptl. Med.* 53(3), 437-45(1931).

Hemolysis, anemia, leukocytosis and weight loss, follow injections of collargol. Sudden leukopenia and marrow hypoplasia followed irradiation (deep therapy dose of 350-1050 ma min). Combined effects are cumulative and more toxic than reaction to either procedure alone. BA 8-13633.

3420

FAT NECROSIS SIMULATING THROMBOSIS AFTER INJECTION OF RADIOACTIVE SOLUTIONS INTO THE VEINS. M. Askanazy and A. Jentzer. Wien. *Med. Wochschr.* 79(1), 3-8(1929). (In German).

Intravenous use of radioactive solutions in treating malignant tumors has led occasionally to signs of venous

thrombosis. Actual lesions was found to be perivascular fat necrosis, not thrombosis. Similar lesions may be produced experimentally in rabbits by direct application of Ra water on perirenal fat pads. Dose ranges from 3-12 mc, 5-10 min. BA 8-13637

3421

CICATRIZATION OF NEOPLASTIC SKIN ULCERS FOLLOWING LOCAL ADMINISTRATION OF INSULIN. F. S. Gomes da Costa. *Z. Krebsforsch.* 39(1), 5-11(1933). (In German).

Local application of insulin has marked beneficial effect on tumors perhaps due to enhancement of tissue's sensitivity to x irradiation. BA 8-13706

3422

STUDIES ON PHYSIOLOGICAL AND PATHOLOGICAL CHEMISTRY OF THE SKIN. VI. RESIDUAL NITROGEN AND NITROGEN FRACTIONS OF THE SKIN IN THE NORMAL STATE, IN KIDNEY DISEASE AND UNDER EXPERIMENTAL CONDITIONS. Erich Urbach and Grete Sicher. *Z. ges. exptl. Med.* 76(3/4), 483-507(1931). (In German).

X ray exposures which caused vomiting produced an increase in residual N of blood serum and skin, mainly due to increase in urea. Exposures not causing vomiting caused increased N of skin; not of blood. BA 8-13748

3423

SALTATION INDUCED BY X-RAYS IN SEVEN SPECIES OF CHAETOMIUM. Hugh Dickson. *Ann. Botany* 47, 735-54(1933).

Mycelia of 7 species of *Chaetomium* were irradiated and relative numbers of saltants determined. Species fell into 2 groups: (1) 4 species saltated relatively infrequently; (2) 3 species produced saltants readily. BA 8-14983

3424

ON THE GENETIC NATURE OF INDUCED MUTATIONS IN PLANTS. L. J. Stadler. *Proc. Intern. Congr. Genet.* 6th Congr., Ithaca, N. Y. 1, 274-94(1932). BA 8-14996.

3425

ARTIFICALLY INDUCED CROSSING-OVER IN MALES OF *DROSOPHILA MELANOGASTER*. Heinrich Friesen. *Science* 78, 513-14(1933).

X rays (4000 r) applied to pupal stage gave 2-4% crossing-over in males in central regions of 2nd and 3rd chromosomes. Since it is in this same region that crossing-over is increased in females by x rays, mechanism seems to be same for both sexes. BA 8-15008

3426

RADIATION GENETICS. Frank Blair Hanson. *Physiol. Rev.* 13(4), 466-96(1933).
A review. BA 8-15009

3427

X-RAY STERILITY IN THE MALE HOUSE MOUSE. George D. Snell. *J. Exptl. Zool.* 65(3), 421-41(1933).

Treatment with 800 r x ray dose had no effect on survival of spermatozoa in epididymis of male house mice. Litters sired by x rayed males before onset of sterility were markedly smaller, with logarithmic relation between x ray dose and litter size. BA 8-15023

3428

STIMULATION AND DAMAGE BY X-RAYS. Edmondo Ingber. *Atti 1st. botan. "Giovanni Brioni" e lab. crittogam. univ. Pavia* 2, 111-6(1930-1). (In Italian)

Author outlines precautions to be taken in avoiding errors in technique and interpretations of results of biological action of x rays. BA 8-15199

3429

THE INFLUENCE OF X-RADIATION ON *ATRIPLEX HORTENSIS* L. Edna L. Johnson. *New Phytologist* 32(4), 297-307(1933).

Irradiated white plants gave highest percentage of anomalies with stem lesions and dichotomous branching, green variety exhibited most leaf abnormalities, altered phyllotaxy and flattened stems, lateral branching was most frequent in red variety. Greatest decrease in catalase activity occurred in treated red and white varieties. There was only slight difference in catalase content of treated and control green plants. BA 8-15200

3430

ON THE RADIOSENSITIVITY OF THE NON-DIVIDING CELL. J. C. Mottram. Brit. J. Radiol. 6, 615-21(1933).

Author attempted to verify reported high x ray and Ra sensitivity of cells during the 80 min period before mitosis. Bean roots were γ -irradiated during each hr of day. Since in A. M. more cells are in postmitotic, and in P. M. in the premitotic state, difference, if present, should be detected. No evidence of such an effect was observed. BA 8-15202

3431

COMBINED EFFECT OF DYES AND X-RAYS ON YEAST. A. A. Imshenetski. Bull. acad. sci. URSS. Classe sci. math. nat. 1932(2), 225-40(1932). (Russian with German Summary). BA 8-15231

3432

TREATISE ON NORMAL AND PATHOLOGICAL PHYSIOLOGY. I. GENERAL PHYSIOLOGY. G. H. Roger and Leon Binet. Paris, Masson et Cie. 1933. 1136p.

Contains chapter by A. Lacassagne on action of radiations on cells. BA 8-15237

3433

STUDIES ON THE EFFECT OF RÖNTGEN RAYS ON THE GROWTH CURVE OF RATS AND MICE. H. Druckrey A. Low-Beer, and M. Reiss. Z. ges. exptl. Med. 83(1/2), 115-27(1932). (In German).

Mice and rats were x rayed (5-1500 r) and weighed to study effect produced by irradiation during 1st 6 mo of age. Dose of: 5 r produced no difference between weight of treated and control animals, 500 r gave delayed effect of lower wt; 650 r gave early wt increase over normal; 1000 r produced early weight loss, was lethal for new-born. Doses over 650 r produced diarrhea, shagginess of hair, hair loss, and nervous symptoms of ataxia and tremor. BA 8-15240

3434

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF X-RAYS AND GAMMA RAYS. G. Failla and P. S. Henshaw. Radiology 17(1), 1-43(1931).

The γ ray emission of 1 gm of Ra at 1 cm distance was found to be 36 r/min. Comparative effectiveness of 200 kv x rays and γ rays on production of erythema in human skin, retardation of linear growth of embryonic parts in wheat seedlings and mortality in *Drosophila* eggs was studied. Results show that γ rays are 3-4 times as effective on wheat seedlings and *Drosophila* eggs as on human skin. BA 8-15241

3435

THE TIME-INTENSITY FACTOR IN IRRADIATION. George T. Pack and Edith H. Qumby. Am. J. Roentgenol. Radium Therapy 28(5), 650-67(1932).

Authors conclude that if all times used in an experiment are short compared to duration of experimental cell's life cycle, no difference in effect will be seen with different intensities of radiation given in different times to deliver given dose. If duration of exposure to low intensity radiation is comparable to life span of cell, smaller effect may be expected than from higher intensity acting for shorter time. BA 8-15244

3436

STUDIES OF THE EFFECT OF ROENTGEN RAYS ON THE LIVER. HISTOLOGICAL CHANGES IN THE LIVER OF RATS FOLLOWING EXPOSURE TO SINGLE GRADED

DOSES OF FILTERED ROENTGEN RAYS. Ernst A. Pohle and C. H. Bunting. Acta Radiol. 13(2), 117-24(1932).

Histological changes in liver following exposure to 0.18 and 0.34 Å x rays in graded doses of 600-2,500 r included swelling of liver cells, chiefly due to imbibition of serum and fat, followed later by atrophy and eventual recovery. BA 8-15245

3437

A CASE OF FILARIAL INFECTION OF THE HAND TREATED BY DEEP X-RAYS. Subodh Mitra. Proc. Indian Sci. Congr. 17, 360(1930). BA 8-15871

3438

A CONTRIBUTION ON RÖNTGEN RADIATION OF DIPHTHERIA CARRIERS. Ul'sula Kratschell. Arch. Kinderheilk. 99(1), 42-9(1933).

A total of 8-30% S. E. D. x rays was given in 1-3 sessions at 8-14 day intervals to naso-pharynx of 71 diphtheric infants and children. Of these, 38 became negative, 6 of which could not be definitely attributed to irradiation. Concluded that x rays are not superior to chemical disinfection. No x ray injury was observed. BA 8-16012

3439

ON THE AFTER EFFECTS OF VARIOUS TEMPERATURES AND X RAYS ON CROSSING-OVER IN THE THIRD CHROMOSOME IN *DROSOPHILA MELANOGASTER*. PRELIMINARY REPORT. B. A. Kirssanow. Biol. Zentr. 51(10), 529-33(1931). (In German).

Effect of x raying and high (31°) or low (13°) temps. on crossing-over value in chromosome III was studied and compared with results in untreated controls. These agents increase crossing-over in middle (st-p) region to about twice control value. By various combinations, up to 6 times control value may be obtained. BA 8-15011

3440

HAPLOID FORMATION BY X-RAYS IN *TRITICUM MONOCOCCUM*. Yoshiwo Katayama. Cytologia 5(2), 235-7(1934).

Haploids were derived from seeds of spikes x rayed in meiosis. Many more were obtained when ripe pollen was irradiated and applied to normal pistils. No haploids resulted from pollination of irradiated pistils with normal pollen. It is concluded that male nuclei from irradiated pollen or PMC sometimes degenerated after entering the ovule, without fusing with egg, but their presence stimulated egg development by parthenogenesis. BA 8-17120

3441

THE MUTATION EFFECT OF X RAYS AND THE PROBLEM OF GENETIC EVOLUTION. W. P. Efromson. Biol. Zentr. 51(9), 491-506(1931). (In German).

Mutation experiments with *D. melanogaster* treated with soft (10.5 kv. no filter) and hard (150 kv, filter 0.24 mm Cu, 0.5 mm Al) x rays at 1125-9000 r showed direct proportionality of mutation rate and intensity. Mutation rate/unit of intensity applied was higher for hard x rays (ascribed to better penetration). Natural radiation are believed much less than sufficient to account for mutation rate in this organism. BA 8-17202

3442

EFFECTS OF X-RAYS ON THE RATE OF CHANGE IN THE UNSTABLE MINIATURE-3 GENE OF *DROSOPHILA VIRILIS*. M. Demerec. Proc. Natl. Acad. Sci. U. S. 20(1), 28-31(1934).

Rate of reversions of this gene was not significantly increased by x ray treatment of 600-1800 r. BA 8-17198

3443

THE ACTION OF RADIUM ON CANCER CELLS. II. SOME FACTORS DETERMINING THE SUSCEPTIBILITY OF CANCER CELLS TO RADIUM. H. G. Crabtree and

W. Cramer. Proc. Roy. Soc. (London) B113, 226, 238-50 (1933).

Anaerobiosis diminishes, while HCN and cold increases susceptibility of cancer cells to Ra. Variation in susceptibility to radium results when respiratory mechanism of cell is affected. BA 8-17590

3444
HYDROGEN EVOLUTION FROM X-IRRADIATED TISSUE. (PRELIMINARY REPORT). V. Everett Kinsey. Proto-plasma 18(3), 473-4(1933). BA 8-17592

3445
EFFECTS OF X-RAYS ON THE NEUROFIBRILLAR RETICULUM OF NERVE CELLS OF NEW-BORN MAMMALS. Gastone Lambertini. Boll. soc. ital. biol. sper. 4(4), 542-7(1929). (In Italian).

Experiments on 5 puppies indicate that neurofibrillar reticulum of new-born mammal nerve cells, unlike that of adults, is very radiosensitive. Changes include lysis and complete disappearance of neurorete, without stage of conglutination intervening. Age is considered to be responsible for difference of response. BA 8-17593

3446
THE INFLUENCE OF THE TIME FACTOR IN THE IRRADIATION OF *DROSOPHILA* EGGS. Hugo Roesler and P. S. Henshaw. Am. J. Cancer 16(3), 631-9(1932).

Authors conclude that on basis of ionization measurements, low intensity radiation is relatively less effective in killing eggs of *D. melanogaster*. Although higher intensity may be more effective in producing destructive action in tissues, the greater differential effects may be obtained with prolonged irradiation. BA 8-17594

3447
RADIUM RADIATION EFFECTS ON REGENERATION IN *EURATELLA CHAMBERLINI*. Raymond G. Stone. Carnegie Inst. Wash. Publ. 435, 159-66(1934).

Posterior regeneration is progressively reduced in this polychaete by increasing lengths of exposure to β and γ rays of radium. Regeneration rate, but not amount is retarded by γ rays. Failure of regeneration appears to be due to β radiation effect. BA 8-17595

3448
CHANGES IN REDOX POTENTIALS IN SERUM DUE TO RÖNTGEN RAYS. N. Waterman. Z. Krebsforsch. 38(3), 301-11(1933). (In German).

After x irradiation, electrical potential of oxidation-reduction processes in serum of cancerous individuals has higher value than in serum of normal persons and is more variable. Results were obtained with tarred rabbits. BA 8-17597

3449
THE INDUCTION OF SELF-FERTILITY IN THREE FRUITS. D. Lewis and L. K. Crowe. J. Hort. Sci. 29, 220-225(1954).

The authors explain the x-irradiation method of inducing S mutations of the pollen which result in compatibility in hitherto incompatible self and cross matings. PBA 25-479

3450
ON THE EFFECT OF RÖNTGEN RAYS ON THE FINE STRUCTURE OF THE LIVER CELLS OF THE FROG. N. Tschassownikow. Virchow's Arch. pathol. Anat. u. Physiol. 269(1), 166-77(1928). (In German).

After 48-72 hr of x ray exposure, mitochondria of frog liver cells break down into granules which may swell and become globular. Vacuoles which become basophilic appear in cytoplasm; changes in Golgi net occur only after considerable cell degeneration. Basophilic constituents of nuclei increase at expense of acidophilic constituents. BA 8-18052.

3451
CYTOLOGY OF A TRANSLOCATION OF THE 1 · 2 CHROMOSOME IN *DATURA*. A. Dorothy Bergner and A. F. Blakeslee. Bull. Torrey Botan. Club 61(4), 197-209(1934).

As result of radiation treatment a gamete was produced in which 1 · 2 chromosome broke in mid-region; 0 · 2 half translocated to 0 11 end of 11 · 12 chromosome, forming a chromosome with 3 possible points of attachment for other chromosomes. The 0 · 1 half remains free. BA 9-21

3452
THE EFFECT OF X-RADIATION UPON SOMATIC CHROMOSOMES. K. Mather and L. H. A. Stone. J. Genetics 28(1), 1-24(1933).

Rooted corms of *Crocus olivieri*, *C. balansae* and *C. biflorus*, and *Tulipa gesneriana* bulbs were irradiated (64 kv, 5 ma, 30 cm target dist., for 15-30 min, unscreened). Abnormal metaphases were seen in fixed root tips in 2-3 days. It is concluded that chromosomes split during resting stage; attachment constriction remaining unaffected by radiation. BA 9-40

3453
THE INHERITANCE OF FOCAL MELANOSIS IN *DROSOPHILA*. John W. Gowen. Arch. Pathol. 17(5), 638-47(1934).

Focal melanosis of femur-tibia articulation in *D. melanogaster* was induced through action of gene located in middle portion of the sex chromosome, 29 units, mutated twice by x rays; once by 8,920 esu from Cu target tube and again by 26,620 esu from Cr target. BA 9-116

3454
CRYSTALLINE PEPSIN. VI. INACTIVATION BY BETA AND GAMMA RAYS FROM RADIUM AND BY ULTRA-VIOLET LIGHT. John H. Northrop. J. Gen. Physiol. 17(3), 359-63(1934).

Loss of activity of crystalline pepsin solutions exposed to β and γ rays of Ra and to ultraviolet were accompanied by corresponding decrease in pepsin protein. Rate of inactivation by ultraviolet depends on pH; maximum at pH 2.0. BA 9-417

3455
STUDIES ON SENSITIZATION TO GRENZ RAYS. C. Carrie. Strahlentherapie 46(4), 697-704(1933). (In German).

Hematoporphyrin and uroporphyrin (but not tryptaflavin or eosin) injections just before exposure sensitized mice to Grenz rays; not to x rays. BA 9-423

3456
CHANGES IN SUSCEPTIBILITY OF *DROSOPHILA* EGGS TO X-RAYS. I. A CORRELATION OF CHANGES IN RADIOSENSITIVITY WITH STAGES IN DEVELOPMENT. P. S. Henshaw and C. T. Henshaw. Radiology 21(3), 239-51(1933).

D. melanogaster eggs of different ages, exposed to varying dosages of 200 kv x rays, became more sensitive during cleavage and blastulation, comparatively much more resistant at gastrulation and more sensitive again after gastrulation. BA 9-425

3457
THE EFFECT OF RÖNTGEN RADIATION ON BLOOD CHOLESTEROL LEVEL AND ITS ADJUSTMENT BY ORAL ADMINISTRATION OF LIPOID. Magda Kiesel. Strahlentherapie 46(2), 311-42(1933). (In German).

In 11 of 15 rabbits, blood cholesterol (b. c.) fell and x ray sickness supervened after exposure; in 4 of 7 given Colsil (cholesterollécithin) before x irradiation b. c. rose in 2½ hr, was elevated in all after 24 hr, and there was no x ray sickness. In 13 of 20 patients b. c.

fell and x ray sickness occurred. Given Colsil before and hourly postirradiation, 11 of 20 showed increase b. c., usually no x ray sickness. BA 9-427

3458
ON THE RELATIONSHIP BETWEEN β AND γ RADIATION IN THE TREATMENT OF TUMORS. J. C. Mottram. Brit. J. Radiol. 5, 768-74(1932).

Repeated sublethal exposures to either β or γ radiation increased resistance of Jensen's rat sarcoma to the respective radiation. Increased resistance to one of these radiations by such conditioning was not accompanied by increased resistance to the other. BA 9-429.

3459
THE EFFECT OF RÖNTGEN RADIATION ON NERVE ACTION CURRENT. W. Schmitz and H. Schaefer. Strahlentherapie 46(3), 564-7(1933). (In German).

Action current of sciatic nerve of *Rana temporaria* measured by cathode ray oscillograph before and during irradiation was unaffected by doses to 1000 r in 15 min; by doses to 10,000 r intensified by Pb sheet behind nerve and applied until nerve died, or by 8 mgm RaBr for several hr at 1 mm distance. BA 9-431

3460
THE EFFECT OF SPACED RADIATION ON TISSUE CULTURES IN VITRO. F. G. Spear. Proc. Roy. Soc. (London) B110, 224-34(1932).

Tissue cultures from choroid and sclera of fowl embryos were exposed to Ra emanation for various periods separated by various intervals. Fractionation of dose into two parts decreased the effect on mitosis (inhibition), two exposures separated by 80 min. having a greater inhibitory effect than similar exposures separated by 160 min. Twenty four exposures to 300 mg Ra at 0.5 cm, $2\frac{1}{2}$ min. each, separated by 80 min. intervals produced a delayed lethal effect equivalent to continuous irradiation of $4\frac{1}{2}$ hours. BA 9-432

3461
ON THE ACTION OF RADIUM D, E, AND F WITH COLLOIDAL BISMUTH UPON GROWING TUMORS. A. G. C. Taylor. Brit. J. Radiol. 5, 446-56(1932).

Radioactive solution of radium D, E and F dissolved out of old radon tubes had a marked inactivating effect on emulsion of Jensen's rat sarcoma; only slight effect when injected around young growing tumors; little or no effect when injected into flank opposite that in which tumor was growing. BA 9-433

3462
BIOLOGICAL PROBLEMS IN X-RAY THERAPY. Friedrich Voltz. Strahlentherapie 47(1), 137-43(1933).

A review. BA 9-434.

3463
THE QUESTION OF LEUKOCYTE DEPRESSION AFTER IRRADIATION WITH VERY SOFT RÖNTGEN RAYS. E. Wilhelmy and Ning Yu. Strahlentherapie 47(3), 531-9 (1933). (In German).

No differences in leucocyte count, which could not be attributed to spontaneous fluctuation, were observed among 17 patients given 300 r of x rays on 6 x 6 cm field and 17 healthy controls receiving no irradiation. BA 9-435

3464
THE EFFECT OF X-RAYS ON THE ELECTRIC POTENTIALS AND THE RATE OF OXIDATION OF FROG'S SKIN. Marvin M. D. Williams and Charles Sheard. Protoplasma 15(3), 396-414(1932).

Curves for (1) potential difference and (2) O_2 consumption were similar in form, but changes in (2) generally preceded changes in (1). Results indicate cyclic type of relation between physiologic effects of x rays and time after irradiation. Doses of 9,000 and 160,000 r were applied in this study. BA 9-436

3465
SERUM COLSIL LEVELS, AND ROENTGEN SICKNESS AS REFLECTED BY SERUM CHOLESTEROL. Elisabeth Willms. Strahlentherapie 42(1), 171-80(1931). (In German).

Most patients with malignant tumors have higher than normal serum cholesterol. No relationship was found between incidence of radiation sickness and postirradiation change in serum cholesterol. Attempts to control radiation sickness with cholesterol preparation, Colsil, failed. BA 9-437

3466
CHOLINE CONTENT OF BLOOD UNDER SEVERAL EXPERIMENTAL CONDITIONS. Ada Bolaffi. Arch. ital. sci. farmacol. 2(2), 126-40(1933). (In Italian).

Irradiation with ultraviolet and Ra tends to increase choline content of rabbits' blood. BA 9-533

3467
A NOTE ON THE EFFECT OF RADIATION ON BLOOD. G. White Phillips. Lancet 225, 745-7(1933).

Blood counts at 2-day intervals in 6 untreated controls and in 9 malignant cases undergoing Ra therapy (5 also x rayed) showed no characteristic changes in blood picture 15-27 days after large x ray doses, no anemia or leucopenia resulted. Low lymphocyte count in malignant cases and gradual lymphocyte decrease in 2 cases were believed not to have been related to radiations. BA 9-560

3468
EFFECT OF X-RAY STERILIZATION ON OESTRUS IN THE FERRET. A. S. Parkes, I. W. Rowlands, and F. W. Rogers Brambell. Proc. Roy. Soc. (London) B109, 425-34(1932).

Complete obliteration of the ovarian follicular system followed whole-body x ray exposure for 5-80 min periods. Results indicate sterilized ovary of ferret produces enough estrin to cause uterine changes, but not enough for vulval swelling during breeding season. BA 9-694

3469
THE ROENTGEN-RAY TREATMENT OF EXPERIMENTAL TUBERCULOSIS. John W. Spies. Am. J. Roentgenol. Radium Therapy 26(5), 716-25(1931).

Guinea pigs and rabbits irradiated weekly for 8 wk: (1) before inoculation with virulent strain of tubercle bacillus, (2) after inoculation, (3) partly before and partly after inoculation. No retardation in the development of the disease was observed. BA 9-919

3470
ENHANCED LETHAL EFFECTS OF X-RAYS ON *BACILLUS COLI* IN THE PRESENCE OF INORGANIC SALTS. Walter D. Claus. J. Exptl. med. 57(2), 335-47(1933).

B. coli was irradiated by heterogeneous x rays in a series of solutions of M/10 KBr and nitrates of Sr, Ba, and Pb. Synergistic effect of salt solutions plus irradiation was found to increase with harder radiation. Enhanced lethal effect is believed to be a function of absorption coefficient of the salt and of wave length of x rays. BA 9-1167

3471
INHIBITION OF REGENERATION IN THE ADULT NEWT (*TRITURUS VIRIDESCENS*) BY X-RADIATION. Pressley L. Crummy. Anat. Record 57(4, Suppl.), 61(1933). (Abstract). BA 9-1623

3472
THE ACTION OF γ RAYS OF RADIUM ON THE NEURORETE OF DONAGGIO OF THE SPINAL NERVOUS ELEMENTS OF MAMMALS. Gastone Lambertini. Monit. zool. ital. 41 (Suppl.), 244-7(1931). (In Italian).

Abstract of paper. BA 9-1624

3473

HISTOLOGICAL CHANGES IN NON-REGENERATING LIMBS OF X-RAYED AMBLYSTOMA LARVAE. E. G. Butler. Anat. Record 55(4, Suppl.), 9(1933).

Abstract of paper. BA 9-1724

3474

AN EXPERIMENTAL STUDY IN THE DETERMINATION OF THE MORPHOLOGY OF HYDROCEPHALUS, PRODUCED IN THE ALBINO RAT WHEN IRRADIATED IN UTERO. T. T. Job and L. T. Palumbo. Anat. Record 55(4, Suppl.), 61(1933).

Abstract of paper. BA 9-1724

3475

AN EMBRYOLOGICAL STUDY OF A SPECIAL STRAIN OF DEFORMED X-RAYED MICE, WITH SPECIAL REFERENCE TO THE ETIOLOGY AND MORPHOGENESIS OF THE ABNORMALITIES. George M. Plagens. J. Morphol. 55(1), 151-83(1933).

Normal development of x rayed strain during first 13 days after insemination was followed by development of pathological structures (blebs, hematomas, thrombi) which crowd developing tissues and result in body deformation. BA 9-1744

3476

THE EFFECT OF X-RAYS ON ANTERIOR REGENERATION IN LUMBRICULUS INCONSTANS. Clarence D. Turner. Anat. Record 57(4, Suppl.), 65(1933). BA 9-1745.

3477

CROSSING OVER INDUCED BY X-RAYS IN DROSOPHILA MALES. J. T. Patterson and Meta L. Suche. Genetics 19(4), 223-36(1934).

Males heterozygous for 8 mutant genes in III-chromosome were x rayed, and F₁ males backcrossed to females with same series of genes. F₂ gave 77 variants (of 8,371) ascribable to x raying. Tests show that majority of variants were due to exchange of segments between homologues of III-chromosome. It is concluded that x rays induce crossing-over in males when immature germ cells containing diploid number are irradiated. BA 9-2325.

3478

A STUDY IN DROSOPHILA MELANOGASTER ON THE RELATIONSHIP BETWEEN DOSE AND MANNER OF IRRADIATION ON THE INDUCED MUTATION RATE. N. W. Timofeeff-Ressovsky. Strahlentherapie 49(3), 463-78 (1934). (In German).

For 8 doses between 750 and 6000 r-units, the frequency of sex-linked mutations induced in mature sperm is in simple and direct proportion to intensity of x radiation. Changing irradiation method did not alter dose-mutation frequency relationship. Direction and kind of mutation process is dependent upon structure of genes and chromosomes. BA 9-2338

3479

SOME EFFECTS OF X-RADIATION ON THE AMPHIBIAN, TRITURUS VIRIDESCENS. Pressley L. Crummy. Proc. Penn. Acad. Sci. 6, 167-71(1932).

Pigment changes following x raying showed red to be most susceptible; black gave little response. Histological studies of skin, intestine, and liver showed destruction of epidermal, epithelial, and cortex-like cells, respectively. BA 9-2575.

3480

THE EFFECT OF X-RAYS ON THE GRANULOPLAXIC ACTIVITY OF THE R.-E. SYSTEM. G. Dellepiane. Arch. intern. pharmacodynamie 39(3), 294-304(1930). (In Italian). BA 9-2576

3481

CELL CHANGES IN THE OVARY OF THE ROENTGEN IRRADIATED SEXUALLY MATURE WHITE MOUSE.

F. Chr. Geller. Arch. Gynakol. 141(1), 61-75(1930). (In German).

After 200-500 r x ray dose to ovaries of sexually mature mice, all visible ova, larger follicles and, later, corpora lutea disappeared. BA 9-2577

3482

METABOLISM OF TISSUES GROWING IN CULTURE. V. EFFECT OF RADIUM ON THE METABOLISM OF CULTURES OF EMBRYONIC KIDNEY TISSUE. Barbara Elizabeth Holmes. Biochem. J. (London) 27(2), 391-6 (1933).

Cell movement appeared to take place at expense of protein breakdown in the absence of suitable carbohydrate. An exposure of 14 hrs at 0.5 cm to γ rays of 300 mgm Ra produced 40-50% inhibition of carbohydrate breakdown, did not affect protein breakdown. BA 9-2578

3483

THE QUANTITATIVE BIOLOGICAL EFFECT OF X-RAYS OF DIFFERENT EFFECTIVE WAVE LENGTHS. Vasil Obreshkove. Physiol. Zool. 7(3), 330-9(1934).

Simocephalus vetulus young were subjected to beams of x rays of different qualities. Degree of injury was measured in terms of decrease in O₂ consumption. Between 0.317 and 0.450 Å, degree of injury was dependent on total amount of energy absorbed rather than on the qualities of x rays employed. BA 9-2579.

3484

THE DIFFERENTIAL ACTION OF GAMMA RAYS. S. Russ and G. M. Scott. Brit. J. Radiol. 5(59), 814-23(1932).

Rabbit ovaries were exposed to 45, 500, 1500, or 1700 mgm el. hrs, and animals were killed 6 wks later; ovaries examined macro- and microscopically. Rat livers were treated with radon seeds of 0.6, 0.3, and 0.1 mm platinum filtration; doses equalled 10, 32, and 45 mc for 2 hr. Livers were examined 48 hr after exposure. With the same ionization, there was proportionately greater biological effect from radiation of longer wave length. BA 9-2580

3485

ON THE ALTERATION OF CELL MEMBRANE PERMEABILITY BY A COMBINATION OF X-RAYS AND PHOTOCHEMICAL CATALYSTS. Lydie Tsebrikow. Arch. intern. med. exptl. 5(4), 641-8(1930). (In French).

Studies showed that photochemical catalyzers such as colloidal Fe, Ag, and Au intensify x ray action by increasing the permeability of the cell membrane. Trypan blue and trypanflavin, photochemical catalyzers for light and ultraviolet rays have no effect on x ray action. BA 9-2581.

3486

ON THE EFFECT OF ROENTGEN IRRADIATION ON THE LEVEL OF UREA AND AMMONIA IN THE BLOOD. Hans Wantoch. Deut. Z. Chir. 226(1/2), 160-3(1930). (In German).

Blood ammonia and urea in rabbits increased rapidly after x irradiation. Both apparently arise from proteins of rapidly disintegrating cells. BA 9-2582

3487

EXPERIMENTAL STUDIES ON THE CAUSE OF THROMBOSIS. A CONTRIBUTION ON THE ROLE OF BLOOD PLATELETS. Willy König. Arch. klin. Chir. 171(3), 447-502(1932). (In German).

Post-operatively, intermediate nuclear decomposition products cause circulatory changes in spleen, resulting in stimulation of the spleen which then destroys more platelets. After irradiation, platelets in peripheral blood first decrease then increase; clotting is reported as accelerated. BA 9-2652

3488

STUDIES ON THE SURVIVAL LENGTH OF LEUCOCYTES IN VITRO, TESTED BY THEIR AMOEBOID MOVEMENTS.

III. THE INFLUENCE OF VARIOUS RADIANT ENERGIES THEREON. Junkichi Ono. Trans. Japan Pathol. Soc. 19, 172-9(1929).

Post-irradiation survival of leucocytes was compared to normal mean survival of 21.4 hr, in vitro. Exposure to sun lamp, Kromayer's mercury-quartz lamp and solar radiation was most injurious, x rays, Ra were less effective, light of electric lamps relatively innocuous. BA 9-2664

3489

STUDIES IN THE PHYSIOLOGY OF THE PROSTATE GLAND. Robert Lee Johnston. Endocrinology 18(1), 123-41(1934).

Radon doses of 0.2, 2-4, 6-10 mc and x radiation of 800-2000 r and 250-1000 r were applied to testes and prostates of rats and dogs. Effects on exposed organs on hormone production and on fertility are described. Beneficial effects of anterior pituitary gonadotropic hormone on the irradiated testes was observed. BA 9-2840

3490

ROENTGEN RAY INTOXICATION DISTURBANCES IN METABOLISM PRODUCED BY DEEP MASSIVE DOSES OF THE HARD ROENTGEN RAYS. C. C. Hall and G. H. Whipple. Am. J. Med. Sci. 157, 453-81(1919).

Dogs were given a lethal dose of hard roentgen rays from the Coolidge tube. After a latent period of 24 hrs, vomiting and diarrhea began. Autopsy findings: decreased spleen size, congestion of intestinal mucous membrane and liver damage.

3491

RADIATION THERAPY OF MONGOLISM AND ITS INFLUENCE ON SERUM CHOLESTEROL LEVELS. Ernst Bingenheimer. Z. ges. exptl. Med. 87(5/6), 592-612(1933) (In German).

Roentgen irradiation of either skull or trunk causes increased serum cholesterol in Mongolian idiots (who characteristically have low serum cholesterol). Curve of cholesterol change after radiation suggests special influence of hypophysis and adjacent midbrain on cholesterol level. No effect on clinical picture. BA 9-3105

3492

AN EXPERIMENTAL STUDY ON THE EFFECT OF X-RAYS ON TUBERCULOUS TESTIS. K. Matsuoka. Sei-i-kwai Med. J. 50(3), 1-32; (4), 68-100(1931). (In Jap. with Eng. Summary).

Author inoculated bovine tubercle bacillus into both testes of rabbits, then x rayed one side. Inflammatory reaction and tuberculous change were milder, and bacilli were less numerous in exposed organ as compared with control. Necrobiosis and atrophy of parenchyma were distinct in x rayed testis. Beneficial effects of x ray treatment were not histologically demonstrable. BA 9-3276.

3493

ACTION OF X-RAYS ON HISTOGENESIS IN THE THYMUS. Ch. Gregoire. Compt. rend. assoc. Anat. 27, 328-36 (1932). (In French).

Study of the thymus of 100 guinea pig embryos from x rayed mothers is believed to confirm theory that small thymic cells evolve from thymoblasts or epithelial cells of endodermal origin. Beginning of radiosensitivity of embryo's thymocytes coincides with terminal stages of mitosis giving rise to them. BA 9-3859

3494

THE ACTION OF X-RAYS ON EUPLOTES TAYLORI AND ASSOCIATED BACTERIA. Morden G. Brown, J. Murray Luck, Grace Sheets, and C. V. Taylor. J. Gen. Physiol. 16(3), 397-406(1933).

Minimum lethal x ray dose for E. taylori (2110 r per sec for 220 sec) far exceeds that for associated bacteria, allowing relatively simple sterilization of

protozoa. Irradiation of Euplotes for 100-220 sec caused temporary cessation of ciliary activity in many organisms. Effect of x rays on bacteria were direct, not via media. BA 9-3889.

3495

EXPERIMENTAL CONTRIBUTION TO THE INVESTIGATION OF THE EFFECT OF IRRADIATION ON PLANT TUMORS. M. Ponzio. Vestnik Rentgenol. i Radiol. 10, 123-8(1932). (In German).

Tumors produced by B. tumefaciens in P. zonale and R. communis were more sensitive to soft x rays, especially K series, and secondary rays of metals with high atomic weight than to short wave-length x rays. BA 9-4577

3496

PLANT DISEASES CAUSED BY PSEUDOMONAS TUMEFACIENS. III. C. Stapp and H. Bortels. Zentr. Bakteriell., Parasitenk. Abt. II. 88(13/16), 313-9 (1933). (In German).

Neither x raying nor Lakhovsky's copper-wire ringing method have any effect on P. tumefaciens tumors in P. zonale, S. lycopersicum, or D. stramonium.

BA 9-4584.

3497

HISTOGENETICAL STUDY OF ROENTGEN TUMOURS. III. ON THE INFILTRATION OF THE GROUP OF SPECIAL CELLS, AND ITS RELATION TO THE OCCURRENCE OF TISSUE-ABNORMALITY. Hideo Komuro. Trans. Japan. Pathol. Soc. 21, 704-7(1931). (In Japanese).

Histological studies of x ray induced tumors in beans and peas are described. Nucleus of special cells induced by x ray (cells which gave rise to tumor) underwent amitotic division. BA 9-4637

3498

ELEVATION AND DEPRESSION OF TERMOGENESIS IN THE PHYTOPATHOGENIC EUMYCETES IRRADIATED WITH X-RAYS. L. Pasinetti. Riv. patol. vegetale 24(5/6), 217-59(1934). (In Italian).

In general, x rays reportedly stimulated energy metabolism of pathogenic fungi studied: Thielavia basicola, Aspergillus niger, Corticium rolfsii, Nigrospora oryzae, and Sclerotium delphinii. BA 9-4641

3499

THE EFFECT OF SOFT X-RAYS ON THE GERMINATION OF WHEAT SEEDS. Harris M. Benedict and H. Kersten. Plant Physiol. 9(1), 173-8(1934).

Wheat seeds irradiated with characteristic K lines of Cu for 5 sec. yielded seedlings with increased diastatic activity and reducing sugar content. Those exposed longer gave plants with progressive decreases in diastatic activity, reducing sugar content, respiratory rate, and percentage of water in seedlings. BA 9-4686.

3500

INFLUENCE OF DEATH CRITERIA ON THE X-RAY SURVIVAL CURVES OF THE FUNGUS, NEUROSPORA. Fred M. Uber and David Goddard. J. Gen. Physiol. 17(4), 577-90(1934).

Ascospores of N. tetrasperma were irradiated with 11 kv x rays. Cultures of these yielded a wide variety of mutant forms. Analysis of survival curves and modes of death indicate that ascospore death results not from a single well defined reaction but from several deleterious processes initiated by radiation. BA 9-4691

3501

EFFECT OF X-RAYS ON FERN PROTHALLI. Lewis Knudson. Am. J. Botany 20(10), 680(1933). BA 9-4737.

3502

THE INFLUENCE OF ROENTGEN RAYS ON THE ACID-BASE EQUILIBRIUM. Douglas H. Sprunt. J. Biol. Chem. 92(3), 605-13(1931).

Determinations of bicarbonate, chloride, protein phosphorus, total base and non-protein N concentration of serum and cell volume were made on the blood of 5 dogs and 2 monkeys before and after x irradiation. Consistent decrease (sometimes preceded by increase) in concentration of total base and undetermined acids was found in both species postirradiation. BA 9-4822

3503

ON THE EFFECT OF THORIUM ON METABOLISM.

J Zapatero Dominguez. Biochem. Z. 251(1/3), 141-7 (1932). (In German).

Small doses of ThCl₄ (0.1 to 0.2 gm per kgm) administered to rabbits have an inconstant effect; larger doses (0.2 to 0.6 gm per kgm) increase oxygen consumption. BA 9-4840.

3504

VISUAL SENSATION PRODUCED BY ROENTGEN AND RADIUM RAYS. S. R. Gifford and E. E. Barth. Arch. Ophthalmol. (Chicago) 11(1), 81-91(1934).

In studies with normal persons and those with various ocular diseases, results indicated that x rays directly stimulate visual cells photochemically and that visual sensation is due to this effect. BA 9-4907

3505

EFFECT OF RADIUM EMANATION ON BACTERIA, PERIPNEUMONIA VIRUS AND BACTERIOPHAGE. B. P. Ebert and L. G. Peretz. Vestnik Rentgenol. i Radiol. 10, 569-84(1932). (Russian with Fr. and Germ. sum.).

Vegetative forms of bacteria, spore-bearing bacteria, peripneumonia virus, and bacteriophage exposed to radium emanation showed increasing resistance in that order. BA 9-5374.

3506

THE SENSITIVITY, IN VITRO, OF BACTERIA TO THE BETA AND GAMMA RAYS OF RADIUM. R. R. Spencer. U. S. Public Health Repts. 49(6), 183-92(1934).

Broth cultures of actively multiplying bacteria exposed to Ra, β, and γ rays show initial growth retardation followed by stimulated growth, pleomorphism, and tendency to stain more deeply. Results are believed to indicate lethal effect due to β rays. BA 9-5409

3507

VARIABILITY OF DANYSZ BACILLUS AND OF BACTERIOPHAGE UNDER THE INFLUENCE OF RADIUM EMANATION. A. Ia. Zholkevich. Vestnik Rentgenol. i Radiol. 11(5/6), 443-8(1932). (Russian, Ger. sum.).

Emulsions of Danyisz bacilli were subjected to action of 10 mc. of Ra emanation for 12 hr. New strains resulted with stable, transmissible characters. Dissociation went from S to R; virulence was sharply lowered. Bacteriophage underwent marked changes. BA 9-5416

3508

COLLOIDAL THORIUM DIOXIDE (THOROTRAST) INJECTIONS IN RABBITS. G. R. Mather Cordiner, and N. Hamilton Fairley. Trans. Roy. Soc. Trop. Med. Hyg. 26(4), 318-19(1933). BA 9-1055.

3509

EFFECT OF PLANTING DENSITY ON THE DEVELOPMENT OF *P. NITENS* IRRADIATED WITH ULTRA-VIOLET AND X-RAYS. G. S. Filippov. Vestnik Rentgenol. i Radiol. 12(1/2), 3-25(1933). (Russian, with German Sum.).

Exceedingly high population density of *P. nitens* cultures accelerated development 2-10 times and resulted in underdeveloped, dwarf forms. X and ultraviolet irradiation of cultures caused increase in size of morphologic elements and higher productivity; increase did not surpass control. Sexual process was unfavorably affected. Ultraviolet was more effective than x rays. BA 9-6665.

3510

THE EFFECT OF X-RAY STERILIZATION AND CRYPTORCHISM ON THE HYPOPHYSEAL FUNCTIONS.

Emil Witschi and W. T. Levine. Anat. Record 55(4, Suppl.) 41(1933). BA 9-7003.

3511

ACUTE AND CHRONIC FATAL RADIATION INJURY IN HUMAN BEINGS. H. von Hamperl. Arch. pathol. Anat. u. physiol. Virchow's. 298, 376-93(1936).

Two cases discussed: a 26 year old girl's death due to self administered thorium X, and a 35 year old roentgenologist's death from x ray irradiation.

3512

THE HISTOLOGY OF THE ACTION OF X RAYS ON DONAGGIO'S NEURORETE IN THE SPINAL NERVE CELLS OF NEWBORN MAMMALS, AND OF RA RAYS ON THE SAME ELEMENTS IN ADULT MAMMALS.

G. Lambertini. Riv. neurol. 6(1), 124(1933). (In Italian). BA 9-7202.

3513

SPECIAL LOCALIZATION INTO FOCI, OF LESIONS OF THE NEURORETE IN SPINAL NERVE ELEMENTS OF THE ADULT RABBIT BY THE COMBINED ACTION OF RA AND COLD. L. Pilati. Riv. neurol. 6(1), 126(1933).

BA 9-7202.

3514

MELANOTIC NEOPLASMS OF THE SKIN. S. William Becker. Am. J. Cancer 22(1), 17-40(1934).

Pigmentation of skin was studied in 8 cases. Pigment activity due to irradiation by ultraviolet or α rays and changes related to continued stimulation are described. BA 9-7256.

3515

EFFECTS OF IRRADIATION BY X-RAYS ON THE EXHALATION OF CARBON DIOXIDE BY THE MOUSE. G. Hevesy, and A. Forssberg. Nature 168, 692(1951).

Glucose was injected subcutaneously into mice after irradiation. Non-fasting irradiated mice exhale only 80% of the amount of CO₂ exhaled by control mice. It is suggested that catabolism of glucose and fatty acids and not that of glucose may be responsible for the reduced exhalation of CO₂.

3516

THE EFFECT OF X-RADIATION ON THE REGENERATION OF THE FORE LIMB OF AMBLYSTOMA LARVAE. Elmer G. Butler. J. Exptl. Zool. 65(3), 271-315(1933).

X irradiation with an adequate dosage prevents regeneration of the fore limb of *Amblystoma* larvae regardless of age of the larva or stage of limb development at time of amputation. Histological changes are described. BA 9-8159.

3517

THE EFFECTS OF X RAYS ON THE ADULT AND PUPAE DURING METAMORPHOSIS. Mme. Hufnagel and Marcel Joly. Compt. rend. 196(13), 962-4(1933). (In French).

Larvae of *Calliphora erythrocephala* and (2) *Hyponomeuta padella* ready to pupate were irradiated in petri dishes on paraffin blocs or moist earth. Normal development of (1) was prevented by 20,000 r while 80,000 r did not affect (2). Irradiation did not affect cells already differentiated but embryonic and resting cells were strongly affected. BA 9-8187

3518

RADIATION GENETICS. C. P. Oliver. Quart. Rev. Biol. 9(4), 381-408(1934).

Author reviews principal results obtained in experiments on genic and chromosomal effects of supersonic, electrical,

electrostatic, electromagnetic, ultra-violet, Grenz, x-ray, and radium radiations, and of uses of such research. 306 papers cited. BA 9-8728

3519

CHROMOSOMAL ALTERATIONS INDUCED IN PLANTS BY X-RADIATION. T. H. Goodspeed. Am. Naturalist 67(718), 466(1934).

Abstract of paper. BA 9-8729

3520

THE PRODUCTION OF TRANSLOCATIONS AND MUTATIONS IN MICE BY MEANS OF X-RAYS. George D. Snell. Am. Naturalist 67(715), 178(1934).

Abstract of paper. BA 9-8729

3521

THE EFFECTS OF ALPHA RADIATION FROM POLONIUM IN PRODUCING SOMATIC MODIFICATIONS IN DROSOPHILA. Frank Blair Hanson and Florence Heys. Am. Naturalist 67(715), 165-6(1934).

Abstract of paper. BA 9-8729

3522

TYPES OF MUTATIONS AFFECTING POLLEN GRAINS WHICH HAVE BEEN INDUCED BY X-RAYING AND AGING SEEDS OF DATURA. J. L. Cartledge and A. F. Blakeslee. Am. Naturalist 67(715), 163(1934).

Abstract of paper. BA 9-8729

3523

GENETIC CHANGES IN MICE INDUCED BY X-RAYS. G. D. Snell. Am. Naturalist 67(708), 81(1933).

Abstract of paper. BA 9-8729

3524

THE EFFECTS OF X-RAYS ON THE CHROMOSOMES OF CIRCOTETIX VERRUCULATUS (ORTHOPTERA). Edwin R. Helwig. Am. Naturalist 67(708), 62(1933).

Abstract of paper. BA 9-8729

3525

THE EFFECTS OF X-RAYS ON GROWTH AND RESPIRATION OF WHEAT SEEDLINGS. Dorothy S. Francis. Bull. Torrey Botan. Club 61(3), 119-53(1934).

Linear growth of 4 organs (1), increase in fresh and dry wts of growing portions of organisms (2) and CO₂ production by given number of seedlings (3) were determined postirradiation. Doses from 1130 to 13,560 r retarded all three; after 565 r transitory stimulation was seen in (3) followed by a depression. Effects are greater after larger doses and at later intervals of measurement. BA 9-9029

3526

THE ACTION OF ULTRA-VIOLET RAYS AND X-RAYS ON YEAST CELLS. G. Nadson and C. Stern. Doklady Akad. Nauk SSSR. 1931A(2), 39-44(1931).

Changes in Saccharomyces cerevisiae after irradiation with ultraviolet from Hg arc and x rays included; change in contour of vacuoles, coagulation of metachromic granules and death. Comparative time intervals for effects with each type of irradiation are given. Young cells are more sensitive than older ones. BA 9-9039

3527

ON THE COMBINED EFFECTS OF METALS AND X-RAYS ON YEASTS. G. Nadson and C. Stern. Doklady Akad. Nauk SSSR. 1931A(3), 80-6(1931). (In French).

Oligodynamic action of metals on yeast may either retard growth or kill the cell. When exposed to these metals alone or with x rays for $\frac{1}{2}$ or 24 hr, order of decreasing action is: Cu, Pb, Ag, Pt, Al. When irradiated in presence of metal for $\frac{1}{2}$ hr, order is Pb, Pt, Cu, Ag, Al. BA 9-9040.

3528

THE EFFECT OF X-RAYS ON THE VITAMIN B CONTENT OF WHEAT SEEDLINGS. Kanematsu Sugiura. Radiology 21(5), 438-48(1933).

Vitamin B in dry wheat seeds is partially inactivated by heavy doses of unfiltered x rays (120,000 r) and almost completely destroyed in wet germinated seedlings given half this dose. Such destruction of vitamin does not prevent growth. BA 9-9046.

3529

X-RAY DOSAGE IN RELATION TO GERMINATION OF PECAN NUTS. H. P. Traub and H. J. Muller. Botan. Gaz. 95(4), 702-6(1934).

With nuts of Hicoria pecan, the maximum dosage permitting reasonable percentage of germination (20%) probably lies between 40 and 80 min exposure (Victory Company Coolidge Tube, tungsten target, Snook transformer, 50 kv, 10 ma, 1 mm Al, 14 cm target distance.) BA 9-9048

3530

CONCENTRATION OF RADIUM BY PLANTS V. L. Vernadskii. Doklady Akad. Nauk S. S. S. R. 1930A(20), 539-42(1930). (In Russian)

Author gives quantity of Ra atoms contained in individual plants, Lemna minor, 1.02×10^5 atoms, L. gibba, 5.83×10^5 , L. triscula, 8.91×10^5 . BA 9-9049

3531

INVESTIGATION ON THE EFFECT OF RONTGEN RAYS ON LIMB REGENERATION IN TRITON. I. OBSERVATIONS ON LIMB REGENERATION IN TRITON AFTER VARIOUS RÖNTGEN RAY DOSES. V. V. Brunst and E. A. Scheremetjewa. Z. wiss. Biol. Abt. D. Wilhelm Roux' Arch. Entwickl. mech. Organ 128(1), 181-215(1933). (In German).

Regenerating or intact hind limbs of Triton cristatus were exposed to x rays, then amputated through middle of stylopodium. Doses of 15,000 and 3750 r inhibited or greatly slowed regeneration, 1500 and 750 r also slowed rate, 300 r or less was followed by slightly slowed or normal regeneration. There was no evidence of initial stimulus of x rays. BA 9-9077

3532

SOME EFFECTS OF X-RADIATION ON REGENERATION IN THE NEWT, TRITURUS VIRIDESCENS VIRIDESCENS (RAF.). Pressley Lee Crummy. Univ. Pittsburgh Bull 31(1), 54-60(1934).

Dose of 1800 r inhibited regeneration in the adult newt for 1 yr, 450 r inhibited process for 60 days and was followed by abnormal development of regenerating part. Greatest inhibitory effect was observed when exposure occurred during differentiation. Melanophores were strongly affected by both 1800 and 450 r. BA 9-9079

3533

ON THE EFFECT OF RONTGEN RAYS ON BLOOD CATALASE. Ladislaus Deutsch. Strahlentherapie 48(1), 114-17(1933). (In German).

Blood catalase increase after x irradiation in 10 cancerous patients was proportional to erythrocyte count, depended on dosage, site and size of field. Author concluded that x rays increase oxidation and hence resistance. BA 9-9080.

3534

POISONING FROM DRINKING RADIUM WATER. Alexander O. Getter and Charles Norris. J. Am. Med. Assoc. 100(6), 400-2(1933).

Authors report first case on record of fatal poisoning from consumption of water containing traces of Ra salts in which presence of Ra in bones and tissues was definitely proved by scientific procedures. Death was due to pathologic lesions caused by deposited Ra. BA 9-9082

3535

THE PHYSICAL BASIS OF THE BIOLOGICAL EFFECT OF RADIATION. R. Glocker. Strahlentherapie 48(1), 1-14(1933). (In German).

A review. BA 9-9083

3536

EFFECT OF ROENTGEN IRRADIATION ON THE HEALING OF WOUNDS. Gorton Ritchie. Arch. Pathol. 16(6), 839-51 (1933).

In 66 rats in which a 6 cm wound was made on skin of back, $\frac{1}{2}$ of each wound was irradiated, in 1 group immediately, in a 2nd group 24 hrs, after incision, and in a 3rd group, 48 hrs afterward. Chief irradiation effects were sluggishness of fibroblastic growth, presence of anomalous giant fibroblasts and persistence for varying period of fibrin network. BA 9-9089

3537

THE DETECTION AND ESTIMATION OF RADIUM IN LIVING PERSONS. IV THE RETENTION OF SOLUBLE RADIUM SALTS ADMINISTERED INTRAVENOUSLY. Herman Schlundt, John T. Nerancy, and John Paul Morris. Am. J. Roentgenol. Radium Therapy 30(4), 515-22(1933).

Twelve patients with mental disease were given intravenous RaCl_2 every few days for 2-6 mo, total of 2190 μg administered to the 12 patients. Radioactivity of patients was measured at various times after injection. Such therapy showed no superiority over other therapeutic procedures in psychiatric patients. BA 9-9090

3538

WHOLE ANIMAL EXPOSURES TO HIGHLY FILTERED GAMMA RAYS. W. G. Whitman. Radiology 21(3), 265-73 (1933).

Rats (67) were exposed to emanation of 6 g Ra filtered by 16 mm Pb, 1 mm Pt, 1 mm brass, 5 mm celluloid, for intervals of 0.5 min to 17 hrs. Lethal exposure at 62 mm, distance was 4 hrs. Minimum exposure detectable by blood counts was equivalent to 1/20 to 1/80 lethal dose and weight changes on a growth curve were nearly equal in sensitivity. Another group (16) was exposed to 2.5 g Ra filtered by 1 mm Pt 1 mm brass. Progeny of rats exposed to a dose greater than 1/10 L. D. showed an increased number of abnormal offspring. BA 9-9092

3539

VITAL STAINING OF THE CELLS OF SERTOLI AND THE SPERMATOGENIC CELLS IN TESTICLES EXPOSED TO X-RAYS. Giovanni Tramontano-Guerritore. Atti. accad. fisiocrit. Siena 4(9/10), 829-31(1929-30).

Irradiation of rat testicles before, during, and after vital staining made no appreciable difference in results obtained. (Trypan blue and carmalum). BA 9-10218

3540

THE KURLOFF-FOA-CARBONE'S BODIES AFTER CASTRATION BY ROENTGEN-RAYS. E. Fiorini. Pathologica 24, 573-6(1932).

Castration in the guinea-pig by Roentgen rays caused a reduction in size and number of Kurloff bodies in leukocytes without causing their complete disappearance. Treatment with whole extract of guinea-pig's testis produced no change in the number of these formations. BA 8-9556

3541

X-RAY MUTATIONS IN THE TOMATO. John W. MacArthur. J. Heredity 25(2), 75-8(1934).

X rayed dormant tomato seeds produced new mutants in 12.4% of F_2 progenies. All were recessive and monofactorial, mainly lethal or injurious, and involved chlorophyll and anthocyanin colors, leaf form, stature, habit, growth rate, and structure of the growing tip. BA 8-19358,

3542

MUTATIONS PRODUCED BY ROENTGEN RADIATION AND THE "DIVISION HYPOTHESIS." Willem Eduard de Mol. Cellule 42(2), 151-62(1933). (In German).

X raying of either Hyacinthus or Tulipa bulbs during flower formation may induce somatic variations in blossom, leaf, or pollen formation. Effects of 100, 200, and 300 r

doses are described. Aberrations in meiosis may give rise to mutations through changes in chromosome complex. Hereditary changes may arise from variation in number of genes as well as from change in karyotype. BA 8-19359

3543

THE EFFECT OF RADIUM ON GLUTATHIONE AND ITS BIOLOGICAL SIGNIFICANCE. Frederick S. Hammett. Protoplasma 15(3), 422-6(1932).

Cell proliferation-retarding action of Ra in weak non-destructive amounts is concluded to be due largely to destruction of sulfhydryl. Probably this effect is enhanced by production, through action of Ra on the -S-S-linkage, of sub-oxidized sulfur derivatives which retard cell multiplication. BA 8-19698

3544

HOMOGENEOUS X RADIATION AND LIVING TISSUES. W. Moppett, Sydney, Australasian Medical Publishing Co., Ltd. 1932. 133p.

Effects of homogeneous x radiation upon allantoic membrane of chick and several other tissue are described. BA 8-19699.

3545

FERTILITY AND OFFSPRING OF FORMER X-RAY ASSISTANTS. H. Naujoks. Strahlentherapie 32, 613-39 (1929). (In German). BA 8-19701

3546

THE INFLUENCE OF PARTIAL IRRADIATION OF THE BONES ON THE STROMA OF BONE MARROW AND ON THE REST OF THE HEMOLYMPHATIC APPARATUS. G. Santori. Atti accad. nazl. Lincei, Rend. Classe sci. fis. mat. e nat. 7(8), 676-80(1928). (In Italian).

Single tibia of rabbit was x irradiated. Changes produced in hemolymphatic system are described. Effects were also perceptible in other bone marrow and organs of rabbit. BA 8-19703

3547

CHANGES IN ELECTRIC POTENTIALS AND RATES OF OXIDATION OF THE SKIN SUBSEQUENT TO ROENTGEN IRRADIATION. Marvin M. D. Williams and Charles Sheard. Radiology 22(1), 41-8(1934).

(1) Electrical differences of potential and (2) rate of oxygen consumption were determined in frog skin following 900 and 160,000 r doses of unfiltered x rays. After 9000 r both (1) and (2) were increased for 16-18 days; after 160,000 r (lethal dose) increase lasted only 1-3 days. BA 8-19704

3548

THE BEHAVIOR OF REDUCED GLUTATHIONE IN THE BLOOD AND TISSUES UNDER X-IRRADIATION OF THE ADRENAL REGION. M. Bacigalupi. Ateneo parmense 5(3), 247-58(1933). (In Italian).

Preliminary paper. BA 8-19808

3549

THE EFFECT OF ROENTGEN RAYS ON THE BLOOD CHOLESTEROL LEVEL IN CARCINOMA PATIENTS. V. Jura. Z. Krebsforsch. 39(4), 374-81(1933). (In German).

X irradiation of cancer tissue leads to a nearly immediate increase of blood cholesterol, provided patient is not cachectic. Since similar reaction occurs, through rarely, in non-cancer patients, it cannot be used as a diagnostic measure. Rise is often of short duration. BA 8-20185.

3550

LOCAL IMMUNITY AND THE INTESTINAL MUCOUS MEMBRANE. A. M. Bonanno. Boll. sez. ital. soc. intern. microbiol. 4(11), 498-501(1932). (In French).

Typhoid vaccine administered orally at same time as x irradiation of abdomen of experimental animals

induced considerable enhancement of immunity to subsequent typhoid inoculation. BA 8-20265

3551

ON THE EFFECT OF RADIUM RAYS ON TUBERCLE BACILLUS CULTURES. A. Dimtza and O. Schurch. Beitr. Klin. Tuberk. 80(2), 225-8(1932). (In German).

Tubercle bacilli are only slightly sensitive to γ rays, but very sensitive to β rays. Experiments were made on organisms growing on solid egg media (Lubenau). BA 8-20518.

3552

EXPERIMENTAL CONTRIBUTION TO THE STUDY OF THE MAMMALIAN THYMUS. COMPARISON OF X-RAY EFFECT ON THE THYMUS DURING HISTOGENESIS AND IN THE ADULT, FROM THE POINT OF VIEW OF THE RADIOSENSITIVITY OF SMALL THYMIC CELLS, THE PHAGOCYTIC PROCESS AND THE MECHANISM OF REGENERATION. Ch. Gregoire. Arch. intern. med. exptl. 7(3), 513-629(1932). (In French).

X-ray sensitivity of guinea pig embryo thymocytes is described. Small thymic cells became radiosensitive when formation of new thymic cells from thymoblasts stops. Small thymic cells are destroyed by x rays as fast as they are formed. BA 8-20941.

3553

THE CYTOGENETICS OF FOURTEEN TYPES DERIVED FROM A SINGLE X-RAYED SEX CELL OF NICOTIANA TABACUM. T. H. Goodspeed and P. Avery. J. Genetics 29(3), 327-53(1934).

Progeny of a single x rayed female gamete gave 7 pure-breeding derivative types and 7 others not yet established in pure-breeding condition. Variations were in habit, form of flower, leaf and capsule, and color of leaf and flower. BA 9-10750

3554

THE RADON PROBLEM IN DEEP LEVEL MINING. D. A. Holaday. A. M. A. Arch. Ind. Health 12, 163-6(1955).

High concentration of radioactive dust and gas exist in a high proportion of uranium mines. Adequate data are not available for interpreting these concentrations in terms of effects on human health. It has been demonstrated that minor amounts of ventilation will reduce radon concentrations.

3555

SKIN ERYTHEMA DOSE IN TERMS OF ROENTGENS IN SUPERFICIAL THERAPY. George C. Andrews and C. B. Braestrup. Am. J. Roentgenol. Radium Therapy 29(5), 663-6(1933).

Dose of 400 r measured in air found to be equivalent to an erythema dose of unfiltered rays or of radiation filtered with 3 mm Al in study using fields 7.5 cm diameter on healthy skin of thigh of 24 subjects. No erythema occurred with 350 r: intense erythema with 450, 500, and 550 r. Practically no individual variation in skins was observed. BA 9-11230

3556

SENSITIVITY OF DIVIDING AND NON-DIVIDING CELLS TO RADIATION. F. G. Spear, A. Glucksman, A. F. W. Hughes, and C. W. Wilson. Nature 134, 460-1(1934). BA 9-11223.

3557

DEMONSTRATION OF SUBSTANCES INCREASING CAPILLARY PERMEABILITY IN THE BLOOD AFTER ROENTGEN IRRADIATION. A. Beutel and O. Klein. Z. klin. Med. 123(1/2) 104-10(1933). (In German).

Intravenously injected dye was used to test for the presence of a circulating substance increasing vascular permeability in 5 x-irradiated persons. Dye color appeared in wheals from irradiated serum, was less marked in wheals from unirradiated serum. Neither

organ irradiated nor dose affected permeability to an appreciable extent. No consistent time curve was observed for the effect. BA 9-11231

3558

CELLULAR REACTIONS IN ASEPTIC WOUNDS OF LIVER IRRADIATED WITH X-RAYS. Egidio Cappelli. Sperimentale 87(5/6), 477-500(1933).

Healing of lesions produced in the liver of rabbits by electric coagulation was studied for period of 14 hr-1 mo. Mild radiation increased initial hyperemia and exudation and decreased proliferation of Kupffer cells. Delayed healing after radiation is attributed to decreased number of phagocytes. BA 9-11232

3559

THE ACTION OF RADIUM ON CANCER CELLS. III. FACTORS DETERMINING THE SUSCEPTIBILITY OF CANCER CELLS TO GAMMA RADIATION. H. G. Crabtree and W. Cramer. Sci. Rept. Invest. Imperial Cancer Res. Fund. 11, 103-17(1934).

Pure γ rays have the same biological effect on cancer cells as mixture of β and γ rays. In both cases, functional condition of respiratory system determines biological response of cell, and glycolytic mechanism is not primarily concerned. BA 9-11233

3560

INCREASE OF RESISTANCE OF PROTOZOA TO X-RADIATION BY LECITHIN IN COLLOIDAL SOLUTION. B. -S. Levin and C. Piffault. Compt. rend 198(23), 2024-6(1934). (In French). BA 9-11237

3561

THE EFFECTS OF CROWDING ON HEAD FREQUENCY AND LENGTH OF LIFE OF PLANARIA DOROTOCEPHALA THAT HAVE BEEN EXPOSED TO VARIOUS DOSES OF ROENTGEN RAYS. F. G. Meserve and Mary J. Kenney. Am. J. Roentgenol. Radium Therapy 32(4), 552-4(1934).

Four hundred animals were exposed to 4, 8 and 12 skin units of x rays. First apparent effects appear to be on non-specific protoplasmic factors upon which head development depends. Range of distribution of types increases as crowding increases. Regeneration occurred at all doses. One of the most frequently observed effects was shortening of head. BA 9-11238.

3562

THE SIGNIFICANCE OF RESULTS OBTAINED BY EXPOSING THE ALLANTOIC MEMBRANE OF THE CHICK TO HOMOGENEOUS X RADIATION. Warnford Moppett. J. Cancer Research Comm. Univ. Sydney 5(4), 197-202(1934).

Author proposes that homogeneous x rays act on cells with maximal efficiency when frequency is such that integral number of quanta are required. BA 9-11240

3563

STUDIES ON THE EFFECT OF ROENTGEN RAYS ON THE HEALING OF WOUNDS. II. HISTOLOGICAL CHANGES IN SKIN WOUNDS IN RATS FOLLOWING POST-OPERATIVE IRRADIATION. Ernst A. Pohle and Gorton Ritchie. Radiology 20(2), 102-8(1933).

Half of incisions in skin of back of 66 rats were x rayed (100 kv, 2 mm Al) immediately, 24 and 48 hr after incision, and biopsy specimens were taken 1-9 days after incision. Delayed healing was observed in wounds irradiated at 24 hr interval. Effects were readily apparent 7-8 days after incision. Irradiation effect on connective tissue was greater than that on epithelium. BA 9-11241.

3564

ALTERATIONS IN THE pH OF THE BLOOD IN CANCER FOLLOWING ROENTGEN AND GAMMA IRRADIATION. Janetta Wright Schoonover, Ethol Hall Shiels and Bernard

P. Widmann. Am. J. Roentgenol. Radium Therapy 31(4), 532-7(1934).

No definite trend in blood pH was found during course of radiation therapy. Slight changes observed in either direction were only transient. BA 9-11243

3565

CHRONIC RADIUM POISONING IN RATS. Horace E. Thomas and Frank H. Bruner. Am. J. Roentgenol. Radium Therapy 29(5), 641-62(1933).

Four male and 4 female rats were injected subcutaneously with 40-60 micrograms $RaCl_2$ over 126-191 days. Detailed description of results given, including decreased weight gain, anemia, bone marrow injury and extramedullary hematopoiesis, destruction of lymphocytes in lymphoid tissue, morphological changes in salivary glands, adrenal glands and testes, myocardial fibrosis, parenchymatous nephritis, resorption of fetuses by radioactive mothers and abnormal deposition of Ca salts in bone, predisposing to fractures. Abscesses in soft tissues around the mandible were frequently found. BA 9-11246.

3566

SOME OBSERVATIONS OF THE EFFECTS OF RADIUM IRRADIATION ON TISSUE CULTURES. W. G. Whitman. Am. J. Cancer 17(4), 932-45(1933).

Changes observed in tumor cells (rat sarcoma) and normal tissue in tissue cultures exposed to Ra emanation were compared. Marked increase in number of abnormal mitoses was noted, the depression being greater in normal cells (macrophages) than in tumor cells. BA 9-11247

3567

THE INFLUENCE OF ROENTGEN RAYS ON THE GROWTH AND PHOSPHATASE ACTIVITY OF BONE. Walter E. Wilkins and Eugene M. Regen. Radiology 22(6), 674-7(1934).

Puppies 30-40 days old were given a 600 r x ray dose to the left foreleg, (right used as control) and killed 3-34 days later. Irradiated bone was heavier for few days post-exposure. Growth was retarded more in wt. than length. Phosphatase activity decreased to minimum in 1-3 wk, then recovered. No decrease in enzyme activity followed irradiation of bone extract and blood plasma with 1200 r. BA 9-11248

3568

THE EFFECT OF ROENTGEN IRRADIATION OF THE ENTIRE ANIMAL ON THE PHOSPHATASE ACTIVITY AND ELECTROLYTE CONTENT OF ITS WATER EXTRACT. Walter E. Wilkins and Eugene M. Regen. Radiology 23(4), 443-5(1934).

Rabbits given whole-body exposure to 500-1100 r x irradiation. Whole body extracts made 1 wk later showed that phosphatase activity of irradiated animal was appreciably lower than that of controls. No appreciable change was observed in total P. inorganic P. chlorides, Ca, Mg, Na, and K. BA 9-11249

3569

GASTRIC SECRETION FOLLOWING IRRADIATION OF THE EXPOSED STOMACH AND THE UPPER ABDOMINAL VISCERA BY ROENTGEN RAYS. Albert M. Snell and Jesse L. Bollman. Am. J. Digest. Diseases Nutrition 1(3), 164-8(1934).

Irradiation of intact upper abdomen of dogs produces variable and temporary reduction in gastric acidity and destruction of gastric mucosa. Similar effects followed irradiation of the surgically exposed and isolated stomach. Effects were temporary; acidity subsequently returned to normal. It is suggested that improvement of ulcer patients given x ray therapy may be due to effect on local

leukocytic infiltration, not to direct effect on gastric secretion. BA 9-11433.

3570

ACTION-CURRENTS OF THE RETINA ON IRRADIATION WITH RADIUM. P. F. Thier. Acta Brevia Neerl. Physiol., Pharmacol., Microbiol. 4(1), 17-19(1934).

On irradiation of frog eyes with Ra, action-currents arose in retina and were of the same general shape as those obtained with light, but all phases developed more slowly. Beta rays main cause of Ra E. R. G., γ rays had much smaller effect. CO_2 had specific damaging influence on functions of the retina. BA 9-11488

3571

RADIUM POISONING A REVIEW OF PRESENT KNOWLEDGE. Robley D. Evans. Am. J. Public Health 23(10), 1017-23(1933). BA 9-11549

3572

LEUKEMOID AND LEUKEMIC CONDITIONS IN WHITE MICE WITH SPONTANEOUS MAMMARY CARCINOMA. W. C. Hueper. Folia Haematol. 52(2), 167-78(1934).

X ray irradiation of cancerous mice produced a marked increase in the incidence of leukemia. Hyperplastic myeloid or lymphoid proliferations were changed into leukemic ones by x rays. BA 9-11581

3573

THE THERAPEUTIC ACTION OF RADIUM ON SPONTANEOUS MAMMARY CARCINOMATA OF THE MOUSE. W. Cramer. Sci. Rept. Invest. Imperial Cancer Research Fund 11, 127-45(1934).

Spontaneous mammary carcinomata of the mouse show considerable differences in sensitivity to Ra. Reactions of radiosensitive and radioresistant tumors are described. Both radiosensitive and radio-resistant tumors show nonlethal damage of irradiated cells, but only in the former is this followed by prolific macrophage invasion and subsequent fibrosis. BA 9-11625

3574

THE CARBOHYDRATE TOLERANCE IN CANCER PATIENTS, AND THE EFFECT UPON IT OF ROENTGEN RAY RADIATION. F. H. L. Taylor and Henry Jackson, Jr. Am. J. Cancer 22(3), 536-47(1934).

In only 11 of 35 cancer patients studied was decreased tolerance for glucose found prior to the institution of x-ray therapy. No consistent x-ray effect on sugar tolerance was observed in these patients. BA 9-11687

3575

INFLUENCE OF GRENZ RAYS ON PATHOGENIC FUNGI IN SKIN MATERIAL. Emanuel Muskatblit and Boris Ouspensky. Arch. Dermatol. and Syphilol. 27(6), 953-5(1933).

Hairs from 17 children with tinea capitis, containing 5 fungus species, were exposed to Grenz rays in 22 experiments. Microsporon audouini, M. lanosum, Achorion schonleinni, and Trichophyton crateriforme were unaffected by doses as high as 50,000 r. T. violaceum was unaffected by 30,000 r, its growth delayed or inhibited by 50,000 r. Cultures from hairs irradiated showed no peculiarities in gross or microscopic morphology. BA 9-11972.

3576

RADIUM AND LETHAL MUTATIONS IN DROSOPHILA. FURTHER EVIDENCE OF THE PROPORTIONALITY RULE FROM A STUDY OF THE EFFECTS OF EQUIVALENT DOSES DIFFERENTLY APPLIED. Frank Blair Hanson and Florence Heys. Am. Naturalist 66, 335-45(1932).

A series of dosages as nearly equivalent as possible but applied in different ways gave approximately equivalent results. Effect was proportional to total energy absorbed. BA 9-13081

3577

CHEMICAL ACTION, ELECTRIC RESISTANCE, AND TISSUE DAMAGE. Alberto Pirovano. Riv. biol. (Perugia) 16(2), 1-18(1934)

Comparison of effects of **magnetic flux and x rays** on developing ears of maize. BA 9-13333

3578

BIOLOGICAL DOSIMETERS IN RADIOLOGY. Charles Packard. Cold Spring Harbor Symposia Quant. Biol. II, 264-74(1934).

Author discusses the advantages of using *Drosophila* eggs as biological dosimeters. BA 9-13452.

3579

THE EFFECTS OF X-RADIATION UPON CELL GROWTH AND STRUCTURE. George L. Clark. Cold Spring Harbor Symposia Quant. Biol. II, 248-63(1934). BA 9-13452

3580

CHEMICAL-PHYSICAL FOUNDATION OF THE BIOLOGICAL ACTIVITIES OF X-RAYS. Hugo Fricke. Cold Spring Harbor Symposia Quant. Biol. II, 241-8(1934). BA 9-13452.

3581

RESPIRATION AND DEVELOPMENT OF INDIVIDUAL MUD-DAUBER WASP LARVAE FOLLOWING X-IRRADIATION. Joseph Hall Bodine and Titus Carr Evans. Physiol. Zool. 7(4), 550-6(1934).

Activity developing larvae of *S. caementarium* proved to be more sensitive to x rays than were blocked or "diapause" larvae. Organisms that were irradiated and immediately subjected to periods of normal or artificially produced developmental blocks showed marked powers of resistance to, or recovery from, harmful irradiation effects normally shown by developing organisms. BA 9-13565.

3582

EFFECT OF X-RAYS ON THE TRANSPARENT MEDIA OF THE EYE. A. P. Devirts and S. M. Khaulin. Izvest. Akad. Nauk SSSR. Otdel. Mat. i Estestven. Nauk 1933(1), 161-72(1933). (In Russian).

Changes in lens of eyes of rabbits irradiated with 4 H units of x rays (delivered to the head) are described. Cloudiness of the posterior surface of lens was perceptible 2-3 months post-exposure. Similar changes are seen in lens, vitreous humor and cornea in humans after therapeutic x irradiation. BA 9-13567

3583

THE RATE OF RECUPERATION OF HUMAN SKIN FOLLOWING IRRADIATION. James J. Duffy, A. N. Arneson, and Edward L. Voke. Radiology 23(4), 486-90 (1934).

Authors studied the quantity of radiation necessary to produce threshold erythema in single and divided doses of 200 kv x rays (0.5 mm Cu and 2 mm Al). Threshold erythema dose was 525 r; for equal amounts of radiation at 24 hr interval it was 400 r per exposure; for 48 hr intervals 425 r per exposure. BA 9-13568

3584

EXPERIMENTS ON THE CHORIO-ALLANTOIC MEMBRANE OF THE CHICK EGG WITH REGARD TO THE ACTION OF HOMOGENOUS X-RAY IRRADIATION. E. S. Duthie. Brit. J. Radiol. 7, 238-46(1934).

No x-ray effect on chorio-allantoic membrane of 8-10 day old chick embryos was demonstrated under the condition of the experiment. BA 9-13569

3585

RESPIRATION AND VISIBLE DEVELOPMENT OF INDIVIDUAL GRASSHOPPER EGGS FOLLOWING X-IRRADIATION. Titus Carr Evans. Physiol. Zool. 7(4), 556-72(1934).

Visible development and respiratory rates of grasshopper eggs was immediately but temporarily affected by

irradiation of <1000 r; above this level hatching was suppressed. Above 2000 r, embryos died at earlier stages. Initial movements of blastokinesis were resistant to all doses below 10,000 r. Some recovery occurred with refrigeration (9-10°C) for several days immediately after exposure, none if refrigeration was delayed. BA 9-13570.

3586

STUDIES ON THE EFFECT OF CONTINUOUS EXPOSURE OF MICE TO GAMMA RAYS OF RADIUM. J. Furth and D. H. Kabakjian. Am. J. Roentgenol. Radium Therapy 32(2), 227-34(1934).

Mice were exposed continuously to γ rays emanating from 0.003 to 5 mgm. Ra. Radiation from 1-5 mgm shortened life span and the leucocyte count of those exposed to 5 mgm dropped much below normal in one week although mice lived 2-3 months. Exposure to 0.3 mgm did not prevent development of spontaneous neoplasm. Radiation increased susceptibility to transmitted lymphomatosis. Mice already afflicted with the lymphomatosis showed some prolongation of life under continuous irradiation from 1-5 mg radium. BA 9-13571

3587

AUDITORY EFFECTS OF ROENTGEN RAYS IN DOGS. II. Edward Girden and Elmer Culler. Am. J. Roentgenol. Radium Therapy 32(5), 675-9(1934).

Temporary increase in auditory acuity (average gain 5.5 decibels) was noted in 8 dogs following irradiation of head with small doses (80-100 kv, 5 ma, 25 cm). Second shorter period of increased acuity appeared, in 4 cases, upon subsequent exposure. Cumulation of over 4,400 r and 11,000 r did not impair auditory function. Cumulated doses of 67 r and 3500 r at 200 kv, 5 ma produced no change in function. BA 9-13572

3588

THE TIME-INTENSITY FACTOR IN RELATION TO THE GENETIC EFFECTS OF RADIATION. H. D. Griffith and K. G. Zimmer. Brit. J. Radiol. 8(1), 40-7(1935).

Author reviews studies of time-intensity in radiation showing a time factor of unity for all intensities for genetic changes. BA 9-13573

3589

ACTION OF SOFT AND HARD RAYS ON THE FORMATION OF OSSEOUS CALLUS. M. Lambranzi. Arch. radiol., Parte I. 9(2), 247-50(1933). (In Italian).

In group of 18 rabbits hard rays appeared to promote callus formation more effectively than did soft rays. BA 9-13574.

3590

ON THE ALTERATION IN THE SENSITIVITY OF CELLS TOWARDS RADIATION PRODUCED BY COLD AND BY ANAEROBIOSIS. J. C. Mottram. Brit. J. Radiol. 8(1), 32-9(1935).

Broad bean roots exposed to x and γ rays in ice water were more retarded in growth than were those irradiated in water at 24°C. Irradiation in N atmosphere was less effective than in air. BA 9-13577

3591

EFFECTS OF RADIATION ON TISSUE CULTURES OF LYMPH NODE. Wilhelm Stenstrom and Joseph T. King. Proc. Soc. Exptl. Biol. Med. 31(8), 909-10(1934).

Preliminary paper. BA 9-13581

3592

HISTOLOGICAL CHANGES IN THE ANTERIOR LOBE OF A ROENTGEN IRRADIATED HUMAN HYPOPHYSIS. E. Stockl. Zentr. Gynakol. 58(20), 1160-6(1934). (In German).

About 2/3 of anterior lobe of pituitary underwent necrosis 38 days after 610 r x ray dose (woman 56 yrs). Marked basophil content of anterior lobe is attributed to

heart trouble, excretion of albumin in urine and possibly anemia. BA 9-13582

3593

CERTAIN PHYSIOLOGICAL EFFECTS OF X-RAYS ON EUPLANARIA DOROTOCEPHALA. I. DIFFERENCES IN SUSCEPTIBILITY. H. H. Strandskov. *Physiol. Zool.* 7(4), 572-86(1934).

Of two hundred animals exposed to x rays from 172-864 r, 113 were perceptibly affected, the degree of effect varying in general with length of exposure. Antero-posterior gradient of susceptibility to x rays was similar in pattern to susceptibility gradients brought out by other agents in same animal. Surviving affected animals subsequently regenerated some or all of the tissues destroyed by exposure. BA 9-13583.

3594

REACTION OF TRANSPLANTABLE MOUSE SARCOMA NO. 180 TO RADIATIONS OF DIFFERENT WAVE LENGTHS (200 kv. ROENTGEN RAYS AND GAMMA RAYS). Kanematsu Sugiura. *Am. J. Roentgenol. Radium Therapy* 31(5), 614-27(1934).

Viability of mouse sarcoma irradiated *in vitro* and then transplanted was destroyed by 10 min unfiltered x rays (2,400 r) or 63 min filtered (2,800 r), both usually at 200 kv, or 7 hr of γ rays. Effect of sub-lethal doses on growth are described. Bunsen-Roscoe law was found to be applicable within limits of the experimental conditions. BA 9-13584

3595

THE EFFECT OF RADIATION FROM FILTERED RADON IMPLANTS ON THE GROWTH OF CARCINOMA AND SARCOMA IN ANIMALS. Kanematsu Sugiura and Stanley R. Benedict. *Am. J. Cancer* 20(4), 813-26(1934).

An experimental attempt to determine MLD of radiation from a radon seed in terms of skin erythema dose (SED) using Flexner-Jobling rat carcinoma and Sugiura rat sarcomas as test systems. Tumors were irradiated *in vivo*. BA 9-13585

3596

EFFECT OF ROENTGEN RAYS ON THE THYROID OF GROWING ORGANISMS. A. Viethen. *Z. Kinderheilk.* 56(4), 400-4(1934). (In German).

Thyroid gland of young rats received a dose of 25-1,000 r, that of adults a dose of 100-1,000 r. Inhibition of function was observed in young gland, but radiation had no effect in adults. Effect varied with size of dose and time of examination. BA 9-13586

3597

ENDOCRINE REACTIONS IN FEMALE RATS AFTER X-RAY TREATMENT. W. T. Levine and Emil Witschi. *Proc. Soc. Exptl. Biol. Med.* 30(8), 1152-3(1933).

Preliminary paper. BA 9-13915

3598

EFFECT OF X-RAYS UPON THE DEVELOPMENT OF SEXUAL CHARACTERISTICS. A. F. Rolf, Carl H. Schroeder, and W. A. Higgins. *Poultry Sci.* 13(5), 274-7(1934).

Exposure of 6 wk cockerels to 1,750, 2,200, and 2,700 r or 2 exposures of 1,750 r at intervals of 10 days reduced development of testes, comb and wattles, and destroyed ability to crow. External characteristics were of "slip" rather than of capon. Results indicate that production of hormone responsible for these characters was not inhibited completely. Weight gain was significantly reduced. BA 9-13941

3599

A CASE OF MULTIPLE RADIUM CANCERS OF THE SKIN. H. Droschl. *Z. Krebsforsch.* 38(3), 274-82(1933). (In German).

Author presents a detailed account of a case of human cancer of the skin, developed after years of exposure to Ra. Death in this case (a physician) was due to severe aplastic anemia. BA 9-14043

3600

STIMULATING ACTION OF RADIO-ACTIVE DEPOSITS IN THE BODY. Frederick B. Flinn. *Radiology* 23(3), 331-8(1934).

Exposure to Ra caused no direct stimulation of tissue *in vitro*. Clinically, its action was found to be always destructive, due to impact of α particle on cell nucleus. Lesions observed in several cases are described histologically. Amounts of Ra in cases observed had no effect on germ cells. Observations suggest slow wearing down of bone tissue. Sarcomas which developed are attributed to continuous stress on the injured bone. BA 9-14045

3601

THE ACTION OF RADIUM ON THE INORGANIC STRUCTURE OF TUMOUR CELLS AS SHOWN BY MICROINCINERATION. E. S. Horning. *Sci. Rept. Invest. Imperial Cancer Research Fund* 11, 67-73(1934).

Paraffin sections of adenocarcinoma 27 were obtained 4 hr-24 days after irradiation and incinerated at 650°C., then examined by dark field microscopy. Increase of cytoplasmic salts occurred in tumor cells 6-8 hr after exposure. It was maintained until 24 hr after Ra application and was accompanied by cellular hypertrophy on 3rd day. BA 9-14052

3602

STUDIES ON THE EFFECT OF ROENTGEN RAYS ON LYMPHOMATOSIS OF MICE. J. Furth. *Am. J. Roentgenol. Radium Therapy* 32(3), 377-83(1934).

Total irradiation of lymphomatous mice prolonged life, did not prevent fatal termination of illness. Prolongation of life was proportional to dose, the optimum dose being 400 r, the minimum, 150 r. Complete regression of tumor of leg occurred following 3000 r applied to tumor, 2000 and 1000 r caused only partial regression. Death rate due to intercurrent diseases was greater among irradiated mice. BA 9-14096.

3603

EFFECTS OF ARTIFICIALLY INDUCED LYMPHOPENIA IN CANCER RESISTANT AND CANCER-SUSCEPTIBLE RATS. M. F. Guyer, F. E. Mohs, and F. M. Shebesta. *Arch. Pathol.* 19(1), 66-74(1935).

Lymphopenia due to repeated x irradiation did not destroy immunity in a strain of cancer-resistant rats nor alter response of a highly susceptible strain to cancer implants. The characteristic lymphocytic and fibrotic response to cancer implants was greatly reduced in irradiated rats. BA 9-14128

3604

THE DELETERIOUS EFFECTS OF DEEP ROENTGEN IRRADIATION ON LUNG STRUCTURE AND FUNCTION. V. C. Jacobsen. *Am. J. Roentgenol.* 44, 235-49(1940).

A patient with bronchial carcinoma received deep x-ray therapy to the chest in amounts totaling 18,300 r over a period of 9 years. The tumor was almost totally destroyed: was identified at autopsy from a small remnant remaining (it was not the direct cause of death). Complications of the extensive irradiation included: atelectasis, chronic interstitial fibrosing pneumonitis, chronic bronchitis, hemoptysis from granulation tissues, extensive arterial obliteration in the affected side.

3605

ON THE BREEDING OF WILLOW. V. N. Sukachev. *Sbornik Trudov Tsentral Nauch-Issledovatel' Inst. Lesnogo Khoziaistva (Bull. USSR Central Forestry Research Inst.)* 1, 51-85(1934).

Shoots of cuttings subjected to x rays showed modifications with general trend towards narrowing of leaves. In one case convolute leaves, and in another an acceleration of shoot growth were noted. BA 9-14503

3606

CHROMATIC INCLUSIONS IN THE CYTOPLASM OF CELLS AFTER GAMMA RADIATION, AND CHANGES IN THE NUCLEOLUS. J. C. Mottram. J. Roy. Microscop. Soc. 53(1), 28-34(1933).

Root tip cells of *Vicia faba* exposed to γ radiation (radium) are described. Cytoplasmic inclusions observed are considered to be extrusions from nucleolus. Nucleolus is considered a "factory for chromatin"; irradiation inhibiting normal passage of chromatin to spireme. BA 9-15273

3607

OVARIAN IRRADIATION AND SEXUAL PRECOCITY IN THE RAT. James L. Mandel and E. N. Grisewood. Proc. Soc. Exptl. Biol. Med. 32(1), 155(1934).

Immature females were x irradiated (200 kv, 3 ma, 25 cm dist., 41.4 r/min) with doses ranging from 540-1,240 r. Vaginae of all irradiated animals opened at 14 days, 3 wk before those of controls. Examination of ovaries revealed abnormally large follicles, their growth and activity apparently stimulated by x rays. Vaginal canalization was markedly precocious. BA 9-15811

3608

THE QUESTION OF THE EFFECT OF ROENTGEN RAYS ON THE LUNGS AND ON THE HEART OF DOGS. M. I. Karlin and B. N. Mogilnitsky. Frankfurt. Z. Pathol. 43(3), 434-47(1932). (In German).

Dogs and rabbits were exposed to one of the following: (1) single erythema dose (ED) to one anterior and 1 posterior field or (2) 3 exposures of 1 ED/field at monthly intervals. No changes were apparent during the 4 mo observation period from (1), (2) caused peribronchial and perivascular proliferations of connective tissue: epicardial thickening and perivascular connective tissue thickening in the heart. BA 9-16083

3609

EXPERIMENTAL CHRONIC NEPHRITIS PRODUCED BY RADIUM. Leyland J. Adams, William C. Egloff, and James P. O'Hare. Arch. Pathol. 15(4), 465-89(1933).

Intravenous injection of active deposit of Ra emanation produced chronic renal insufficiency without hypertension in 17 dogs (1 control), longevity varied inversely with Ra dosage. Pathological changes in kidney are described. Early attempt at regeneration of tubular epithelium was thought to be considered probably secondary to Ra effects on cement and collagen throughout kidney. BA 9-16112

3610

EFFECT OF X-RAY ON EXPERIMENTAL ENCEPHALITIS IN MICE INOCULATED WITH THE ST. LOUIS STRAIN. Samuel A. Goldberg, Maurice Brodie, and Phyllis Stanley. Proc. Soc. Exptl. Biol. Med. 32(4), 587-90(1935).

The data presented indicate that x rays either prevent or cure encephalitis in mice inoculated intranasally. Treatments: 135 kv, 5 ma, 15 in. dist., 3 mm Al, for 5 min; 38 mice treated daily until death, or up to 12 treatments. Report of favorable x-ray therapy results in cases of encephalitis is included. BA 9-16324

3611

A NOTE ON BACTERICIDAL EFFECTS OF X-RAYS. Fred L. Mohler and Lauriston S. Taylor. J. Research Natl. Bur. Standards 13(5), 677-9(1934).

It is assumed that biological effects localized in the columns of ionization along path of each high-speed electron. Studies by others on the killing of colon bacilli by cathode rays and x rays are analyzed in terms of effective collision area of the column of ionization and of the

bacillus. Authors find that column must pass through a particular point in the bacillus to cause death. BA 9-16401

3612

THE FORMATION OF GIANT CELLS IN CULTURES OF BONE MARROW UNDER THE INFLUENCE OF RADIUM EMANATION. M. Torrioli and M. Gusti. Policlinico II (Rome) (Sez. med.) 41(7), 381-7(1934).

In cultures of guinea pig bone marrow exposed to radon, protoplasmic and nuclear fusion of adjacent myeloid cells produced giant cells resembling Sternberg cells especially megakaryocytes. BA 9-16897

3613

THE EFFECTS OF X-RADIATION ON CHROMOSOMES IN THE MICROSPORES OF TRILLIUM ERECTUM LINN. C. Leonard Huskins and A. W. S. Hunter. Proc. Roy. Soc. (London) 117, 22-33(1935).

Microspores were irradiated in homoeotypic telophase or early resting stage of pollen tetrads. No morphologic effects were noted immediately although mitosis was delayed. Lateral translocations of chromosome fragments onto a broken chromatid were observed frequently in 1st postirradiation mitotic prophase. Later effects are also described. BA 9-17606

3614

TRANSFORMATIONS OF CHROMOSOMES UNDER INFLUENCE OF X-RAYS. G. A. Levitskii and A. C. Araratian. Trudy Priklad. Botan. Genet i Selektii (Bull. Appl. Bot., Genet. and Plant-Breed.) 27(1), 265-303(1931). (In Russian and English).

Young seedlings of *S. cereale*, *V. sativa*, and *C. capillaris* (*virens*) exhibited chromosome fragmentation as a common postirradiation effect. BA 9-17612.

3615

THE EFFECT OF RADIATION UPON CELL RESPIRATION Leon C. Chesley. Biol. Bull. 67(2), 259-72(1934).

Wheat seedlings were x and γ irradiated with doses sufficient to impede growth 40% by 24 hr post exposure. O_2 consumption and fresh wt were determined at various intervals. Except at 6 hr interval postirradiation, O_2 consumption/gm was unaffected, at 6 hr O_2 /gm was higher in irradiated than in control plants. Growth was inhibited before respiratory rate changes were apparent. *Arbacia* and *Chaetopterus* eggs were studied in similar experiments BA 9-17898

3616

STUDIES OF FACTORS IN TISSUE RADIOSENSITIVITY OTHER THAN MORPHOLOGIC PHENOMENA. BIOLOGICAL CHARACTERISTICS OF RESTING TISSUES. Joseph Lambert. Arch. biol. (Liege) 44(4), 621-739(1933). (In French).

Radiosensitivity of dry and soaked peas depends on the duration of swelling and is maximal shortly before mitosis. Sensitivity is dependent solely on respiration and fermentation in seedlings, but no direct relationship between swelling, respiration and fermentation curves could be established. Great radioresistance of latent tissues is suggested presumably due to low rate of metabolism in these tissues. BA 9-17900

3617

PHYSIOLOGY OF METABOLISM. Erwin Bunning. Fortschr. Botan. 3, 63-82(1933-4). (In German).

This review includes a section on the basis of radiation effects. BA 9-17971

3618

MODIFICATION OF X-RAY INJURY BY CO_2 AND AMMONIA. R. E. Zirkle. Am. J. Physiol. 109(1), 115(1934).

Ammonia decreases and CO_2 increases the radio-sensitivity of the fern, *Pteris longifolia*, to soft x rays. BA 9-17974

3619

ACUTE TOXICITY OF RADON. Donald A. Morken.
A. M. A. Arch. Ind. Health 12, 435-8(1955). NSA 10-533

3620

SOME EFFECTS OF X-RAY IRRADIATION ON DEVELOPING GRASSHOPPER (*MELANOPLUS DIFFERENTIALIS*) EGG.
Titus Carr Evans. Anat. Record 57(4, Suppl.), 44(1933).

(Abstract of paper). Eggs were irradiated with 100-1500 r just before beginning of later stages of development. Changes in the rate of oxygen consumption and visible morphological changes during subsequent development are described. Increases in oxygen consumption are closely related to developmental processes.
BA 9-18105

3621

RECOVERY OF NON-DEVELOPING MUD WASP (*SCELIPHON CAEMENTARIUM*) LARVAE AFTER IRRADIATION WITH X-RAYS. J. H. Bodine and T. C. Evans. Anat. Record 57(4, Suppl.), 66(1933).

(Abstract of paper). Low doses of x rays accelerate the rate of oxygen consumption and development of larvae, but doses of approximately 600 r temporarily retard both. If larvae are in diapause when irradiated, effects will have disappeared by the time development takes place. Disappearance of radiation effects was also observed if the organism was maintained at a low temperature for a few weeks following exposure.
BA 9-18105

3622

X-IRRADIATION OF THE OVARIES OF GUINEA PIGS AND ITS EFFECT ON SUBSEQUENT PREGNANCIES.
Ida T. Genther. Anat. Record 57(4, Suppl.) 60(1933)

(Abstract of paper.) Ovaries of sexually mature and of immature guinea pigs were x rayed with a minimum sterilizing dose or with 2/3 of this dose. The relationship of subsequent pregnancies to morphological ovarian changes is described. BA 9-18105

3623

EFFECT OF RÖNTGEN IRRADIATION OF THE SPLEEN ON IRON METABOLISM IN ANIMAL ORGANS. J. J. Arkusky. Strahlentherapie 49(3), 455-62(1934). (In German).

After Fe balance determinations on 6 male rabbits, 1 was splenectomized, others were given a 710-4260 r x ray dose to spleen. Fe intake and excretion temporarily decreased following splenectomy or larger doses, and Fe was stored in spleen and liver (Kupffer cells) organs that were ordinarily free of Fe deposits, none was found in kidneys or lungs. BA 9-18106

3624

THE EFFECT OF RADIUM EMANATION ON THE FORMATION OF BONE CALLUS. Alessandro Bich. Arch. ital. chir. 34(2), 223-32(1933).

Experiments on 30 rats with fractures of the diaphysis of the radius showed that subcutaneous injection of small doses of Ra emanation in distilled water inhibits callus formation. BA 9-18107

3625

X-RAY AND RADIUM PROTECTION, WITH SPECIAL REFERENCE TO THE DEPARTMENT OF RADIOLOGY, PERTH HOSPITAL, PERTH, WESTERN AUSTRALIA. Geoffrey Bourne. J. Cancer Research Comm. Univ. Sydney 5(3), 142-54(1933).

Blood counts taken from hospital x ray and radium staff showed no case in which the blood picture was seriously affected by amount of irradiation received, although occasional abnormalities apparently occurred.
BA 9-18108.

3626

BIOLOGICAL EFFECTS OF PENETRATING RADIATIONS.

V. Rivera. Cerebro 13(5), 396(1934). (In Italian).
Abstract of paper. BA 9-18110

3627

BIOLOGICAL EFFECT OF PENETRATING RADIATIONS. V. Ducceschi. Cerebro 13(5), 395(1934). (In Italian).
Abstract of paper. BA 9-18110

3628

ACTION OF X-RAYS ON THE NEUROFIBRILLAR RETE. A. Donaggio. Cerebro 13(5), 388(1934) (In Italian)
Abstract of paper. BA 9-18110

3629

BIOLOGICAL EFFECT OF ROENTGEN RAYS ON NORMAL TESTES. R. Balli. Cerebro 13(5), 388(1934). (In Italian). BA 9-18110.

3630

A MUTATION OF THE TAIL OCCURRING IN THE OFF-SPRING OF MALE MICE WITH IRRADIATED TESTICLES. N. Dobrovol'skaia-Zavad'skaia. Cerebro 13(5), 386(1934). (In French).

Abstract of paper. BA 9-18110.

3631

ACTION OF X-RAYS AND γ RAYS ON PLANTS. V. Rivera. Cerebro 13(5), 385(1934). (In Italian).
Abstract of paper. BA 9-18110

3632

EARLY VASOCONSTRICTION INDUCED IN THE ISOLATED RABBIT'S EAR BY X-RADIATION. P. M. Brooks, H. B. Gerstner and S. A. Smith. Radiation Research 4, 500-9(1956).

A method for obtaining continuous recordings of perfusion flow rates was developed. With this technique, measurements were performed on 112 isolated rabbit ears prior to, during and after exposure to various doses of x-radiation administered at a dose rate of 1 kr/hr. Doses in excess of 5 Kr induced a marked vasoconstriction. This reaction became noticeable several minutes after start of radiation and progressed to complete arrest of perfusion flow at higher doses. Approximately 20 minutes after cessation of perfusion flow, the vascular bed opened again and subnormal or normal flow rates were resumed even when radiation was continued. The irradiated ears showed marked protein washout.

3633

THE EFFECT OF A MINIMAL LETHAL DOSE OF X-RAYS UPON CHICK EMBRYOS. H. Ernest Crow. Kansas Univ. Sci. Bull. 21(paper 16), 479-523(1933).

Chick embryos of 28, 48, 60, 75, 96, and 120 hr incubation were exposed to unfiltered x rays (22 a, 90 v, for 15 min at 18 cm). This dosage was found to be the minimal lethal dose, causing death in 15-20 hr. Although all tissues were affected, the greatest modifications occurred in blood and nervous systems. Histological studies of serial sections made at periods from 20 min to 20 hr after exposure are described. BA 9-18111.

3634

ACTION OF RADIUM ON TISSUE CULTURES. F. B. Flinn, J. Victork, N. Stillman, and D. MacDonald. Am. J. Cancer 22(2), 351-8(1934).

Exposure to Ra in amounts of 5 and 2.5×10^{-1} to 10^{-11} mg produced no evidence of direct stimulation in hanging drop and flask cultures of fibroblasts, leukocytes, and bone marrow. Euglena showed no evidence of direct stimulation. BA 9-18112.

3635

THE TIME FACTOR IN THE BIOLOGICAL ACTION OF X-IRRADIATION. II. STUDIES ON ALGAE AND DROSOPHILA PUPAE. Arne Forssberg. Acta Radiol. 14(4), 399-407 (1933).

Scenedesmus basiliensis, Chlorella vulgaris, Mesotaenium caldarium were given 22-3, 235 r/min in 5, 000 and 10, 000 r doses in periods ranging from 227 min, 16 sec to 1 min, 32 sec, Drosophila pupae were given 2, 000 r, intensity 5-3, 235 r/min, in from 400 min to 37 sec. Maximum effect on algae was produced at 1, 620 r/min; on Drosophila, at 20 r/min. BA 9-18113

3636

STUDIES ON THE EFFECT OF ROENTGEN RAYS AND GAMMA RAYS UPON THE EGGS OF DROSOPHILA MELANOGASTER. Otto Glasser and F. R. Mautz. Am. J. Roentgenol. Radium Therapy 29(6), 815-25(1933).

In a comparative study it was found that 300 r x rays equalled 450 r gamma rays of Ra with respect to effect on survival (to hatching) of Drosophila eggs. BA 9-18115

3637

A STUDY OF THE EFFECT OF IRRADIATION UPON THE LUMBAR SYMPATHETIC GANGLIA IN RATS. J. Q. Griffith, Jr. and E. P. Pendergrass. Radiology 23(4), 463-5 (1934).

Degeneration of the sympathetic nerve fibers in adventitia of arteries which they supply occur in 45-60 days after ablation of the sympathetic ganglia. Irradiation (800 r) in 16 rats had no effect on the adventitial plexus. BA 9-18116

3638

CHANGES IN SUSCEPTIBILITY OF DROSOPHILA EGGS TO X-RAYS. II. CORRELATION OF BIOLOGICAL ACTIVITY AND RADIOSENSITIVITY. P. S. Henshaw. Radiology 24(4), 438-443(1935).

During cleavage and blastulation Drosophila eggs were very susceptible to radiation injury, with onset of gastrulation resistance suddenly increased, then decreased again after gastrulation. Author believes irradiation affects regulators of cellular activity. BA 9-18117

3639

DOES IRRADIATION OF THE ABDOMEN AFFECT GASTRIC ACTIVITY? Anna Iugenburg and R. I. Gurevich. Vestnik. Rentogenol. i Radiol. 12(1/2), 38-42(1933). (Russian with Ger. summary).

Study of 107 patients (gastric ulcer, duodenal ulcer, pericolicitis, cholecystitis, peptic ulcer) subjected to x-ray therapy showed decreased gastric acidity in 15%, increased in 16%, and no change in 69%. In some cases of gastric achylia, acidity returned to stable norm. BA 9-18119

3640

A BIOLOGIC STUDY OF THE ACTION OF X-RAYS TO MALIGNANT TUMORS, ESPECIALLY ON THE ATTITUDE OF THE PARENCHYMAL TISSUES OF MALIGNANT TUMORS TO X-RAYS. H. Kawakami. Japan. J. Obstetr. Gynecol. 17(5), 378-86(1934).

Transplantation of tumors to mice and rats while hosts were reacting to whole body x irradiation was more successful than transplantation to normal animals. Tumors often began to atrophy as recovery from irradiation began. Radiation is considered to interfere with protective power of animal against foreign protein. Studies of one irradiated and one non-exposed tumor in same host indicated that radiation effect was purely local. BA 9-18123

3641

CLINICAL AND EXPERIMENTAL OBSERVATIONS ON THE QUESTION OF FRACTIONATED RADIATION OF CARCINOMAS. Fr. Keller. Strahlentherapie 47(4), 636-45(1933). (In German).

In 30 mice application of 2750, 5500, or 7000 r in 42-7 days caused no hair loss but hair was more easily pulled out after the two higher doses. Epilation occurred after 6 ED at one session. X-ray effect on size of tumors of mice and on survival of tumor bearing mice is described. Fractionated doses of Ra and radioactive Bi in 5 patients caused severe complications. BA 9-18124

3642

ACTION OF X-RAYS ON THE FORMATION OF MYELIN IN THE WHITE RAT. G. Leboucq. Rev. belge sci. med. 6(5), 383-7(1934). (In French).

New-born white rats were irradiated (120 kv, 2 ma, filter 2 Al, 25 cm, 1000 French r per seance) up to 4 times at intervals of 3-5 days. One dose (at birth) interrupted myelinization of motor pathways for 1-2 days after which it resumed normally; 2 doses; also caused temporary arrest of myelinization; 3 doses seriously interfered with myelinization; 4 doses hastened destruction of neuron, only glial elements being resistant. BA 9-18125

3643

ON THE INHIBITION OF MITOTIC ACTIVITY BY X RADIATIONS OF DIFFERENT QUALITIES. W. H. Love. Med. J. Australia 22(Vol. 1 No. 8), 247-8(1935).

In material derived from the heart of fowl embryos, grown in fowl plasma and chicken extract by classical hanging drop technic, the quantitative biological reaction, as measured by inhibition of mitotic activity in tissue cultures, was apparently independent of penetration of radiation over range of 100-175 kv. BA 9-18126

3644

THE PHYSICAL BASIS OF THE BIOLOGICAL EFFECTS OF HIGH VOLTAGE RADIATIONS. W. V. Mayneord. Proc. Roy. Soc. (London) A146, 867-79(1934).

Ranges in mm. of secondary high speed electrons produced in cells by irradiation with x rays of various wave lengths tabulated; for photoelectrons (from data on Al) and for recoil electrons (by use of Klein-Nishina equation). Survival curves calculated for mass of cells irradiated at various wave lengths and used in discussion of selective action of x rays on rapidly-growing tissues. BA 9-18127

3645

X-RAY ABSORPTION. E. Momigliano. Ann. ostet. e ginecol. 56(10), 1565-1622(1934).

X-ray dose required to interrupt pregnancy in rabbits 50-200% of ED measured at surface; over uterus dose calculated at depth of 3-4 cm is reduced 30-35%. During 1st half of pregnancy dose caused death of embryo, and its resorption rather than expulsion; in second half it caused birth of dead or non-viable fetuses. An apparent relation between percentage of mortality and irradiation intensity noted. BA 9-18128

3646

THE RADIOSENSITIVITY OF ADENOCARCINOMA OF THE BODY OF THE UTERUS. Emanuele Momigliano. Arch. ostet. e ginecol. 42(2), 85-129(1935).

Epithelium of uterine horns in 16 rabbits completely refractory to action of Ra. Author deduces selective action of Ra, sparing normal and destroying neoplastic tissues. Failures in Ra therapy of cancer in body of uterus attributed to errors in dosage or to presence of complications (e.g. fibroma) which prevent Ra action on cancer cell. BA 9-18129.

3647

ON THE EFFECT OF RADIUM EMANATION ON URIC ACID METABOLISM. Shinkichi Okaue. Folia Pharmacol. Japon. 18(1), 87-93(1934). (In German).

On 2nd day after 4 cc Ra emanation was injected subcutaneously in rabbits, blood uric acid concentration began to decrease, total uric acid in urine to increase. Later there was considerable increase in uric acid in blood and urine accompanied by increase in total- and ammonium-N in the urine. Increased uric acid production and excretion are thought probably to be secondary to destructive effect of Ra on cell nuclei. BA 9-18130

3648

THE EFFECT OF ROENTGEN RAYS ON AN ORGANISM,

ESPECIALLY ON THE ACTIVITY OF PLASMA. H. Joseph and S. Prowazek. *Zeitsch. Allg. Physiol.* 1, 142-153(1902).

3649

ACTION OF X-RAYS ON LEPTOMAS IN RATS. R. Prudhomme. *Bull. soc. pathol. exotique* 27(10), 917-20 (1934). (In French).

Of 20 rats inoculated with rat leprosy, 10 were x rayed at site of inoculation every 2 or 3 days for 2 months for total of 3-12 hr. Course of disease retarded and death delayed for several months as compared to controls. Bacilli from infected cells destroyed by irradiation produced infection when transferred. BA 9-18132.

3650

HISTOLOGICAL CHANGES IN SQUAMOUS CELL CARCINOMA OF THE CERVIX OF THE UTERUS AFTER RADIATION. N. M. Alter. *Jour. Med. Res.* 40, 241-264 (1919-1920). (See also *IBID.* 41, 439-456).

3651

THE EXPONENTIAL LAW OF TISSUE RECOVERY APPLIED TO RADIUM AND RADON DOSAGE. Marvin M. D. Williams. *Radiology* 23(1), 64-70(1934).

Author postulates that since primary radiation effects are due to absorption of energy, recovery must represent a loss of energy. Formulae are derived giving amount of excess energy present at any time during treatment of following treatment when either radon or radium element is used. Tables and curves are presented showing residual tissue dosage at various times for various initial intensities. BA 9-18134

3652

THE ORIGIN OF BLOOD PROTEINS. H. A. Reimann, G. Medes, and L. Fisher. *Folia Haematol* 52(2), 187-202(1934).

Leukocyte destruction caused by injections of benzol and by exposure to x rays accompanied by increase in fibrinogen and decrease in total blood proteins. BA 9-18281

3653

X-RAY IRRADIATION OF THE HYPOPHYSIS AND PARTIAL REACTIVATION OF THE OVARY UNDER THE ACTION OF ADRENAL CORTEX HORMONE: EXPERIMENTS BASED ON THE ANALOGIES BETWEEN ADRENAL CORTEX HORMONE AND PROLAN B. Angelo Migliavacca. *Z. wiss. Biol. Abt. B, Z. Zellforsch. u. mikroskop. Anat.* 17(4), 662-80(1933). (In Italian).

Luteinization of peripheral connective elements of atresic follicles produced, with no appreciable direct action on uterus, in guinea pigs castrated by x radiation of hypophysis. Irradiated animals also showed hypertrophy of adrenal cortex. BA 9-18491

3654

INFLUENCE OF CURIETHERAPY AND X-RAY THERAPY ON THE BLOOD PROTEINS OF CANCER PATIENTS. P. Cristol, P. Monnier, and J. Bassaget. *Arch. soc. sci. med. biol. Montpellier* 14(2), 53-8(1932-3). (In French).

Serum protein levels of cancer patients were increased by Ra treatment, but not so predictably as following x ray therapy. Serum protein changes were not dose-dependent. Action of x rays and Ra on cells are compared and authors suggest that Ra acts more slowly in liberating globulin from neoplastic tissue and that action of x rays is more rapid, causing sharp increase in serum albumin. BA 9-18906.

3655

THE EFFECT OF ROENTGEN RADIATION ON THE DEVELOPMENT OF MESOTAENIUM CALDARIORUM. Arne Forssberg. *Acta Radiol* 15(6), 803-7(1934). (In German).

Multinucleated giant cells develop in alga M. caldarium after x irradiation; size increased with dose

to 15,000 r, followed by decrease toward normal with very large doses. Growth curve after irradiation normal up to 15,000 r, irregular with large doses. BA 10-325.

3656

GROWTH MODIFICATIONS IN CITRUS SEEDLINGS GROWN FROM X-RAYED SEED. C. P. Haskins and C. N. Moore. *Plant Physiol.* 10(1), 179-85(1935).

Morphological variations found in citrus seedlings from seed exposed to high-voltage x rays; albinism, premature flowering (both higher percent than normal), nanism, twisting of stem, peloric leaf formation, production of high percent of bi- and trifoliate leaves. BA 10-326

3657

INHIBITORY EFFECT OF RADIUM ON THE GROWTH OF ROOTLETS OF LENS ESCULENTA MOENCH; ANTAGONISTIC EFFECT OF MAGNESIUM ON RADIOLESIONS OF THE ACTIVE OR DORMANT PLANT CELL. A. Sartory, R. Sartory, J. Boyer, and J. Ernst. *Bull. acad. med. (Paris)* 111(3), 140-2(1934). (In French).

MgSO₄ antagonized effects of Ra irradiation on lentils germinating in solution of the salt. BA 10-331

3658

HISTOLOGIC CHANGES IN RABBITS AND IN DOGS FOLLOWING THE INTRAVENOUS INJECTION OF THORIUM PREPARATIONS. Evan Shute and M. Edward Davis. *Arch. Pathol.* 15(1), 27-34(1933).

Thorotrast and other thorium preparations injected intravenously in rabbits and dogs for visualization of spleen and liver caused intense degeneration of liver, spleen; abortion; spleen rupture; fatal postpartum hemorrhage. Placenta appears to be effective barrier to thorium. BA 10-539

3659

A COMPARATIVE STUDY OF THE OPERATIVE AND X-RAY CASTRATIONS. S. Tomita. *Japan J. Obstet. Gynecol.* 17(2), 116-84(1934).

Operative and x-ray castration apparently brought about same essential changes, differing only quantitatively and in time required. Castration with x ray did not destroy static and atresic follicles. BA 10-812

3660

EXPERIMENTAL INDUCTION OF OSTEOGENIC SARCOMA WITH RADIUM IN RABBITS. O. Schurch and E. Uehlinger. *Schweiz. med. Wochschr.* 64(28), 664-7(1934). (In German).

Description of case considered to be first in which Osteogenic sarcoma was produced (in rabbit) by purely exogenous irritant (3-5 μ gm Ra or mesothorium in vaseline implanted in femur). Metastasizing spindle cell sarcoma produced. BA 10-1022

3661

EXPERIMENTAL STUDIES ON OTOCEPHALY AND BASIC MALFORMATIONS OF THE FACE. (PRELIMINARY NOTE). Etienne Wolff. *Arch. Anat., Hist. et Emb.* 18(5/8), 229-62(1934). (In French).

Chick embryos irradiated in 8-15 somite stages; monsters produced are described. Malformations attributed to lesion of presumptive anlagen of facial processes, precise localization of which is found in relation to primary cerebral vesicles as landmarks. BA 10-1985

3662

THE EFFECTS OF X-RAYS ON ANTERIOR REGENERATION IN LUMBRICULUS INCONSTANS. Clarence Donnell Turner. *J. Exptl. Zool.* 71(1), 53-82(1935).

X irradiation of 78 r completely inhibited anterior regeneration in this worm. BA 10-2000.

3663

THE RELATIONSHIP OF THE MESODERM ANLAGEN ON REGENERATION IN RHYNCHELMIS LIMOSELLA.

(STUDIES ON THE EFFECT OF ROENTGEN RAYS ON REGENERATION AND TRANSPLANTATION.) L. Zhinkin. Zool. Anz. 105(11/12), 305-12(1934). (In German).

After x-ray destruction of neoblasts normally regenerating the mesoderm, only initial regeneration appeared in intestine and epithelium. After grafting irradiated segments on normal worm, normal regenerate resulted; neoblasts migrated from host. BA 10-2004.

3664

ON THE PRODUCTION OF HEREDITARY CHANGES IN *OENOTHERA BIENNIS GIGAS* BY MEANS OF ROENTGEN RADIATION. H. Langendorff. Biol. Zentr. 54(9/10), 547-51(1934). (In German).

Fifty seedlings 2 days old x rayed for 30 min with dosage of 36000 r. Exposed plants exhibited defects in form, shape, size, and color of leaves. F₁ and F₂ seedlings showed high mortality and various abnormalities. BA 10-2621.

3665

THE QUESTION OF DELAYED BREAKAGE IN THE CHROMOSOMES OF *DROSOPHILA*. J. T. Patterson. J. Exptl. Zool. 70(2), 233-42(1935).

Scute-8 apricot flies, possessing X-chromosome with very long inversion, x rayed and crossed with normal flies. F₁ females mated to yellow males with 6 other sex-linked recessive gene markers. Analysis of experimental data indicates that, in strict sense, no delayed effect was produced. BA 10-2639

3666

THE INFLUENCE OF X-RAYS ON SEED AND POLLEN OF TREES AND SHRUBS. I. N. Nikitin. Sbornik Trudov Tsentral. Nauch-Issledovatel' Inst. Lesnogo Khoziaistva, I, 86-104(1934). (Russian with English Summary).

Increase in per cent germination reportedly caused by x irradiation described in several species. BA 10-2879

3667

A CYTOLOGIC STUDY OF THE LIVING BODY IRRADIATED WITH A HARD RAY. I. INFLUENCE OF A HARD RAY UPON THE DEVELOPMENT OF BEANS AND THE ABNORMALITY OF THE NUCLEI AND CELL-DIVISION. T. Saito. Japan. J. Obstetr. Gynecol. 17(4), 285-90 (1934).

Hard ray radiation inhibited development of root tip cells of *V faba minor*; abnormal cell division and nuclear division result. Radiosensitivity of cells highest during division. BA 10-2880

3668

ROENTGEN RADIATION AS A MEANS OF COMBATTING THE DIPHTHERIA BACILLUS IN CARRIERS. M. Bychowsky, J. Fraenkel, and M. Eisenberg. Fortschr. Gebiete Rontgenstrahlen 50(6), 586-8(1934). (In German).

X-ray treatment of child and adult diphtheria patients is described. The majority became bacillus-free after treatments varying from 10-15 ESD with 4 mm Al for children and from 25-30 ESD with 0.5 mm Zn + 1 mm Al for adults. BA 10-3906

3669

THE APPLICATION OF ROENTGEN RADIATION TO DIPHTHERIA CARRIERS AND PATIENTS WITH DIPHTHERIA POSITIVE DISCHARGES. E. D. Dubowiy, N. A. Grinberg, M. T. Prodan, and O. W. Geftter. Fortschr. Gebiete Rontgenstrahlen 50(3), 294-9(1934). (In German).

X-ray therapy described which rendered diphtheria carriers, and patients still excreting bacilli 4-8 weeks after onset of the disease, bacillus-free. BA 10-3908

3670

DO GERM CELLS DEVELOP FROM THE FOLLICULAR CELLS OF YOUNG TESTES OF RATS? G. G. Shchegolev. Arkh. Anat. Gistologii i Embriologii 13(2), Russ. 309-14; Ger. 399-403(1934).

Results of x irradiating young rats indicate germ cells and follicular cells are different cellular elements present in same gland, physiologically closely related but different in origin and fate. BA 10-4375.

3671

SENSITIVITY OF DIVIDING AND NON-DIVIDING CELLS TO RADIATION. W. H. Love and J. C. Mottram. Nature (London) 134, 252-3(1934). BA 10-5047

3672

CYTOLOGICAL OBSERVATIONS OF DEFICIENCIES INVOLVING KNOWN GENES, TRANSLOCATIONS AND AN INVERSION IN *ZEA MAYS*. B. McClintock. Missouri Agr. Exptl. Sta. Research Bull. 163, 130(1931).

Maize plants with known genetic constitutions which arose from x rayed pollen or x rayed embryos, were examined at mid-prophase of meiosis permitting measurement of short deficiencies in chromosomes (which are elongated in mid-prophase). Inversions and translocations were studied cytologically. BA 10-5062

3673

RACE FORMATION IN *T. GLUTINIS* AFTER X-RAY IRRADIATION. G. S. Filippov. Vestnik Roentgenol. i Radiol. 10, 512-45(1932). (Russian with French and German summary).

Single-cell cultures of 3 pink, 1 orange, and 2 white races of *Torula glutinis* irradiated for 5 min. -2 hrs; doses ranged from 1270-1340 r to 30480-32160 r. Source race split into 5 basic groups: pink, orange, yellow, brownish-yellow, and white. Splitting greater, quantitatively, after large doses and more successful in old cultures and in those given multiple doses. BA 10-5102

3674

ARTIFICIAL MUTATIONS IN *P. PUPARUM* INDUCED BY RADIUM IRRADIATION. R. L. Dozortseva. Doklady Akad. Nauk SSSR 4(1/2), 88-94(1934). (Russian and English).

Homozygous virgin female wasps (*P. puparum*) irradiated and then allowed to lay eggs on 4 *Pieris brassicae* (cabbage butterfly) pupae on which they are parasitic. Observations made relative to survival, visible abnormalities, fertility and hereditary changes due to irradiation. BA 10-5122.

3675

EXPERIMENTAL STUDIES ON IRRADIATION OF THE OVARIES IN RATS. Erich Fels. Semana med. (Buenos Aires) 42, 1453-62(1935). (In Spanish).

Studies on (40 rats) confirm the difficulty of obtaining x-ray castration in this species. Dose required is about 3000 r, and this destroys only follicles; corpora lutea undergo physiologic involution. Results of smaller doses are variable, and no persistent lesion was discernible after irradiations of less than 1200 r. BA 10-5535

3676

CYTOLOGIC CHANGES IN THE SPERMATOGONIAL NUCLEI CORRELATED WITH INCREASED RADIO-RESISTANCE. L. C. Foga and R. F. Cowing. Exptl. Cell Research 4, 107-15(1953)

Types A and B spermatogonia differ in radiosensitivity. Some type A cells remain even after 1500 r whereas all type B cells are gone after 200 r x ray doses. (The apparent LD₅₀ for B spermatogonia was about 50 r, the LD₅₀ for type A about 100 r).

3677

THE EFFECT OF ROENTGEN RAYS ON THE ESOPHAGUS AND TRACHEA. Rolf Bull Engelstad. Acta Radiol. 15(3), 608-14(1934). (In German).

Reaction to subepidermicidal doses of x rays (1700 r) given to 10 rabbits usually slight, subsided in 2-3 months, reaction to epidermicidal (2200-6830 r) given to 35 animals, and lethal (9000-13,500 r) given to 9,

often had not subsided in 5-6 months. Changes began earlier, developed more acutely in esophagus, those in trachea often dominated picture in later stages. All doses applied in 1-4 sessions at 24-48 hr intervals to rt. thorax field. BA 10-5976

3678

ACTION OF THOROTRAST ON JENSEN SARCOMA OF THE WHITE RAT. C. H. Oberling and M. Guerin. Bull. assoc. franc etude cancer 22(7), 469-89(1933). (In French).

Intraperitoneal injections of 1 cc thorotrast in 1 cc serum given twice a week for 5 weeks to 20 rats with Jensen sarcomas and to 5 normal controls. Ten of 20 rats with tumors died from the tumors, in the other 10, tumors disappeared. All injected rats showed non-malignant "thorotrast granulomas" of peritoneum. Thorotrast appeared not to incite neoplasia. BA 10-6028

3679

TRANSMISSION OF THE VIRUS OF POLIOMYELITIS TO MICE. Maurice Brodie, Samuel A. Goldberg, and Phyllis Stanley. Science 81, 319-20(1935).

Mice rendered susceptible to infection with virus of poliomyelitis by repeated x raying. Pathology in infected mouse found mainly in brain and meninges. Infectious agent from brains transmitted from mouse to mouse, from mouse to monkey and back to same mouse. Virus filterable through Seitz filters and neutralized by antipoliomyelitic serums. BA 10-6255.

3680

IRRADIATION WITH α RAYS FROM RA EMANATION ON VARIOUS CELL TYPES CULTURED IN VITRO. L. Buccianto and A. Foa. Monit. zool. ital. 44(Suppl.), 58-60(1933). (In Italian).

Irradiation, with α rays by means of very fine needles of Ra emanation inserted with micro-manipulator of (1) nerve fibers of chick embryo in vitro caused fragmentation of the fibers, (2) hepatic epithelial cells caused destruction of severe injury and regression of cells in mitosis or the formation of binuclear cells. BA 10-6857

3681

THE ACTION OF X RAYS IN INFLAMMATIONS FROM PYOGENIC GERMS. Michele Proto. Morgagni 75(37), 1111-18(1933). (In Italian).

Suspension of *S. aureus* injected subcutaneously into 14 guinea pigs, (1) 6 irradiated from time abscess appeared; (2) 4 irradiated daily for 3-day period ending 24 hr before inoculation, (3) control. In (1) abscess was resorbed in 6-7 days from beginning of irradiation, 9-11 days from appearance of abscess. In (2) abscess formed on 2nd day, was resorbed in 4-5 days. In (3) suppurative process ran 15-20 days before recovery. BA 10-6336.

3682

ON SOME EFFECTS OF X-RAYS ON THE DEVELOPING CHICK EMBRYO. R. J. Gladstone and Hector A. Colwell. J. Anat. 68(1), 85-95(1933).

Single massive dose, 4 P. D., administered to 9-day embryos. Action appeared purely destructive; effects of unfiltered rays more pronounced than in screened series. Highly differentiated embryonic tissues and organs appeared more susceptible than those less highly developed. Cytological changes described. BA 10-6977

3683

ON THE BIOLOGICAL EFFECT OF VERY LARGE ROENTGEN RAY DOSES. H. Langendorff and M. Langendorff. Strahlentherapie 47(4), 723-6 (1933). (In German).

Axolotl eggs in meta-telophase of first segmentation division were irradiated in 5 series with doses ranging

from 30,000 r in 1/2 min, to 600,000 r in 10 min. Segmentation was abnormal in only one part of 1st series; none developed beyond blastula. Delayed, atypical segmentation occurred with 120,000 r in 2 min and all segmentation was inhibited with 300,000 r in 5 min. Immediate death followed 600,000 r. BA 10-8004

3684

EXPERIMENTAL ANIMAL STUDIES ON THE EFFECT OF DOSE FRACTIONATION ON LATE EFFECTS. G. Miescher. Acta Radiol. 16(1), 25-38(1935). (In German).

Problem of fractional x irradiation was studied using rabbit ears; action measured by secondary effect (condition 1-4 yr after exposure). Results show increase in tissue tolerance and dose fractionation bear a relation to one another that may be illustrated graphically. (Late effects studied: permanent baldness, atrophy, necrosis, and hyperkeratosis.) BA 10-8006

3685

THE EFFECT OF ROENTGEN RAYS ON THE BRAIN: EXPERIMENTAL INVESTIGATION BY MEANS OF THE CONDITIONED REFLEX METHOD. M. I. Nemenow. Radiology 23(1), 94-6(1934).

Dogs x irradiated at early age on cerebral hemispheres walked in circles, and growth, weight increase, and mental development were retarded for several months afterward. Death followed occurrence of epileptoid fits in some cases. BA 10-8007

3686

ON THE REDUCTION IN THE MULTIPLICATION OF A PROTOZOON (*BODO CAUDATUS*) CAUSED BY THE EXPOSURE TO GAMMA-RAY IRRADIATION WITH A STUDY OF THE SENSITIVE PERIOD OF THE LIFE OF THE CELL. II. A STUDY OF THE BEHAVIOR OF CULTURES OF *BODO CAUDATUS* UPON RELEASE FROM IRRADIATION WITH GAMMA RAYS AND OF THE EFFECT UPON THE GROWTH OF INTERRUPTED OR REPEATED IRRADIATIONS. M. Robertson. Brit. J. Radiol. 8, 502-27; 570-88(1935).

B. caudatus was not killed by large γ -ray doses, but constant irradiation changes were produced. These are described. Division rate and cell size were both affected. BA 10-8010.

3687

ATTEMPT AT SOLUTION OF THE QUESTION OF SKIN PERMEABILITY TO RADIUM EMANATION. W. Santholzer. Strahlentherapie 48(3), 519-34(1933). (In German).

Amount of emanation entering body during period of immersion in water saturated with Ra emanation measured in blood samples with ionization chamber. Maximum value reached after 30-60 min in bath; distinct decrease followed. Decrease in skin permeability unexplained. BA 10-8011.

3688

STUDY OF X-RAY EFFECT ON TAIL REGENERATION IN THE TADPOLE *PELOBATES FUSCUS*. I. STUDIES OF THE REGENERATE AFTER VARIOUS SINGLE DOSES. E. A. Scheremetjewa and V. V. Brunst. Z. wiss. Biol. Abt. D. Wilhelm Roux' Arch. Entwicklunsgemech. Organ. 130(3/4), 777-91(1933). (In German).

Regeneration of amputated tail inhibited by x-ray doses of 750-7500 r, both total and local. Variations in sensitivity exhibited by various tissues of stump. No x-ray stimulation of regeneration demonstrated. BA 10-8012.

3689

THE CONSTITUTIONAL EFFECTS OF X-RAYS AS DETERMINED BY BLOOD SERUM TESTS. S. Gilbert Scott and F. Hernaman-Johnson. Brit. J. Radiol. 8, 365-72(1935).

Shift in acidity of ortho-vanadic acid precipitation in blood serum described in cases of asthma, spondylitis, and cancer treated by x rays. BA 10-8013.

3690

THE RELATIONSHIP BETWEEN VASCULARITY AND THE REACTION TO RADIUM OF SQUAMOUS EPITHELIUM. M. G. Seelig, C. T. Eckert, and Z. K. Cooper. *Am. J. Cancer* **25**(3), 585-91(1935).

After compromising the circulation of the entire thickness of the rabbit's ear by making pedicled flap, there was no alteration in its radiosensitivity following the application of Ra to the flap, suggesting that radiosensitivity is an inherent quality of cell which varies in individuals of same species. BA 10-8014

3691

INFLUENCE OF X-RAY TREATMENT ON SOME PHASES OF POSTEMBRYONIC DEVELOPMENT OF RAT TESTIS. G. G. Shchegolev. *Ark. Anat., Gistologu i Embriologu*, **13**(2), 315-26 (Russ.), 404-14(Ger.); (1934)

Day old rats x rayed on posterior third of body and killed at 2-day intervals, littermates served as controls. Up to 7th or 8th day number of gonocytes in irradiated testes greater per cross section area than in controls, but length of tubules was greater in controls. Spermatogonia developed in controls after 7th day, while gonocytes disintegrated in exposed individuals. BA 10-8015

3692

EARTH γ RAYS AND COSMIC RAYS. Rolf M. Sievert. *Acta Radiol.* **16**(2), 155-68(1935). (In German).

Historical review of research on radiations present on surface of earth, especially cosmic radiation. Germination of *R. sativus* and development of *D. melanogaster* in vessel with iron wall 15 cm thick studied. Percent germination smaller within vessel than in controls, but development per individuum quicker. Similar results obtained with *Drosophila*. Amount of radiation within houses varies with Ra and Th content of building materials. Small doses do have biological effect. BA 10-8016

3693

THE ACTION OF SOFT X-RAYS ON CLADOCERA (*DAPHNIA MAGNA*). G. Snider and H. Kersten. *Physiol. Zool.* **8**(4), 530-8(1935).

Effect of x rays studied in regard to: lethal dose; differential action on anterior and posterior halves of animal, susceptibility of eggs in mother's brood-pouch, influence on growth and development of young, effect of heart shielding, effect of age and developmental stage at time of exposure. BA 10-8017

3694

STUDIES ON THE EFFECTS OF X-RAYS UPON THE DEVELOPMENT OF A POND SNAIL, *LYMNAEA (RADIX) JAPONICA* JAY, Shubel Sonehara. *J. Sci. Hiroshima Univ. Ser. B, Div. I* **2**(8/13), 151-9(1933).

Small x-ray doses caused no apparent ill effect on egg production in *L. japonica*, but reportedly accelerated rate of reproduction. Eggs of irradiated females were affected in development; toxic effect increased with increased exposure. Resistance gradually increased with age. BA 10-8018.

3695

RADIUM AND CANCER. A MONOGRAPH. H. S. Souttar. London, William Heinemann. (Medical Books), Ltd. 1934. 387p.

Included in this treatise on radiology is section dealing with biological effects of radiation, technique of radiation treatment, principles of radiotherapy, dosage measurement and therapy for specific conditions. BA 10-8019

3696

SUPPLEMENTARY NOTE ON THE BIOLOGICAL RESPONSE TO GAMMA RAYS OF RADIUM AS A FUNCTION OF THE INTENSITY OF RADIATION. F. G. Spear and L. G. Grimmett. *Brit. J. Radiol.* **8**, 231-4(1935).

Calculations of γ ray intensities used in a previous report were rechecked with more accurate instruments, relative values agree with published values, but actual ones are 24% higher. Optimum intensity for reducing mitosis in tissue cultures is in region of 77 lmc. BA 10-8020.

3697

THE EFFECTS OF X-RADIATION ON THE RECONSTITUTION OF *STENOSTOMUM TENUICAUDA* AND SOME OTHER WORMS. C. D. Van Cleave. *Biol. Bull.* **67**(2), 304-14 (1934).

Maximum dosages of approximately 30,000 r applied over 9 hrs, and of approximately 20,000 r applied in 36 min had no apparent effect on normal reconstitution in *Stenostomum*. Lethal effect of latter dosage indicated by disintegration of completely reconstituted worms and isolated unoperated worms 4 days postirradiation. *Pristina longisetia* unfavorably affected by apparently non-lethal dosage of 20,000 r over 4½ hr; *Dero limosa* specimens cytolized. BA 10-8023

3698

STUDY ON THE TISSUE RESPIRATION AND GLYCOLYSIS IN OBSTETRICS AND GYNECOLOGY. J. Toyoshima. *Japan. J. Obstetr. Gynecol.* **16**(6), 520-37(1933).

Observations on respiratory activity, aerobic glycolysis in human fetal organs and in normal and cancerous uterine tissue, effect of x rays thereon. BA 10-8130

3699

ON THE EFFECTS OF HARD X-RAY IRRADIATION ON THE GROWTH, CELL-DIVISION, AND MITOSIS OF FLAT BEAN ROOTS. T. Saito. *Japan J. Obstetr. Gynecol.* **17**(1), 69(1934).

Abstract of paper. BA 10-8215

3700

A COMPARATIVE STUDY OF THE EFFECTS OF X-RAY AND OPERATIVE CASTRATION ON THE MOVEMENT OF INTESTINES IN SITU. T. Tomita. *Japan J. Obstetr. Gynecol.* **17**(1), 76(1934).

Abstract of paper. BA 10-8215

3701

EFFECT OF ROENTGEN RAYS ON THE CENTRAL NERVOUS SYSTEM: RESULTS OF LARGE DOSES ON THE BRAINS OF ADULT DOGS. R. S. Lyman, P. S. Kupalov, and W. Scholz. *Arch. Neurol. Psychiat.* **29**(1), 56-87(1933).

In 4 dogs, heavy x-ray dosage on occipital part of head was followed by physiologic variations, determined by conditioned reflexes. Histologic examination showed diffusely scattered degenerative changes in precapillaries and capillaries of brain 6 wk postirradiation. Late effects as observed clinically and at autopsy described for one dog. BA 10-8306

3702

HISTOLOGICAL STUDIES OF THE LIVER, SPLEEN AND BONE MARROW IN RABBITS FOLLOWING THE INTRAVENOUS INJECTION OF THORIUM DIOXIDE. Ernst A. Pohle and Gorton Ritchie. *Am. J. Roentgenol. Radium Therapy* **31**(4), 512-9(1934).

Roentgenographic and histologic studies representing eighty rabbits observed for 493 days after injection are described. Thorotrast was seen in r-e cells of liver, spleen, bone marrow, and scattered in fine granules throughout liver cells. Degenerative changes in liver, spleen, and bone marrow are described. BA 10-8463

3703

ON THE FORMATION OF NEW STABLE RACES OF LOWER FUNGI BY MEANS OF X-RAYS. G. Nadson and G. Philippov. *Compt. rend.* **186**, 1566-8(1928). (In French).

3704

THE EFFECT OF RADON IMPLANTS ON THE CYTOLOGY OF THE LIVER OF THE ALBINO RAT. J. C. Thomas Rogers and George M. Higgins. *Radiology* 22(1), 93-8 (1934).

Gold-filtered radon seeds were implanted in livers of rats and the irradiated tissue was studied histologically at periods of 6 hr-60 days. Increase in number and size of local histocytes was noted at 12 hr, maximal activity at 48 hr. Amitosis occurred by fragmentation and budding. At 14 days large hyaline areas surrounded by radiating and diffuse connective tissue fibers characterized the lesion. BA 10-8518

3705

A QUANTITATIVE COMPARISON OF THE EFFECTS OF THE BETA RAYS OF RADIUM ON THE AGENT OF THE ROUS SARCOMA, ON THE BACTERIOPHAGE, ON TETANUS TOXIN AND ON CERTAIN BACTERIA, ANTIBODIES AND FERMENTS. S. L. Baker. *Brit. J. Exptl. Pathol.* 16(2), 148-55 (1935).

Study of relative susceptibility of the various bodies to β rays shows: Rous sarcoma falls into bacterial group, tetanus toxin is equally susceptible, antibodies much less susceptible, ferments still more resistant. BA 10-8696

3706

STUDIES OF SPLEEN CULTURES FROM IRRADIATED GUINEA PIGS. Karl Haszler and Alexander Farago. *Arch. Exptl. Zellforsch. Gewebezücht. (Explantation)* 17(3), 306-17 (1935). (In German).

Guinea pigs were irradiated (3600 r, 0.8 Cu, and 0.5 Al filters, 180 kv and 6 ma, 40 r/min) 3 days prior to spleen explantation. In cultures of exposed spleen, plasma liquefied sooner than in controls, lymphocytes were decreased in number. After several transplantations new lymphocytes developed from follicular cells. Fibroblasts, macrophages or giant cells were unaffected by irradiation. Observations on phagocytic activity of the various cells are included. BA 10-9454.

3707

MEDULLARY AND NON-MEDULLARY ERYTHROPOIESIS WITH SPECIAL REFERENCE TO THE PLASMA-CELL ERYTHROPHAGE OR RUSSELL BODY CELL, AND TO THE ERYTHROCATHERETIC (ERYTHROLYTIC) FUNCTION OF LYMPH NODES AND HEMAL NODES. Nicholas A. Michels. *Am. J. Anat.* 57(3), 439-501 (1935).

In lymph nodes undergoing fatty involution after x raying, plasma cells and Russell body cells are very numerous. Plasma cells result from combined effects of x-ray irritation and involution. Russell bodies represent phagocytised erythrocytes or erythrocyte fragments. BA 10-16959

3708

STUDIES ON LIMB REGENERATION IN X-RAYED AMBLYSTOMA LARVAE. Elmer G. Butler. *Anat. Record* 62(3), 295-307 (1935).

From study of x-ray effect on limb regeneration in larvae *A. punctatum*, the author concludes that prevention of regeneration is due to local action of radiation on cells in limb and is not result of general action of radiation on body of animal. BA 10-17062

3709

BIOLOGICAL EFFECTS OF ROENTGEN RAYS. THE DETERMINATION OF CRITICAL PERIODS IN MAMMALIAN DEVELOPMENT WITH X-RAYS. Thesle T. Job, George J. Leibold, and H. A. Fitzmaurice. *Am. J. Anat.* 56(1), 97-117 (1935).

Administration of specific doses of x rays on 9th day of gestation produced hydrocephalic condition in young rats, on 10th day, defective eye development, on 11th day, defective jaw development. Males in utero were

definitely more susceptible than female, with exception of jaw defect. Certain doses appeared to exert sex-differentiating influence when administered during 9th, 10th, and 11th days of gestation. BA 10-17072

3710

THE EFFECTS OF X-RADIATION ON LIMB DEVELOPMENT AND REGENERATION IN AMBLYSTOMA. William O. Puckett. *J. Morphol.* 59(1), 173-213 (1936).

Regeneration of early fore-limb bud of larvae was prevented by x radiation. Histologic studies show that failure to regenerate is due to destruction of undifferentiated mesenchymal cells which normally furnish materials for the process. Failure of limb stump to differentiate into components of new limb after irradiation is ascribed to effect on cellular differentiation rather than on cellular proliferation. BA 10-17079

3711

THE EFFECT OF RÖNTGEN RAYS ON RYE. L. P. Breslavetz, G. B. Medwedewa, and A. S. Afanassjewa. *Protoplasma* 23(4), 520-33 (1935). (In German).

Pronounced increase in grain yield was obtained by exposing seeds and seedlings to hard x rays, optimum yield with dose of 250 r (114 r/min, 30 cm, 2 min 12 sec). State of nuclei of root-tip cells paralleled grain yield. After 250 r, 2 nuclei of equal size, several of unequal size, and polyploid nuclei were noted. BA 10-7571

3712

THE EFFECT OF X-RAYS UPON THE CHROMOSOMES OF CIRCOTETIX VERRUCULATUS (ORTHOPTERA). Edwin R. Helwig. *J. Morphol.* 55(2), 265-311 (1933). BA 10-7602

3713

X-RAY TREATMENT OF OENOTHERA CHROMOSOMES. D. G. Catchside. *Genetica* 17(3/4), 313-41 (1935).

Untreated ovules of *O. blanda* were fertilized by x irradiated pollen. F₁: normal plants, no pollen sterility; normal plants with 50% pollen sterility, and variant plants with over 50% bad pollen. Quantitative relation appears to exist between x-ray dosage and percentage of variants, pollen steriles, and interchange heterozygotes. BA 10-7635

3714

X-RAY INDUCED MODIFICATIONS OF FLOWER COLOR IN THE PETUNIA. C. N. Moore and C. P. Haskins. *J. Heredity* 26(9), 349-55 (1935).

Petunias hybrid for factors inducing stippling and variegation in flower coloration were x rayed (Collidge tungsten-target tube, 85 kvp, 10 ma). Both somatic flower bud tissue and seeds were treated. Stippling and variegation were recessive, F₁ normals were plain colored. Both factors were recovered in small percentage of treated seed, recurrence occurred invariably in bud-rayed material. BA 10-7653.

3715

THE EFFECT OF X-RAYS ON SORGHUM POLLEN. F. N. Rangaswami, Ayyangar and V. Panduranga Rao. *Madras Agr. J.* 22(12), 448-9 (1934).

Sorghum pollen x irradiated for 5, 10, and 15 min (70 kv, 4 ma, 16 cm, no Al filter) showed 30.1, 29.2, and 28.9% germination in artificial media. Stigmas treated with rayed pollen gave 41.7% setting for 5 min exposure, 18% for others. One plant from irradiated seeds showed absence of top 8 leaf blades, showing only an ensheathed stem. BA 10-7661

3716

"SALTATIONI" IN HETEROSPORIUM GRACILE. Cesare Sibilia. *Boll. regia staz. patol. vegetale* 14(4), 447-74 (1934). (In Italian).

From monoconidial cultures of *H. gracile* on Iris, variations and saltations were obtained. With Ra, 2 saltations were secured, none with ultraviolet. Effect

of temperature and toxic concentrations of $ZnSO_4$ were also studied and found to produce saltations. BA 10-7668.

3717

EFFECT OF X-RAYS OF FUNGI Jagtar Singh. Proc. Indian Sci. Congr. 20, 305(1933).

Abstract of paper. BA 10-7846

3718

SUMMARY OF SMITHSONIAN RESEARCHES ON RADIATION AND PLANT GROWTH. F. S. Brackett. Proc. Pacific Sci., Congr., Pacific Sci. Assoc., 5th Congr., Canada, 1933, 3, 1721-7(1934). BA 10-7887

3719

MODIFICATION OF LEAF STRUCTURE BY X-RAYS. Yakichi Noguchi. Plant Physiol. 10(4), 753-62(1935).

Irregular coloring of blades was frequently induced by x irradiation in *Helianthus annuus*. X-ray injuries seem localized and confined to directly-treated region. BA 10-7890

3720

THE TELEUTOSPORES OF P. GRAMINIS AND THEIR NON-RESPONSIVENESS TO THE ACTION OF X-RAYS. L. Pasinetti. Rev. pathol. vegetale 21(5/6), 137-43 (1931). (In Italian).

Moist and dry samples of teleutospores were exposed to rays of 3 ma, 100 kw, at 25 cm focal dist., no filter at 23°C. Treated and untreated material showed no change (in hanging drop preparations). BA 10-7891

3721

A SUMMARY OF MEDICAL PHYSICS. Andre Strohl. Paris, Masson et Cie. 1935. 723p. (In French).

Section on x rays and x-ray therapy is included. BA 10-7929

3722

EXPERIMENTAL RESEARCH ON THE ACTION OF X-RAYS UPON BONE MARROW. Annibale Casati. Radiobiologia 1(4), 91-5(1934). (In Italian).

Rabbits were x rayed twice at 15 day intervals (8H or 400 r; 140 kw, 2.5 ma, 40 cm, 0.5 mm Zn and 2 mm Al filter). One group was injected with trypan blue after exposure, one before. Histologic examination of both groups showed transitional cells to be radiosensitive. These cells did not take vital stain, hence are considered not to be R-E cells. Reticular cells were normal, some presenting trypan blue granules deposited on fibrils. BA 10-7985

3723

MECHANISM OF THE BIOLOGICAL ACTION OF IONIZED AIR. A. L. Chizhevskii. Trudy Tsentral'noi Nauchno-Issledovatel'skoi Laboratorii Ionifikatsii (Central Lab. Sci. Res. Ionization) 1, 167-218(1933). (In Russian).

Study of action of intensely ionized air on healthy and sick rats, guinea pigs, chimpanzees, rabbits, pigs, cattle, sheep, chickens, bees; and on seeds and bacteria is reported. Stimulating and therapeutic effect was observed. BA 10-7987

3724

IONIZATION OF GAS AND ATMOSPHERIC AIR. A. L. Chizhevskii. Trudy Tsentral'noi Nauchno-Issledovatel'skoi Laboratorii Ionifikatsii Central Lab. Sci. Res. Ionization, 1, 1-38(1933). (In Russian).

Air is considered to be normally ionized to a certain degree; role of radiation from radioactive materials in earth in maintaining this ionization is discussed. BA 10-7987

3725

THE INHIBITION OF REGENERATION BY X-RAYS IN URODELE, *TRITURUS VIRIDESCENS*. Pressley L. Crumley. Am. Naturalist 69, 9194(1935).

Average tail regeneration of adult *Triturus* after 1704 r (given in 20 min) was less than 1 mm in 105 days, over 9 mm in non-irradiated controls in same time. Bodies were lead-shielded. BA 10-7990

3726

VARIATIONS IN SUSCEPTIBILITY TO X-RAYS OF *MELANOPLUS DIFFERENTIALIS* EGGS DURING DEVELOPMENT. Titus C. Evans. Physiol. Zool. 8(4), 521-9(1935).

Arrest of development and lessening of O_2 consumption rate were noted in irradiated eggs. The observed x-ray resistance or recovery of diapause egg was apparently associated with its inactivity during and after irradiation. BA 10-7991

3727

TISSUE CULTURE. I. THE ADVANTAGES AND LIMITATIONS AS A RESEARCH METHOD. II. ITS APPLICATION TO RADIOLOGICAL RESEARCH. III. ITS APPLICATION TO RADIOLOGICAL RESEARCH (CON.) Honor B. Fell. Brit. J. Radiol. 8, 27-32; 68-87, 280-98(1935).

Direct and indirect effects of x and γ rays on growing cells are described. In vitro and in vivo experiments are compared. Effects observed included alterations in: mitotic rate, cell migration, metabolic processes. Indirect effects were studied by irradiating embryos. BA 10-7993.

3728

LEUCOCYTIC VARIATIONS IN RADIUM WORKERS. I AND II. D. R. Goodfellow. Brit. J. Radiol. 8, 669-84; 752-81(1935).

Systematic blood counts carried out at intervals of 2-4 wk on 32 workers in Ra and x rays for 6 month-3 yr indicated that the only sign of early overexposure common to all workers was leucopenia due to reduced circulating neutrophils. Individuals' sensitivities vary. Eosinophilia and early or abnormal leukocytes were seen in some cases. BA 10-7994

3729

A SUMMARY OF CHANGES NOTED IN THE ALLANTOIC MEMBRANE OF THE CHICK IN 500 EXPERIMENTS. Elnor S. Hunt. J. Proc. Roy. Soc. N. S. Wales 68(2), 184-91(1934-5).

Allantoic membrane of embryo chick prepared according to method of Moppett was exposed for 2 hr-6 days to radiation from 3 mg Ra needle. Abnormalities are described. Mere exposure to a blank needle holder (without Ra) appeared to have a "sensitizing" effect that could not be attributed to infection. BA 10-7999

3730

STRUCTURE OF THE INCOMPATIBILITY GENE. IV. TYPES OF MUTATIONS IN *PRUNUS AVIUM* L. D. Lewis and L. K. Crowe. Heredity 8, 357-363(1954).

Spontaneous and x-ray-induced mutations of the S complex in *P. avium* have been found to be of three types: 1) permanent loss of the component governing pollen activity, 2) revertible mutation affecting the component for pollen activity, and 3) a permanent loss of the part determining stylar activity.

3731

CHROMOSOME RING IN X-RAYED RICE. K. Ramiah, N. Parthasarathi, and S. Ramanujam. Proc. Assoc. Econ. Biol. 2, 1-4(1934).

Dry, soaked (24 hr), and germinating seed of 3 pure lines were exposed 1, 2, and 3 hr each. Wet and germinated seed were badly affected, in dry seed, survivals decreased with increased dose. Survivals showed changes in stature, grain size, leaf size, chlorophyll differences and varying amount of sterility. An observed ring of 4 chromosomes is believed due to segmental interchange of 2 non-homologous chromosomes and may be cause of pollen sterility. BA 10-10159

3732

CYTOLOGICAL INVESTIGATION OF THE PROGENY OF

THE VETCH (*V. SATIVA*) SUBJECTED TO X-RAY TREATMENT. P. F. Savchenko. Trudy Priklad Botan, Genet i Selektan (Bull. Appl. Bot., Genet. and Plant-Breed.) Ser. 2 8, 59-79(Russ.); 183-9(Eng. summ.), (1935).

Frequency of aberrants was 3.4% in F_1 of *V. sativa* x rayed in germinating seeds. Aberrants include: heterozygous translocations, homozygous translocations; shifts in locus of spindle fibre attachment, trisomics, chromosomal fragments present in some cells of an individual, not in others: karyologically normal, phenotypically aberrant individuals. BA 10-10162

3733
RADIATION AND LIFE IN THE PLANT WORLD. Vincenzo Rivera. Nuovo giorn. bot. ital. 39(1), 1-18(1932). (In Italian).

Author presents a generalization on effect of whole range of electromagnetic waves, from cosmic rays to radio wave lengths. Wave lengths longer than those of visible light believed to stimulate cell division in meristem of normal and pathological plant tissues, those shorter than visible light supposedly depress cell multiplication. BA 10-10403

3734
BIOLOGICAL EFFECTIVENESS OF ALPHA PARTICLES AS A FUNCTION OF ION CONCENTRATION PRODUCED IN THEIR PATHS. R. E. Zirkle. Am. J. Cancer 23(3), 558-67(1935).

Irradiation of *Pteris longifolia* spores with α particles was followed by inhibition of cell division and chlorophyll development and cracking of spore wall; the effects being attributed to irradiation of nucleus. Biologic effectiveness was found empirically to vary approximately as 2.5 power of the ion concentration in the path of α particle. (Spores were arranged so that their nuclei were traversed by one of seven segments of the α particle path and biological effectiveness of the various path segments were compared). BA 10-10406

3735
THE EFFECT OF BITEMPORAL X-RAY IRRADIATION ON ALIMENTARY HYPERGLYCEMIA. Bruno Bonomini and Mario Testolin. Atti. soc. med.-chir. Padova 12(3), 132-5(1934). (In Italian).

Blood sugar curves after ingestion of glucose were determined before and after 2 bitemporal irradiations, made a day apart, in group of normal, one Basedowian, and one hyperthyroid subject. Effects of irradiation were irregular in normal subjects, in those with decreased tolerance for carbohydrate, exposure invariably lowered the glucose tolerance curve. BA 10-10639.

3736
INFLUENCE OF X-RAYS IRRADIATION UPON UROPOIETIC SYSTEM. I. INFLUENCE OF ROENTGEN IRRADIATION UPON RABBIT KIDNEY. S. Takita. Japan. J. Obstet. and Gynecol. 16(3), 184-207(1933).

X irradiation of rabbit kidney was followed by swelling, congestion of glomerular loops with blood, acceleration of renal discharge of intravenously injected dye. No marked histologic or functional change was observed following dosage up to 2.8 S. E. D.; degeneration, and atrophy followed heavier doses. BA 10-10892

3737
INFLUENCE OF X-RAY IRRADIATION UPON UROPOIETIC SYSTEM. II. INFLUENCE OF ROENTGEN IRRADIATION UPON EXPERIMENTAL NEPHRITIS. S. Takita. Japan. J. Obstet. and Gynecol. 16(3), 207-24(1933).

In experimental cantharidin and uranium nephritis, x irradiation hastened and intensified recessive degeneration in tubular system, congestion of blood vessels, albuminuria and decrease in quantity of urine. BA 10-10892.

3738
INFLUENCE OF X-RAY IRRADIATION UPON UROPOIETIC SYSTEM. III. EXPERIMENTAL STUDY ON THE RADIOSENSIBILITY OF KIDNEY. S. Takita. Japan. J. Obstet. and Gynecol. 16(4), 365-77(1933).

Subcutaneous injection of various heavy metals increased sensitivity of kidney immediately following irradiation in ascending order: Ag, Cu, I ion, Bi, and Hg. Uroselectan and abrodil did not increase radiosensitivity, KI did. BA 10-10892

3739
EFFECTS OF X-RAYS ON THE BIOLOGIC PRODUCTION OF HEMOLYSINS. A. Gualdi. Boll. ed atti accad. med. Roma 60(7/8), 254-60(1934). (In Italian).

Irradiation of spleen region with weak ($1/3$ E. D.) x-ray dose produced in 2 rabbits hemolytic titers of $1/1500$ and $1/1400$, strong (E. D.) dose produced in 2 other rabbits titers of $1/2000$ and $1/2200$; in 4 rabbits injected with previously irradiated antiship antigen, titers of $1/2300$ - $1/2800$ developed. BA 10-11149

3740
VOLUME-INCREASE OF BACTERIA FROM X-RAY IRRADIATION. Thomas J. Dietz. Radiology 24(1), 31-8 (1935).

Bacillus coli suspensions were irradiated with sub-lethal doses of x rays and growth was estimated by means of turbidity measurements with spectrophotometer. Increase in volume of irradiated in comparison with normal bacteria was noted and accredited to increase in active protoplasmic volume stimulated by irradiation and to increased water absorption through altered cell membrane. BA 10-11409

3741
PULMO-RADIOGRAPHY AND ITS END RESULTS. I. ALVEOLAR (PULMOALVEOLOGRAPHY), AND 2. LYMPHATIC (PULMO-LYMPHOGRAPHY). S. Kadrnka and R. Junet. Acta Radiol. 16(3), 361-78(1935). (In French).

Radiologic and histologic examinations of rabbit lungs given colloidal thorium intravenously in fractionated doses and varying total amounts were made at various intervals up to 3 yr after injection. Spleen, liver, and bone marrow were aided by lungs in removing excessive doses. Thorium granules always lie within cells. BA 10-11908

3742
AN EXPERIMENTAL STUDY OF OVARIAN IRRADIATION AND TRANSPLANTATION IN THE RAT. James Mandel. Anat. Record 61(3), 295-309(1935).

Irradiating ovaries of the immature albino rat 7-10 days old caused precocious vaginal opening and estrual changes at about 22 days. Many large ovarian follicles; normal genitalia 6 wks were observed after (a) 540 r dose to ovarian region (immature rats), mostly proliferative cords and interstitial tissue, few large follicles after (b) 830-1240 r. Ovaries of (a) transplanted to immature female castrates hastened sexual maturity. BA 10-11944.

3743
STUDY OF EFFECT OF X-IRRADIATION ON THE LIVERWORT *SPHAEROCARPUS* BY MEANS OF POLLEN ANALYSIS. Edgar Knapp. Z. induk. Abstamm.-u. Vererbh. 70(3/4), 532(1935). (In German). BA 10-12639

3744
RESULTS OF AN ATTEMPT TO OBTAIN ARTIFICIAL MUTATIONS IN SOLANACEAE. M. F. Ternovsky. Genetica 17(5/6), 499-546(1935). (In German).

Differential response of flower buds of *Solanum annuum* and *Nicotiana tabacum* followed x irradiation. Flower buds of pepper fell off more rapidly following treatment than did those of tobacco. No visible mutations

were detected in pepper; young flower buds were more sensitive than old. In tobacco, mutants were detected as early as seedling stage; were characterized by such abnormalities as irregular leaf shape and excessive branching. BA 10-12656

3745

ARTIFICIAL MUTATIONS IN THE SILK-WORM (BOMBYX MORI L.) EXPERIMENTAL PRODUCTION OF SEX-LINKED LETHALS BY GAMMA RADIATION OF RADIUM. B. L. Astaurov. *Genetica* 17(5/6), 409-60(1935).

Ten sex-linked lethals and 1 dominant autosomal mutation are reported as result of treating pupae with γ rays of Ra. Dominant mutation produces yellow color in hemolymph; 6 of lethals cause death in early egg development, 2 in larval stage. Frequency of occurrence of spontaneous sex-linked lethals in this species estimated at less than 0.6%; 2.5% for Ra-treated material. BA 10-12664

3746

A NEW PHENOTYPIC EFFECT OF THE Y-CHROMOSOME IN DROSOPHILA MELANOGASTER. N. P. Dubinin and M. A. Heptner. *J. Genetics* 30(3), 423-46(1935).

Dominant mutation, A, produced by x rays causes darkening of eye color to brown, and is found to be located in chromosome II. BA 10-12672

3747

FURTHER STUDIES ON ARTIFICIALLY PRODUCED CROSSING-OVER IN D. MELANOGASTER. G. Frizen. *Doklady Akad. Nauk SSSR* 3(3), 179-82(1934). (Russian and German).

Crossing over, mostly near spindle fibre attachment, between homologous chromosome was induced in males by x raying pupae. Resulting crossover chromosomes were viable in homozygous condition; inversions in 2nd chromosome (suppress crossing over in females) have little or no effect on induced crossing over in males. Possible explanation for normal absence of crossing over in males is suggested. BA 10-12676

3748

EFFECTS OF X-RADIATION ON PRODUCTION OF MOSAIC MALES AND ON SEX RATIO IN HABROBRACON. Raymond J. Greb. *Am. Naturalist* 67, 88-93(1933).

Dosage of 2000 r was administered to 2/3 (397) of females heterozygous for 3 genes affecting eye color; 1/3 kept as controls. X rays increased mosaicism based on egg binuclearity, and lowered percentage of females in bisexual fraternities. BA 10-12680

3749

MUTATIONS PRODUCED BY X-RAYS IN THE PARASITIC WASP P. PUPARUM. A. P. Gul'. *Doklady Akad. Nauk SSSR* 4(1/2), 95-102(1934). (In Russian and English).

X irradiation (3500-4500 r) of larvae caused almost complete sterility. Controls averaged 66 sons, treated adults 33, treated pupae only 14.4. High death rate was noted among larvae, pupae and young adults of treated mothers. BA 10-12682

3750

THE PRODUCTION OF STERILITY IN DROSOPHILA MELANOGASTER BY X-RAY TREATMENT. W. G. Moore. *Am. Naturalist* 68, 508-15(1934).

Following x irradiation, little increase in sterility was noted in adults; sterility of 72-hr females greatly increases; in 36-hr larvae, 33% and 55.8% sterility were produced in females and males, respectively. Sterility is attributed to mutation and chromosome abnormality. BA 10-12701

3751

THE PRODUCTION OF MUTATIONS IN DROSOPHILA MELANOGASTER BY IRRADIATION WITH ALPHA-RAYS. Frances D. Ward. *Genetics* 20(3), 230-49(1935).

Reproductive cells at amicropolar end of developing egg were exposed to α or x rays; somatic cells at opposite end were shielded. Treatment increases mutation rate by factor of 4600. α rays were less effective than x rays. Sterility ranged from 20% to 59% with doses of 3.8-10 millicurie seconds and increased rapidly with dosage. (Control sterility rate was 3%.) BA 10-12718

3752

CARCINOGENIC ACTION OF THORIUM DIOXIDE IN THE WHITE RAT. G. Roussy, Ch. Oberling, and M. Guerin. *Bull. acad. med. (Paris)* 112, 809-16(1934). (In French).

Of 15 rats which lived 1-1½ yr after subcutaneous injection with thorium dioxide, 8 died of subcutaneous or intra-abdominal, serially transmissible, sarcoma. BA 10-13447

3753

THE ROLE OF HISTOLOGICAL EXAMINATION IN THE THERAPEUTIC TREATMENT OF CANCERS WITH RADIUM. De Nabias. No. 4 of *Huit Conférences De Cancerologie*, Paris, Masson et Cie. 1931. 229p. BA 10-13557.

3754

THE RADIOSENSIBILITY OF TISSUES AND ITS RELATION TO THE TREATMENT OF CANCERS. Simone La Borde. No. 5 *Huit Conférences de Cancerologie*, Paris, Masson et Cie. 1931. 229p

Author considers role of: type of tissue, radiation dose, mitotic activity, dose fractionation, condition of circulation in the irradiated tissue, indirect effects of radiation in response of tissues to therapeutic irradiation. BA 10-13557

3755

PATHOGENESIS, PROPHYLAXIS AND THERAPY OF ROENTGEN SICKNESS. Anna Jugenburg, L. H. Peretz, and R. S. Mostowa. *Fortschr. Gebiete Rontgenstrahlen* 51(3), 280-90(1935). (In German).

Dogs with fistulae in left half of transverse colon exhibited marked change in colonic flora after x raying; loss in floral ratio, particularly decrease in percentage of coli bacilli and increase in other microbes. Patients given x-ray therapy were fed B. coli milk to test theory that depleted B. coli and upset floral ratio cause x-ray sickness. Return of correct bacterial ratio was accompanied by recovery from x-ray sickness. BA 10-13594

3756

THE ACTION OF X-RAYS ON CERTAIN BACTERIA. A. T. Pugsley, T. H. Oddie, and C. E. Eddy. *Proc. Roy. Soc. (London)* B118, 276-98(1935).

X rays (0.25-2 A) kill Sarcina lutea, B. coli, and Phytomonas medicaginis var. phaseolicola (in order of increasing sensitivity). With equal doses in r-units, higher killing rate with longer wave lengths was observed. Bacteria irradiated in colonies yield survivor-curve differing from that for single bacteria; results are consistent with one-quantum-hit-to-kill mechanism, with added effects due to absorption and scattering of x rays in colony. Media was also altered, suggesting it may become toxic. BA 10-13964

3757

THE EFFECT OF CERTAIN X-RAYS ON THE ELECTROPHORETIC MOBILITY OF ESCHERICHIA COLI. Margaret E. Smith, Martin W. Lisse, and Wheeler P. Davey. *J. Bacteriol.* 31(3), 275-86(1936).

Extreme doses (greater than lethal dose) is required to cause decreased motility. A wave length effect is indicated. BA 10-13972

3758

LEAF AND STEM STRUCTURE OF SOME X-RAYED

PLANTS. Evelyn Wolcott. Univ. Colo. Studies 23(3), 223-33(1936).

Seedlings of *Hordeum*, *Brodiaea*, *Eurphobia*, *Ricinus*, *Helichrysum*, *Mesembryanthemum*, *Nemophila*, *Raphanus*, *Silene*, and *Zinnia* were x rayed with doses of 1000 to 3500 r. Leaves of irradiated plants were generally small, deformed, thick and rough in texture and of variegated occasionally albescent, coloring. Stems and petioles were often ridged and twisted, occasionally fasciated. Abnormal colorless areas developed in parenchyma of mesophyll. Further alterations are described, including decrease in vessel size in stems. BA 10-14393.

3759

ON THE EXPERIMENTAL SEXUAL INVERSION OF THE OVARIAN ANLAGE IN THE CHICK EMBRYO. Vera Dantchadoff. Compt. rend. soc. biol. 120, 597-9(1935). (In French).

Inversion of the morphogenetic process in ovarian anlage is obtained by introduction of male hormone after partial sterilization by x rays. Partial inversion of male to female occurs by irradiation of egg at hatching. After irradiation, use of folliculin causes definite inversion of male chick embryo. BA 10-14549

3760

MORPHOGENETIC PROCESSES IN SEXUAL INVERSION IN THE OVARY. Vera Dantchakoff. Compt. rend. soc. biol. 120, 599-601(1935). (In French).

In female embryo, x-ray atrophy of ovarian anlage allows male factors to predominate. BA 10-14549.

3761

EFFECT OF MIXED AND MONOCHROMATIC X-IRRADIATION ON TISSUE GROWTH IN VITRO. II. TISSUE CULTURES OF EMBRYONIC CHICK HEARTS IN AMNIOTIC FLUID. V. Wendrowsky and H. Zapolska. Arch. exptl. Zellforsch. Gewebezucht. (Explantation) 18(1), 17-41(1935). (In German).

Cultures of 8-10 day-old chick hearts were irradiated with: (1) Ag and Mo anticathodes for mixed x rays or (2) same anticathodes plus Pd and Zr filters for monochromatic x rays. From data author concludes x rays hinder development of mesenchymal cells into more differentiated cell types. BA 10-14576.

3762

NEW STUDIES OF THE NUCLEUS IN THE GENUS "NARCISSUS." Abilio Fernandes. Bol. soc. Broteriana 9, 3-198(1934). (In French).

Study of several species and hybrids of *Narcissus* has shown existence of 2 basic chromosome numbers, 7 and 10, with polyploid series from diploid to hexaploid. X and γ irradiation produced aneuploids, γ rays and cosmic rays in nature are believed to be responsible for existence of aneuploid populations. BA 10-15227.

3763

REGULARITIES IN CHROMOSOME TRANSFORMATIONS INDUCED BY X-RAYS. G. A. Levitskii and M. A. Sizova. Doklady Akad. Nauk SSSR 4(1/2), 84-7(1934). (Russian and English).

X ray induced chromosome transformations (116) are classified into 6 types. Fragmentation is more frequent in certain regions of certain chromosomes, long arms of A and D being most common donors; C donates rarely. Breakage frequency varies along length of chromosome arm; fragments unite with end of any chromosome which happens to be closest. BA 10-15258.

3764

THE SENSITIVE-VOLUME OF THE MEIOTIC CHROMONEMATA OF GASTERIA AS DETERMINED BY IRRADIATION WITH X-RAYS. A. G. Marshak. Proc. Natl. Acad. Sci. U. S. 21(4), 227-32(1935).

Flower spikes of *Gasteria* were exposed to various doses of x rays and anthers of each bud examined when cells reached first meiotic anaphase. Three types of chromosome abnormalities were observed, all effects being in chromonema of chromatid without involving matrix. Rectilinear relation between dosage and frequency of abnormalities was found. Results are interpreted in terms of "sensitive volume" of chromonemata. BA 10-15262.

3765

THE BEHAVIOR OF MEIOTIC CHROMOSOMES AFTER X-IRRADIATION. K. Mather. Hereditas 19(3), 303-22 (1934).

Chief x-ray effects on meiotic behavior of chromosomes in irradiated plants of *V. faba* and *Tradescantia braotecta*: extensive chromosome fragmentation before metaphase in *Tradescantia*, at late metaphase and anaphase in *Vicia*; changes in chromosome structure; increase in frequency of chiasma formation in nuclei at meiosis some time after treatment. BA 10-15264.

3766

THE LIFE-HISTORY OF THE NUCLEUS AND NUCLEOLUS AND THE EFFECT OF β RADIATION UPON THEM. J. C. Mottram. J. Roy Microscop. Soc. 52(4), 362-9 (1932).

β radiation inhibits evolution of nucleus at two specific stages, apparently thus stopping mitotic process. BA 10-15268.

3767

HISTOLOGIC BEHAVIOR OF CONNECTIVE ELEMENTS IN IRRADIATED CANCER OF THE UTERINE CERVIX. Luigi Puccioni. Ann. ostet. e ginecol. 55(10), 1647-99 (1933). (In Italian).

Successive biopsies on 9 cases of Ra-treated uterine cervix cancer showed that first changes occur about 96 hr after therapy, and consist of degeneration of neoplastic tissue, proliferation of connective tissue, reaching height about 12-15 days after Ra treatment in dosage of 2880-3600 mg/hr. Further changes are also described. BA 10-16159.

3768

MICROINCINERATION STUDIES: II. LOCALIZATION OF ASH-YIELDING SUBSTANCES DURING MEIOSIS AND ITS POSSIBLE SIGNIFICANCE IN X-IRRADIATION PHENOMENA. Fred M. Uber and T. H. Goodspeed. Botan. Gaz. 97(2), 416-20(1935).

Pollen mother cells of *Lilium longiflorum* and *Kniphofia* were incinerated. Chromosomes were delineated distinctly by their ash from prophase through anaphase. Regarding x-ray effects, this distribution of heavy elements may account for greater sensitivity of nuclei over cytoplasm and may give rise to wave-length identification method. It may also affect size of "sensitive volume." BA 10-15286.

3769

STUDY OF THE GROWTH-INHIBITING EFFECT OF X-RAYS. Fritz Gessner. Biol. Zentr. 34(11/12), 567-87 (1934). (In German).

Power of and time of germination of *Helianthus annuus* seeds was unaffected by x irradiation for 2 hr (7.5 ma, 60 kv, 13 cm) but seedlings of these seeds were stunted. Power of extensibility of cell walls was lowered by x rays; change in extensibility believed cause of growth inhibition rather than an effect. BA 10-15470

3770

EFFECT OF RADIATION, LACTATE AND IODOACETIC ACID ON TUMORS. W. R. Franks and M. M. Shaw. Am. J. Cancer 22(3), 601-5(1934).

Authors studied 445 mice inoculated with 2 mouse tumors and treated with x ray, Ra, Na lactate, and iodoacetic acid in various combinations with and without

asphyxia. Regressions were obtained in 29 mice. Variables are evaluated in terms of experimental results. BA 10-16119

3771
PRELIMINARY NOTE OF MORPHOLOGICAL VARIATIONS OCCURRING IN X-RAYED STOCK IN THE ATTACINE MOTH, *CALLOSAMIA PROMETHIA* DRU. C. P. Haskins. J. N. Y. Entomol. Soc. 42(2), 145-54(1934).

Thirty cocoons were exposed at 50 cm to 300-9600 r from Coolidge tube, no filter. Lethal limit was reached only with larvae in 2nd instar receiving 64-min exposure. Effects: sterile females from pupae rayed before emergence; abnormal development of larval tubercles, attempt of larvae to pupate naked, tendency to microcephaly with reduction of antennae. BA 10-17751

3772
FUTHER STUDIES OF THE EFFECT OF RADIUM UPON BACTERIA. R. R. Spencer. U.S. Public Health Repts. 50(47), 1642-55(1935).

By irradiating bacteria over many generations, profound morphological and cultural changes were induced in 6 out of 20 tests, while continuous irradiation of same culture for 30 days produced no genetic changes. Tests in contamination-proof box yielded no changes. Author concludes irradiation of bacteria does not induce genetic changes as frequently as does irradiation of certain higher forms. BA 10-17731

3773
THE EFFECT OF LIGHT UPON THE SENSITIVITY OF WHEAT SEEDLINGS TO X-RAYS. Leon C. Chesley. J. Cellular Comp. Physiol. 6(1), 69-84(1935).

Wheat seedlings were sprouted in dark and in light from 75 watt bulb at 50 cm and 18 hr after germination were exposed to graded doses of x rays. Light-sprouted seedlings were found less sensitive to x rays, especially small doses. One hr exposure to light immediately before x ray treatment gave optimal protective effect. X ray destruction of auxin is suggested. BA 10-18024.

3774
BIOLOGICAL EFFECTS OF RADIATION. MECHANISM AND MEASUREMENT OF RADIATION, APPLICATIONS IN BIOLOGY, PHOTOCHEMICAL REACTIONS, EFFECTS OF RADIANT ENERGY ON ORGANISMS AND ORGANIC PRODUCTS. Benjamin M. Duggar, Ed. New York, McGraw-Hill Book Co. 1936. Vol. I, 676p.; Vol II 1343p. BA 10-18025

3775
THE INHIBITION OF GROWTH IN POLLEN AND MOLD UNDER X-RAY AND CATHODE RAY EXPOSURE C. P. Haskins and C. N. Moore. Radiology 23(6), 710-19(1934).

The amount of incident energy required for hard x rays to produce given effect is greater than that for soft x rays by factor of 2.1 for mold and 6.0 for pollen. Disparity between cathode rays and hard x rays is considered to be insignificant. BA 10-18027.

3776
STUDIES IN CONSTITUTION AND LIGHT BIOLOGY IN WOMEN, WITH PARTICULAR REGARD TO THE CONDITION IN PREGNANCY. Friedrich Ellinger. Arch Gynakol. 156(3), 471-96(1934). (In German).

Parallelism in reaction of skin to ultraviolet and to x rays is stressed and also its use as means of preventing injury by exposure to these rays. Influence of factors such as age, sex, complexion, and skin vascularity is considered. Studies were carried out in a women's clinic. BA 10-18171

3777
THE PROTECTION OF STAFF AND PATIENTS IN RADIOOTHERAPY. I. THE PROTECTION OF RADIOLOGY STAFFS FROM THE EFFECTS OF RADIUM AND X-RAYS. II. THE PROTECTION OF PATIENTS UNDERGOING DEEP THERAPY TREATMENT. Geoffrey Bourne and A. H.

Merritt. J. Cancer Research Comm Univ. Sydney 6(1), 39-55(1934)

Regular blood counts at intervals of not more than 1 month is suggested as best protection against effects of x and γ radiation for radiologists. Blood counts of cancer patients undergoing deep x-ray therapy showed generally a fall in red blood cell count and inconsistent reaction in white blood cell count. BA 10-18189.

3778
ON THE INFLUENCE OF TEMPERATURE ON THE BIOLOGICAL EFFECT OF ROENTGEN RAYS E. Dubowy. Fortschr. Gebiete Rontgenstrahlen 52(2), 183-5(1935). (In German).

D. melanogaster larvae were irradiated at 25.5° and 4° with 410 and 540 r. More than 30 experiments, each with 40-70 larvae, showed temperature difference had no marked effect on biological action of x rays BA 10-18191.

3779
EFFECT OF X-RAYS ON REGENERATION OF CHELIPEDS OF *ATYA BISULCATA*. Charles Howard Edmondson. Bernice P. Bishop Mus. Occas. Papers 11(16), 1-15 (1936).

Regeneration of *Atya* chelipeds was retarded during irradiation, normal rate was recovered after exposure. Irradiation effects decreased as period of treatment was extended. Retardation was less marked on regeneration that was well started. Continuous doses of sufficient strength had greater effect than same dosage spread over long period of time. Irradiation of posterior half of body did not retard regeneration. Destruction of mesoderm forming cells by x rays is suggested as mechanism of observed effect. BA 10-18192.

3780
DO COSMIC RAYS HAVE BIOLOGICAL EFFECTS? R. B. Engelstad. Strahlentherapie 51(4), 672-5(1934). (In German).

Comparison of 108 mice during first 6 mo of life, in a deep mine where ionization was 4.63 ions/cc/sec, with 68 controls at earth's surface where ionization was 8.52 ions/cc/sec showed 8.9% greater body wt in first group. No difference in appearance or rate of breeding was observed. BA 10-18193

3781
FACTORS IN THE RADIOSENSITIVITY OF TISSUES J. Firket. Bull. acad. roy. med. Belg. 15(2), 66-98 (1935). (In French).

Author discusses physical and biological factors responsible for tissue radiosensitivity and calls attention to metabolic exchanges which might have a bearing on radiosensitivity. Studies relative to effects of: respiratory and glycolytic intensity, ischemia, and the metabolic stimulant, cyclopentylidinitrophenol on radiosensitivity are reported. Observations were made on pea seeds, and young and embryonic guinea pig thymus. BA 10-18195

3782
THE BIOLOGICAL ACTION OF X-RAYS ON THE GRAVID UTERUS. A. Galli. Boll. soc. Eustachina 31(1/2), 33-6 (1933). (In Italian).

Abortion or resorption of the fetus in rabbits treated with x rays suggested the existence of a chemical action through production of a roentgencytolysin. Injections of serum obtained after irradiation caused termination of pregnancy. Microscopic studies indicated serum acted specifically to inhibit cell mitoses. BA 10-18196

3783
EFFECT OF ROENTGEN RAYS UPON HEARING IN DOGS Edward Girden J. Comp. Physiol. Psychol. 20(2), 263-90(1935).

Auditory acuity of dogs was determined by conditioned reflex method. X irradiation (80-100 kv, 5 ma) produced

transient gain in acuity of about 5.5 decibels which lasted 2 to 5 wks. Gradual accumulation of large doses (up to 11,100 r) did not apparently impair hearings although skin burns and loss of hair were produced. BA 10-18197.

3784
RADIOBIOLOGICAL STUDIES ON THE BASIS OF THERAPY WITH HIGH ENERGY CATHODE RAYS. R. Glocker, G. A. Kugler, and H. Langendorff. *Strahlentherapie* 51(1), 129-38(1934) (In German)

Cathode rays generated at 1.7 million volts have range of 1 cm in water, give maximum lethal effect on *Drosophila* eggs at 2 mm in water. At this depth intensity is 150% of surface intensity BA 10-18198.

3785
THE EFFECT OF X-RAYS ON CLEAVAGE IN *ARBACIA* EGGS: EVIDENCE OF NUCLEAR CONTROL OF DIVISION RATE. P. S. Henshaw and D. S. Francis. *Biol. Bull.* 70(1), 28-35(1936).

Time required for first cleavage was prolonged when eggs were irradiated before fertilization, same effect produced by irradiating sperm before they fertilized normal eggs. Results indicate that nuclei of cells studied exert some control over rate of cell division. BA 10-18200

3786
METABOLISM OF TISSUES GROWING IN CULTURE. VI. EFFECT OF RADIUM ON THE LACTIC DEHYDROGENASE AND ARGINASE SYSTEMS OF EMBRYONIC TISSUES. Barbara Elizabeth Holmes. *Biochem. J. London* 29(10), 2285-90(1935).

Arginase in embryo rat kidneys was unaffected by dose of γ rays sufficient to inhibit glycolysis. Lactic dehydrogenase system of young embryo tissue was more sensitive to γ radiation than was older tissue. Preliminary studies suggest that co-enzyme is the part of the system injured by γ rays. BA 10-18202

3787
INFLUENCE OF RADIUM ON THE COLORATION, THE DEVELOPMENT AND THE OXYGEN CONSUMPTION OF LARVAE OF *T. MOLITOR*. Viktor Janda. *Vestník Kralov. Ceske Spolecnosti Nauk, Trida Mat. Prirod.* (Mem. Soc. Roy. Sci Boheme Cl. Sci.) 1932 (paper 9), 1-26(1933) (French Sum.).

Larvae exposed to 5 mgm $RaCl_2$ with and without Pb and Pt filters, for 30 sec to 12 and 28 days at 8 mm with unfiltered, and 2.5 cm with filtered rays. Unfiltered rays produced raised spots which nearly covered larval integument. From these normal adults developed. Larger doses arrested development, caused incomplete pigmentation of eyes, legs, head, and prothorax. BA 10-18205.

3788
THE BIOLOGICAL ACTION OF THE RAYS FROM RADIOACTIVE SUBSTANCES. I. THE EFFECTS OF SMALL-DOSE RADIATION UPON THE REPRODUCTIVE ACTIVITY OF UNICELLULAR ORGANISM. Yukichi Kimura. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 28, 27-47 (1935).

Prolonged irradiation (3-12 wk) with low doses of radioactive substances (pitchblende, monazite, and UX preparation) promoted reproduction in *Paramecium caudatum*. Effect was maintained during exposure without any distinguishable after-effects, and was due to direct action of rays on organism. Gamma rays are considered to be essential in producing observed effects. BA 10-18207.

3789
COMPARATIVE STUDY OF THE ACTION OF X- AND GAMMA RAYS ON THE LIVING CELL. RADIOBIOLOGICAL DOSIMETRY WITH THE AID OF *LUCILIA SERICATA* EGGS. Lucien Mallet and M. Bouchard. *J. radiol. et electrol.* 19(4), 155-61(1935). (In French).

Response of *L. sericata* eggs was independent of quality of radiation, but was a function of dose. Method does not give absolute values in r units but may be used for comparative measurements on given apparatus. BA 10-18210.

3790
INFLUENCE OF γ RAYS ON *MACROSIPHUM ROSAE* L. Livia Pirocchi. *Atti soc. ital. sci. nat. e museo civico storia nat. Milano* 74(1/2), 195-203(1935).

Colonies of *M. rosae* on first plant stock were subjected to radiation from Ra salts (1.02 mgm) which were shielded so only γ rays could escape. Exposure for 72 to 18 hr killed all aphids exposed, exposure for 15 to 3 hr resulted in reproduction after a few days, followed in 1-3 days by death of all parents and young. Exposure for 90 to 20 min speeded reproduction up to 4th generation. BA 10-18211.

3791
EXPERIMENTAL RADIUM POISONING. I. BONE MARROW AND LYMPH NODE CHANGES IN RABBITS, PRODUCED BY ORAL ADMINISTRATION OF RADIUM SULPHATE. Maurice Rosenthal and Edwin J. Grace. *Am. J. Med. Sci.* 191(5), 607-18(1936).

Oral administration of radium sulphate in rabbits resulted in: jaw necrosis, early erythropoietic hyperplasia and decreased maturation of erythroblasts and replacement with myelocytes in bone marrow; later fibrosis of marrow; initial stimulation of stem cells in lymph nodes followed by depletion and atrophy of lymphoid tissue, absolute lymphopenia in circulating blood and extramedullary myelopoiesis. BA 10-18215.

3792
THE BIOLOGICAL ACTION OF HOMOGENEOUS AND HETEROGENEOUS X-RAYS. C. M. Scott. *Proc. Roy. Soc. (London)* B112, 365-83(1933).

Homogeneous and heterogeneous x rays produced identical biological effects on allantois of hens' eggs. BA 10-18216.

3793
ACTION OF X-RAYS ON THE EGGS OF CALLIPHORA. C. M. Scott. *Proc. Roy. Soc. (London)* B115(792), 100-21(1934). (App: Method of Preparing Microscopic Sections for the Eggs of *Calliphora erythrocephala*, by D. Kilgour)

Raising of flies and handling of eggs are described. Dosage: 40 r/min, 47.1 cm, 79 kv, 5 amps, 0.01 cm AC filter, time varied. During development, radiosensitivity of egg decreases in a non-uniform manner. Author concludes that since change from uni- to multi-nuclear stage is abrupt and is accompanied by sudden decrease in radiosensitivity, the decrease is related to division of entire cell. BA 10-18217.

3794
RESULTS OF X-RAY IRRADIATION OF THE TEMPORAL REGIONS IN CERTAIN CASES OF DIABETES. Bruno Bonomini and Mario Testolin. *Atti. soc. med.-chir. Padova* 11(6), 690-702(1933). (In Italian).

In 8 cases of diabetes, irradiation of temporal region produced temporary reduction in glycosuria. Irradiation effects varied in intensity and duration. In cases previously treated with insulin, bitemporal irradiation seemed to diminish dose of insulin necessary to maintain aglycosuria. Findings are considered compatible with theory of importance of tuberohypophyseal region in carbohydrate metabolism. BA 10-18259

3795
STUDIES ON THE X-RAY DESTRUCTION OF THE ANTERIOR PITUITARY LOBE. I. X-RAY DESTRUCTION OF THE ANTERIOR PITUITARY LOBE AND MG-, CA-, AND

P METABOLISM. L. Cannavo and R. Beninato. *Endokrinologie* 15, 389-404(1935). (In German).

Four x-rayed rabbits showed severe destruction of all cell types in anterior pituitary, no apparent injury in neural lobe or adjacent brain, compared with 4 untreated controls. Treatment was followed by cachexia and death. Serum P and Mg, and excretion of P and Mg were lessened. Ca metabolism was apparently unchanged. BA 10-18382.

3796

THE EFFECT OF LARGE DOSES OF X-RAYS ON THE GROWTH OF YOUNG BONE. Eugene M. Regen and Walter E. Wilkins. *J. Bone and Joint Surg.* 18(1), 61-8(1936).

Eight of 14 rabbits were treated over left forelegs with 2,600 r and x-ray pictures were taken of both forelegs each month until growth in controls stopped. Within first month, growth in treated bones ceased completely, did not begin again in period of observation. Growth in untreated bones of experimental animals was unaffected. BA 10-18603.

3797

HISTOPATHOLOGY IN EXPERIMENTS WITH "THOROTRAST" INJECTION. Eiichi Jin. *Mitt. allgem. Pathol. u. pathol. Anat. (Japan)* 8(3), 439-60(1935). (In German).

Intravenous Thorotrast injections in rabbits were absorbed by liver, spleen, bone-marrow, lymph nodes, kidneys, adrenals, and lungs in respective reticular or endothelial cells. Spleen takes up the most the quickest, liver absorbs considerable amounts more slowly, other organs absorb small amounts. As result of absorption, some R-E cells become necrotic, desquamate, enter circulation, are deposited in spleen and liver. Toxic effects on hemopoietic system were noted. BA 10-18696.

3798

THE EFFECT OF X-RAYS ON THE INCUBATION PERIOD, SEXUAL DEVELOPMENT AND EGG-LAYING IN THE WHITE AND BROWN LEGHORN CHICKENS. J. M. Essenberg. *Poultry Sci.* 14(5), 284, 293, 317(1935).

White and Brown Leghorn chicken eggs (600) were x rayed with dosages of 30-600 r at incubation ages of 19-243 hr. Viable chicks were observed for 3 yr. Development during incubation in x rayed eggs varied with dosage. Less than 80 r accelerated, over 80 r, retarded development. Sexual development was accelerated. Average egg production for exposed group, 8.8/mo; for controls, 22/mo. BA 10-19208.

3799

THE ORIGIN OF NEW EPIDERMAL CELLS IN THE SKIN OF NORMAL AND X-RAYED FROGS. John Andrew Cameron. *J. Morphol.* 59(2), 327-49(1936).

Few mitotic figures were seen in skin of irradiated tadpoles and frogs (leopard and bullfrogs) by tenth day of larval life. Spindle-shaped "traveling cells" on vertical connective tissue fiber bundles connecting lower dermal layer with epidermis, are believed to be the source of replacement in normal and irradiation-induced desquamation. Number of mitoses and period of mitotic activity were both reduced by x ray in proportion to dose. BA 10-19565

3800

SURVEY OF PHENOMENA OF THE RECONSTRUCTION OF THE CHROMOSOMAL APPARATUS. Th. G. Dobzhansky. *Trudy Priklad. Botan. Genet. i Seloktsii, Seria 2 (Bull. Appl. Bot., Genet. and Plant-Breed., Ser. (2) 6*, 143-71 (1934). (In Russian).

Literature on spontaneous and x-ray-induced chromosomal aberration up to the year 1930 is reviewed. Bearing of these phenomena on various problems of genetics, such as cytological maps, permanence of spindle fiber attachments and mechanism of meiosis is discussed. BA 10-20261.

3801

CONSTANCY OF CHLOROPHYLL CONTENT AND CHROMATOPHORE DEGENERATION OF CHLOROPHYLL-MUTANT BARLEY LINES. H. V. Euler, B. Bergman, H. Hellstrom, and D. Burstrom. *Hereditas* 21(2/3), 119-28(1936). (In German).

Study of chlorophyll distribution in x-ray induced mutants of barley is reported. BA 10-20290.

3802

STUDIES ON THE EFFECT OF X-IRRADIATION ON THE LIVERWORT SPHAEROCARPUS, BY MEANS OF POLLEN ANALYSIS. Edgar Knapp. *Z. Induk. Abstamm. -u. Verebl.* 70(2), 309-49(1935). (In German).

Results of irradiation of spore mother cells shortly before meiosis, of young spore tetrads shortly after meiosis, and of mature tetrads are described. BA 10-20293.

3803

THE EFFECT OF α IRRADIATION OF PROTOPLASM AND CHLOROPLASTS. Richard Biebl. *Protoplasma* 24(2), 225-57(1935). (In German).

Leaves of Bryum were exposed to α rays of Po preparations. Similar effects were produced with different Po preparations by application of equivalent doses. Chloroplasts exhibit the first irradiation injury, protoplasm injury being apparent later. BA 10-20582

3804

REPORTS ON THE ROENTGENBIOLOGY OF MAN AND PLANTS. E. Ingber. *Radiobiologia* 1(2), 37-47(1932). (In Italian).

Bean seedlings were exposed to x rays of different wave lengths and intensities. There was no apparent effect from 11 r, little or none with 22 r, injury to plants from 44-330 r, lethal effect from 440-550 r. Pre-irradiation treatment of plants with chloral hydrate tended to shift borderline between reversible and irreversible effects, result of combining the 2 elements more than addition of effects. Author describes parallelism between x-ray effect on plants and man. BA 10-20586.

3805

DO AVERAGE AMOUNTS OF RADON IN SOIL-AIR HAVE AN EFFECT ON SEED DEVELOPMENT IN THE SOIL? W. Kosmath and V. Hartmair. *Protoplasma* 24(1), 8-13(1935). (In German).

Vicia faba seedlings were grown in quartz-sand through which Ra emanation, 100×10^{-16} Curie/cm, was passed. Results failed to support claim of Stoklasa that Ra emanation in soil-air is of ecological importance. BA 10-20588.

3806

A MODEL SYSTEM FOR EXAMINING THE RADIO-SENSITIVITY OF METABOLISING LAYERS OF CELLS. O. C. A. Scott. *Brit J. Cancer* 11, 130(1957).

Tumor cells separated from their oxygen supply by a compact layer of metabolising cells no more than 250 microns thick become anoxic within a few minutes at room temperature and are then much more resistant to radiation than are the same cells when adjacent to their oxygen supply.

3807

EXPRESSION OF SERUM FROM BLOOD CLOTS AND SYNERESIS. (COLLOID CHEMISTRY STUDIES ON THE THROMBO-EMBOLISM PROBLEM.) II. PHYSICAL FACTORS. H. Lampert and A. Ott. *Z. ges. exptl. Med.* 94(3), 309-22(1934). (In German).

Study of nature of formation of an embolus from a thrombus indicates parallelism between syneresis of blood clot and of other organic and inorganic gels. Effects of pressure and temperature are described. Ultraviolet and x irradiation had no effect upon syneresis. BA 10-20636

3808

IRRADIATION INDUCED MALIGNANT HYPERTENSION;
CURED BY NEPHRECTOMY W. M. Levitt and M. S.
Ogram. Brit. Med. J. 2, 910-12(1956).

An example is recorded of severe malignant hypertension induced by renal damage from irradiation. Patient became normotensive after nephrectomy. The blood pressure fell slightly over a period of 7 months, and responded at once, and satisfactorily, to moderate doses of reserpine orally.

3809

PRELIMINARY OBSERVATIONS CONCERNING THE
EFFECTS OF ROENTGEN IRRADIATION IN THE PRESENCE
OF FLUORESCIN. Murray E. Goodrich. Am. J.
Roentgenol. Radium Therapy 34(3), 378-80(1935).

Fairly soft radiation apparently exerts increased ionization effect in a scattering medium containing small amounts of fluorescein (paraffin phantom) and small amounts of fluorescein in malignant tissue decrease its resistance to roentgen irradiation. BA 10-20693.

3810

STUDIES ON THE EFFECT (INDIRECT) OF LOCALIZED
ROENTGEN IRRADIATION ON NORMAL AND PATHO-
LOGICAL WHITE BLOOD CELL PRODUCTION E. Hayer,
Z. ges. exptl. Med. 86(5/6), 623-37(1933). (In German).

X irradiation of thigh of dogs before start of turpentine abscess of the ear, and before and after perforation of the abscess appears to affect white blood picture although dosage (600 r) was applied at some distance from the inflammatory focus. BA 10-20694.

3811

ON THE EFFECT OF RADIUM RAYS AND ULTRAVIOLET
LIGHT ON THE COLORATION, METAMORPHOSIS AND
OXYGEN CONSUMPTION OF PUPAE OF TENEbrio
MOLITOR L. Viktor Janda. Biol. Generalis 10(2),
483-520(1934). (In German). BA 10-20696

3812

INFLUENCE OF A HYPERTHERMAL RADIOACTIVE
SULFURATED ATMOSPHERE ON SOME CHEMICAL
COMPONENTS OF THE BLOOD A. Krijanovsky. Compt.
rend. soc. biol. 120(40), 1236-8(1936). (In French).

Blood of patients who had been in "radio-vaporarium" exhibited decrease in blood sugar, blood N and blood cholesterol, blood cell chloride increased and plasma chloride decreased. BA 10-20699

3813

VARIATIONS IN THE SENSITIVITY OF THE CELL TO
RADIATION IN RELATION TO MITOSIS. J. C. Mottram.
Brit. J. Radiol. 8, 643-51(1935)

Tumor cells vary greatly in sensitivity to Ra irradiation when submitted to conditions affecting cellular respiration. Exposure to cold or HCN increases radio-sensitivity, N or CO anaerobiosis decrease it. No correlation found by author between sensitivity and state of mitosis at time of irradiation. BA 10-20700.

3814

STUDIES OF THE DIRECT AND INDIRECT EFFECTS OF
ROENTGEN RAYS. (EXPERIMENTAL INVESTIGATION
OF THE BLOOD FORMING ORGANS.) P. W. Sspowsky.
Beitr. pathol. Anat. u. allgem. Pathol. 94(1), 1-19
(1934). (In German).

Irradiation effects on rabbit bone marrow showed lymphocytic series including megakaryocytes and hematoblasts to be most sensitive, myeloid series, endothelial and reticulum cells followed in that order. BA 10-21261

3815

CONSIDERATIONS RELATIVE TO A CASE OF SIMMOND'S
DISEASE. Leandre Cervera, Albert Folch, and Bonaventura
Benaiges. Barcelona Libreria Catalonia. 1933. 15p.
(In Spanish).

X-ray stimulation of pituitary is recommended for specific case of Simmond's disease, believed by authors to be hypopituitarism. BA 10-21287.

3816

THE EFFECT OF X-RAYS ON BACTERIA IN MEDIA OF
HIGH SPECIFIC GRAVITY. Wayne A. Johnston. Radiology
20(3), 195-201(1933).

Cultures of *S. aureus* were mixed with Beck's paste and with lipidol and x irradiated (110 kv, 5 ma, 0 filter, 10 in. focal dist.). Subcultures made at 5, 10, 30, and 60 min exhibited growth inhibition which increased with each interval. Growth in presence of **meat was** inhibited somewhat after 1 hr irradiation. Author attributes x-ray effect to secondary rays of heavy metals in Beck's paste (bismuth) and lipidol (iodine); and to proteins of high mol wt in meat. BA 10-21672

3817

EXPERIMENTAL STUDIES ON CYCLOPIA Etienne Wolff.
Arch. anat., hist. et embryol. 18(1/4), 145-67(1934).
(In French).

Local x irradiation of chick embryos on prosencephalon at stage of: cephalic prolongation resulted in complete cyclopia with median unpaired eye, at 2-15 somites resulting in 2 eyes developing in same orbit with continuous eyelid. Other irradiation-induced abnormalities are also described. BA 10-22267.

3818

FURTHER STUDIES ON THE CHROMOSOME ALTERATIONS
BY X-RAYS IN LOXOBLEMMUS ARIETULUS. Kazuo
Suzuki. Proc. Imp. Acad. (Tokyo) 10(4), 233-35(1934).

In spermatogonia of irradiated insects, fusion of normally separate chromosomes into rods, fragmentation of rods and fragmentation of V-chromosomes were observed. All changes were in direction of increase of chromosome number. BA 11-94

3819

A NEW FORM OF TETRAPLOIDY AFTER ROENTGEN
IRRADIATION. M. J. D. White. Naturwissenschaften
23, 390-1(1935). (In German).

X irradiated *Locusta migratoria* males produced spermatogonia in which chromosomes split twice between successive mitoses, without division of spindle attachment. Resulting cell has v-shaped instead of rod-shaped chromosomes, which consist of 2 homologous arms united proximally. Every such chromosome is structurally analogous to "attached-X" chromosome in *D. melanogaster*. BA 11-99.

3820

A PRELIMINARY EXPERIMENT ON CROSSING OVER
IN THE FEMALE OF BOMBYX MORI. Daigoro Moriwaka.
Proc. Imp. Acad. (Tokyo) 11(10), 453-4(1935).

Crossing over was produced twice (in 1158 trials) by x-raying, never (in 899) by heat. BA 11-152.

3821

MECHANISM OF MOSAIC FORMATION DUE TO THE
EFFECT OF X-RAYS IN *D. MELANOGASTER*. M. K.
Neigauz. Zool. Zhur. (Zool. J. USSR) 13(3), 507-10
(1934). (Russian, English summary).

Fractional mutations were studied in offspring of x-rayed flies. Treated males were crossed to attached X females immediately after treatment or after 5, 10, 15, or 20 days. Frequency of fractional mutations obtained in male offspring proved independent of time lapse between treatment and mating. BA 11-153

3822

COMPARISON OF THE MUTATION-ELICITING EFFECT
OF ROENTGEN AND RADIUM RAYS ON *DROSOPHILA*
MELANOGASTER. A CONTRIBUTION TO RADIATION
GENETICS. Arthur Pickhan. Strahlentherapie 52(3),
369-88(1935). (In German).

Percentage of sex-linked lethal mutations induced in *D. melanogaster* by x rays or hard γ rays strictly proportional to dosage, has time-factor of unity, shows no dependence on wave length when correct physical dosage measurement is employed. 2.48% of induced mutations found/1000 r with error of $\pm 0.36\%$, proportion of visible to lethal mutations 3.5% for both x and γ rays. BA 11-157

3823

REACTION OF PROTOPLASM TO RADIUM RADIATION.

William Seifriz. *Protoplasma* 25(2), 196-200(1936)

Protoplasm of slime molds is highly resistant to Ra emanation (β and γ rays). When rays are concentrated on small bit of plasmodium, spreading and streaming stops and there is a slight increase in viscosity. BA 11-361

3824

"ANOMALOUS OSMOSIS" IN ANIMAL CELLS. W. A. Dorfman. *Protoplasma* 14(3), 341-59(1932).

Addition of thorium salts causes anomalous swelling of frog erythrocytes or sea-urchin eggs, whether medium be an iso-, hyper- or hypotonic solution of electrolytes or non-electrolytes. Thorium causes swelling of the nucleus when medium is hypertonic NaCl. Possible interpretations are discussed. BA 11-402

3825

STUDIES ON THE EFFECT OF X-RAYS ON TAIL REGENERATION IN TRITON AFTER A SINGLE EXPOSURE TO VARIOUS DOSES. V. Brunst and E. Cheremetieva. *Arch. biol. (Liege)* 46(3), 357-68(1935). (In French).

Stump of amputated tail destroyed by 15,000 r in *Triton cristatus*. After 3750 r, stump destroyed in 73% of animals, regeneration followed 1,500 r dose in 63.3%, 65% normal after 750 r, 35% retarded. BA 11-475

3826

STUDIES ON THE ROLE OF TISSUE METABOLISM IN THE RADIOSENSITIVITY OF THE GUINEA PIG THYMUS. M. Chevrement. *Arch. biol. (Liege)*, 46(3), 507-98 (1935). (In French).

From studies on young guinea pigs, author concludes that local metabolic factors are fundamental in radiosensitivity, that it is anaerobic fermentation and not respiration that determines cellular radiosensitivity BA 11-476

3827

EFFECT OF X-RAYS ON DEVELOPING LONG BONES: RADIOGRAPHIC AND ANATOMICAL STUDY. Bjarne Dahl. *J. Radiol. et electrol* 18(3), 131-40(1934). (In French).

Lower femur and upper tibia of young rats were irradiated with nearly epidermicidal dose of x rays. Studies indicate: early resorption of bone marrow; arrest of endochondral and periosteal ossification, early calcification and slow devascularization of metaphyses and epiphyses; fractures and resorption of diaphyses, arrest of proliferation of cartilage of union, resistance of epiphyseal cartilage to radiation. BA 11-478

3828

EFFECTS OF FRACTIONATED DOSES OF X-RAYS ON THE MORPHOLOGY OF THE OVARY OF THE ADULT RABBIT. ATTEMPT AT STATISTICAL INTERPRETATION OF OBSERVED PHENOMENA. Paul Desai. *Arch. biol. (Liege)* 46(3), 475-506(1935). (In French).

Follicles in single ovaries exposed to 210, 420, 840, and 1470 r were counted and ratios of atretic to normal follicles calculated. After 14 days, during which ovary received successive doses of x rays, almost complete degeneration of ovary was observed. X ray action is contrasted to that of prolan. BA 11-479

3829

ATTEMPT TO DUPLICATE TELERADIUM TREATMENT

USING ROENTGEN RADIATION. Erik Ebbehøj.

Strahlentherapie 52(2), 338-43(1935). (In German)

Skin and tissue reactions following teleradium treatment are precisely reproducible by x-ray treatment if focusing distance and quality are chosen to give similar dosage-rate and depth dose. Sievert unit (1mc) must be taken as 4.0 r/hr (biological determination of Braun), not as 8.2 r/hr (physical measurement). BA 11-480.

3830

THE EFFECTS OF ADMINISTRATION OF THORIUM DIOXIDE.

A. J. Fleming and W. H. Chase. *Surg. Gynecol. Obstet.* 63(2), 145-8(1936).

Microscopic evidence of proliferative reaction in connective tissue is presented in 2 human cases. Radio-activity in liver tissue 5 mo after injection was demonstrable by photographic methods. Authors conclude that intravenous injection of this material as contrast media is dangerous if life expectancy is over 2 yr. BA 11-482

3831

ON A BIOLOGICAL AND BIOCHEMICAL EFFECT OF γ RAYS, WITH PARTICULAR REGARD TO THE EFFECT OF SIMULTANEOUS ACTION OF OTHER FACTORS (TEMPERATURE, LIGHT, U.S.W.). (PRELIMINARY COMMUNICATION). Arne Forssberg. *Acta Radiol.* 16(2), 204-16(1935). (In German).

Authors studied effects of various doses of continuous γ radiation (Ra) on catalase and peroxidase, germinating wheat and oat seeds, and *Drosophila* eggs at various temperatures to determine whether γ radiation effect is always one of retardation. BA 11-483

3832

EFFECT OF ROENTGEN RAYS ON AUTOLYSIS AND PROTEOLYSIS OF THE NUCHAL LIGAMENT OF THE OX. E. Hayer. *Strahlentherapie* 49(4), 678-93(1934). (In German).

Extension and tearing tests were made on nuchal ligaments (maintained in vitro) before and at various intervals after exposure to 600 r or 2400 r x rays (0.9 mm Cu half value layer). After 600 r autolysis was delayed. Resistance to stress was maintained for longer periods, and normal collagenous tissue staining was maintained still longer. No change in optical properties of tissue was detected. Autolysis was uneven after 2400 r Biochemical implications of results are considered. BA 11-485

3833

TEMPERATURE AND BIOLOGICAL EFFECT OF α RAYS. T. Hercik. *Strahlentherapie* 49(4), 703-6(1934). (In German).

Irradiation of bacteria cultures with α particles from Po gives lethal effect which has zero temperature coefficient. BA 11-486.

3834

THE ROLE OF ROENTGEN-RAY WAVE LENGTH IN SKIN TOLERANCE. Paul C. Hodges, Alexander Brunschwig, and S. P. Perry. *Am. J. Roentgenol. Radium Therapy* 34(2), 234-40(1935).

Skin reactions in 8 rabbits and 4 humans showed no difference after exposure to radiation produced by 200 kv, filtered by 1 mm Cu, λ , 0.146, and radiation produced by 80 kv, filtered by 1 mm Al, λ , 0.41A. Authors conclude that skin reaction to irradiation is independent of wave length, and that this is also true of radiation of over 200 kv. BA 11-488.

3835

THE EXPERIMENTAL INTRAVENOUS ADMINISTRATION OF COLLOIDAL THORIUM DIOXIDE. Dudley A. Irwin. *Can. Med. Assoc. J.* 27(2), 130-5(1932).

Varying doses of thorium dioxide injected intravenously into 25 rabbits were found chiefly in reticuloendothelial cells with traces in suprarenal glands and ovaries. Doses to 5 cc of 25% suspension/kilo body wt were well tolerated. There was no evidence of elimination for at least 4 mo BA 11-489.

3836

SUSCEPTIBILITY OF SOFT X-RAYS OF DAPHNIA MAGNA DURING ITS DEVELOPMENT FROM EGG TO YOUNG IN THE BROOD POUCH. G. Snider and H. Kersten. J. Exptl. Zool. 74(1), 1-6(1936).

Results of irradiating eggs or embryos of D. magna (soft x-rays, 80 sec, 8 cm, gas x-ray tube, Cu target, 25 kv, 10 ma) show that eggs are more easily injured by soft x rays in segmentation stage, more difficult to injure in gastrula and subsequent developmental stages. BA 11-492.

3837

RADIATION EXPERIMENT ON CHICK EMBRYOS IN VITRO AND IN VIVO USING RADIUM GAMMA RAYS. C. W. Wilson, A. F. Hughes, A. Glucksmann, and F. G. Spear. Strahlentherapie 52(3), 519-24(1935). (In German).

Irradiation of whole embryos with γ ray dosage of 116 Sievert units for 8 min was followed by diminution of mitotic rate relative to controls, then rapid rise to above normal rate, and return to normal after 6 hr. BA 11-494.

3838

STUDIES OF GROWTH FACTORS OF EMBRYO EXTRACT. W. C. Hueper, A. Allen, M. Russell, G. Woodward, and M. Platt. Am. J. Cancer 17(1), 74-105(1933).

Surface tension of embryo extract was not changed materially by radon irradiation and growth-promotion was unaffected by x rays and radium emanation. Only slight destruction of glutathione in extract was caused by x rays. Spectrograms taken of normal embryo extract and extract irradiated with ultraviolet, x rays and radium are presented. BA 11-782

3839

MESOBlastic TUMOURS PRODUCED IN FOWLS BY EXPOSURE TO RADIUM. J. C. Mottram. Proc. Roy. Soc. Med. 29(1), 15-18(1935).

Small exposures to β radiation were given 12 cockrels at weekly intervals for 2 yr. Birds developed mesoblastic tumors near the point of radiation. Tumors were spindle-cell sarcoma, a fibrosarcoma and a lymphosarcoma none of which grew when grafted into other birds. BA 11-1094.

3840

ON THE GENETICS, HISTOLOGY AND CYTOLOGY OF A NEW RADIUM-INDUCED DEGENERATIVE MUTATION IN ANTIRRHINUM MAJUS. Emmy Stein. Z. indukt. Abstamm.-u. Vererbbl. 70(3/4), 525-31(1935). (In German).

Mutant of A. majus (A. m. var. cancroidea) obtained in F_2 of irradiated seed is described. Plants are stunted, with abnormal flowers, and are male sterile. Chromosome numbers observed in mutant somatic cells: 16, 32, and 64, normal number is 16. BA 11-10353.

3841

THE STRUCTURE OF THE CHROMOSOMES OF THE SALIVARY GLAND OF DROSOPHILA MELANOGASTER. Alfred Marshak. Am. Naturalist 70, 181-4(1936).

X-ray treatment of eggs results in deficiencies in adjacent pairs of chromatic bands, these in turn possibly being caused by inactivation of a unit in achromatic region. Chromosome abnormalities are believed to be the result of indirect, not direct effect of irradiation, since exposure of older larvae produces no visible effects. Last normal mitosis apparently occurs 6-8 hr after egg is laid. BA 11-10368.

3842

NEW EVIDENCE FOR THE POSITION EFFECT HYPOTHESIS. I. B. Pansin. Compt. rend. acad. sci. URSS 4(1/2), 85-8(1935).

X irradiated wild-type flies were crossed to untreated flies homozygous for 3rd chromosome recessive, curled. Cytological study of F_1 flies showed the curled effect revealed 3rd chromosome break in vicinity of curled locus in most instances. Study of crossovers shows that changes are apparently due to position effect. BA 11-10371

3843

A MUTATION OF THE TAIL, APPEARING IN THE DESCENDANTS OF MALE MICE WITH IRRADIATED TESTES. [N.] Dobrovolskaia-Zavadskaja. Arch. electr. med. 42, 460-5(1934). (In French).

Effects of irradiation of testicles (25-29 cm, 4 mm Al, 4 ma, 230-6.75 r) is described for 48 white mice and their descendants. Histological examination revealed that germinal epithelium was affected more than were interstitial cells. Two mutations were seen in descendants, "waltz" and "short tail." Author suggests that x rays did not cause the "short tail" mutation but influenced conditions to permit a larger incidence to appear. BA 11-10382

3844

TWO UNUSUAL MODIFICATIONS OF EYE COLOR IN DROSOPHILA MELANOGASTER. E. V. Enzmann and C. P. Hoskins. Nature (London) 138, 165(1936).

X irradiation of eggs and larvae of mutant white-eyed flies of Florida wild-type Drosophila (red eye) apparently caused 2 full reversions to wild-type (white to red eye). No reversions were noted in 5000 controls. Four individuals in stock culture of 30,000 eosin Drosophila exhibited mutation to color darker than eosin but lighter than wild-type. Three were from irradiated stock; 4th obtained from control population, raised on old and contaminated molasses. BA 11-10388.

3845

SOME EMBRYONIC ABNORMALITIES CAUSED BY X-RAYS. Titus C. Evans. Proc. Iowa Acad. Sci. 42, 207-8 (1935-36).

Effective dosage of x rays caused various abnormalities, especially in the embryos, of Melanoplus differentialis. These are described. BA 11-10389

3846

A STUDY OF THE QUESTION OF THE RELATIONSHIP BETWEEN ROENTGEN RAY DOSE AND INDUCED MUTATION RATE. K. G. Zimmer. Strahlentherapie 51(1), 179-84(1934). (In German).

Analysis of published results show that when correct mathematical treatment is used, induced mutation rate in drosophila can be shown to be strictly proportional to x-ray dosage applied. BA 11-10413

3847

MODIFICATION OF RADIOSENSITIVITY BY MEANS OF READILY PENETRATING ACIDS AND BASES. R. E. Zirkle. Am. J. Roentgenol. Radium Therapy 35(2), 230-7 (1936).

Pteris longifolia spores kept in equilibrium with various concentrations of (1) CO_2 , (2) H_2S or (3) NH_3 . As concentration of (1) increased from 0% to 20% in atmosphere (0-0.006M in culture solution) radio-sensitivity increases from 1.0 to 1.5; further increase decreased radiosensitivity. Variation with (2) similar to that with (1). BA 11-10532

3848

RADIUM EMANATION AND THE PHOSPHOROUS OUTPUT OF FROG MUSCLES. O. V. Hykes and J. Rerabek. Biochem. Z. 278(1/2), 123-32(1935). (In German).

Amount of P given off by frog-muscle-nerve preparations (resting or stimulated) into surrounding Ringer's solution was increased by pre-irradiation of solution with Ra emanation. BA 11-11135.

3849

EXPERIMENTAL BASIS OF ROENTGEN THERAPY IN ACUTE INFLAMMATORY PROCESSES. J. P. Mischtschenko, M. M. Forenko, T. F. Feszenko, S. N. Ledanow, and A. W. Morgatschow. *Strahlentherapie* 52(3), 464-96 (1935). (In German).

Biological effects of x rays on experimentally produced inflammation (*S. albus*, Diphtheria toxin and Pneumococcus) studied with rabbits, guinea pigs and mice. Increase in phagocytosis and leucocyte destruction, and R-E system reaction occurred. X rays observed to affect all elements of focus of infection. Optimal dose higher in initial than in cicatrical stage. Disproportionately high doses caused spread of inflammatory reaction and perhaps sepsis. BA 11-11373.

3850

HISTOLOGICAL INVESTIGATIONS ON THE RAT SPLEEN AFTER GRADED DOSES OF ROENTGEN RADIATION. Ernst A. Pohle and C. H. Bunting. *Strahlentherapie* 57(1), 121-31(1936). (In German).

Spleens of 181 rats were x rayed (100 kv, 2.0 mm Al, λ eff. = .34A, doses of 5 -- 5000 r at varying intervals). Chief x-ray effects noted in fixed and circulating blood cells of the organ, lymphocytes appeared most susceptible. Decisive lesions first found at 30 min. histological changes well marked at 3 hr. BA 11-11379

3851

THE INFLUENCE OF THE AGE AND SEX OF THE GERM CELLS ON THE FREQUENCY OF MUTATIONS IN *DROSOPHILA* STIMULANT. K. V. Kosikov. *Compt. rend. acad. sci. URSS* 2(3), 115-8(1936)

Author suggests that lethal mutations occurring in X chromosome of immature male germ cells kill or hinder multiplication of these cells, female cells are somewhat protected (having 2 X chromosomes) against effect of recessive lethal in one chromosome. Percentage of lethals in cultures from gametes at 1-6, 6-12, and 12-24 days postirradiation was determined and mutation frequency was found to be lower in immature cells than in nature. BA 11-10399.

3852

A PRELIMINARY NOTE ON THE PREPARATION OF NON-TOXIC SHIGA DYSENTERY VACCINES BY IRRADIATION WITH SOFT X-RAYS. Helen Norris Moore and H. Kersten. *J. Bacteriol.* 31(6), 581-4(1936).

Concentrated saline suspensions of *Shigella dysenteriae* were irradiated (38 kv, 20 ma, 30-300 min). Vaccines receiving large doses were rendered non-toxic and retained antigenic properties; those given small doses (even though more than sufficient to kill organisms) were still toxic. (Most intense portion of the soft x rays consisted of K_{α} and K_{β} lines of Cu.) BA 11-11514

3853

A NOTE ON BACTERICIDAL EFFECTS OF ROENTGEN RAYS. F. L. Mohler and Lauriston S. Taylor. *J. Roentgenol. Radium Therapy* 34(1), 89-91(1935).

Author postulates that biological effects of x ray are localized in columns of ionization along path of each high speed electron in liquid. Area of a bacillus is such that passage of column through such an organism is not generally fatal, and column must pass through a particular vulnerable point to cause death. BA 11-11780

3854

SOME EFFECTS OF GAMMA RAYS OF RADIUM ON THE DEVELOPING CHICK EMBRYO. I. THE DEPENDENCE OF THE DELAYED LETHAL DOSE ON THE AGE OF EMBRYO.

II. THE RECOVERY AND DEVELOPMENT OF CHICK EMBRYOS AFTER IRRADIATION AT VARIOUS AGES.

C. W. Wilson. *Acta Radiol.* 16(6), 719-34(1935).

Chick embryos were exposed to γ -ray irradiation of 5.3 r/min for 3 hr exposures, total dose 1,000 r. Radiosensitivity of chick embryo was found to decrease for first 3 days of incubation, to decrease more rapidly from 3-5 days, then remain stationary. BA 11-12384.

3855

ON THE FORMATION OF AN AXIAL ROW OF SOMITES IN THE CHICK EMBRYO AFTER IRRADIATION OF HENSEN'S NODE. Etienne Wolff. *Compt. rend. soc. biol.* 118(5), 452-5(1935). (In French).

X irradiation of a delimited area containing Hensen's node in postprimitive streak embryos was followed by varying degrees of arrest of cord and tube, and concentration of mesoderm in median line. BA 11-12386

3856

RESULTS OF A LESION IN THE REGION OF HENSEN'S NODE ON THE DEVELOPMENT OF THE CHICKEN. Etienne Wolff. *Compt. rend. soc. biol.* 118(1), 77-80 (1935). (In French).

X-irradiation of small circular area containing Hensen's node in 32 post-primitive streak embryos of varying ages up to 5 somites, yields constant results which disagree with those obtained by Dantschakoff with Ra. Embryos surviving beyond 4th day exhibited various malformations, chiefly of the cord BA 11-12385

3857

INFLUENCE OF RADON EMANATIONS ON THE DEVELOPMENT OF THE EGGS OF *R. ESCULENTA*. P. Pasquini. *Atti Pontificia accad. sci. Nuovi Lincei* 85, 424-86(1932).

Eggs were subjected to radon radiation at successive stages, from early morula to tail-bud stage; dosages ranged from 2-3 mc to 108 mc. Histogenic changes depend on dosage, morphological changes upon stage of development treated. As gastrulation advances, radiation seems to affect nervous tissue more profoundly. BA 11-2023

3858

AN ANOMALY, ATYPICAL MITOSIS. A. J. Atabekova. *Compt. rend. acad. sci. URSS* 1(3), 133-6(1936). (In German).

Cytological examination of *Pisum sativum* showed disturbance in synchrony of mitosis in x-irradiated seeds. BA 11-5260

3859

MUTATION EXPERIMENTS WITH *OENOTHERA HOOKERI*. C. F. Rudloff and H. Stubbe. *Flora* 29(4), 247-362(1936). (In German).

X irradiated pollen of *O. hookeri* was used to pollinate untreated flowers. Narrow-leaved forms, dwarfs, weaklings and other variants appeared in F_1 . In F_2 variety of abnormal types appeared, many of which are interpreted as gene mutations, but genetical analyses are incomplete. Names and descriptions of 24 gene mutations included. BA 11-5296

3860

THE EFFECT OF X-RAYS ON THE PRODUCTION OF STERILE RICE. Yoshitaka Imai. *Japan J. Genetics* 10(3/4), 233-6(1935).

Sterility mutations in treated series averaged 6.39%: in controls, 0%. Exposure at microsporogenesis produced more frequent mutations than treatment at flowering, longer exposures produced more frequent mutations than shorter ones. Of sterile plants induced, 7.18% were mosaic for sterility of different degrees or for sterile and fertile ears. BA 11-5318.

3861

KARYOGENETIC STUDIES ON X-RAYED SEX CELLS

AND THEIR DERIVATIVES IN TRITICUM MONOCOCCUM. Yoshiwo Katayama. J. Coll. Agri. Tokyo Imp. Univ. 13(4), 333-62(1935).

Flowers of T. monococcum ($2n = 14$) and Secale cereale were subjected to different x-ray dosages. Abnormalities in meiosis and development are described. Chromosomal changes observed in F_1 are attributed to simple translocation, with or without deletion, between 2 non-homologous chromosomes. Incidence of abnormal mitoses was greater when material was fixed 1-5 hr. post-exposure than when fixed immediately. Frequency of abnormalities was roughly proportional to dose. BA 11-5322.

3862

EFFECT OF RADIUM EMANATION AND OF RADIO-ACTIVE EARTH ON YEASTS. E. Ia Rokhlina. Microbiologia 5(2), 248-52(1936). (Russian, English summary).

Stable variants of Saccharomyces cerevisiae which differed from one another and from parent culture morphologically, physiologically, and especially in increase of fermentation rate, were obtained by subjecting yeast cultures to x, Ra, and ultraviolet radiation. BA 11-5328.

3863

THE SEMI-LETHAL EFFECT OF X-RAYS ON D. MELANOGASTER. F. A. Smirnov. Trudy Leningrad. Obshchestva Estestvoispytatelei (Trav. Soc. Nat. Leningrad) 63(3), 379-85(1934). (Russian, German summary).

Author presents results to support idea that one of most frequent classes of mutations consists of minor changes that produce small effects, especially small decreases of viability. BA 11-5369

3864

EFFECT OF X-RAYS ON THE FORMATION OF ARTIFICIAL DECIDUA IN THE RABBIT. A. Lacassagne, A. Fehr, and W. Nyka. Compt. rend. soc. biol. 121(5), 385-7(1936). (In French).

Irradiation of rabbit ovary shortly after copulation and with a dose sufficient to kill ovum does not prevent pregravid proliferation of endometrium nor formation of artificial decidua, corpus luteum regresses prematurely. Uterine mucosa is only slightly radiosensitive. BA 11-5959

3865

CLASSIFICATION OF PHYSIOLOGICAL OR PATHOLOGIC EFFECTS OF IRRADIATION. American Roentgen Ray Society, Committee on Safety and Standards. Am. J. Roentgenol. Radium Therapy 35(2), 266-7(1936). (Roentgen Rays or Radium.) BA 11-6138.

3866

PURIFICATION OF VARIOLA VACCINE BY MEANS OF X-RAYS. Baruch Samuel Levin. Compt. rend. 200(16), 1441-3(1935). (In French).

Tubes containing variola vaccine were exposed to massive x-ray doses (anticathode of Cr: 30 kv, 20 ma, at 30 mm for 2 min). Contaminating organisms were destroyed and immunizing strength of variola vaccine was only slightly if at all diminished, as shown by tests on rabbits. BA 11-6324.

3867

CONCERNING THE QUESTION OF THE MITOTIC DIVISION OF THE SERTOLI CELLS IN MAMMALS. G. G. Shchegolev. Arkh. Anatomii, Gistologii i Embriologii (Arch. Russe Anat. Hist. et Emb.) 14(2), 198-220 (Russian), 306-8(German Summary) (1935).

Newborn rats were x irradiated with 200-680 r to destroy germ cells, sacrificed 60, 90, 100 or more days later. No metaphases, prophase, or anaphases were found in Sertoli cells, indicating lack of cell division after their development from follicular cells. Author believes Sertoli cells belong to ultra stabile type. BA 11-2648.

3868

TRANSFORMATION OF HAPLOID GENOTYPE FEMALE GAMETOPHYTES OF SPHAEROCARPUS DONNELLI INTO MALES BY MEANS OF ROENTGEN RAYS. Gerhard Lorbeer. Planta 25(1), 70-83(1936). (In German).

Growing points of gametophytes of S. donnellii which were subjected to intermittent x radiation to total dose of 14,000 r, then exposed in damp chambers to unilateral illumination, gave rise to numerous outgrowths; 34 haploid female growing points so treated producing 275 outgrowths, of which 11 bore antheridia instead of archegonia, 1 was sex-mosaic. BA 11-2679

3869

ELICITATION OF CROSSING-OVER IN DROSOPHILA MALES BY ROENTGEN IRRADIATION OF THE IMAGO. H. Friesen. Genetica 18(1/2), 187-92(1936). (In German).

Day-old males were x irradiated and mated to virgin females at 3 day intervals. With one exception, no cross-overs resulted until 6-7 days after exposure. Of 174 flies recorded during this period, 10.9% were crossovers. Results indicate that crossing-over can be induced during spermatogenesis in adult stage of male flies. BA 11-2697.

3870

EXPERIMENTAL STUDIES OF GENOVARIATION IN DROSOPHILA MELANOGASTER UNDER THE INFLUENCE OF ROENTGEN AND RADIUM RAYS. R. Gassul and W. Slepko. Arch. exptl. Zellforsch. Gewebezucht. (Explanation) 11(1/2), 133-5(1931). (In German). BA 11-2698

3871

THE EFFECT OF X-IRRADIATION ON AUXIN AND PLANT GROWTH. Folke Skoog. J. Cellular Comp. Physiol. 7(2), 227-70(1935).

Application of hard x rays inactivated auxin in solution or in plant. Destruction is believed to be due to oxidizing agents formed by irradiation. Mechanism of auxin transport and capacity of growth were not affected by exposure. Effect of irradiation on auxin and on its formation is studied to be the factor in immediate x-ray inhibition of plant growth. BA 11-2919

3872

ACTION OF RADIO-EMANATION ON THE GERMINATION OF GRAINS. M. de Caraman and Ch. Champy. Compt. rend. soc. biol. 121(8), 750-2(1936). (In French).

Irradiation of oats increased weight of stems and roots of seedlings about 10-fold. BA 11-2944

3873

THE RELATION OF X-RAY DOSAGE TO DEGREE OF INJURY IN NEMOPHILA AND ZINNIA. Edna Louise Johnson. Am. J. Botany 23(6), 414-8(1936).

Extreme ray susceptibility of N. insignis and Z. elegans seedlings was indicated by lethal response to 2500 r. Seedling growth in both species when treated with 1000, 1500, and 2000 r showed definite relation between dosage and effects produced with respect to: percent living for 3 mo, average height at various periods, average green wt of above-ground parts at maturity and percent of plants producing flowers and fruit. Use of these plants as dosimeters is held to be impractical. BA 11-2946.

3874

SUSCEPTIBILITY OF SEVENTY SPECIES OF FLOWERING PLANTS TO X-RADIATION. Edna L. Johnson. Plant Physiol. 11(2), 319-42(1936).

Seedlings of 70 plants were irradiated with medium doses of x rays when cotyledons were expanded and growing tips were visible. Of these, 15 species were apparently unaffected, 15 slightly affected, particularly during early growth, 40 species noticeably affected. Experiments represent 10 year study of morphological

effects of x rays on above-ground parts of 70 species of flowering plants. BA 11-2947.

3875
DEVELOPMENT OF ROOTS AND UNDERGROUND STEMS AS INFLUENCED BY X-RADIATION. Edna Louise Johnson. Univ. Colo. Studies 23(3), 169-87(1936).

Underground parts as well as aerial portions of plants were found to be radiosensitive in study of 22 sp. In fibrous roots, medium doses decreased growth (length) as well as number and length of secondary roots. Sprouted corms and bulbs of Iridaceae and Liliaceae were unaffected or showed decrease in above ground parts. Number and length of roots decreased by 50% and flower stalk development was retarded in paper-white narcissus bulbs. Iris rhizomes and Jerusalem artichoke were also radiosensitive. BA 11-2948

3876
EFFECT OF X-RADIATION UPON GROWTH AND RESPIRATION OF NARCISSUS BULBS. Mary Fleishman Meserve. Univ. of Colo. Studies 23(3), 199-207(1936).

Sprouted bulbs (100) were irradiated with 3500 r and CO₂ production was determined in these and in an equal number of controls for periods of 10 min to 478 hr. Shoot growth was retarded; respiration depressed at time of irradiation, remaining so throughout experiment. BA 11-2950

3877
EFFECTS OF THORIUM ON BLOOD AND LIVER ENZYMES OF WHITE RATS. Bernard S. Gould. Proc. Soc. Exptl. Biol. Med. 35(1), 77-8(1936).

Preliminary paper. BA 11-3062

3878
STUDIES OF THE INFLUENCE OF THERAPEUTIC RADIUM-AND ROENTGEN-IRRADIATION ON THE BLOOD CHOLESTEROL AND THE LIVER Kurt Fuge. Strahlentherapie 50(1), 157-66(1934). (In German).

In 31 carcinomatous women blood cholesterol level was normal. After therapeutic doses of Ra or x rays it sank more often than it rose, but average and absolute variations were about equal. **Change in percent of ester-** to total-cholesterol were too slight to indicate injury to liver parenchyma. BA 11-3059

3879
SOME EFFECTS OF GAMMA RADIATION ON THE DEVELOPING RAT RETINA. A. Glucksmann and Katharine Tansley. Brit. J. Ophthalmol. 20(9), 497-509 (1936).

Eyes of young rats were exposed to γ radiation. Undifferentiated cells of retina degenerated, amount of degeneration depending on dosage and age of rat. Eye size was reduced; new fiber layer formed, dividing inner nuclear layer into 2 parts. Under certain conditions, rosettes may result. Last two effects are secondary to degeneration, not direct irradiation effects. BA 11-3061

3880
CERTAIN X-RAY EFFECTS UPON PARAMECIUM. Robert T. Hance. Proc. West Va. Acad. Sci. 5(2), 56-7(1931).

X rays uniformly increased permeability of paramecia, as measured by time of decolorization of intracellular nuclear red by NH₄OH. Cell age was a significant factor in demonstrating this effect. Increasing the ionizing power of x rays (6 times) decreased the permeability 20% below controls. BA 11-3063.

3881
CHEMICAL PHENOMENA WHICH ACCOMPANY RESORPTION OF IRRADIATED TISSUE. Jean Loiseleur. Compt. rend. 199(15), 686-8(1934). (In French).

Effects observed in rabbits following irradiation of thymus glands (150 kv; 6 amps; 6 mm Al; 30 cm,

focus-skin dist., for 38 min, skin dose, 1350 r): nuclear disintegration disclosed by free phosphate, enrichment of cellular residua in chlorine, increased alkali reserve and pH of blood, decreased urea in erythrocytes as C1 content increases, hyperphosphaturia and hypochloruria. BA 11-3065

3882
PATHOLOGY OF MONKEYS EXPOSED TO MASSIVE DOSES OF TOTAL BODY GAMMA RADIATION. C. C. Lushbaugh and C. Houck. Federation Proc. 14, 411-12 (1955).

Complete autopsies were performed on monkeys dying after total-body exposure to ionizing radiation, in doses from 1,000-30,000 r. Necrosis of the gastric parietal cells, the adrenal cortex, the pancreatic islets, and the adenohypophysis, and lymphoid atrophy resulting from phagocytosis of apparently intact lymphocytes were observed.

3883
RADIATION QUALITY AND SKIN REACTION G. Schwarz and A. Frank. Strahlentherapie 50(1), 145-56(1934). (In German).

With 20.16-0.33 Å (half value layer 0.95-0.133 mm Cu) 1600 r x rays (rate: 40 r/min) produced distinctly greater x-ray dermatitis when harder rays were used on comparative 4 cm² thigh fields, 7 subjects, contradicting usual view that softer x rays produce greater skin injury. BA 11-3067

3884
THE TIME FACTOR IN THE BIOLOGICAL ACTION OF ROENTGEN RAYS. 3. INVESTIGATIONS AT VERY SHORT IRRADIATION TIMES. Rolf M. Sievert and Arne Forssberg. Acta Radiol. 17(3), 290-8(1936).

Drosophila eggs were x irradiated with 165 r for 0.39-1.16 sec 24,000-7,800 r/min and results were compared with those obtained with same dose given in 2.1 sec-30 min. Results suggest that irradiation effect diminishes at very short irradiation times. Death rate was reduced at 0.39 sec by more than 20%. BA 11-3068.

3885
GIANT CELLS IN THE BONE MARROW OF ANIMALS IRRADIATED WITH X-RAYS. Mario Torrioli and Sergio Fiorentini. Pathologica 27, 37-42(1935). (In Italian).

After treating bones of guinea pigs with massive dosages of deep x rays, cell fusions forming typical megakaryocytes were seen. BA 11-3069

3886
THE RADIOSENSITIVITY OF THE CELLS OF THE MAMMARY GLAND. C. W. Turner and E. T. Gomez. Am. J. Roentgenol. Radium Therapy 36(1), 79-93(1936).

X-irradiation effects on rudimentary duct system of normal young rabbits, on young rabbits with growth stimulated by estrogen, on mature virgin rabbits, on rabbits during pseudo-pregnancy, and on lactation described. Indications were that x irradiation permanently affected cells concerned. BA 11-3070

3887
ON THE REACTION OF SKIN TO LONG WAVE LENGTH ROENTGEN RAYS AND CATHODE RAYS. Ernst Wilhelmy. Strahlentherapie 55(3), 498-523(1936). (In German).

With x rays generated at 2.5-15 kv, half value in Al 0.001 mm to 0.043 mm, early erythema appears in 8 days, followed by a principal erythema appearing 3-4 wk after exposure. Threshold dose for early erythema falls from 4000 r to 80 r as voltage rises from 2.5 to 15 kv; for principal erythema from 20,000 r at 3 kv to 600 r at 9 kv. Figures quoted apply to one particular typical individual. BA 11-3071

3888
ELECTROSTATIC MEASUREMENTS ON INDIVIDUAL

MOTOR ENDPLATES AND MUSCLE FIBERS. II. EFFECT OF CURARE-POISONING AND RADIUM IRRADIATION. Fritz Buchthal and J. Lindhard. Skand. Arch. Physiol. 72(1/2), 35-50(1935). (In German).

End plate-fiber potential difference and irritability to indirect stimulation disappeared, when solution of curare was applied or when fiber was exposed to Ra emanation. Potential differences along muscle fiber were unaffected. Curare and Ra effects were reversible within limits. BA 11-3523

3889

ON HIROSE'S CHOLIN GRANULES IN THE LIVER.

K. Yamaoka. Fukuoka Acta Med. 28(4), 602-54 (Jap.); 34 (Ger. summ.) (1935).

Immediately after and up to 168 hr after exposure of cholin granules in liver (obtained by Hirose's process) were exposed to 60-600 r, the amount of cholin first diminished, later increased far above normal, then underwent second decrease. Size of granules was also changed. BA 11-3720.

3890

ON THE EFFECT OF ROENTGEN RAYS ON THE PHAGOCYTIC ACTION OF GIANT CELLS. W. G. Garschin, M. A. Zacharjewska, and W. W. Ossinska. Frankfurt Z. Pathol. 49(2), 252-61(1936). (In German).

X rays (3-6 erythema doses) retarded development of xanthomogranuloma in tissues injected with cholesterol. Growth of granulation tissue in cholesterol deposit was stopped; formation of macrophages checked. X-ray effect on phagocytic activity: retarded infiltration of connective tissue in foreign body deposits and reduction in number, size, and digestive activity of macrophages. (Solution of cholesterol crystals by cells was inhibited by x rays). BA 11-3743

3891

X-RAY MUTANTS IN SOFT WHEAT. A. A. Sapegin. Trudy Priklad. Botan., Genet. i Selektii, Ser. 29, 3-37 (1936). (Russian, English summary).

Triticum vulgare plants were x rayed shortly before or during flowering. F_1 plants were "extremely polymorphic". Up to 60% of deviating types were characterized by various chromosomal abnormalities (fragmentation, univalents, multivalents). These were fewer variations in F_2 than in F_1 . BA 11-7848.

3892

COSMIC RAYS AND THE MUTATION PROCESS. Henrich Friesen. Compt. rend. acad. sci. URSS 1(4), 183-6(1935). (In German).

Wild Naltschick stock *Drosophila* males were subjected to cosmic radiation in stratosphere balloon. Following exposure of 100-150 ion pairs per cm^2/sec for 2 hr, 2724 chromosomes were tested for sex-linked lethals. Fewer mutations found in these than in controls. Thus cosmic radiation is believed to play no significant part in evolution by the production of mutations. BA 11-7867

3893

SPERMATOGONIAL CROSSING-OVER IN *DROSOPHILA*.

H. Friesen. Z. indukt. Abstamm.-u. Vererbl. 71(4), 501-26(1936). (In German).

Day-old males (*D. melanogaster*) heterozygous for 8 recessive genes of 3rd chromosome (ru, h, th, st, cu, sr, es, ca) were x rayed and mated to 15 females homozygous for same genes. Of 164 males, 45 produced crossover in the F_1 and the same crossover type tended to occur in many individuals of same progeny. This is believed to result from crossing over in an early spermatogonial division, with subsequent production of large number of gametes containing the same crossover chromosome. Frequency of crossing over was greater near the attachment construction, little occurring near the distal ends. BA 11-7868

3894

X-RAY MUTATIONS IN *D. SIMULANS*. K. V. Kosikov. Trudy Inst. Genet. 10, 189-97(1935). (Russian English summary).

Wild-type male flies were x rayed at 50 kv, with 4 ma, 1 mm Al filter. With dose of 3240 r the number of recessive lethal x ray mutations in sex chromosome of *D. simulans* is 11 times that of controls. Lethal mutations increased with increase in dose. Mutations in this species are compared with those in *D. melanogaster* and *funnebris*. BA 11-7872.

3895

CROSSING OVER IN THE MALE OF *DROSOPHILA VIRILIS* INDUCED BY HEAT AND X-RAYS. Daigoro Moriwaki.

Proc. Imp. Acad. (Tokyo) 11(6), 242-3(1935).

Heterozygous males of constitution ru a/st es were crossed with females (ru st a es). Male larvae 3-5 days old were then exposed to 35-37°C for 24 hr, or to 50 kv x rays (4 ma, 25 cm) for 20 min. Of 2922 flies exposed to heat 3 exhibited crossovers; in 5808 x-rayed flies 6 crossovers appeared; in control group, no crossovers in 6846 flies. BA 11-7882

3896

PHYSICAL-CHEMICAL EFFECT OF ROENTGEN RAYS ON ORGANISMS. V. G. D. Lieber. Strahlentherapie 52(3), 497-511(1935). (In German).

Distribution of K and Ca in *V. faba* root tips was extensively modified by x irradiation of 4000-7000 r. K was lost first by cytoplasm, then by nucleus on further irradiation. Ca is concentrated in region of cell walls and around nucleus. Minimum wave length band used was 0.07-0.09 Å. BA 11-8013

3897

STIMULATION OF GROWTH OF SOY BEAN SEEDS BY SOFT X-RAYS. Theo P. Long and H. Kersten. Plant Physiol. 11(3), 615-21(1936)

Dry soy beans were irradiated with soft x rays (Cu target tube, varying voltage, 10 ma, 3.3 cm, 5-25 sec). Plants from seeds irradiated at 20 kvp for 10 sec had an average wet weight 2.3% greater than controls. Each of 3 lots of plants from seeds exposed at 25, 30, and 35 kvp showed maximum wet weight increase following to 5 sec of irradiation, average of the 3 lots was 5.9% greater than control. BA 11-8015

3898

STUDIES ON THE EFFECTS OF X-RAYS RADIATION UPON GERMINATION, GROWTH AND YIELD OF RICE PLANTS. Hideaki Saeki. J. Soc. Trop. Agr. (Taiwan) 8(1), 28-38 (1936).

Rice seeds and seedlings were continuously exposed for different periods to unfiltered x rays from Coolidge tube with Cu anticathode. Seed germination, number of tillers, ears and grains, weight of straw, roots and grains were favored by certain doses. Large doses had inhibitory effect. Dose is expressed as MA. M/D^2 at 30 KV, where MA is secondary current intensity; M, exposure time in minutes; D, target object distance. BA 11-8019

3899

THE TISSUE CHLORINE OF THE RAT AFTER TOTAL BODY ROENTGEN IRRADIATION. Alois Beutel and K. Anton Winter. (Strahlentherapie 54(1), 89-95(1935). (In German).

Six rats were subjected to total body irradiation of either (1) 800 r (single dose), or (2) 750-1000 r (fractionated dose), 0.5 Cu + 1 Al filter at 180 kv, 4 ma, 40 cm. Increase in tissue Cl occurred in all tissues but liver whether examined on 2nd, 5th, or 8th day after (1), or on 1st or 3rd after (2). Of 16 tissues and organs examined, liver showed decrease without exception. BA 11-8159.

3900

STUDY OF EFFECT OF ROENTGEN IRRADIATION ON BLOOD SUGAR OF HUMANS. Knud Brochner-Mortensen. *Strahlentherapie* 51(4), 675-84(1934). (In German).

Blood sugar was determined in 10 patients at 15 min intervals after x irradiation with 75-500 r. In 4 cases (150-400 r) blood sugar remained within 10 mg percent distance of initial value before exposure, in 4 cases (100-385r) value rose 13 to 17 mg percent, in 5 cases (75-500 r) rise of 21 to 52 mg percent occurred. BA 11-8160.

3901

STUDIES ON THE EFFECT OF ROENTGEN RAYS UPON THE INTESTINAL EPITHELIUM AND UPON THE RETICULO-ENDOTHELIAL CELLS OF THE LIVER AND SPLEEN. Sv. A. Chrom. *Acta Radiol.* 16(6), 641-60(1935).

A histological and bacteriological study was made on x irradiated white mice. Total body exposure to 250-580 r resulted in general infection with intestinal bacteria. Abdominal irradiation with spleen and liver shielded did not. Observed effect is believed to reflect damage to protective functions of intestinal epithelium and to liver and spleen. BA 11-8161

3902

BIOLOGICAL EFFECT OF ROENTGEN RAYS ON TISSUE CULTURES. Alexander Farago. *Strahlentherapie* 54(4), 626-38(1935). (In German).

At 24 hr after x raying of chick-embryo tissue cultures (100-2500 r) fat globules were seen in cell. Globules/cell were proportional to dosage up to 700 r when delivered in one fraction at 40 r/min and were independent of wave length between 1.18 mm Cu and 0.13 mm Cu half value layers. BA 11-8163.

3903

THE BIOLOGICAL ACTION OF NEUTRON RAYS. John H. Lawrence and Ernest O. Lawrence. *Proc. Natl. Acad. Sci. U. S.* 22(2), 124-33(1936).

Whole-body neutron-irradiated white rats exhibit leukopenia; lymphocytes are more affected than polymorphs. Neutrons are much more effective/unit of ionization than are x rays in producing this effect in rats, due to greater ionization produced in tissues as compared to x and γ rays. (Neutron source: beryllium bombarded with deuterons.) BA 11-8166.

3904

THE EFFECT OF γ -RAY IRRADIATION UPON THE GROWTH AND NITROGENOUS METABOLISM OF THE PROTOZOON, *BODO CAUDATUS*. Norman Risborough Lawrie and Muriel Robertson. *Biochem. J.* (London) 29(5), 1017-20(1935).

Rate of NH_3 production was used as index of N metabolism in γ -irradiated Bodo cultures. Exposure bodos were larger than controls. Increasing periods of exposure were followed by, first an inhibition of NH_3 production, then a marked increase, then less marked increase. Greatest stimulation of NH_3 production coincided with greatest effects on size and division rate. BA 11-8167

3905

BIOLOGICAL EFFECTS AND THERAPEUTIC POSSIBILITIES OF NEUTRONS. Gordon L. Locher. *Am. J. Roentgenol. Radium Therapy* 36(1), 1-13(1936).

Various means of producing intense neutron beams are described; personnel protection stressed. Applications to biology and medicine are considered. BA 11-8168

3906

THE QUANTITATIVE EFFECT OF X-RAYS ON MITOSIS IN THE MOUSE TUMOUR S-37. Wm. H. Love. *Med. J. Australia* 1(24), 814-5(1936).

Number of dividing cells in 200 fields diminished from 240 to 173 after 100 r. After 200 r the number of mitoses was 86; after 300 r, 53; after 400 r, 38, after 500 r, 34. BA 11-8169

3907

RADIOSENSITIVITY IN RELATION TO THE TIME FACTOR R. McWhirter. *Brit. J. Radiol.* 9, 287-99(1936).

Daily treatments (7) were administered to corresponding areas on each individual, one series with high intensity, one with low, to same total dose. With variations of 106 times in intensities, reactions on normal skin were similar. In treating rodent ulcer and carcinoma, there was no apparent difference in rate of regression of lesion with change in intensity. Results held for both Ra and x rays. BA 11-8170.

3908

THE BIOLOGICAL EFFECT OF ROENTGEN IRRADIATION ADMINISTERED IN VARIOUS FRACTIONS. Hayes E. Martin. *Strahlentherapie* 57(1), 73-86(1936). (In German).

Author describes technique of fractionated x irradiation of pharyngeal cancer and technique of fractionated x radiation to be used in conjunction with radon seeds and Ra capsules. Biological effects differ markedly after fractionated, and single massive doses BA 11-8172.

3909

ON THE INFLUENCE OF ROENTGEN RAYS ON URIC ACID METABOLISM. Shinkichi Okaue. *Folia Pharmacol. Japan.* 19(2), 259-66(1934). (Japanese with German summary.)

Rabbits exposed 80-120 min to x rays had decreased urine volume on the 1st days, general decrease in total urine N, increased uric acid content on 2nd day. Directly after irradiation, blood uric acid increased; was normal in 1 hr. then gradually decreased and was still below normal 24 hr post-exposure. BA 11-8173.

3910

THE INFLUENCE OF X-RAYS ON THE RETICULO-ENDOTHELIAL SYSTEM. K. I. Safronova. *Voprosy Onkologii* (Problems of Oncology) 5, 58-63(1934). (In Russian).

Storage of intravenously injected 1-3% trypan blue solution in R. E. system was diminished by application of massive x-ray doses ($3\frac{1}{2}$ - $10\frac{1}{2}$ HED) to heads of rabbits and dogs. Weaker fractionated dosage ($1/3$ - $3/4$ HED) increased storage in R. E. system. BA 11-8175

3911

CHROMOSOMES INVOLVED IN A SERIES OF INTER-CHANGES IN MAIZE. E. G. Anderson and I. W. Clokey. *Am. Naturalist* 68, 440-5(1934).

Fourteen chromosomal interchanges were isolated from x-rayed maize. Intercrosses with known interchanges, linkage and cytological identification were used to determine chromosomes involved in interchanges. Chromosomes interchanged: 5. 6, 2. 9, 4. 5, 3. 9, 1. 10, 4. 8, 3. 5, 6. 9, 2. 6, 4. 5, 2. 10, 3. 7, 5. 7, 3/8. BA 11-7818

3912

RADIATION QUALITY AND SKIN REACTION. F. Schwarz and A. Frank. *Strahlentherapie* 54(1), 83-8(1935). (In German).

Irradiation with 170 kv x rays in ionometrically equal dose, is believed to be more dangerous to skin than irradiation of 110 kv. There was no difference in skin reaction over the range from 110 kv to 80-60 kv when dose was measured with integrating thimble ionization chamber, since decreasing sensitivity of ionization chamber has compensatory effect below 80 kv. BA 11-8176.

3913

ATTEMPT TO DEVELOP REDUCED RADIO-SENSITIVITY IN JENSEN RAT SARCOMA BY MEANS OF ROENTGEN IRRADIATION. Bjorn Snellman. *Acta Radiol.* 16(5), 545-56(1935).

Reduced radiosensitivity reported in descendants of irradiated tumors is associated with slower growth, lower incidence, higher content of collagen substance, fewer

mitoses. Lethal dose in vivo for this strain of Jensen rat sarcoma is 4,000-4,500 r. BA 11-8177.

3914

STUDY OF THE QUESTION OF RADIATION EPILATION IN REFERENCE TO MENTAL DEVELOPMENT IN CHILDREN. Theo Symann. *Strahlentherapie* 55(2), 248-61 (1936). (In German).

Of 53 children subjected to x-ray epilation at 3-13 yr, 8 showed mild to marked mental retardation. No definite proof was found relating this condition to x-ray treatment. Atrophy of hair and skin; darkening of hair, lightening of hair; loss of curly hair which grew in again, but straight, were some effects noted. BA 11-8178.

3915

EFFECT OF THE ROENTGEN RAYS ON THE LIPIDS OF THE EPIDERMIS. U. J. Wile, O. J. Cameron, and H. C. Eckstein. *Arch. Dermatol. and Syphilol.* 32(1), 69-72 (1935).

Skin samples from unembalmed cadavers were irradiated (900 r unfiltered x rays, 120 kv, 30 cm, 5 ma, 9 min). Results of analysis made following extraction of lipids indicates that phospholipids and sterols of skin are readily altered by x ray. BA 11-8179

3916

CONTRIBUTION OF THE GENERAL EFFECT OF ROENTGEN RAYS. E. Woenckhaus. *Arch. exptl. Pathol. Pharmacol.* 183(2/3), 294-309(1936). (In German).

Reinjection of 200 cc of defibrinated human blood was followed by transient fall in blood sugar and by leucopenia. Reinjection of x-irradiated defibrinated blood causes white cell changes like those seen in irradiated animals; lymphopenia, rise in blood sugar, shorter coagulation time. BA 11-8180.

3917

RADIUM AND THE HUMAN LEUCOCYTES. David R. Goodfellow. *Acta Radiol.* 17(1), 1-50(1936).

Lymphocytes were blood cells most affected in 61 patients receiving Ra therapy. Mathematical relationship was demonstrated between rate of lymphocyte disappearance and dosage of irradiation. BA 11-8708

3918

THE EFFECT OF RADIUM AND ROENTGEN RAYS ON MAGNESIUM CONTENT OF SERUM AND CARCINOMA TISSUE OF UTERINE CARCINOMA. Hellmuth Winkler. *Strahlentherapie* 54(2), 294-311(1935). (In German). BA 11-8829

3919

NON-SPECIFIC "DESENSITIZATION" THERAPY FOR ALLERGIC CONDITIONS. A. Engel, C. E. Haeggstrom, and Ernst B. Salen. *Proc. 16th. Congr. Internal Med., Acta Med. Scand. Suppl.* 59, 444-62(1934). (In German).

Treatment of asthma with sulphur, tuberculin, and x rays was attempted. Specific effects of the individual treatment are not described. Seven areas of chest were exposed in succession to 1/2-1/4 H. E. D. of x rays. Results are considered not to indicate the use of x-ray therapy for allergy and asthma. BA 11-8888

3920

THE ACTION OF RADIUM EMANATION OF GRAPE YEASTS. G. K. Burgvidzh and A. A. Bachinskaya. *Microbiologia* 5(2), 240-7(1936). (Russian, English Summary).

Addition of 0.48-1.17 mc of Ra emanation/30 cc of grape juice inoculated with *S. ellipsoideus* hastened fermentation. Stimulation persisted in cultures transplanted twice. Ra emanation also affects shape of cells and produces greater vacuolation and increase in fat content of yeast cells. BA 11-9137

3921

ON THE EFFECT OF RADIUM EMANATION ON *AZOTOBACTER CHROOCOCCUM*. E. A. Shtern and N. N. Sushkina. *Microbiologia* 5(2), 253-8(1936). (Russian, English summary).

When Ra emanation capillary tubes (2.4-7.0 mc) were placed in center of Petri dishes of *A. chroococcum* cultures more active N fixing dissociates resulted. One of the new strains was able to fix 8.96 mgms of N, contrasted with 6.09 mgms/plate of Ashby medium fixed by parent culture used as control. BA 11-9168

3922

IS THERE GERM CELL SELECTION IN *DROSOPHILA MELANOGASTER*? N. I. Sapiro. *Compt. rend. acad. sci. URSS* 2(3), 119-22(1936).

Beadex Curley males were x rayed and crossed to C1B; Lobe females. C1B/Bx F₁ females were analyzed for lethals in 2nd chromosome; L/t for lethals in 2nd chromosome. Progeny from 1-6 days (post-exposure) were compared with those from 20-26 days to determine whether there was a differential effect of x rays on mature and immature germ cells in X and 2. Germinal selection of about 50% for sex-linked lethals was found. BA 11-17907

3923

THE EFFECT OF ROENTGEN RAYS ON SUMMER WHEAT (*TRITICUM VULGARE*, VAR. 'CAESUM' 0111). A. S. Afanassjeva. *Protoplasma* 25(1), 77-91(1936). (In German).

Air-dried seeds were irradiated with 125-16000 r and germinated. No effect on time of germination was observed, compared with controls; doses <16,000 r did not affect development. Cytological examination of rootlets fixed 4 days post-irradiation showed doses to 1000 r have little effect on cells although tetraploidy, more nucleoli and binucleation were seen in few instances. Larger doses caused cytoplasmic inclusions, nuclear budding, adhesion of chromosomes to equatorial plate and abnormal disjunction. BA 11-18236

3924

THE EFFECT OF ROENTGEN IRRADIATION OF DORMANT AND GERMINATING SEEDS. A. J. Atabekowa. *Protoplasma* 25(2), 234-60(1936). (In German).

Doses of 250 to 36,000 r were applied to pea (*Pisum*) seeds; 1800-2400 r decreased tendency to germinate; 36,000 r proved lethal to all seeds tested. Tetraploidy and abnormal chromosomal behavior were induced by 1000 r; disintegration of chromatin, unequal separation and shortening of chromosomes follows 8000 r. Abnormal anaphases were observed in seedlings treated with 250 r. Sensitive dose for seedlings was 250 r, for seeds, 1000 r. BA 11-18239

3925

A CONSIDERATION OF THE BIOLOGICAL FACTORS INFLUENCING THE RADIOSENSITIVITY OF CELLS. P. S. Henshaw and D. S. Francis. *J. Cellular Comp. Physiol.* 7(2), 173-95(1935).

Dry wheat was soaked for 30 min, and planted in dark, moist chambers at 26° C. Effect of radiation on growth was investigated as follows: (2) 18 hr seedlings were dried and irradiated before, during and after re-soaking; (3) seedlings were exposed to reduced O₂ supply and low temperature before irradiation to retard growth during exposure; (4) normally germinated seedlings were irradiated before, during and after asphyxiation in N. Results: no clear relationship between radiosensitivity and biological processes studied. BA 11-18244

3926

STRUCTURAL CHANGES PRODUCED IN LEAF TISSUE OF SOY BEAN PLANTS BY IRRADIATION OF THE DRY

SEEDS WITH SOFT X RAYS. Theo P. Long and H. Kersten. *Plant Physiol.* 12(1), 191-7(1937).

Dry dormant Wilson Black soy beans were irradiated with soft x rays (maximum intensity $1.54 \text{ \AA}$). Leaves of plants from these seeds showed 6 types of injury which are described. BA 11-18245

3927

EFFECTS OF X-RAYS ON ZEA MAYS. Mary A. Russell. *Plant Physiol.* 12(1), 117-33(1937).

Sprouted corn was irradiated with doses of 75-10,000 r and planted. With increasing doses, more time was required for lateral roots to appear and their point of origin on primary root became farther removed from the grain. Low temperatures after irradiation apparently lessened resulting injury. BA 11-18252

3928

RELATIVE EFFECTIVENESS OF X-RAYS AND FAST NEUTRONS IN RETARDING GROWTH. Raymond E. Zirkle and Paul C. Aebersold. *Proc. Natl. Acad. Sci. U. S.* 22(2), 134-8(1936).

Both fast neutrons and x rays retard linear growth of wheat seedling roots. In producing this effect, one ionization unit of fast neutrons is equivalent to several units of x rays. BA 11-18257

3929

THE BIOLOGICAL MEASUREMENT OF DEPTH DOSAGE WITH 165 KV AND 650 KV ROENTGEN RAYS. P. S. Henshaw and D. S. Francis. *Am. J. Roentgenol. Radium Therapy* 34(6), 789-97(1935).

Depth intensity measurements at 6 levels in paraffin phantom were obtained with 165 kv and 650 kv x rays for wheat seedlings, *Drosophila* eggs and ionization chamber. Results indicate that error may be encountered in basing biological depth dosages on measurements made with an ionization chamber for the biologically effective dose did not vary in the same manner as the dose registered by the instrument. BA 11-18368

3930

ON THE EFFECT OF INTRAVENOUS RADON INJECTION ON THE BLOOD. (EXPERIMENTAL INVESTIGATION). M. Nemenow and R. Gurewitsch. *Strahlentherapie* 50(4), 693-704(1934). (In German).

Ra emanation was applied intravenously to mice and rabbits. Fall in number of lymphocytes proportional to amount of emanation. Regeneration starts 4-6 days after treatment; normal value reached in 20 days. Many large lymphocytes seen during regeneration; erythrocytes apparently unaffected. BA 11-18369

3931

THE EFFECTS OF X-RADIATION ON THE REGENERATION OF THE HYDROID, *PENNARIA TIARELLA*. William O. Puckett. *Biol. Bull.* 70(3), 392-9(1936).

Regeneration of amputated hydranths was prevented by x irradiation; effect being apparently on differentiation rather than on proliferation of cells. Fresh tissue was regenerated but appeared powerless to differentiate into new hydranths. Effect of lead-shielding of part of an irradiated colony indicated that radiation effects are local. BA 11-18370.

3932

THE EFFECT OF X-RAYS ON THE SEX GLANDS AND THE SECONDARY SEXUAL CHARACTERS IN *L. RETICULATUS*. G. V. Samokhvalova. *Trudy po Dinamike Razvitiia Dynamics Development* 10, 213-29(1935). (Russian with English summary).

Dose of 20 H caused sterility and decreased gonad size but did not affect secondary sex characteristics of adult male fish. Testes may regenerate 3-4 mo post-exposure. Doses of 60 H caused death in 3-4 wk; 10 H reduced number in first litters by 50%, 20 H by 75%.

Underdevelopment of gonads was observed in x rayed immature males. BA 11-18371

3933

SECOND FATAL CASE OF FIBROSIS OF THE LUNGS OWING TO INDUSTRIAL RADIUM EFFECTS. Elisabeth Tonges and Heinrich H. Kalbfleisch. *Frankfurt. Z. Pathol.* 50(1), 100-22(1936). (In German). BA 11-18845

3934

THE EFFECT OF X-RADIATION ON TUMOUR PRODUCTION BY A CHEMICAL COMPOUND IN MICE, AND THE ASSOCIATED BLOOD CHANGES. W. V. Mayneord and L. Dorothy Parsons. *J. Pathol. Bacteriol.* 45(1), 35-48(1937).

Irradiation of mice either previous to or during their injection with Na 1:2:5:6-dibenzanthracene-9;10-endo- $\alpha\beta$ -succinate accelerates tumor formation and gives rise to greater number of sarcomas. Eosinophil counts show high peak at variable point during latent period in mice developing sarcomas, but not in non-sarcoma-bearing mice. Progressive rise was observed in immature cells in blood of tumor bearing animals, greatest at death. BA 11-18871

3935

STIMULATION OF LOCAL ANTIBODY FORMATION IN THE CORNEA BY GRENZ RAYS. Richard Thompson, Richard Pfeiffer, and Eduardo Gallardo. *Proc. Soc. Exptl. Biol. Med.* 36(2), 179-82(1937).

Local formation of precipitins following injection of purified egg-albumin into rabbit's cornea was increased by exposure of cornea to Grenz rays. Effect was most marked when exposures were made for several days prior to injection of antigen. BA 11-18940

3936

CHANGES IN THE NONDIVIDING NUCLEUS FOLLOWING GAMMA RADIATION. J. C. Mottram. *J. Roy. Microscop Soc.* 53(3), 213-9(1933).

Nuclei of *Infusoria*, of Jensen's rat sarcoma cells and of bean root increased in size 2-3 days after radiation when either β or γ rays were used, due to great increase in nucleoplasm accompanied by stretching of nuclear membrane. Nucleolus also increased in size. Meshes of linin network were widened. Chromatin was more dispersed and appeared to be diminished, but actually remained quantitatively the same. BA 11-12942

3937

STRUCTURAL CHANGES IN CHROMOSOMES INDUCED BY IRRADIATION OF PHYSIOLOGICAL MODIFIED CELLS. M. A. Sizova. *Compt. rend. acad. sci. URSS* 2(5), 197-8(1936).

X-ray treatment of seedling root tips resulted in more structural changes after pre-treatment with CO_2 or ammonia than in controls with no pre-treatment. BA 11-12957

3938

PRODUCTION OF MUTATIONS IN *DROSOPHILA MELANOGASTER* BY MEANS OF α PARTICLES FROM AN ATMOSPHERE CONTAINING RADON. K. G. Zimmer and N. W. Timofeefressovsky. *Strahlentherapie* 55(1), 77-84(1936). (In German).

Flies exposed for 24 hr to atmosphere containing ca 0.002 mc radon show mutation rate about 8 times the normal one. BA 11-12993.

3939

ON THE ARTIFICIALLY INDUCED MUTATIONS AND POLYPLOID PLANTS OF RICE OCCURRING IN SUBSEQUENT GENERATIONS. Kichitaro Ichijima. *Proc. Imp. Acad. (Tokyo)* 10(6), 388-91(1934).

X rays, ultraviolet rays, and temperature variations were used to produce genic and chromosomal mutations in rice. Some mutant characters appeared in immediate

progenies, others in 2nd or 3rd generations. Partial and total sterility were common. Haploid, trisomic, triploid, and tetraploid plants were identified cytologically in 2nd generations. BA 11-13001.

3940

ON HEREDITARY CHANGES PRODUCED EXPERIMENTALLY IN YEASTS. Georges Adam Nadson. Compt. rend 200(22), 1875-6(1935). (In French).

In pure cultures derived from single cell, new races were produced by x rays and radium in *Saccharomyces*, *Zygosaccharomyces*, *Torulopsis*, *Nadsonia* and *Sporobolomyces*; and also by extremes of temperature, chloroform, cyanides in *S. cerevisiae*. New races diverse and stable in various media. Changes included altered: cell size, mode of budding, colony appearance, fermentation, growth rate, and viability. BA 11-13006

3941

X-RAY MUTATIONS IN DURUM WHEAT. A. A. Sapegin. Botan. Zhpr. SSR (Botanical Journal USSR) 20(1), 3-9 (1935). (Russian with English Summary).

Spikes of *Triticum durum melanopus* were x rayed with 300 r x-ray dose prior to blooming. Seed from those spikes showed 37% germination (check, 87%). Of 266 plants from treated seed, 89 showed numerous changes in external morphology. Cytological study of F_1 showed abnormalities in meiosis. Some normal individuals gave normal F_2 plants, others showed segregation into normal and modified individuals. Nine of 89 modified plants were fertile; gave modified progenies in F_2 . BA 11-13017.

3942

MODIFICATIONS OF THE COMPOUND EYE OF *DROSOPHILA MELANOGASTER* ARISING UNDER X-IRRADIATION. C. P. Haskins and E. V. Enzmann. Am. Naturalist 1, 87-90 (1937).

Modifications of eye color and form in homozygous eosin stock of *D. melanogaster* are shown in figures and described. These modifications were found during study of production of mosaic patches of whitened or lightened ommatidia in imagos arising from x-rayed eggs and larvae. Most modifications were observed in x-rayed stock, a few were found in lower frequency in controls. BA 11-13036

3943

DOES IRRADIATION OF THE SOMA PRODUCE MUTATIONS IN THE GERM-CELLS? IU. IA. Kerkis. Doklady Akad. Nauk SSSR (Comp. Rend. Acad. Sci. URSS) 1(1), 55-61 (1935). (Russian and English).

Developing *Drosophila* pupae were irradiated over head and thorax, or over abdomen or whole body. There was no difference in number of lethal mutations seen in these groups, compared with normal mutation rate, i. e. no increased incidence of mutations after exposure to Roentgen rays was found by this investigator. BA 11-13037

3944

THE CONTRIBUTORY EFFECT OF COLD WITH IRRADIATION IN THE PRODUCTION OF MUTATIONS. N. N. Medvedev. Compt. rend. acad. sci. URSS 4(6/7), 283-5(1935).

Frequency of lethal mutations in *D. melanogaster* was determined by C1B method, compared in cultures x rayed at 0°C and at room temperature (20°C), in 4 studies with x-ray dosage ranging from 2500 to 7000 r. Mutation frequency was higher in cold series, average difference being 4.6 times the standard error. Fertility of treated parent males and F_1 flies was considerably lower in cold series. BA 11-13044

3945

ELICITING VIABILITY MUTATIONS BY ROENTGEN IRRADIATION OF *DROSOPHILA MELANOGASTER*. N. W. Timofeeff-Ressovsky. Strahlentherapie 51(4), 658-63(1934). (In German).

Irradiation (6000 r) induces recessive mutations which cause slight physiological changes as shown by decreased viability, the rate being 2.5 times greater than more extreme mutations. Total induced sex-linked mutation rate is about 1% per 20-30 r. BA 11-13051.

3946

THE EFFECT OF ROENTGEN IRRADIATION AND NONSPECIFIC STIMULI ON THE CARBOHYDRATE METABOLISM AND ERYTHROPOIESIS IN EXPERIMENTAL SARCOMA IN RATS. III. M. W. Lepskaja and A. F. Goldberg. Z. Krebsforsch. 44(5), 432-9(1936). (In German).

During growth of implanted sarcomas in rats there occurred an increase in blood sugar with terminal drop before death; decrease of Hb and red cell count. Changes were marked in irradiated animals. Least change in blood sugar and blood picture occurred in animals irradiated and subcutaneously injected with $MgSO_4$. Injection of casein lysate, along or with irradiation gave no definite results. BA 11-13922.

3947

THE QUESTION OF SKIN SENSITIVITY TO RADIATIONS IN XERODERMA PIGMENTOSUM. B. B. Heft. Acta Dermato-Venereol. 16(2), 146-55(1935). (In German).

Author found, in patient with classical xeroderma pigmentosum; normal sensitivity to ultraviolet rays in healthy parts of skin, reduced sensitivity in pathologically involved skin, normal sensitivity to heat rays and x rays, reduced sensitivity of diseased skin to chemical irritation. BA 11-14041.

3948

SPLITTING OF PROTEIN MOLECULES BY ULTRAVIOLET LIGHT AND α RAYS. T. Svedberg, Nature 143, 938(1939).

3949

METHODS FOR PRODUCING A UNIFORM ANTHRAX VACCINE AND KILLING CULTURES FOR THE VACCINE. W. K. Tschakowsky. Zentr. Bakteriell. Parasitenk. I. Orig. 134(3/4), 239-44(1935).

Anthrax vaccine was prepared which stands midway between Pasteur's Vaccine I and II. Anthrax culture was x irradiated at 135,000 volts, 25 cm distance, and a sterile disc of Pb foil was placed on culture to increase number of secondary photoelectrons. BA 11-14122.

3950

EXPERIMENTAL PRODUCTION AND CAUSE OF AN UNKNOWN MONSTROSITY: ANTERIOR SYMMELIA. Etienne Wolff. Compt. rend. 199, 1673-5(1934). (In French).

Hensen's node regions of chick embryos were irradiated at head process stage (17-20 hr incubation). After 3 days, in 5 of 6 cases, a condition resulted in which wings were either very close together or actually fused in middle of back. Other wing anomalies also were noted. Production of the anomaly was governed by law that 2 organs, normally paired, unite to form single median organ if embryonic elements normally between them before their differentiation are destroyed. BA 11-14887.

3951

ROENTGEN PATHOLOGY OF MITOSIS. I AND II. Hans Marquardt. Z. Botan 32(9/10), 401-94(1938). (In German).

Scilla campanulata root tips irradiated during four 1 min intervals in 24 min period and fixed every hr for 7½ hr and after 12 and 24 hr. Results described. Primary and secondary effects of 700 r on pollen mitosis of *Bellevalla romana* studied in second part of investigation. Effects on diploid and haploid mitosis similar. BA 12-15591

3952

THE STATE OF MITOSIS AT WHICH CHROMOSOMES ARE

RENDERED LESS SENSITIVE TO X-RAYS BY AMMONIA. Alfred Marshak. *Proc. Soc. Exptl. Biol. Med.* 39(1), 194-8(1938).

Ammonia, like x rays, apparently inhibited onion root cells from entering the prophase. Chromosome abnormalities produced by ammonia occurred chiefly in metaphase when x ray effect is negligible. Apparently, positive charged surfaces develop in chromonemata at onset of prophase and are gradually neutralized during prophase. BA 12-15592

3953

VARIATION IN DEVELOPMENT OF F₁ MICE AFTER ROENTGEN IRRADIATION OF SPERMATOGONIA, FERTILE AND UNFERTILE SPERMATOOZOA. Paula Hertwig. *Biol. Zentr.* 58(5/6), 273-301(1938) (In German).

Animals were exposed to doses of 1500-4000 r. Light doses were well tolerated, even 4000 r did not inactivate spermatozoa, but animals were sterile after 14 days. Males temporarily sterilized by 400-2000 r; F₁ showed increased embryonic mortality, defective development, decreased fertility (effects not persistent). Order of decreasing x ray sensitivity: spermiogenesis, mature sperm, spermatogonia. BA 12-15603

3954

INACTIVATION OF SPERM BY X-RADIATION IN HABROBRACON. Jane Maxwell. *Biol. Bull.* 74(2), 253-5(1938).

Different females of inbred stock were bred as follows: (1) unmated or mated to unrelated males, (2) untreated or (3) x rayed with 41,000 r or (4) 142,000 r. Offspring/day from (1): 3.12 males, (2) 1.05 males, 3.01 females; (3) 1.41 males, (4) 2.01 males. There were fewer offspring from unmated females than from mated controls, indicating presence of recessive lethals. Increasing sons/day with increasing dosage indicates failure of some sperm to fertilize and thus to kill eggs. BA 12-15615.

3955

EFFECT OF ULTRAVIOLET LIGHT AND X-RAYS ON *PERANEMA TRICHOPHORUM*. L. B. Shettles. *J. Cellular Comp. Physiol.* 12(2), 263-72(1938).

Exposure of 20 min was required to kill *Peranema* with x rays of wave length 0.03 to 0.5 mμ. BA 12-15856

3956

CYTOPLASMIC CHANGES INDUCED IN THE WALKER RAT SARCOMA 256 BY X-RADIATION OF DIFFERENT INTENSITIES. Lloyd C. Fogg and Shields Warren. *Proc. Soc. Exptl. Biol. Med.* 39(1), 91-3(1938).

Rats bearing Walker carcinoma 256 were given x ray dose of 800 r, 200 kv, at 15, 20, 25 ma. There was little variation in changes produced by different ma; series at 25 ma showed least effect or quickest recovery. BA 12-15857

3957

A THEORY OF THE ACTION OF RADIATIONS ON BIOLOGICAL MATERIALS CAPABLE OF RECOVERY. I. THE TIME-INTENSITY FACTOR. II. DELAY IN CELLULAR DIVISION. D. E. Lea. *Brit. J. Radiol.* 9(127), 489-98, (128) 554-66(1938).

Author proposes that while there are alternative mechanisms for recovery, they all lead to dose-intensity curves of practically the same shape. Cumulative dose theory is discussed. BA 12-15858.

3958

THE EFFECT OF GAMMA RADIATION ON CELLS IN VIVO. SINGLE EXPOSURES OF THE NORMAL TADPOLE AT ROOM TEMPERATURE. F. G. Spear and A. Glucksmann. *Brit. J. Radiol.* 9(128), 533-54(1938).

Effects of γ radiation (268 r/70.5 min) on tadpoles 3-6 wk and 11-14 wk old include: reduction in cell division, altered ratio of the different mitotic phases, appearance

of degenerate cells that were mitotic or premitotic. Recovery was possible after this dose and was twice as rapid in metamorphosing animals. BA 12-15859.

3959

EFFECT OF ROENTGEN RAYS ON THE PHYTOPHARMACOLOGICAL REACTION OF BLOOD. David I. Macht. *Proc. Soc. Exptl. Biol. Med.* 39(1), 1-8(1938).

Phytopharmacological study of blood samples from animals pre- and post-exposure to x rays revealed the presence of substance inhibiting plant growth. Substance was detectable a few hr. post-exposure; was found in largest amounts 24 hr later. BA 12-15914

3960

THE APPEARANCE OF INTRAPARENCHYMATOUS MYELOID FOCI DURING REGENERATION OF THYMUS TRANSPLANTS PREVIOUSLY IRRADIATED WITH X-RAYS. Ch. Gregoire. *Compt. rend. soc. biol.* 127(14), 1481-4(1938). (In French).

Under conditions of the experiment there seemed to be definite metaplasia of thymocytes into cells of myeloid series beginning with promyelocytes and going on to metamyelocytes and polymorphonuclear leukocytes. BA 12-16024.

3961

TRANSMISSION OF CHLOROLEUKEMIA OF MICE. John W. Hall and Frederick J. Knoke. *Am. J. Pathol.* 14(2), 217-25(1938).

Authors describe a strain of chloroleukemia of mice that is readily transmitted to related mice by intravenous injection of suspension of leukemic cells. Subcutaneous inoculation produces local tumor that is slower in development and less often fatal than generalized leukemia produced by intravenous injection. X ray dose of 400 r before injection results in greater percent of successful subcutaneous inoculations, but does not render unrelated mice of two different stocks susceptible to the disease. BA 12-6621

3962

QUANTITATIVE STUDIES ON THE EFFECT OF X-RAYS ON NEOPLASTIC CELLS. J. Furth, A. Tuggle, and C. Breedis. *Proc. Soc. Exptl. Biol. Med.* 38(4), 490-2 (1938).

Different neoplastic cells of mice exhibit various x ray susceptibilities, viruses producing neoplasms are far more x ray resistant than tumor cells. Exposure in vitro to 15,000 r may distinguish between virus-containing and virus-free neoplasms, as exposure renders the latter incapable of transmitting the disease. BA 12-6620.

3963

THE INFLUENCE OF X-RADIATION ON THE DEVELOPMENT OF IMMUNITY TO HETEROLOGOUS TRANSPLANTATION OF TUMOURS. Johannes Clemmesen. (Translated by Robert Fraser) London. Oxford University Press. 1938. 160p.

Subjects include: lowered resistance of rats against hetero-transplants as result of x ray exposure; serial passage of mouse sarcoma 180 in x rayed rats; effect of x irradiation before and after tumor transplantation, x ray dose and inhibition of resistance. Results of experiments using carcinoma and sarcoma are included showing that rats can be made temporarily susceptible to operative inoculation with mouse tumors by in toto exposure to strong x irradiation. BA 12-6616

3964

DIFFERENCES IN THE RELATIVE ACTION OF NEUTRONS AND ROENTGEN RAYS ON CLOSELY RELATED TISSUES. Raymond E. Zirkle and Isadore Lampe. *Am. J. Roentgenol. Radium Therapy* 39(4), 613-27(1938).

Action of neutron rays and of 200 kv x rays on roots and shoots of wheat seedlings and on *Drosophila* eggs is expressed by an X/N ratio, where X is dose in r of x

rays producing a given effect and n the number of arbitrary neutron units producing same effect. For *Drosophila* eggs 1½, 4, and 6 hr old ratios were 2, 3.2, and 2.8. For wheat-seedling roots, ratio varied from 6.2 - 11.8, for shoots 5.9--9. BA 12-6087

3965

SKIN REACTIONS CAUSED BY 1,000 KILOVOLT AND 200 KILOVOLT RADIATIONS. Robert S. Stone. Radiology 30(1), 88-93(1938).

Author compares skin effects after 200 kv and 1000 kv x rays. While an increase of 25% in r dose measured in air can be given with 1000 kv radiations, increase in dose as measured on skin, with addition of exit dose, is negligible. Amount of energy absorbed in depths as measured by thimble chamber ionization meter is not greater in many thin parts for 1000 kv than for 200 kv radiations.

BA 12-6086

3966

THE QUALITATIVE CHANGES IN THE FORMED ELEMENTS OF THE BLOOD FOLLOWING THERAPEUTIC IRRADIATION. Karl Kornblum, Fred Boerner, and Samuel G. Henderson. Am. J. Roentgenol. Radium Therapy 39(4), 601-12(1938).

In 48 patients referred for radiation therapy, analysis of blood counts indicate: occasional but insignificant reduction in number of erythrocytes, definite reduction in total leukocytes, most marked in lymphocytes, less in neutrophils, definite reduction in platelets during exposure, returning to normal after cessation of therapy.

BA 12-6084

3967

THE EFFECT OF X-RAYS ON TRYPANOSOMES.

L. Halberstaedter. Brit. J. Radiol. 11(124), 267-70 (1938).

Mouse blood rich in trypanosomes was irradiated in hollow slide with 35 kv x rays of very high intensity. A dose of about 600,000 r was required to kill all trypanosomes. About 1/50 of this dose suppressed normal division and ended infectivity. Wide variation in x ray susceptibility was found among individual organisms. Doses of same order of magnitude have same effects on *Paramecia*

BA 12-6083

3968

ABERRANT FORMS IN *DROSOPHILA* AND SEX DIFFERENTIATION. J. T. Patterson. Am. Naturalist 72(740), 193-206(1938).

Presence of a possible major sex factor was sought by x ray fragmentation of X chromosomes of *D. melanogaster*. Such a factor was not found except in small section of 4 bands located in mid-region of the chromosome. Efforts to secure males hyperploid for this small section failed, such flies apparently being non-viable.

3969

HEREDITARY DAMAGE DUE TO RADIATION. A. Pickhan. Strahlentherapie 62(2), 240-50(1938). (In German).

Author presents an analysis of effect of radiation on mutations. All rays of short wave length, ultraviolet through Ra γ rays, may cause mutations and the effect is in direct, linear proportion to order of magnitude of dose. Mutation rate is believed to be independent of λ and dose rate. Experiments on *Drosophila* are described; x ray therapy of humans discussed. Author concludes that 20 r is maximal safe dose to gonads.

3970

SALIVARY CHROMOSOME STUDIES OF LETHALS IN *DROSOPHILA MELANOGASTER*. B. M. Shizynski. Genetics 23(3), 283-90(1938).

Comparative study of spontaneous and induced lethal changes in X chromosome is reported. Crossover tests were used for genetic determinations, salivary gland chromosomes for cytological analyses. Of spontaneous

lethals, 43.3% were found to be small deficiencies as compared with 30% of induced lethals. This is believed to indicate that there is no primary difference between these two types of lethals. BA 12-10970

3971

THE INDUCTION OF OOGONIAL CROSSING OVER IN *DROSOPHILA MELANOGASTER*. Maurice Whittinghill. Genetics 23(3), 300-6(1938).

Crossing over in oogonial cells of asynaptic (Gowen) females was demonstrated by excessively clumped distribution of recombination offspring. Comparisons are made between meiotic crossing over and the various mitotic varieties, oogonial, spermatogonial, and somatic crossing over.

3972

RESULTS OF SEVERAL YEARS OF BIOLOGICAL EXPERIMENTS WITH EARTH RAYS. Karl M. Muller. Allgem. Forstg-u. Jagdztg. 114(5), 149-56(1938). (In German).

The author discusses the work of Jenny, Oehler, and Stauffer on the biological effects of the "earth rays" in Switzerland and Lautenschlager's experiments on the same problem at Munich.

3973

THE EFFECTS OF RADIATIONS ON PATHOGENIC EUMYCETES AS A FUNCTION OF THE RESPIRATION COEFFICIENT. L. Pasinetti and P. Grancini. Riv. patol. vegetale 28(5/6), 193-203(1938). (In Italian).

Study of effects of radiations on respiration of cultures of (1) *Corticium rolfsii*, (2) *Sclerotium delphinii*, and (3) *Alternaria brassicae* indicated: x rays had stimulating action, ultraviolet and sun rays a depressing effect or none at all, (1) and (2) were extra sensitive to Ra γ rays, sporulation of (3) was hastened after x ray or Ra-treatment. Biological effects were related to quantity of energy applied.

BA 12-11099

3974

THE BIOLOGICAL ACTION OF X-RAYS. A THEORETICAL REVIEW. J. A. Crowther. Brit. J. Radiol. 11(123), 132-45(1938).

Action of x rays on single cells and unicellular organisms is considered. "Poison" and "target" hypotheses are discussed.

3975

ON THE ROENTGEN RAY SENSITIVITY OF LECITHINS AND THE SENSITIVE POINTS IN PROTEIN MOLECULES. G. Kogel. Z. Krebsforsch. 47(2), 169-75(1938). (In German).

Points of x ray sensitivity of gelatin are at H-C groups, resulting in breaking up of gelatin molecule into peptid-like substances in which -CO-NH- arrangement was intact.

3976

CHANGES IN THE RETICULOCYTE LEVEL IN THE ROENTGEN IRRADIATED WHITE MOUSE. H. Langendorff. Strahlentherapie 62(2), 304-14(1938). (In German).

Effects of single doses (0.5-8 r/min) and protracted fractional doses (1 r/min) were compared for total doses of 100-1000 r. Effect of fractional method without protraction was much more pronounced on reticulocytes and organism as whole than was effect of protracted fractional dose. In general, tolerance was greater for protracted fractionated dose than for simple fractionated dose.

BA 12-11195

3977

RADIOSENSITIVITY AND CELL DIVISION. Wolfgang Luther. Strahlentherapie 62(3), 436-49(1938). (In German).

Frog eggs were exposed immediately after fertilization at intervals of 6, 10, 15 min for 5 or 6 min to Ra rays at rate of 20 r/min. Death curve for all eggs injured

before gastrula are plotted. Curve following exposures at 15 min intervals at 20°C is very similar to that for x rays at 11°C. Sensitivity of irradiated eggs was apparently dependent on stage of mitosis. BA 12-11197.

3978

ON PROTRACTED ROENTGEN DOSES. K. Nitzge and H. Iven. *Strahlentherapie* 62(1), 91-108(1938). (In German).

X ray injury curves are given for tobacco plant. Protracted dose was used, intensity 2-32 r/sec. Irradiated plants were observed on 4 different days after exposure and data are recorded. BA 12-11198

3979

ON A NEW ROENTGEN EFFECT. K. Staunig and J. Lobering. *Strahlentherapie* 62(1), 73-90(1938). (In German).

Samples of tissue taken from cattle immediately after death (sacrifice) were x irradiated and, together with controls samples, were submerged in double distilled H₂O for 24 hr. Weights of specimens before and after submersion revealed some irradiated tissues absorbed more, some less H₂O than untreated controls. "Roentgen negative" and "roentgen positive" properties are postulated. BA 12-11201.

3980

CHROMOSOME STRUCTURE. XII FURTHER RADIATION EXPERIMENTS WITH *TRADESCANTIA*. B. R. Nebel. *Am. J. Botany* 24(6), 365-72(1937).

Occurrence of "half-chromatid" lesions in chromosomes of *T. reflexa*, irradiated previous to synapsis were investigated under varying doses of x, Grenz, and γ rays. Half-chromatid lesions of presynaptic chromosomes were found in 92 cases, indicating that in living material the presynaptic chromatid is split. No wave length effect was found. BA 12-3997

3981

FREQUENCY OF INDUCED BREAKS IN CHROMOSOMES OF *DROSOPHILA MELANOGASTER*. B. P. Kaufmann and M. Demerec. *Proc. Natl. Acad. Sci. U. S.* 23(9), 484-8(1937).

Salivary chromosome analysis of 262 breaks induced by x rays in sperm indicates that these breaks occur with equal frequency in the heterochromatic Y-chromosome and in the essentially euchromatic autosomes, indicating that structure of chromonema is similar in all regions of the chromosomes. BA 12-4017

3982

ALTERATION OF CHROMOSOME SENSITIVITY OF X-RAYS WITH NH₄OH. Alfred Marshak. *Proc. Soc. Exptl. Biol. Med.* 38(5), 705-13(1938).

When *V. faba* and *A. cepa* seedlings were treated with various concentrations of NH₄OH before and during x irradiation, the percentage of chromosome abnormalities in anaphases 3 hr post exposure was greatly reduced. CO₂ in concentrations up to 80 vols percent gave no change in percentage of abnormalities induced by x rays. BA 12-7440

3983

ARTIFICIALLY INDUCED FATUOIDS IN A DWARF MUTANT OAT. R. A. Derick and R. M. Love. *Science Agr. (Ottawa)* 17(11), 703-6(1937).

Three lots of 25 seeds each of dwarf and intermediate oats were subjected to 5, 10, and 15 min x ray treatments (70 kv, 5 ma, at 12 in., no filter). Only dwarfs x rayed for 10 min produced mutations, 11 homozygous fatuoids appearing among 2000 progeny of 25 treated seeds. Mutation rate for this material was over 3%. Irregular dwarf form has a terminally attached pair of chromosomes. Induced fatuoid dwarfs have 2 quadrivalents, indicating that translocation of part of a chromosome has occurred. BA 12-4035

3984

CAUSE FOR REDUCED LITTER SIZE IN MICE AFTER ROENTGEN IRRADIATION OF SPERM. Paula Hertwig and Hildegard Bienneke. *Z. Indukt. Abstamm.-u. Vererbh.* 72(3/4), 483-7(1937). (In German).

Males irradiated to dosage of 4000 r and mated to normal females proved to be as fertile as controls. Abnormalities appear before implantation in early cleavage stages with supernumerary nuclei arising in 2-cell stage. These abnormal zygotes increase with dosage, incidence being greater than 90% after 4000 r. Further reduction in litter size is due to intra-uterine mortality as result of dominant lethals or chromosome aberrations. BA 12-4072

3985

A STUDY OF RENAL FUNCTION IN ROENTGEN RAY INTOXICATION. I. McQuarrie and G. H. Whipple. *J. Exptl. Med.* 35, 225-42(1922).

With x-ray exposures of the abdomen and shielding of the kidneys fatal intoxication may be produced without the slightest disturbance of kidney function as measured by the ability of the kidney to eliminate phenolsulfonphthalein and urea.

3986

THE COMPARATIVE EFFECTS OF NEUTRONS AND X-RAYS ON THE WHOLE BODY. John H. Lawrence and Robert Tennant. *J. Exptl. Med.* 66(6), 667-87(1937).

Clinical, bacteriological, and pathological studies on a large number of mice irradiated over whole body with neutrons or x rays indicated that similar effects occur after both forms of irradiation. Intestinal mucosa, lymphoid tissue, bone marrow, and spleen are most radiosensitive. For same amount of radiation, neutrons are more destructive biologically than are x rays. BA 12-4514.

3987

THE TIME FACTOR IN THE IRRADIATION OF MALIGNANT TUMORS. Perry J. Melnick and Albert Bachem. *Arch. Pathol.* 23(6), 757-92(1937).

Massive, fractional, protracted-fractional, and saturation methods of treating tumors with x rays were compared on 131 transplantable rat tumors. In these experiments no difference was found between effect of protracted-fractional method and simple fractional method; saturation method was found most effective. BA 12-4515

3988

SOME BIOLOGICAL EFFECTS OF CONTINUOUS GAMMA IRRADIATION, WITH A NOTE ON PROTECTION. S. Russ and G. M. Scott. *Brit. J. Radiol.* 10(116), 619-30(1937).

Rats were exposed to 148 mg Ra at distances of 50, 107, and cm for 4 mo. Controls showed faster weight increase. Of rats given largest dose, males were sterile for several months; females fertile, but young died in utero or within 2 or 3 days after birth. Those given smaller doses had lower birth rates than controls but offspring were apparently healthy. Death rate of irradiated rats was higher than that of controls. Need for adequate protection of humans in radiation work is stressed. BA 12-4516.

3989

SOME QUANTITATIVE ASPECTS OF THE BIOLOGICAL ACTION OF X AND γ RAYS. C. M. Scott. (Gr. Brit.) Privy Council Med. Res. Council Spec. Rept. Ser. 223, 1-99(1937).

Brief survey of literature on this subject is included. X irradiation of 100,000 r (80 kv, 5 ma, 12 cm, 0.1 mm Al, 550 r/min) did not change rate, rhythm or amplitude of contraction of isolated *R. esculenta* heart, 16,500 r did not affect heart's respiration or its conversion of

carbohydrate to lactic acid. Contraction of isolated auricles was unaffected by continuous exposure to β and γ rays of 5 mg Ra. X-ray effect on hatching of *Calliphora erythrocephala* eggs is described. BA 12-4517.

3990

SKIN GRAFTING AS A METHOD OF DETERMINING THE BIOLOGIC EFFECT OF RADIATION John Ungar, Jr and Shields Warren. Arch. Pathol. 23(3), 299-30(1937).

In 55 skin grafts on rabbits, irradiated skin was transplanted to normal corium. In another 55, normal skin was transplanted to irradiated corium. Epidermis irradiated sufficiently to become necrotic survived in significant proportion to cases if transplanted to normal corium immediately postexposure. Effects of combined β and γ rays are caused by both direct and indirect activity. BA 12-4518

3991

EXPERIMENTAL INVESTIGATION OF THE BIOLOGICAL EFFECT OF NEUTRONS. H. Yamashita. Gaun 31(6), 629-59(1937). (In German).

Twenty-day-old rats were irradiated with neutrons (2.4, 1.3 r/hr at 3.5 cm). Weight loss and death in 17 days occurred following 30.8 r and marked reduction in leucocytes was noted. Erythrocytes and Hb slowly decreased. Spleen, testis, ovary, and bones were reduced in size (These "r" units not comparable to roentgen doses.) BA 12-4519

3992

ELICITATION OF MUTATIONS BY BETA RAYS OF RADIUM IN *D. MELANOGASTER*. K. G. Zimmer, H. G. Griffith, and N. W. Timofeeff-Ressovsky. Strahlentherapie 59(1), 130-8(1937). (In German).

Number of sex-linked mutations was directly proportional to β ray dosage. For equivalent ionizing ability, β rays are equal in effectiveness to x and γ rays. BA 12-4520

3993

INCREASED ACOUSTIC SENSITIVITY IN DOGS FOLLOWING ROENTGEN RADIATION OF THE HYPOPHYSIS. W. J. Brogden and Elmer Culler. Am. J. Physiol. 119(1), 13-23 (1937).

Previously reported transient grain in acoustic sensitivity after x irradiation of the head was confirmed for 3 frequencies (125, 1000, and 8000 cycles). Magnitude and duration of effect were constant throughout the dosage range of 75-675 r, latency decreases as dosage increases. Relation of effect to sugar level in body fluids is suggested. BA 12-4808.

3994

LEUCOCYTIC INFILTRATION OF IRRADIATED MOUSE SARCOMA 180. Robert Chambers and C. G. Grand. Proc. Soc. Exptl. Biol. Med. 36(5), 673-5(1937).

Irradiation of sarcoma 180 induces changes which call forth an accumulation of granulocytes in the tumor. Granulocytic response and necrosis accompany one another in irradiated tumors but not in spontaneous necrotic changes of non-irradiated tumors of sarcoma 180. BA 12-4948.

3995

PRODUCTION OF EPITHELIAL TUMORS BY IRRADIATION OF A PRECANCEROUS SKIN LESION. J. C. Mottram. Am. J. Cancer 30, 746-8(1937).

Application of 1000 r of γ radiation to precancerous skin lesion was followed by more epithelial tumors than would have occurred without irradiation. BA 12-4965.

3996

EFFECT OF ROENTGEN RAYS ON THE BLOOD UREA OF RATS IMMUNE TO JENSEN'S SARCOMA. Isabella H. Perry. Arch. Pathol. 23(4), 515-6(1937).

Blood urea of immune rats was reduced after x raying, that of tumor bearing animals was not. BA 12-4969

3997

THE EFFECT OF SOFT X-RAY IRRADIATION ON BACTERIOPHAGES. Elizabeth V. Wright and H. Kersten. J. Bacteriol. 34(6), 639-44(1937).

Lytic activity of *S. aureus*, hemolytic *Streptococcus*, *E. coli* and Shiga dysentery bacilli was partially or completely inhibited by soft x rays (gas x ray tube, Cu target, most intense radiation: K_{α} 1.54 Å). Species varied in sensitivity, inhibition increased with increased dose. BA 12-5150

3998

ON SOME HISTOLOGICAL CHANGES PRODUCED IN THE MAMMALIAN BRAIN BY EXPOSURE TO RADIUM. H. A. Colwell and R. J. Gladstone. Brit. J. Radiol. 10(115), 549-64(1937).

Six rats, 18 mo old, were Ra-irradiated (Ra applicator 1.5 cm diam., 0.2 mm Ag screen, 14.63 mg Ra) over the head for 3 hr, killed at intervals up to 136 days later. Brain examination showed vascular engorgement, alteration in nerve cells, especially larger cells of cortex of hemispheres and cerebellum, basal ganglia, pons and medulla oblongata, hemorrhages, contraction of arterioles, necrosis. BA 12-5516

3999

CHROMOSOME ABERRATIONS INDUCED BY X RAYS. Karl Sax. Genetics 23(5), 494-516(1938).

Analysis of x ray induced chromosome aberrations in *Tradescantia microspores*. BA 12-12645

4000

NEW MUTANTS IN *SCIARA* AND THEIR GENETIC BEHAVIOR. H. V. Crouse and Helen Smith-Stocking. Genetics 23(3), 275-82(1938).

Six new mutants are described occurring in *Sciara* among descendants of Ra-treated flies: "stop", autosomal dominant in *S. coprophila*, "yellow", sex-linked recessive in *S. ocellaris*, "puff" and "vesiculated", autosomal dominants, "Jagged" and "ruffled", sex-linked dominants and "yellow" sex-linked recessive in *S. reynoldsi*. BA 12-7464

4001

THE PRODUCTION OF MUTATIONS IN *DROSOPHILA* WITH NEUTRON RADIATION. Mary A. Nagai and Gordon L. Locher. Genetics 23(2), 179-89(1938).

Adult *Drosophila* males (eosin) were treated with fast neutrons dislodged from Be by 4 gr of Ra and offspring were examined for lethals in X chromosome by C1B method. Lethal mutation rate in treated series was 2.6 times that of γ ray controls. Slow neutrons produced 1 lethal/300.8 F_1 flies. BA 12-7467

4002

ON THE EFFECT OF PERFUSATES FROM ROENTGEN IRRADIATED HIND LEGS OF FROGS ON THE ELECTRICAL POTENTIAL OF THE ADRENALS. Bun-ichi Hasarao. Pfluegers Arch. ges. Physiol. 240(2), 165-70(1938). (In German).

Hind legs of *R. nigromaculata* were exposed to x ray (20 min, 150 kv, 3 ma, 25 cm). Five cc perfusion fluid was injected into dark adapted frogs, unpolarizable electrodes applied to adrenals to register potentials. Perfusion fluid increased negative potential of adrenals and produced light adaptation of retinae. Effects are attributed to release of epinephrine. BA 12-7652

4003

PROXIMAL IRRADIATION THERAPY AND THE HEMATOLOGIC CURVE IN NORMAL RATS. B. Luchetta. Bol. inst. med. exptl. estud. cancer (Buenos Aires) 14(45), 521-6(1937). (In Spanish).

In proximally x irradiated rats, relative and absolute decrease in blood cells of myelogenic origin and lymphoid elements, low degree of anemia and an increase in endothelial cells were observed. Changes were less marked than those observed by others using distant irradiation. BA 12-8269

4004

THE EFFECT OF PROXIMAL RADIOTHERAPY ON MALIGNANT CELLS CULTURED IN VITRO. A. E. Roffo, Jr. Bol. inst. med. exptl. estud. cancer (Buenos Aires) 14(45), 277-98(1937). (In Spanish).

Growth after implantation of transplantable rat fibrosarcoma x irradiated with 400 r was completely arrested. With doses less than 300 r, effect was less pronounced. BA 12-8280

4005

THE EFFECT OF PROXIMAL RADIOTHERAPY ON THE MALIGNANCY OF NEOPLASTIC TISSUES A. E. Roffo, Jr. Bol. inst. med. exptl. estud. cancer (Buenos Aires) 14(45), 381-446(1937). (In Spanish).

Transplantable rat carcinoma and spindle cell sarcoma were irradiated, implanted into animals and observed 40 days later. Malignancy was diminished after irradiation and effect was greater with increase in voltage and in time of irradiation. Carcinoma showed the greater radiation effect. BA 12-8282

4006

THE SUSCEPTIBILITY OF THE GERM CELLS OF ORYZIAS LATIPES TO X-RADIATION AND RECOVERY AFTER TREATMENT. Archie N. Solberg. J. Exptl. Zool. 78(4), 417-34(1938).

X ray sensitivity and recovery of O. latipes was measured by ability of germ cells to produce normal embryos. Spermatozoa were 3-4 times as sensitive as ova; required twice as long to recover from same x ray dose. Early stages of spermatogenesis and oogenesis were most sensitive. Formation of spermatocytes from spermatogonia was inhibited by 1980 r. BA 12-8900

4007

THE SUSCEPTIBILITY OF FUNDULUS HETEROCLOTUS EMBRYOS TO X-RADIATION. Archie N. Solberg. J. Exptl. Zool. 78(4), 441-65(1938).

Changes in x ray sensitivity were measured in Fundulus embryos for 4 different doses. Except for slight rise in sensitivity in later stages of gastrulation, susceptibility decreased during development. Dose which deforms embryos at 108 hr is 10 times that required to deform embryos during cleavage. BA 12-8954

4008

DECREASE IN BIPARENTAL MALES BY X-RAYING SPERM IN HABROBRACON. P. W. Whiting. Proc. Penna. Acad. Sci. 12, 74-6(1938).

X raying of males decreased the number of male and female biparental offspring at same rate. For controls and for dosages of 2500 r, 5000 r, and 7500 r, $\frac{00}{++}$ /day were: 1.83, 0.97, 0.31, 0.06, biparental males: 1.20, 0.59, 0.17, 0.05; number of azygous males was unaffected. Results indicate that radiation is no more lethal to males than to females; type of fertilization is unchanged. BA 12-12667

4009

DEMONSTRATION OF ORGAN SPECIFIC PROTEASES IN THE URINE AFTER ROENTGEN RADIATION. R. Abderhalden. Fermentforschung 15(4), 529-35(1937). (In German).

Proteases appear in urine 15 hr after x irradiation and permit breakdown of protein from irradiated tissue cells. Secondary derangement of endocrine system follows x ray injury of pituitary. After liver irradiation there is disintegration of erythrocytes and leucocytes, liver and spleen plus transitory injury of endocrine glands. BA 12-12786

4010

EFFECT OF ROENTGEN RAYS ADMINISTERED WITHOUT FRACTIONATION OF THE DOSE ON THE TESTICLES OF THE RAT, WITH REGARD TO THE STERILIZATION OF THE

SEMINAL EPITHELIUM. R. Ferroux, Cl. Regaud, and N. Samssonow. Compt. rend. soc. biol. 128(16), 170-3(1938). (In French). BA 12-13071

4011

COMPARISON OF EFFECTS PRODUCED ON THE TESTICLES OF THE RABBIT WITH REGARD TO STERILIZATION OF SEMINAL EPITHELIUM BY EQUAL DOSES OF X-RAYS, SOME ADMINISTERED WITHOUT FRACTIONATION: SOME FRACTIONATED AND PROTRACTED. R. Ferroux, Cl. Regaud, and N. Samssonow Compt. rend. soc. biol. 128(16), 173-6(1938). (In French). BA 12-13072

4012

A SYMPOSIUM ON CANCER GIVEN AT AN INSTITUTE ON CANCER CONDUCTED BY THE MEDICAL SCHOOL OF THE UNIVERSITY OF WISCONSIN. Leiv Kreyberg. Madison, University of Wisconsin Press. 1938. 202p.

Included are papers discussing: influence of wave length on biological action of radiation, reaction of tissue cells to irradiation; radiosensitivity of various cancers. BA 12-13287.

4013

THE INFLUENCE OF WAVE-LENGTH ON GENETIC EFFECTS OF X-RAYS. Hugo Fricke and M. Demerec. Proc. Natl. Acad. Sci. U. S. 23(6), 320-7(1937).

D. melanogaster males were x irradiated with rays of 0.9 Å and 2.2 Å. Frequency of induced X chromosome lethals, determined by genetic methods, was the same for both wave lengths. BA 12-9146

4014

HABROBRACON AS A MEANS FOR TESTING THE EFFECTIVENESS OF PHYSICAL AGENTS IN CAUSING MUTATIONS. P. W. Whiting. Proc. Penna. Acad. Sci. 11, 50-2(1937).

Production of dominant lethals by radiation of sperm is manifest in Habrobrakon by decrease in female progeny/day, not compensated by increase in impatinate males (produced when sperm are lacking or inactivated). Number of females per day is reduced following a dose of 10,000 r, no females were produced after 20,000 r. Neutrons produced dominant lethals. BA 12-9165

4015

EFFECTS OF THE LENGTH OF X-RAY WAVES ON SEEDS. Arthur A. Bless. Proc. Natl. Acad. Sci. U. S. 23(4), 194-6(1937).

Seeds of corn were subjected to 5 dosages of filtered x rays (0.12-0.6 Å). Effects depended on energy absorbed, not on λ ; longer exposures produced temporary inhibitory effects. Optimum dose varied with stage of growth. BA 12-9416.

4016

TUBERIZATION OF THE COLORADO WILD POTATO AS AFFECTED BY X-RADIATION. Edna Louise Johnson. Plant Physiol. 12(2), 547-51(1937).

Results of 5 trials with numerous tubers indicate that 1 dose of 1500 r to mother tubers of Solanum jamesii favored tuberization. Treatment of unsprouted tubers gave slight increase in number of progeny and in average wt/hill. Irradiation of sprouted mothers gave marked increase in average number and weight of offspring/hill and in average wt/tuber. BA 12-9417

4017

THE STIMULATION OF YEAST RESPIRATION BY RADIATIONS. I. II. THE INFLUENCE OF KILLED CELLS ON THE RESPIRATION OF LIVING CELLS. John C. Fardon, M. Jordan Carroll, and M. Veronita Ruddy. Studies Inst. Divi Thomae I(1), 17-39(1937).

Respiration of yeast suspensions was stimulated by direct ultraviolet and x irradiation. Addition of cells killed by ultraviolet irradiation or by autoclaving to fresh yeast suspensions stimulated respiration. Growth, pH, age of culture, and storage temperature had little effect on ultraviolet stimulating effect. BA 12-9422

- 4018**
 RONTGENERYTHEMA. G Miescher. Strahlentherapie 16, 333-371(1924). (In German).
- Report of studies on: 1) sequence of erythema development and pigment deposition following various single dose exposures of man; 2) effect of dose on the skin changes, 3) the dependence of latent period on the dose, 4) lack of effect of skin coloring and personal idiosyncrasy in determining the extent of skin response, and 5) relationship between the follicular swelling and the erythema.
- 4019**
 THE HISTOLOGICAL CHANGES IN RABBIT EYES AFTER INTRAOCULAR INJECTION OF RADIUM CHLORIDE SOLUTION. F. Eichbaum. Strahlentherapie 59(1), 90-103(1937). (In German).
- Injection of 1-1½ millicuries produced inflammation of entire eyeball, particularly ciliary and papillary regions. Result was extensive destruction of retina as far as pigment epithelium there was no effect from 1/4 mc, slight effect from ½ mc. BA 12-9481.
- 4020**
 RECENT PROGRESS IN THE STUDY OF RADIUM POISONING Robley D. Evans and Joseph C. Aub. Occasional Publ Am. Assoc. Advancement Sci. 4 (Suppl. Science) 85, 227-33(1937)
- Metabolism and excretion of Ra are described. BA 12-9482
- 4021**
 STUDIES TO DETERMINE THE RADIORESISTANCE OF THE VIRUS OF TRANSMISSIBLE CHICKEN LEUKOSIS. E. Forfota. Strahlentherapie 59(1), 83-9(1937). (In German).
- Neither infectivity nor virulence of virus was altered by 110,000 r of x rays (150 kv, 4 ma, no filter, 300 r/min.). BA 12-9483
- 4022**
 THE BIOLOGICAL ACTION OF THE RAYS FROM RADIO-ACTIVE SUBSTANCES II. THE EFFECT OF β- AND γ-RAYS FROM MONAZITE SAND AND SAMARSKITE ON THE RATE OF GROWTH AND THE OESTROUS CYCLE OF MICE. Yukichi Kimura. Sci. Papers Inst. Phys. Chem. Research (Tokyo) 31(691/93), 229-43(1937).
- Average growth rate of mice was retarded by β and γ rays of monazites and unaffected by those of samarskite. Oestrous cycle was altered after exposure to either radiation. BA 12-9485
- 4023**
 THE EFFECT OF X-IRRADIATION ON THE BASAL OXYGEN CONSUMPTION OF THE RAT. R. H. Mole. Quart. J. Exptl. Physiol. 38, 69-74(1953).
- There was no increase in the basal oxygen consumption of rats during the first three days after whole body x irradiation with doses of 300 r-1,000 r. The basal O₂ consumption began to increase on the fourth day after 800 r, and reached a maximum of 25-35% above control value.
- 4024**
 CHANGES IN THE THYROID GLANDS OF NORMAL RABBITS AFTER ROENTGEN IRRADIATION. H. Takayama. Fukuoka Acta Med. 30(3), 610-78, Ger. Summary 36 (1937). (In German).
- Thyroid glands of rabbits were exposed to hard x rays. Dose of 5-10 r α 0.075 A) stimulated growth for 3 wk, after 25 r growth stimulus persisted after 3 wk, growth was only briefly disturbed after 50 r With λ 0.130 A, 5 r gave temporary acceleration, 10 r gave great growth stimulus, 25 r stimulated or injured, 50 r did the same to lesser degree. BA 12-9488
- 4025**
 HIGH-ENERGY RADIATIONS AND THEIR APPLICATIONS. M. A. Tuve. Occasional Publ. Am. Assoc. Advancement Sci. 4 (Suppl. Science) 85, 183-95(1937).
- Author summarizes physical characteristics of various high-energy radiations and possible extensions of biological applications. BA 12-9489
- 4026**
 ON THE EFFECT OF RHYTHMICAL INTERRUPTION OF ROENTGEN RADIATION ON THE BIOLOGICAL OBJECT. P. Zacharias. Strahlentherapie 59(2), 224-37(1937). (In German).
- Doses of 55, 110, 165, and 220 r were administered as continuous exposure to 20 r/min, intermittent exposure to 20 r/min for 10 sec with 20 sec intervals, continuous exposure to 6.7 r/min. Injurious effect was the same in all cases. BA 12-9490
- 4027**
 PROXIMAL RADIOTHERAPY. A. H. Roffo and A. E. Roffo, Jr. Bol. inst. med. exptl. estud. cancer (Buenos Aires) 14(44), 33-65(1937). (In Spanish).
- Tissue cultures of (1) chick embryo heart, (2) rat embryo heart, (3) spindle-cell sarcoma, were exposed to x rays filtered by air, distilled H₂O, physiological saline, serum, or human skin. Little or no change was seen in (1), greatest effect on (3) in which growth inhibition occurred with filtered radiation unfiltered rays being ineffective. BA12-10025
- 4028**
 ON THE DIRECT AND INDIRECT EFFECT OF TARRING ON MESENCHYMAL TISSUE. E. Zurhelle. Z. Krebsforsch. 46(1/2), 55-72(1937). (In German).
- After Ra irradiation or repeated tarring, combs of fowls showed alternate swelling and shrinkage of connective tissue and production of increased fibrillar material. Similar changes occurred with increasing age and apparently are not the result of cell proliferation but of colloid chemical change. BA 12-10033
- 4029**
 THE INACTIVATION OF ENCEPHALITIS VIRUS (ST. LOUIS TYPE) BY MEANS OF SOFT X-RAYS. Helen Norris Moore and H. Kersten. J. Bacteriol. 33(6), 615-18 (1937).
- Tissue suspensions containing this virus were inactivated by soft x ray irradiation for 4 hr. Inactivation was shown by inoculating susceptible animals, then killing the animals by inoculation with active virus BA 12-10228
- 4030**
 ON QUANTUM BIOLOGY. P. Jordan. Biol. Zentr. 59(1/2), 1-39(1939). (In German).
- Quantum biology is defined. X ray injury, production of mutations, action of poisons and effective substances, ultraviolet light sensitivity, division of single cells, and results of virus investigations are discussed as biological quantum effects. Author postulates that cell contains an organ consisting of a small number of molecules and serving as controlling center of cell. BA 13-8868
- 4031**
 MITOTIC BEHAVIOR OF INDUCED CHROMOSOMAL FRAGMENTS LACKING SPINDLE ATTACHMENTS IN THE NEUROBLASTS OF THE GRASSHOPPER. J. Gordon Carlson. Proc. Natl. Acad. Sci. U.S. 24, 500-7(1938).
- Behavior of x ray induced chromosomal fragments in dividing neuroblasts of *Chortophaga viridifasciata* which lack spindle attachments is described and significance of the observations is discussed. BA 13-8912
- 4032**
 STUDY OF THE ACTION OF RADIUM ON CERTAIN CYTOPLASMIC PROPERTIES OF THE EGGS OF PHOLAD BARNEA CANDIDA. S. Simon. Arch. biol. (Liege) 50(2), 95-203(1939). (In French).

Eggs of pholas were β and γ irradiated with Ra. No alterations appeared if no environmental adaptations were necessary. Permeability was modified; weak doses accelerated entry of H_2O ; strong doses retarded it. Mechanical resistance of membrane was also modified. Additional changes are also described. BA 13-9107

4033

COMPARATIVE EFFECTS ON PRIMORDIAL TISSUES OF X-RADIATION AND TREATMENT WITH CERTAIN GROWTH-PROMOTING SUBSTANCES. Virginia C. Irvine. J. Colorado-Wyoming Acad. Sci. 2(5), 29(1939).

Young plants (sunflower, zinnia, tomato) treated with indole-3-acetic acid, colchicine, and α - and β -naph-oxy-acetic acid showed joining of leaf primordia and deranged phyllotaxy, effects similar to those following X irradiation. BA 13-10302

4034

AN X-RAY INDUCED INTERCALARY DUPLICATION IN *DROSOPHILA* INVOLVING UNION OF SISTER CHROMATIDS. B. P. Kaufmann and Ruth C. Bate. Proc. Natl. Acad. Sci. U. S. 24, 368-71(1938).

Intercalary mirror-imaged duplication ("reversed repeat") in left limb of 3rd chromosome was found in salivary glands of F_1 larval female descended from irradiated father. Origin of duplication is attributed to fusion at identical loci of broken ends of two sister chromatids of paternal 3rd chromosome. BA 13-7118

4035

ON A BIO-PHYSICAL ROENTGEN EFFECT. K. Staunig and J. Loebering. Kolloid-Z. 84(3), 319-23(1938). (In German).

Swelling capacity of several animal tissues was irreversibly modified by x ray treatment; due to macromolecular structure of swelling substance, not to cell structure. Medical importance; possibility of sub-microscopic method of testing for radiosensitivity. Author views x ray therapy problems as being related to electro-osmotic compensation. BA 13-7256

4036

INVESTIGATIONS ON THE EFFECT OF ULTRA SHORT WAVES ON TUMOR IMPLANTS. H. Langendorff and M. Langendorff. Strahlentherapie 64(3), 512-9(1939). (In German).

Male white mice with implanted Ehrlich-Fischer carcinoma were treated with (1) x rays (60 kv, 5 ma, 400 r/min, 2000 r effective dose in tumor), (2) short electric waves (3.2-3.8 M) combined with (1); (3) control. Combined method (2) destroyed 64.4% more tumors than (1). BA 13-7282

4037

LIFE CYCLE OF THE CELL AND RADIATION INTENSITY IN IRRADIATION. N. Motida and T. Adati. Strahlentherapie 64(3), 468-76(1939). (In German).

Doses of 5000-75000 r (80 kv, 1 mm Al, 12.25-20.05 cm FSD, 3-10 ma, 27.7-417 r/min intensity over 3 hr period) were administered to yeast cells. Optimal intensity for killing cells with minimal dose was 10,000 r at 55.5 r/min. BA 13-7283.

4038

THE CYCLOTRON. ITS APPLICATION IN MEDICINE. J. D. Cockcroft. Brit. Med. J. 1939(4071), 81(1939).

Three applications are described: (1) generation of neutrons; (2) production of isotopes, (3) production of extremely energetically charged protons, deuterons, and alpha particles. Neutron effects in tissues are considered. BA 13-7319

4039

SOME CARCINOGENIC SUBSTANCES. L. P. Bosman. S. African Med. J. 12(2), 66-8(1938).

This is a review article in which chemical constitution of carcinogenic hydrocarbons and experimental carcinogenesis

by arsenic, radioactive substances, and aniline dyes are briefly considered. BA 13-7824

4040

LUNG CANCER AMONG MINE WORKERS IN JOACHIMSTHAL. Sigismund Peller. Human Biol. 11(1), 130-43(1939).

Occurrence of all pulmonary chronic diseases, tuberculosis, silicofibrosis, and lung cancer were increased above the average in radium mine workers who died 1929-30 and 1933-38. BA 13-7848

4041

MORPHOGENESIS STUDIES BY MEANS OF X-RAYS. II. NOTE ON AN INHERITED CUTICULAR TUMOR IN *DROSOPHILA*. III. X-RAY INDUCED PERSISTENCE OF A LARVAL CHARACTER IN *DROSOPHILA*. E. V. Enzmann and C. P. Haskins. Roux' Arch. Entwicklungsmech. Organ. 138(1), 159-62(1938).

II. In flies of known genetic constitution and low viability, cuticular tumors appear frequently near the posterior edge of the mesonotum. Tumors develop less frequently in flies x rayed as larvae. III. X ray-induced localized growth which may be a persistent larval spiracle in *Drosophila* imago is described. BA 13-8055

4042

THE TREATMENT OF TRICHINOSIS-A REVIEW OF METHODS. Vernon D. Van Someren. Brit. Med. J. 1939(4077), 376-81(1939).

Methods of treatment described include use of Ra irradiation. BA 13-8713

4043

ON THE RADIOSENSITIVITY OF THE BLOOD AND OTHER TISSUES AFTER RADIUM INJECTION. van Hove. Strahlentherapie 61(2), 300-8(1938). (In German).

Radium content of blood was studied in humans by means of photographic films following intravenous injection of .01-.03 mg Ra. Ra content dropped rapidly on 4th day in some cases; 2 mo later, in others. At first, adrenals, bone marrow, kidneys, spleen, liver, lungs, pancreas, and uterus contain Ra, several weeks, later it is still found in liver, spleen, and bone marrow. BA 13-3572

4044

IS THE PHYSIOLOGICAL ACTIVITY OF POTASSIUM DUE TO ITS NATURAL RADIOACTIVITY? Anthony J. Glazko and David M. Greenberg. Am. J. Physiol. 125(2), 405-9(1939).

Physiological activity of natural K is not due to its radioactivity. Salts of artificially radioactive elements (Na^{24} , P^{32} , K^{42}) are shown to be incapable of replacing K in maintaining beat of isolated perfused frog heart. Emission of β particles by K is too low to be of physiological significance. BA 13-3545

4045

THE RATES OF ABSORPTION OF THE RADIOACTIVE ISOTOPES OF SODIUM, POTASSIUM, CHLORINE, BROMINE AND IODINE IN NORMAL HUMAN SUBJECTS. Joseph G. Hamilton. Am. J. Physiol. 124(3), 667-78(1938).

Radioactive elements were prepared in the cyclotron and given by mouth in isotonic solutions to normal human subjects in fasting state. Atoms of Na, Cl, Br, and I could be detected (by Geiger counter) in hand within 3-6 min; absorption was apparently complete in 3 hr. Atoms of K appeared in 6-15 min; complete absorption required 5 hr. BA 13-3546

4046

INVESTIGATIONS ON THE PROBLEM OF RADIUM POISONING. III. ON THE ACCUMULATION OF LONG LIVED DISINTEGRATION PRODUCTS OF INJECTED RADON IN THE ORGANISM. K. Inouye and A. Krebs. Strahlentherapie 61(2), 269-78(1938). (In German).

Following administration of emanation, long-lived disintegration products are deposited in organism,

especially in bone, bone marrow, spleen, and liver. After application of emanation in solution, Ra salts are deposited in organism. Tolerance dose for various disintegration products, especially polonium, was determined and compared with tolerance for x rays. BA 13-3573

4047

BIOLOGICAL EFFECT OF ALPHA RAYS WITH REGARD TO THE PROBLEM OF SMALL-DOSE RADIUM THERAPY. K. Inouye. *Strahlentherapie* 64(1), 175-200 (1939). (In German).

Effect of 2.55×10^{-6} gm Ra/cc of media on fibroblasts and sarcoma in tissue cultures was studied. Definite relationships was found between dose and metabolism. Effect was dependent upon temperature. Patients were placed in bath containing 17,000 to 60,000 ME (Mache-units). Leukocytosis appeared 4 to 5 hr after treatment followed at 20 hr by leukopenia. Definite correlation was found between emanation concentration in blood and variation in leukocyte count. BA 13-3574

4048

INDUCTION BY FAST NEUTRONS OF MUTATIONS IN ANTIRRHINUM AND MYOSOTIS. R. M. Chatters. *Science* 88(2280), 241-2(1938).

Some plants grown from day seeds which had been exposed to stray cyclotron neutrons produced flowers that differed in color and morphology from their controls. BA 13-1738

4049

OBSERVATIONS ON THE GRAINS OF PROVENCE. CROSS POLLINATION X-RAYS, SHORT WAVES AND MUTATIONS. L. Fondard, E. German and F. Cabasson. *Compt. rend. assoc. franc. avance. sci.* 60, 254-7 (1936-7). (In French). BA 13-1744

4050

A DETERMINATION OF THE MAGNITUDE OF THE CELL "SENSITIVE VOLUME" ASSOCIATED WITH THE WHITE-EYE MUTATION IN X-RAYED DROSOPHILA. III. C. P. Haskins and E. V. Enzmann. *Proc. Natl. Acad. Sci. U. S.* 24(3), 136-41(1938).

Young eosin larvae were x rayed at 4°C , 26°C or 46°C . Radii of corresponding sensitive volumes: 6.39×10^{-7} cm, 6.52×10^{-7} cm, 7.10×10^{-7} cm. BA 13-1769.

4051

THE INDUCTION OF DOMINANT AND RECESSIVE LETHALS BY RADIATION IN *HABROBRACON*. P. W. Whiting. *Genetics* 23(6), 562-72(1938).

Dominant lethals were induced in sperm of *Habrobracon* by x irradiation of males following a dose of 10,000-20,000 r all sperm had at least one lethal. Given 41,000-142,000 r some sperm were inactivated, some carried dominant lethals into eggs. BA 13-1784

4052

PROSPECTS FOR THE APPLICATION OF ARTIFICIAL RADIOACTIVITY. Enrico Fermi. *Ist. Sanita Pubblica* (Rome), *Renduconti* 1(2), 421-32(1938). (In Italian).

This is an account of apparatus in Instituto di Sanita Pubblica for Production of α , β , and γ rays, neutrons and artificial radioactivity substances; and of studies projected for applying these to various biological problems. BA 13-1906

4053

RADIOBIOLOGICAL STUDY ON DROSOPHILA PUPAE. A. Liechti, W. Minder, and J. H. Muller. *Strahlentherapie* 63(4), 689-700(1938). (In German).

Drosophila pupae were exposed to: (1) Grenz rays (11 kv, 200 r/min at 10 cm); (2) x rays (80 kv, no filter, and 190 kv, 1 mm Cu); (3) Ra emanation (applicators of 160, 180, 200 mg. 1.0 mm Pt filter). LD_{50} 's: (1) 4,000 r; (2) 2800 $\pm$ 200 r; (3) 4252 r (1 mgh = 7.5 r). Mortality curves are compared. BA 13-1907

4054

FURTHER STUDIES ON THE EFFECT OF ROENTGEN RAYS ON THE BONE MARROW. Hans-Wolfgang Wunsche. *Arch. exptl. Path. Pharmacol.* 189(5/6), 581-99(1938). (In German).

Bone marrow samples from irradiated rabbits showed accelerated cell maturation, with marked decrease of normoblasts and increase in polymorphs. Large doses caused rapid atrophy of marrow. Red elements were more radioresistant than white. Observations of liver, spleen, and unirradiated portions of the marrow are included. BA 13-1908

4055

THE INFLUENCE OF INGESTED RADIOACTIVE MATERIALS UPON THE THYROID GLAND OF RATS. H. D. Griffith, J. T. Irving, and E. M. Mason. *J. Physiol.* 95(4), 516-24 (1939).

Rats failed to develop any thyroid enlargement when given various radioactive substances, either when intake was adequate, or when it was abnormally low. Author concludes that radioactive substances have no influence upon the thyroid. BA 13-10859

4056

INFLUENCE OF PROTRACTION OF IRRADIATION ON THE REACTION CAUSED BY X-RAYS IN NORMAL TISSUE. D. den Hoed and B. Levie. *Acta Brevia Neerl. Physiol. Pharmacol. Microbiol.* 9(5), 115-18(1939).

Rabbit ears were irradiated with equal total doses, different intensities. Greatest intensity caused greatest injury as indicated by differences in new growth of hair, atrophy, and necrosis. BA 13-10860

4057

CONTRIBUTION TO THE KNOWLEDGE OF THE SPIRAL STRUCTURE OF CHROMOSOMES. A. de S. da. Camara. *Z. indukt. Abstamm.-u. Verebl.* 74(2), 202-15(1938). (In German).

Plants of *Aloe arborescens* were x rayed (65 kv, 5 ma for 10, 15, and 30 min, no filter), and smears made of meiosis in P. M. C. Dicentric chromatids were numerous and are attributed to end-to-end fusion of chromosomes. Chromatids contained 2 spiral chromonemata. Chromonemata were photographed. Acentric fragments were also observed. BA 12-14119

4058

ON THE ANALYSIS OF A DOMINANT EFFECT, A MUTATION WITH VARIABLE EXPRESSION IN *ANTIRRHINUM MAJUS*. H. Stubbe. *Biol. Zentr.* 58(7/8), 394-411(1938). (In German).

Observations on the x ray-induced dominant mutant *Atardata* which is viable only when heterozygous are presented. BA 12-14148

4059

NOTE OF AN UNUSUALLY TRANSMITTED LETHAL EFFECT IN X-RAYED SORGHUM. R. M. Whelden and C. P. Haskins. *Botan. Gaz.* 99(4), 872-6(1938).

Sorghum seeds x rayed at 120 r/min for 4, 8, 16, 32, 64, and 128 min, viable plants produced by all seeds except those exposed 128 min. Second generation of plants from seeds exposed 2-32 min normal. Those from 64 min group uniformly stunted with short, curled leaves and short roots. BA 12-14151

4060

POSSIBILITY OF GENE SENSITIZATION. IU. IA. Kerkis. *Izvest. Akad. Nauk SSSR, Otdel. Mat. Estestven. i Tekh. Nauki, Ser. Biol.* 1938(1), 67-74(1938). (In Russian).

Author reports results of experiments to check another's results indicating that x raying *D. melanogaster* in pupal stage may "sensitize" genes so that subsequent x radiation in adult stage approximately doubles expected mutation rate. BA 12-14156

4061

THE ATTENUATION BY X-RAYS OF THE VIRULENCE OF HUMAN TUBERCLE BACILLI. W. F. Drea. *Am. Rev. Tuberc.* 38(2), 205-28(1938).

Human tubercle bacilli, strain H37, were x rayed almost every day for several years. Virulence of descendants of x rayed bacilli, compared with that of control nonirradiated culture series from same parent, was considerably attenuated. Cultures consisted of attenuated and relatively fewer virulent bacilli. BA 12-15094

4062

THE BEHAVIOR OF *AZOBACTER CHROOCECCUM* UNDER ABNORMAL CULTURAL CONDITIONS. De Jong, Dooren, and L. E. Den. *Arch. Mikrobiol.* 9(2), 223-52(1938). (In German).

Morphological modifications in *A. chroocecum* produced under influence of Ra are described. BA 12-15139

4063

ON THE EFFECT OF ROENTGEN RAYS ON ERYTHRO-POIESIS. II. REPORT. EXPERIMENTAL INVESTIGATION OF RETICULOCYTES AFTER ROENTGEN IRRADIATION. Klaus Mardersteig. *Strahlentherapie* 61(1), 107-29(1938). (In German).

Rabbits were given total body exposure to 180 kv x rays through 0.5 mm Cu FSD 1m up to 100 r and 50 mc for doses over 100 r. Dose of 50 r stimulated bone marrow temporarily; 250 r produced brief stimulation, then inhibition, followed by regeneration; 3000-6000 r stopped bone marrow function. Irradiation of blood samples *in vitro* (up to 300 r) did not affect reticulocytes; 500-1000 r inhibited their development. BA 13-3576

4064

THE LEVEL OF RETICULOCYTES FOUND IN STUDIES ON RADIATION WORKERS. Klaus Mardersteig. *Strahlentherapie* 61(2), 279-99(1938). (In German).

Examination of blood of workers in roentgen tube factory revealed changes in white cell picture and occasional increase in erythropoietic function (expressed as increase of reticulocytes or Hb and erythrocytes). Author concludes determination of reticulocytes is reliable method for recognition of bone marrow stimulation in x ray laboratory workers. BA 13-3577

4065

COMPARATIVE INVESTIGATION OF THE QUESTION OF THE SPECIFICITY OF THE ROENTGEN EFFECT. LIGHT-, HEAT-, ROENTGEN- AND THORIUM-X-REACTION. G. Miescher. *Strahlentherapie* 61(1), 4-37 (1938). (In German).

Effect of light, heat, x rays, and thorium X on skin of guinea pig ear and human skin was studied. Effect of 300-120,000 r of x rays and thorium X paint delivering α rays absorbed in 0.1 mm thickness of tissue include: abnormal karyokinesis, amitosis, polymorphism of nuclei, and hypertrophy of entire cell which appeared as late effects. BA 13-3578

4066

THE PHYSIOLOGICAL ACTION OF NATURAL AND ARTIFICIAL RADIOACTIVITY. Joseph G. Hamilton and Gordon A. Alles. *Am. J. Physiol.* 125(2), 410-B (1939).

Effects upon pulse, respiration, and blood pressure in dogs of intravenously and intra-arterially injected isotonic solutions of chlorides of Na, K, and Rb and their artificially prepared radioactive isotopes were studied. There was no difference in physiological responses to natural as contrasted with artificial radioactive elements. Ra emanation administered intra-arterially produced no effect. BA 13-4116

4067

INORGANIC NUCLEAR CONTENT AS AN INDEX OF TUMOUR

RADIOSENSITIVITY. I. A. B. Cathie. *J. Pathol. Bacteriol.* 48(1), 1-10(1939).

Inorganic ash content of malignant tumor, demonstrated by technique of micro-incineration, affords an indication of its degree of radiosensitivity. Current theories of radiosensitivity discussed, biological variation theory supported. Author concludes that the variant in question is amount of inorganic material in nucleus. BA 13-4185

4068

ON THE DISTRIBUTION OF RADIOACTIVE SUBSTANCES IN THE BODY OF TUMOR BEARING MICE AFTER THEIR INJECTION AS THORIUM B-LINKED SOLUTIONS. C. Dittmar. *Z. Krebsforsch.* 48(2), 121-8(1938). (In German).

Selective deposition of Thorium B was attempted by its injection in "linkage" with tumor extracts, serums, colloidal metals, etc. This was unsuccessful, radioactive material being found predominantly in spleen, liver, kidneys, and bones in all instances. Author suggests that normal distribution of several metals, after artificial induction of radioactivity, might be used in cancer therapy, however. BA 13-4189

4069

NOTE ON THE BIOLOGICAL EFFECTS OF DENSELY IONIZING RADIATION. K. G. Zimmer and N. W. Timofeeff-Ressovsky. *Phys. Rev.* 55(4), 411(1939).

Authors point out that in biological reactions involving single ionization within small volume (e.g., gene mutations), uniform ionization is more effective than same amount of ionization produced in few dense tracks. X ray dose of 1000 r produces $1\frac{1}{2}$ times as many mutations as equal neutron dose, ratio maintained in range 200-2000 r. BA 13-5305

4070

THE BEARING OF THE FREQUENCIES OF X-RAY INDUCED INTERCHANGES IN MAIZE UPON THE MECHANISM OF THEIR INDUCTION. D. G. Catcheside. *J. Genetics* 36(2), 321-8(1938).

Study of x ray induced interchanges in F_1 from irradiated pollen shows individuals with 2 rings of 4 chromosomes are more frequent than those with ring of 6. Similar relation between 2 classes of rings was found after various doses. Possible interpretations of results are discussed. BA 13-5311

4071

THE EFFECT OF X-RAY DOSAGE UPON THE FREQUENCY OF INDUCED STRUCTURAL CHANGES IN THE CHROMOSOMES OF *DROSOPHILA MELANOGASTER*. D. G. Catcheside. *J. Genetics* 36(2), 307-20(1938).

Frequency of induced structural changes of chromosomes in F_1 larvae of x rayed males shows direct linear proportionality with dosages of 1000-4000 r. BA 13-5334

4072

AN EXPERIMENTAL STUDY OF THE ACTION OF RADIUM ON DEVELOPING BONES. D. Engel. *Brit. J. Radiol.* 11(132), 779-803(1938).

Bones of extremities of young animals were γ irradiated from Ra tubes or needles (filter, 0.5 mm Pt) fixed to skin or applied directly to bone. Doses of 4-25 day/mg were employed. Complete arrest of bone growth or curvature was achieved, according to whether whole epiphyseal cartilage or only part was exposed, effect proportional to dose. Chickens were less susceptible than rabbits, and these less than dogs and goats. Radiosensitivity decreased rapidly with age. BA 13-5471

4073

THE INHERITANCE STRUCTURE OF THE CELL AND ITS RELATION TO IRRADIATION EFFECTS. John W. Gowen. *Am. J. Roentgenol. Radium Therapy* 41(1), 91-7(1939).

Author explains lethal x ray effect on *Drosophila* eggs, and ultraviolet light on tobacco mosaic virus, on basis of absorption of energy within gene and chromatin structure. BA 13-5472

4074

THE BIOLOGICAL MEASUREMENT OF RADIATION QUANTITIES. P. S. Henshaw and D. S. Francis. Am. J. Roentgenol. Radium Therapy 40(6), 906-12(1938).

Authors obtained survival curves or growth retardation curves with 4 qualities of radiation (30 kv, 200 kv, 650 kv x rays, and γ rays) with a number of biological organisms in free air, on surface of large paraffin mass, and within paraffin mass. Comparative back scatter and depth dose data are presented BA 13-5473

4075

ALARM REACTION PRODUCED BY THE ACTION OF X RAYS ON THE ABDOMEN OF THE RAT. G. Segal and C. P. Leblond. Compt. rend. soc. biol. 129(26), 279-81 (1938). (In French).

Irradiation of rat abdomen provokes non-specific reaction characterized by atrophy of lymphatic organs and hypertrophy of adrenals. Reaction resembles that of shock and variety of infections. BA 13-5475

4076

HEREDITARY CHANGES IN DESCENDANTS OF FEMALE MICE EXPOSED TO ROENTGEN RAYS. George D. Snell and Forrest B. Ames. Am. J. Roentgenol. Radium Therapy 41(2), 248-55(1939).

White female mice x rayed over ovarian region (240-280 r, 200 kv, filter 0.5 mm Cu, and 1 mm Al) were mated to normal males. Of 56, 18 yielded no litters, 37 a single litter, one, 2 litters. Of 159 offspring, 3 were semisterile, 3 completely sterile, and 9 gave rise to lines probably carrying altered heredity. Offspring of controls were normal. BA 13-5476

4077

THE EFFECT OF ULTRAVIOLET RADIATION AND OF SOFT X-RAYS ON THE SEDIMENTATION BEHAVIOR AND LIGHT ABSORPTION OF PURIFIED HUMAN SERUM ALBUMIN Edward B. Sanigar, Laura E. Krejci, and Elmer O. Kraemer. Biochem. J. 33(1), 1-16(1939).

Three hr irradiation with soft x rays (29,000 r) caused no detectable change in sedimentation behavior or absorption spectrum of serum albumin. BA 13-5510

4078

CHANGES IN THE GENITAL TRACT OF GUINEA PIGS ASSOCIATED WITH CYSTIC AND "INTERSTITIAL GLAND" OVARIES OF LONG DURATION. Ida Genther Schmidt. Endocrinology 24(1), 69-81(1939).

After irradiation of ovaries of guinea pigs, normal ovarian stroma was replaced by interstitial gland cells formed from follicles of all sizes and irregular estrous cycles occurred. Within a year after exposure small endometrial cysts were common. Uterine musculature and tunica propria were replaced by fibrous tissue. Epithelial downgrowths occurred in vaginae. BA 13-5644

4079

ARGENTAFFIN (CARCINOID) TUMORS OF THE SMALL INTESTINE. REPORT OF 11 CASES AND REVIEW OF THE LITERATURE. Irving M. Ariel. Arch. Pathol. 27(1), 25-52(1939).

Regression of tumor following roentgen therapy suggests that carcinoid tumors may be radiosensitive. BA 13-5799

4080

THE EFFECT OF ROENTGEN RAYS ON TUMORS IN ANIMALS TREATED BY PROLONGED CONTINUOUS EXPOSURE OF ENTIRE BODY. Halsey J. Bagg. Am. J. Roentgenol. Radium Therapy 40(3), 418-26(1938).

Mice inoculated with mouse sarcoma 180 were kept under continuous irradiation (20 hr daily) for several

days or weeks. Tumor growth was retarded during irradiation period, while after removal from radiation room, tumors frequently resumed growth. Transplanted tumors grew as rapidly as control tumors. No summation of radiation effect was noted. There was no histological change in tumor after 20 generations of irradiation. BA 13-5800

4081

PROPERTIES OF THE TUBERCLE BACILLUS IRRADIATED WITH α RAYS. H. R. Olivier and P. Bonet-Maury. Compt. rend. soc. biol. 129(26), 301-4(1938). (In French).

Tubercle bacilli, α irradiated, act differently (with respect to allergy) than do living bacilli. BA 13-6085

4082

ON THE ACTIVATION EFFECT OF ROENTGEN RAYS ON TOBACCO MOSAIC VIRUS G. A. Kausche and H. Stubbe. Naturwissenschaften 26(45), 740-1(1938). (In German). BA 13-6651

4083

ON THE ACTIVATION EFFECT OF GAMMA RAYS ON TOBACCO MOSAIC VIRUS. G. A. Kausche. Naturwissenschaften. 26(45), 741(1938). (In German). BA 13-6652

4084

THE EFFECT OF RADIOACTIVE WATER FROM HOT SPRING ON THE LIFE SPAN UNDER OXYGEN DEPRIVATION. (STUDIES ON *DAPHNIA PULEX*). A. Fröhlich. Arch. intern. pharmacodynamic 59(1), 128-32(1938) (In German).

Daphnia deprived of air live longer in water containing Ra emanation than in their usual media, but effect is due only partly to Ra emanation. BA 12-14434

4085

AN EXPERIMENTAL STUDY OF THE EFFECTS OF ROENTGEN RAYS ON THE GONADS OF THE DEVELOPING CHICK. J. M. Essenberg and Anton Zikmund. Radiology 31(1), 94-103(1938).

Eggs before and during incubation and newly hatched chicks were exposed to 40-480 r doses of x rays and gonads were studied histologically. Dose of 100 r was sufficient to reduce mitotic index in germinal cortex of ovaries. Effects of larger doses on germinal epithelium of males and females are described. Testes were found to be more resistant than ovaries. BA 13-12695

4086

THE BIOLOGICAL ACTION OF MUSTARDS ON DORMANT SEEDS OF BARLEY AND WHEAT. J. MacKey. Acta Agr. Scand. 4, 419-429(1954).

Mustard compounds are less active than x-rays in their influence upon cells at the resting stage and their effects are less immediate. The toxicity of the mustards tends to obliterate their mutagenicity. (from abstract)

4087

MEIOSIS AND CROSSING-OVER. CYTOGENETIC INVESTIGATION OF *ANTIRRHINUM MAJUS* L. Hans Ernst. Z. Botan. 34(2), 81-111(1939). (In German).

X ray effect was reduction of chiasmata at diakinesis in strain of 50 *A. majus*. Structural changes in chromosomes from x ray treatment were cytologically visible. BA 13-12501

4088

STUDIES ON THE GENETIC BASIS OF CHLOROPHYLL FORMATION AND THE MECHANISM OF INDUCED MUTATING. A. Gustafsson. Hereditas 24(1/2), 33-93(1938).

Further results from the investigating of x raying barley seeds are reported. BA 13-12525

4089

SENSITIZATION TO X-RADIATION BY THE DIRECT ELECTRIC CURRENT. John Russell Carty. Radiology 31(4), 414-17 (1938).

X ray dose of 1500 r following 4 milliamperes at 30 volts applied to skin of rabbit produced erythema, epilation, and thrombosis. Reaction was more severe under negative pole than control under positive pole.

4090

ACTION OF WEAK RADIOACTIVITY ON THE GERMINATION OF SEEDS. D. Montet. *Compt. rend.* 194, 304-6(1932). (In French).

4091

THE EFFECT OF RADIATION APPLIED DIRECTLY TO THE BRAIN AND SPINAL CORD. I. EXPERIMENTAL INVESTIGATIONS ON MACACUS RHESUS MONKEYS. Leo M. Davidoff, Cornelius G. Dyke, Charles A. Elsborg, and Isidore M. Tarlov. *Radiology* 31(4), 451-63(1938)

Single doses (1000-7200 r) were applied to exposed CNS tissue. Motor effects and histological changes are described. After 4000 r to cerebrum; immediate paralysis of contralateral limbs, after 2000-3000 r, hemiparesis delayed several months. Immediate paraplegia occurred after 5000 r to midthoracic spinal cord, delayed after 4000 r. BA 13-12694

4092

SOME BIOLOGICAL EXPERIMENTS WITH A CONDENSER DISCHARGE TYPE OF X-RAY TUBE. K. H. Kingdon. P. A. Zahl, C. P. Haskins, and H. E. Tanis, Jr. *Radiology* 31(1), 52-8(1938).

Condenser charged to 105 kv was discharged through x ray tube at 200 r/min (3.5 r/discharge; one discharge/sec). Effects were not significantly different from those produced by usual x ray tubes on, survival of *Drosophila* eggs, fermentation of *Aspergillus* spores, elongation of wheat coleoptiles. Imposing magnetic field of 23,000 oersteds during exposure of same material caused no added effects. BA 13-12696

4093

THE ACTION OF IONIZING RAYS ON SEA URCHIN. I. THE EFFECTS OF ROENTGEN, GAMMA, AND BETA RAYS UPON UNFERTILIZED EGGS AND SPERM. Mituo Miwa, H. Yamashita, and K. Mori. *Gann* 33(1), 1-12 (1939).

Rays delayed first cleavage longer than second in *Pseudocentrotus depressus*. Effects lessened when there was an interval between exposure and insemination. There was no recovery of sperm when they were irradiated alone. Three types of radiation had similar effects on cleavage. BA 13-12699

4094

EFFECTS OF ROENTGEN RAYS ON THE ACTIVATION AND PRODUCTION OF THE ENZYME TYROSINASE IN THE INSECT EGG. (ORTHOPTERA). O. Malcolm Ray. *Radiology* 31(4), 428-37(1938).

There was no inactivation of enzyme in solution 5 min-10 days after doses up to 5000 r; no decreased activity of enzyme present in egg even after lethal doses (up to 30,000 r), but enzyme production was reduced after doses as low as 250 r. One day old eggs were most sensitive as regards depression of enzyme production. Effects on rate of production were slight when rate was maximal. BA 13-12704.

4095

THE ACTION OF IONISING RAYS ON SEA URCHIN. II. THE EFFECTS OF ROENTGEN, GAMMA, AND BETA RAYS UPON FERTILIZED EGGS. Hisao Yamashita, K. Mori, and M. Miwa. *Gann* 33(2), 117-21(1939).

Delayed cleavage was observed in irradiated *Pseudocentrotus depressus* eggs when nuclei were in early prophase. Delay of first cleavage greater than second. BA 13-12705

4096

A NEW CONCEPT OF THE RELATIONSHIP BETWEEN CELLULAR METABOLISM AND RADIOSENSITIVITY. Ph. Joyet-Lavergne. *Arch. phys. biol.* 15(1), 94-5 (1938). (In French).

Radiosensitivity and cellular metabolism are somewhat related, since both are dependant upon a respiratory enzyme which in part determines the rate of metabolism and is very sensitive to radiations. BA 13-12780

4097

INVESTIGATION OF GASEOUS METABOLISM IN HETEROPLASTIC TRANSPLANTED TUMORS. C. Seller. *Z. Krebsforsch.* 48(6), 520-31(1939). (In German).

Heterotransplanted mouse carcinoma in the rat shows accentuation of anaerobic glycolysis. After irradiation the transplanted tumor shows a shift towards normal metabolism. Fractional irradiation produces a more marked effect than single dose. BA 13-13231

4098

CUTANEOUS AND MUCOUS TYPE SQUAMOUS CARCINOMAS OF THE UPPER RESPIRATORY AND ALIMENTARY CANAL, WITH REFERENCE TO THEIR RADIOSENSITIVITY. F. Zwimpl. *Z. Krebsforsch.* 49(1), 109-36(1939). (In German).

Mucous type squamous cell carcinoma is more radiosensitive than cutaneous type. Both types are more sensitive in larynx and pharynx, cutaneous cancers of tongue are least susceptible to irradiation. BA 13-13235

4099

THE EFFECT OF LIGHT AND ULTRAVIOLET RADIATION ON PLANT RESPIRATION. Fritz Gessner. *Planta* 29(1), 165-78(1938). (In German)

Oxygen consumption of fresh water plants was not affected by 2460 r x ray treatment, in contrast to marked increase in O₂ consumption following exposure to visible light and ultraviolet. BA 13-14011

4100

STRUCTURAL ABNORMALITIES IN COTTON LEAVES FOLLOWING EXPOSURE OF THE SEED TO X-RADIATION. B. N. Singh, R. S. Choudhri, and S. L. Kapoor. *Ann. Botany (London)* 3(1), 307-12(1939).

Authors describe specific damages to leaves from dry, soaked, and germinated seeds exposed 5, 15, and 30 min. to x ray. Radiation effect was less on dry than on soaked seeds; and less on soaked than on germinated seeds. Tissues differed in their responses to irradiation. BA 13-14013

4101

A CYTOLOGICAL STUDY OF X-RAYED GRASSHOPPER EMBRYOS. Eleanor E. Carothers. *J. Morphol.* 66(3), 529-53(1940)

Single x ray doses in early prediapause produce gross morphological abnormalities, all cells in late prophase, metaphase, or anaphase during treatment die at anaphase within 24 hr. Mitotically active cells are injured most. There also occurs: engulfment of pycnotic nuclei by adjacent cells, liquefaction of cytoplasm (48 hr), lesions due to cytolysis (5 days). BA 14-11550

4102

MITOSIS IN HAIR FOLLICLE CELLS OF MICE FOLLOWING X-RADIATION. Robert T. Hance. *J. Morphol.* 66(3), 409-22(1940).

Erythema doses of x rays stimulate mitosis in follicle cells and this effect spreads even to follicles in unexposed areas (more dividing cells were found in shielded than in exposed areas). Stimulation by x ray was similar to that due to shaving except that the latter remained localized. Excision of x rayed area stopped all mitotic activity in neighboring tissue. Factor causing stimulation develops gradually and is soluble. BA 14-11553

4103

RADIATION, MUTATION AND THE GENE. P. W. Whiting. *Am. J. Roentgenol. Radium Therapy.* 43(2), 271-74 (1940).

X rays (dose of 2000-5000 r) were found to be convenient for producing mutations in *Drosophila*. Ultraviolet,

neutrons, and various culturing temperatures also effect mutations. Short radio waves and all chemicals investigated produced no results. BA 14-11563

4104

WHITE FLOWER CHARACTER FROM X-RAY TREATMENT OF TOMATO SEED. P. A. Young. J. Heredity 31(2), 78-9(1940).

White-flowered character (discovered in 1938) originated by mutation stimulated by x ray treatment of the ancestor Marglobe tomato seed. Yellow-flowered is dominant over white-flowered and segregated in 3/1 ratio. BA 14-11576

4105

RADIATION GENETICS. N. W. Timofeeff-Ressovsky and K. G. Zimmer. Strahlentherapie 66(4), 684-711 (1940). (In German)

This review contains numerous reference and important radiation genetic data in tabular and graphical form. Effects of dose, interrupted exposure and wave length including ultraviolet and neutron radiation) are discussed in terms of the physical mechanism of their effects. Various types of induced genetic change and failure of "natural" radiation to account for spontaneous mutation rates are discussed. BA 14-11599

4106

THE EFFECT OF ROENTGEN IRRADIATION UPON ERYTHROCYTES. D. H. Drummond, J. P. Tollman, and F. L. Richards. J. Phys. Chem. 44(2), 172-80(1940).

X irradiation of sheep erythrocytes caused swelling. Membrane damage resulted either from irradiation or injury due to swelling. Diminution of volume after treatment was observed in cells refrigerated for some time. Earlier findings are confirmed; no adequate explanation is believed possible. BA 14-11668

4107

RADIATION EFFECT ON DROSOPHILA. H. Langendorff and K. Sommermeyer. Fundamenta Radiol. 4(5/6), 196-209(1939). (In German).

X ray doses (55 kv, 1 mm Al, 700 r/min, less than 100 sec), administered to 2-9 hr old Drosophila eggs produce S-shaped killing curves which, according to quantum-hit theory, corresponds to 1-24 hits the highest value being characteristic for 6-hr old eggs. Doses to prevent 50% of eggs from hatching increased with age of eggs. X rays and ultraviolet effects are compared. BA 14-11670

4108

STUDIES ON THE TRANSMISSION OF FLORAL PATTERNS IN PETUNIAS. Albert Levan. Hereditas 25(2), 145-84 (1939). (In German).

X ray treatment of seeds of self-colored line causes a sector of plant to have extreme type of flower pattern which is genetically induced, due not to unstable genes, but to a number of flicking genes. BA 13-14360

4109

COMPARATIVE INVESTIGATION OF THE EFFECT OF 200 KV ROENTGEN AND GAMMA RADIATION ON THE PUPAE OF DROSOPHILA MELANOGASTER. I. DETERMINATION OF "EQUIVALENT ROENTGEN VALUES" FOR GAMMA RAYS. II. INVESTIGATION OF THE SUMMATION OF ROENTGEN AND GAMMA RAYS. J. H. Muller. Strahlentherapie 64(4), 633-54(1939). (In German). BA 13-14372

4110

INFLUENCE OF LOW TEMPERATURE ON RECOVERY FROM ROENTGEN RAYS. Evelyn Vanderwilt Cook. Radiology 32(3), 289-93(1939).

Ascaris equorum, (*Megalocephala*), var. *univalens* were x rayed with 5000 r and transferred to 5° and 25°C temperature. Cleavage was delayed at both temperatures for 2-5 hr. There was a higher percentage of normal embryos

at 5°C and percent normals increased with storage time at 5°. Controls at 5° were not affected. Recovery from x ray injury may occur in absence of appreciable metabolism. BA 13-14465

4111

NOTES ON THE ACTION OF X-RAYS ON GOLDFISH. Friedrich Ellinger. Proc. Soc. Exptl. Biol. Med. 41(2), 527-9(1939).

Single x ray doses 1,500-10,000 r (HVL 6 mm Al, 230 r/min, field 15 x 15 cm, 50 cm target/surface distance) were lethal within 14 days to *Carassius auratus*. Doses of 1000 r: 50% lethal in 14 days; fish before death (in second week) exhibiting pigment change, less activity, dyspnea. Lethal effect is attributed to destruction of lymphoid tissue in nodes and spleen. BA 13-14467

4112

ROENTGEN TREATMENT OF CERTAIN HEMORRHAGIC DISORDERS. L. H. Garland. Calif. and West. Med. 49(2), 123-7(1938).

Single x ray doses of 160 r to spleen cause an increase in blood platelets, decreased bleeding time with coincident decrease or disappearance of hemorrhagic tendency. Such a treatment method is considered for controlling post-operative capillary oozing. BA 13-14468

4113

THE EFFECT OF RADIATION ON CELL RESPIRATION. I. RESPIRATION AND ANAEROBIC GLYCOLYSIS OF MOUSE KIDNEY IN VITRO FOLLOWING RADIATION. Anna Goldfeder and Jennings L. Fershing. Radiology 31(1), 81-8(1938).

No change in O₂ consumption or R. Q. was observed following x ray (200 kv) doses of 1,800-30,000 r at 4°C or 375 mg hr Ra at 37.5°C or 4°C with up to 4,164 mg hr Ra to mouse kidney in vitro. Rn (β , γ rays) exposure of 1,180-6,170 mg hr decreases O₂ consumption and glycolysis but not R. Q. BA 13-14469

4114

THE EFFECT OF WEAK ROENTGEN RADIATION ON THE FORMATION AND COMPOSITION OF LYMPH IN DOGS. Josef Granatowicz. Wien. Arch. inn. Med. 32(5), 261-72(1938). (In German). BA 13-14470

4115

TREATMENT OF DISEASES OF THE EYE WITH GRENZ RAYS. Raymond I. Pfeiffer. Arch. Ophthalmol. (Chicago) 21(6), 976-86(1939).

Ultralong x rays of 2 Å, generated by special tube and apparatus, were found to be especially adapted to treatment of eye diseases because of low penetrance to deeper tissues. Treatment of 302 cases demonstrated this radiation to be most effective in inflammatory diseases. BA 13-14473.

4116

RESEARCHES IN THE PROBLEM OF RADIUM POISONING AND THE TOLERANCE DOSE OF RADIUM. B. Rajewsky. Radiology 32(1), 57-62(1939).

Ra content of the normal human body is given as 1.5×10^{-8} gs. Doses of 1.5×10^{-6} curie hr will alter metabolism. The lethal dose is one γ of Ra equivalent. (Study is based on tissue distribution of Ra in 2 cases of Ra poisoning.) BA 13-14474

4117

FURTHER STUDY OF THE DIRECT AND INDIRECT ACTIONS OF RADIATION ON MALIGNANT CELLS. I. TRANSPLANTATION OF TISSUE CULTURES OF MOUSE SARCOMA 180 AFTER EXPOSURE TO ROENTGEN RAYS. II. CULTURES OF TUMORS IRRADIATED IN VIVO. Kanematsu Sugiura and Irving Cohen. Radiology 32(1), 71-6(1939).

Doses of 100-10,000 r have no effect on outgrowth of sarcoma fragments. Cultures exposed to 2000 r or more

produce tumors in mice. Tumors cultured several days after in vivo exposure to 1500 r grow less readily than those cultured within 24 hr after exposure. Tumor-growth inhibitor in normal tissue is postulated. BA 13-14910

4118

OVARIAN IRRADIATION. ITS EFFECT ON THE HEALTH OF SUBSEQUENT CHILDREN. D. P. Murphy. Surg., Gynecol., Obstet. 47, 201-215(1928).

4119

SOME UNSOLVED PROBLEMS OF BIOLOGICAL RADIATION, (EXPERIMENTAL INVESTIGATION). P. del Buono. Strahlentherapie 65(1), 108-20(1939). (In German).

Effect of x ray, (140-180 kv, 0.6 mm Cu, 23-35 cm, 3 ma) on pea, wheat and sorghum seedlings depends on dose and on condition of plants. Growth may increase with low doses, diminish with doses over 100 r. BA 13-15751

4120

THE EFFECT OF α -RADIATION ON THE CELL WITH FURTHER CONSIDERATION OF NUCLEAR REACTION. Ferdinand Hercik. Strahlentherapie 64(4), 655-70(1939). (In German).

Epidermal cells of Allium cepa bulbs were irradiated with Po α -particles. Survival ratios are plotted and give curves corresponding to a 3-hit-to-kill mechanism. Dose for 50% survival: 34×10^7 α -particles/sq mm (5.1×10^5 r). Author feels "sensitive volume" is in nucleus. BA 13-15752.

4121

FLORAL DEVELOPMENT OF CERTAIN SPECIES AS INFLUENCED BY X-RADIATION OF BUDS. Edna L. Johnson. J. Colorado-Wyoming Acad. Sci. 2(5), 39(1939).

White stippling, spotting, color, and shape changes, and many other abnormalities followed one medium x ray dose given to Salpiglossis plants in bud; but buds over 1 cm long at the time of irradiation developed normally. BA 13-15753

4122

SENSITIVITY TO X-RAYS OF DIFFERENT MEIOTIC STAGES IN UNLAID EGGS OF HABROBRACON. Anna R. Whiting. J. Exptl. Zool. 83(2), 249-69(1940).

Haploid eggs of unmated irradiated females (212 r, 425 r, 850 r, 1275 r, 2500 r) may degenerate within ovary or, if laid, may not produce adults. Degeneration of eggs is correlated with dependence upon nurse and follicle cells. Lowest mortality was observed when laid eggs were exposed in late prophase, highest when eggs were treated in utero. Cleavage was observed in 64.1% of uterine eggs from treated females although most failed to hatch. BA 14-7971.

4123

ALTERATION OF CHARACTERS IN CROP PLANTS INDUCED BY X-RAY IRRADIATION. Fuyuwu Kagawa. Japan. J. Botany 10(1/2), 35-41(1939).

Germinating seeds of Secale cereale, and Solanum melongena subjected to x rays produced some plants with variegated leaves (lack of chlorophyll). X-rayed Oryza sativa plants produced normal leaves but were partially sterile, seeds produced 3.7% yellow or white plants of green sister plants (partially sterile) in third generation, 50% normal, 50% chlorophyll deficient. Self- and cross-pollination experiments, indicated that gene mutations were induced by x rays. BA 14-7981

4124

THE INFLUENCE OF LOW TEMPERATURE ON THE FREQUENCY OF TRANSLOCATIONS PRODUCED BY X-RAYS IN DROSOPHILA MELANOGASTER. George H. Mickey. Genetica 21, 386-407(1939).

X raying at 4°C increased production of translocations and much sterility in adult male flies compared to exposure at room temperature. Chromonema spiraling in mature

sperms is suggested as being ideal for small loop formation leading to chromosome breakage and interchange. Genetic changes are effected through changes in immediate gene environment. BA 14-8011

4125

THE NATURE AND PATHOLOGY OF RADIATION SICKNESS. V. H. Moon, K. Kornblum, and D. R. Morgan. J. Am. Med. Assoc. 116, 489-493(1941).

Exposure of the abdomen causes physiologic disturbances like those of shock arising from other causes. Deep roentgen irradiation causes delayed necrosis of the intestinal mucosa. The resulting signs of illness are likewise delayed in onset.

4126

EFFECTS OF ROENTGEN IRRADIATION UPON THE BLOOD VESSELS OF REPAIR TISSUE AND THE BROWN-PEARCE RABBIT EPITHELIOMA. Vincent Downing, Francis W. Bishop, and Stafford L. Warren. Am. J. Roentgenol. Radium Therapy 43(2), 249-61(1940).

Within 1 hr of irradiation (10,000 r) in vivo, red haze was observed around blood vessels (controls and tumor tissue). Gross erythema was present on fifth post-exposure day. Vessels of tissues after second day became beaded, irregular, with erratic blood flow. Endothelial reaction was the same in control and normal vessels and recovery occurred after one week. Animals were refractory to reirradiation after tumor destruction by irradiation. BA 14-8133

4127

CHANGES IN RESPIRATION FOLLOWING IRRADIATION WITH X-RAYS. John C. Fardon. William A. Sullivan, Gustave C. Brotzge, M. Kenneth Loeffler, and Mary Basilia Andrus. Studies Inst. Divi Thomae 2(2), 203-14(1939).

In vivo irradiation (45 kv, 10 ma, 25 min, target dist. 20 cm) sufficient to produce a "burn," depresses respiration of mouse skin for 13 days, followed by stimulation for 35 days. BA 14-8134

4128

SOME EFFECTS OF ROENTGEN RAYS ON SACCHAROMYCES CEREVISIAE. P. S. Henshaw and H. Turkowitz. Am. J. Roentgenol. Radium Therapy 43(1), 93-106(1940).

Growth curves obtained revealed that growth processes were delayed but not impaired by intense 200 kv x ray beams. Delay was due to death of some organisms since survivors were as vigorous as controls. Exponential form of survival curve indicates that S. cerevisiae is in the "1 hit-to-kill" category. Cells affected lethally may divide to 40 cell stage before succumbing. BA 14-8135

4129

THE EFFECT OF ROENTGEN RAYS UPON BACTERIOPHAGE. STUDIES IN BACTERIAL METABOLISM CXI. Arthur Isaac Kendall and Charlotte Anne Colwell. Am. J. Roentgenol. Radium Therapy 43(2), 262-65(1940).

Pure bacteriophages freed from all protein-like substances and containing 0.5 mg N per 100 cc were prepared for B. Coli, Flexnor and Staph. aureus; suspended in dist. water and filtered. Layers of phage 6 mm deep in uncovered Petri dishes were exposed to 8000-24,000 x ray units. No significant effect was produced. BA 14-8137

4130

STUDIES ON THE RADIOSENSITIVITY OF SEEDS AT THE ONSET OF GERMINATION. J. Lambert. Compt. rend. soc. biol. 110, 580-3(1932). (In French).

4131

THE DEVELOPMENT OF FIBROSARCOMA AS A RESULT OF THE INTRAARTICULAR INJECTION OF RADIUM CHLORIDE FOR THERAPEUTIC PURPOSES. A NEW FORM OF RADIUM POISONING IN HUMAN BEINGS.

Flemming Norgaard. Am. J. Cancer 37(3), 329-42 (1939).

Author reports a case of tibial fibrosarcoma produced by injection of 10 γ of RaCl_2 into knee joint 8 or 9 yr previously. Hyperplasia of marrow and radiation osteitis were also produced. BA 14-8139

4132

THE IMMEDIATE AND DELAYED ACTION OF X-RAYS UPON THE PROTOZOAN DUNALIELLA SALINA. H. S. Ralston. Am. J. Cancer 37(2), 288-97(1939).

Survival curves change in form with time after x irradiation. Author suggests two separate processes: (1) immediate death and cytoplasmic effects; (2) delayed death by inhibiting reproduction through action on the nucleus. BA 14-8140

4133

THE BIOLOGICAL MEASUREMENT OF GAMMA RAYS IN "EQUIVALENT ROENTGENS" WITH MOUSE SARCOMA 180 AS THE TEST OBJECT. Kanematsu Sugiura. Am. J. Cancer 37(3), 445-52(1939).

Survival curves for sarcoma 180 irradiated in vitro with 200 kv x rays and γ rays are almost identical, indicating that they produce the same types of effects. "Equivalent roentgen" value for γ rays was 96 to 114 r/min/g. With 1 cm distance, filtration of 0.5 mm platinum. This differs little from results of others' determinations on *Drosophila* eggs and pupae; and from purely physical measurements. BA 14-8143

4134

RESPIRATORY CHANGES IN VITRO IN NORMAL AND MALIGNANT TISSUES FOLLOWING IRRADIATION. Anna Goldfeder. Am. J. Cancer 36(4), 603-8(1939). BA 14-8530

4135

NEOPLASM STUDIES. VI. GRANULOCYTIC ACCUMULATION FOLLOWING IN VIVO ROENTGEN IRRADIATION OF MOUSE SARCOMA 180. C. G. Grand. Am. J. Cancer 36(4), 540-50(1939).

In vivo irradiation of mouse sarcoma causes: accumulation of granulocytes in tumor, tumor necrosis; absorption of necrotic tumor. Effects are less marked with smaller doses. Absorption begins in 6-12 hrs, is pronounced in 48-80 hr after tumor-lethal dose. Observations were checked by in vitro studies on cultures taken at various times after exposure. BA 14-8533

4136

TUMOR RESPONSE AND STROMA REACTION FOLLOWING X-RAY OF A TRANSPLANTABLE TUMOR IN INBRED STRAINS OF MICE. A. W. Oughterson, R. Tennant, and E. A. Lawrence. Yale J. Biol. and Med. 12(4), 419-25 (1940).

Histological changes and curability of tumors treated with 2500 r and 5000 r x ray doses in tumor-resistant and tumor-susceptible strains of mice as well as host reaction are discussed. Experiments emphasize importance of the host in determining tumor response to radiation. BA 14-8560.

4137

MODIFICATIONS OF THE MYELOGRAM DURING THE COURSE OF ROENTGEN THERAPY. R. Brauner and F. Gottlieb. Sang 13(9), 963-72(1939). (In French).

Small x ray doses accelerate maturation of granulocytes, increasing the number of polymorphonuclear cells in bone marrow. There is a progressive decrease in percent of immature stages; increase in more mature stages. Large doses inhibit marrow cells. Marrow changes were observed 8 min after exposure; maximum effect was observed in 24-48 hr. BA 14-8613

4138

THE EFFECTS OF X-RAYS AND RADIUM UPON

REGENERATION OF BRYOPHYLLUM CALYCINUM.

E. Naylor. Am. J. Botany 27(1), 15-17(1940).

Regeneration from leaf notches was retarded 5 min after x irradiation of B. calycinum leaves (1-85 min, 60 kv, 4-5 ma, 5-8 in. distance) and was markedly inhibited after 30 min. Results were similar after RaBr_2 exposure of 1-120 min. No marked structural changes were observed in irradiated material. BA 14-9387

4139

EFFECT OF X-RAYS ON A TUMOR OF KNOWN GENETIC CONSTITUTION. S. G. Warner and M. C. Reinhard. Proc. Soc. Exptl. Biol. Med. 42(3), 673-76(1939).

Tumors (D br B and new Buffalo) which were negative when transplanted into 3 other pure strains of mice were x rayed with doses of 50-100 r, λ effective 0.16 Å. Controlled experiments show 40% positive transplants in formerly resistant strains; carried through 4 transplant generations. Small x ray doses caused constitutional change in tumors. BA 14-4754

4140

IMMEDIATE EFFECTS OF 250 r OF X-RAYS ON THE DIFFERENT STAGES OF MITOSIS IN NEUROBLASTS OF THE GRASSHOPPER, CHORTOPHAGA VIRIDIFASCIATA. J. Gordon Carlson. J. Morphol. 66(1), 11-23(1940).

All middle prophase through early telephase stages had disappeared within 2 hr after 250 r x ray dose. Middle prophase is believed to be most radiosensitive. BA 14-6036

4141

FRAGMENTATION OF THE SECOND CHROMOSOME IN THE FEMALE OF BOMBYX MORI INDUCED BY X-RAYS AND ITS PROBABLE REFERENCE TO CROSSING OVER. Tunco Takasaki. Japan. J. Genetics 14(16), 256-9(1938). (Preliminary Note)

Heterozygous p-Y-Oa females were x rayed with 1500 r. Examination of genetic constitution of resulting apparent recombination individuals showed that they were all due to chromosome aberrations, mostly fragmentation of second chromosome. No unequivocal case of crossing over was found. BA 14-6038

4142

CONTRIBUTORY EFFECT OF HEAT WITH IRRADIATION IN THE PRODUCTION OF MUTATIONS. N. N. Medvedev. Compt. rend. acad. sci. URSS 19(4), 301-2(1938).

Temperatures of 30-39°C applied during x raying of D. melanogaster caused decrease in mutation frequency as compared with controls irradiated at room temperature. BA 14-6197

4143

UTILIZATION OF BIOLOGICAL TESTS FOR X-RAY DOSIMETRY. Fr. Carter Wood. Acta Unio Intern. contra Cancrum 4, 165-74(1939). (In French).

Drosophila eggs are believed to be ideal test objects for measuring x ray dose. LD with x rays and Ra is not influenced by wave length. Ra affects *Drosophila* less intensely than indicated by purely physical measurements. BA 14-6200

4144

ACTION OF PROTRACTED AND FRACTIONATED IRRADIATION ON CERTAIN CHEMICAL EQUILIBRIA OF THE BLOOD. H. Tellez Plasencia. Acta Unio Intern. contra Cancrum 4, 333-58(1939). (In French).

Due to cell destruction there is hydremia, decline in albumin-globulin and a decrease in chlorine content of red cell and plasma. Disturbed interrelations between endocrine and nervous regulation were noted, associated with diminished alkali reserve, increased acetone bodies and circulating glutathione; decreased blood sugar and cholesterol. BA 14-6202

4145

SOME INDICATIONS FOR ROENTGEN RAY TREATMENT.

U. V. Portmann. Calif. and Western Med. 51(4), 241-4 (1939).

Author recommends x ray therapy for: (1) superficial non-tubercular lymphadenitis, (2) Hodgkin's disease, leukemia, (3) certain endocrine disturbances: hyperthyroidism, pituitary basophilism, functional menstrual irregularities, hypopituitary amenorrheas; hypoovarian amenorrheas; dysfunction of anterior lobe of pituitary causing water retention and premenstrual edema. BA 14-6203

4146

THE IRRADIATION OF MICROORGANISMS. Ralph W. G. Wyckoff. Acta Unio Intern. contra Cancrum 4, 231-36 (1939).

Factors influencing results in experiments testing the killing, or injuring effect of radiations are discussed critically; mathematical formulae describing radiation lethal effect on larger and smaller microorganisms are presented. Lethal dose of ionizing radiation (bacteria, yeast, molds) is 10^{-6} ergs/cm³; yeast are damaged by 1/10 of this dose. Eggs of higher animals; seedlings are injured by less than 1/1000 of the lethal dose. BA 14-6204

4147

THE EFFECT OF X-RAYS ON THE GLUCOSE AND HEXOSE-PHOSPHATE GLYCOLYSIS OF TUMOR TISSUE. Barbara Elizabeth Holmes. Proc. Roy. Soc. (London) 127B(847), 223-36(1939).

Irradiation of tumors at 0°C by x or γ rays inhibits lactic acid formation from glucose. X ray dose inhibiting breakdown of glucose had no effect on formation of lactic acid from hexose di- or monophosphates or from glucose-1-phosphate. Decreased activity of dehydroglucose system in irradiated young embryonic brains was corrected by adding Co-enzyme I to the tissue. BA 14-6641

4148

PATHOLOGICAL MITOSIS IN CONNECTIVE TISSUE CELLS AFTER SINGLE ROENTGEN IRRADIATION. Wilhelm Pfuhl and Helmut Kuntz. Z. Anat. Entwicklungsgeschichte. 110(1), 98-121(1939). (In German).

Two stages of abnormal mitoses in rabbit connective tissue cells are described. These are simple "pykno-mitosis" and a "pykno-mitosis with chromosomorphosis," which are described. BA 14-6772

4149

BACTERICIDAL ACTION OF X-RAYS IN THE PRESENCE OF DYES. Chien-Liang Hsu and T. Tung. Proc. Soc. Exptl. Biol. Med. 42(3), 828-30(1939).

Pneumococcus and Streptococcus hemolyticus were killed by nonlethal x ray dose in presence of mercurochrome, similar effect of x rays in presence of Safranin O and Eosin was demonstrated on *Shigella paradysenteriae* Flexner, *Ebertheila typhosa*, and *E. coli*. *S. aureus*, sporebearing, and acid fast organism were resistant to the combined action. *S. aureus* killed by x rays and dye in presence of H₂O₂. BA 14-7096

4150

THE BLOCKING OF EXCYSTMENT REACTIONS OF COLPODA DUODENARIA BY ABSENCE OF OXYGEN. Morden G. Brown. Biol. Bull. 77(3), 382-90(1939).

Influence of temperature, concentration of excystment solution, O₂ tension, and x irradiation on time required for excystment is discussed briefly. BA 14-7743

4151

AN ANALYSIS OF X-RAY INDUCED CHROMOSOMAL ABERRATIONS IN TRADESCANTIA. Karl Sax. Genetics 25(1), 41-68(1940).

Irradiation of Tradescantia microspores produce 1-hit and 2-hit aberrations in chromatids and chromosome. Equations for aberration frequency are given. Frequency

of x ray induced initial breaks was relatively independent of temperature, but frequency of aberrations was greater in cells kept at low temperature during or after exposure, due to greater reunion of broken ends in original position at high temperatures. BA 14-4091

4152

AN X-RAY ANALYSIS OF PROGRESSIVE CHROMOSOME SPLITTING. Karl Sax and Kenneth Mather. J. Genetics 37(3), 483-90(1939).

The chromosomes of a diploid Tradescantia become effectively double with respect to x rays between 30 and 23 hr before metaphase of the first pollen grain mitosis. During this period chromosome and chromatid breaks are similarly distributed; splitting of chromosomes is accomplished in a shorter period. Chromosome and chromatid breaks progress distally from centromere. BA 14-4092

4153

INVESTIGATION OF SEX LINKED MUTATIONS DUE TO ALPHA PARTICLES. Ilse Beleites. Fundamenta Radiol. 5(3/4), 142-52(1939). (In German).

Following a 20-80 hr period of respiring in Rn atmosphere, *Drosophila melanogaster* males were tested for sex linked mutations by "CIB" technic. Internally emitted alpha particles increased mutation rate from spontaneous value by 0.19-3.69%. Radioactivity of flies checked by Geiger counter. Increase in mutation rate was proportional to time of exposure to radon but not to total ion-pair production in treatment chamber. BA 14-4122

4154

A CONTRIBUTION TO THE QUESTION OF APPLICATION OF RADIATION TO LIVING MATERIAL. B. Belluci. Strahlentherapie 65(4), 547-68(1939). (In German).

Decrease in respiratory CO₂ immediately following intense x irradiation was due to utilization of CO₂ in forming K or Na carbonates to neutralize amino acids released from protein cleavage. Respiratory CO₂ was minimal at 1 hr, maximal at 4 hr after treatment. Increased permeability of intestinal tract is attributed to release of K and Na to form carbonate buffers. BA 14-4272

4155

RADIOBIOLOGICAL CHANGES IN NORMAL BLOOD AND HEMATOPOIETIC TISSUE. G. Bignami. Haematologica Arch. 20(6), 561-616(1939). (In Italian).

Author reviews extensive literature on effect of irradiation on blood and blood forming organs and tissues in the normal state. Bibliography is not included. BA 14-4273

4156

EXPERIMENTAL EVIDENCE OF THE BIOLOGICAL EFFECT OF COSMIC RADIATION. J. Eugester, A. Sperlich, W. Hauptmann, H. Holzl, and L. Jager. Fundamenta Radiol. 5(3/4), 134-41(1939). (In German).

The effects of cosmic rays were observed in seeds of *Linum usitatissimum*, *Antirrhinum majus*, and eggs of *D. melanogaster*, and female rabbits shielded with 18 mm Pb plate at altitude of 24000 m. Preliminary results (effects on growth of seeds and eggs; changes in ovaries) are expressed qualitatively. BA 14-4274

4157

RADIUM POISONING; A REVIEW OF PRESENT KNOWLEDGE IN RELATION TO WAR RISKS. J. Read. Brit. J. Radiol. 12(143), 632-7(1939).

Author reviews the literature on radium poisoning and inhalation of dust; no new material presented. Possibility or probability of an individual receiving a lethal dose of radioactive material through occupational exposure is considered. Brief abstracts of more important articles are included. BA 14-4280.

4158

THE TREATMENT OF TUBERCULOSIS OF THE ANTERIOR PORTION OF THE EYE WITH BETA RAYS OF RADIUM.

A. C. Woods. Arch. Ophthalmol. 22(5), 735-42(1939)

Ten cases of tuberculosis keratitis showed subsidence of all inflammation after one treatment with β rays of Ra. There were two recurrences. Three cases of tuberculous scleritis showed greater resistance and required treatment over greater period of time. Possible mechanisms of β ray effect are discussed. BA 14-4285

4159

THE LAMBDA FACTOR IN RADIO-BIOLOGY. M. Lapenna. Strahlentherapie 65(2), 247-82(1939). (In German).

Wave length effect of x ray and Ra on skin, tumors, biochemical reactions, and smaller test organisms is reviewed. Original data on growth of *Vicia faba equina* seedlings following 160 kv and 110 kv x-ray treatment, all doses 570 r-units of Ra radiation are included. Clinical experiments on cholesterol are also reported. BA 14-4279

4160

IRRADIATION OF CANCER FOLLOWING INJECTION OF COLCHICINE. M. F. Guyer and P. E. Claus. Proc. Soc. Exptl. Biol. Med. 42(2), 565-68(1939).

By administering colchicine 15 to 18 hr before irradiation to rats bearing actively growing carcinoma, the effectiveness of x ray in destroying or retarding growth of the cancer was increased. Light frequent dosages of x ray were more effective than heavy infrequent doses. BA 14-4729

4161

EWING'S TUMOR SIMULATING SARCOMA OF SOFT-TISSUE ORIGIN. A CLINICAL, PATHOLOGICAL, AND RADIOTHERAPEUTIC STUDY OF FOUR CASES. Henry Potosky and Jacob R. Fried. Am. J. Cancer 36(1), 1-11(1939).

Soft tissue component of tumor regressed rapidly after radiotherapy, original tumors in each case being radiosensitive. Two recurrent tumors were irradiated and proved radioresistant. Resistance is attributed to alteration in stroma of neoplasm. BA 14-4747

4162

THE EFFECTS OF HARD X-RAYS AND ULTRA VIOLET LIGHT UPON FOWL POX VIRUS IN VITRO. Robert Graham, C. A. Brandly, and Norman D. Levine. Cornell Vet. 29(4), 383-91(1939).

Irradiation of aqueous suspensions of fowl-pox virus with hard x rays in dosages up to 888 r had no effect on the virus. Effect of ultraviolet is described for comparison. BA 14-5055

4163

FLORAL DEVELOPMENT OF CERTAIN SPECIES AS INFLUENCED BY X-RADIATION OF BUDS. Edna Louise Johnson. Plant Physiol. 14(4), 783-95(1939).

Blossoms of *Salpiglossis sinuata*, *Phlox drummonal*, and *Nicotiana tabacum* x irradiated in reproductive stage with single medium dose showed 10 types of floral anomalies: stippling, spotting, streaking of corolla and color changes in early blooming, split corolla, dissected margin of corolla lobes, puckered corolla tissue, abnormal number of corolla lobes, dwarf blossoms in middle and later flowering period. BA 14-5643

4164

THE EFFECT OF ROENTGEN IRRADIATION ON THE LYMPHATIC TRANSPORT OF INDIA INK. Everette Sugabaker and Kanematsu Sugiura. Am. J. Roentgenol. Radium Therapy 44(5), 756-61(1940).

Young albino rats were injected with India ink-distilled water solution and subsequently x irradiated (750, 1500, or 3000 r at 200 kv). Deposition of pigment in axillary or mediastinal nodes was no greater in irradiated than in non-irradiated animals. BA 15-7692

4165

DEVELOPMENTAL EFFECTS RESULTING FROM EXPOSURE TO X RAYS. II. DEVELOPMENT OF LEOPARD FROG EGG ACTIVATED BY BULL PROG SPERM.

Roberts Rugh and Frank Exner. Proc. Am. Phil. Soc. 83(5), 607-17(1940).

Hybrid crosses involving irradiated sperm enhanced development beyond gastrula stage, when dose was raised to 66,000 r, up to 80% developed to tadpole stage, most of which were parthenogenetic-like haploids. Some maternal diploids were also produced. Exposure-effect relation suggests progressive abolition of hereditary function of sperm. (Hybrid cross with non-rayed sperm produced nonviable embryo.) BA 15-8181

4166

DOSIMETRIC AND RADIO-BIOLOGIC STUDY WITH FAST NEUTRONS. III. Karl G. Zimmer. Strahlentherapie 68(1), 74-8(1940). (In German).

Phantom of stearin-paraffin mixture was exposed to fast Li and D neutrons and x rays. Ionization produced (measured by condensor type chambers) was approximately the same for a field of 150 cm², distance 23 cm, neutron irradiation as with x rays of an HVL of 1.35 mm Cu. BA 15-7694

4167

THE INFLUENCE OF INTRACELLULAR ACIDITY ON THE RADIOSENSITIVITY OF VARIOUS ORGANISMS.

Raymond E. Zirkle. J. Cellular Comp. Physiol. 16(3), 301-11(1940).

Drosophila eggs 2 hr and 4.5 hr of age were exposed during x irradiation to various concentrations of penetrating acid (CO₂) and radiosensitivity was deduced from percent hatching and survival curve in comparison for values for normal eggs. Radiosensitivity-acidity curves are explained by assuming that total radiosensitivity is due to several reactions, each with maximal yield at a characteristic pH. BA 15-8645

4168

COMMON ERRORS IN THE DIAGNOSIS AND TREATMENT OF THE ANEMIAS. P. A. Tuckwiller. Southern Med. J. 33(2), 216-18(1940).

X rays are listed as one cause of anemia. BA 15-8462

4169

THE INDEPENDENT ORIGIN OF AMPHIBIAN RED CELLS AS SHOWN BY DIFFERENTIAL SUSCEPTIBILITY TO X-RAYS. John A. Cameron. Biol. Bull. 79(3), 419-22(1940).

Exposure of neurulae of *Ambystoma jeffersonianum* to 1000 r of x rays produced 9 with no hemopoiesis in blood island, 21 with reduced or retarded hemopoiesis. Heart and endothelium formed in all cases (not eliminated by x-rays) thus implying the physicochemical, morphological, and positional distinction between the anlage of the hemopoietic centers and those of the heart and endothelium. BA 15-8614

4170

THE ROENTGEN RADIATION OF PAPILLOMA VIRUS (SHOPE).

I. THE EFFECT OF X-RAYS UPON PAPILLOMAS ON DOMESTIC RABBITS. J. T. Syverton, R. A. Harvey, J. P. Berry, and S. L. Warren. J. Exptl. Med. 73(2), 243-8(1941).

Tumors on rabbit ears were irradiated in vivo with graded, massive and fractional (600 r on successive days) doses from 250-6000 r, 200 kv, 25 ma, 160 r per min. Papillomas were permanently destroyed by 3600 r (80% destroyed by 3000 r) administered massively or fractionally. BA 15-8850

4171

ACTION OF RADIOACTIVE RADIATION ON THE MULTIPLICATION AND STRUCTURE OF MICROORGANISMS.

S. Metelnikov and A. Yakimach. Ann. inst. Pasteur 64(1), 47-54(1940). (In French).

Cultures of *Sarcina*, Tubercle bacilli, and other organisms were exposed to radium emanations (through capillary tubes introduced in cultures). Growth was stimulated by weak doses, growth inhibition or death occurred after strong doses. After irradiation, cocci and rods with various forms, sizes and pigment variations appeared. BA 15-9057

4172
EFFECT OF X-RAYS ON THE STRUCTURAL VISCOSITY OF PROTOPLASM. H. T. Northen and R. MacVicar. *Biodynamica* 3(59), 28-32(1940).

Contents of filaments of *Spirogyra* exposed to 250-5000 r from tungsten target were more easily displaced by centrifugation than filament contents in controls. Decreasing structural viscosity was followed by rise or fluctuation after longer exposures. Changes are attributed to dissociation and re-association of protein molecules in protoplasmic network. BA 15-9395

4173
DIFFERENTIAL SENSITIVITY OF CELLS TO X-RAYS. Karl Sax and C. P. Swanson. *Am. J. Botan.* 28(1), 52-9 (1941).

Cell sensitivity to x rays, measured by frequency of induced chromosomal aberrations, is greatest shortly before mid-prophase in *Tradescantia*. Microporocytes are most radiosensitive, generative cells most resistant, haploid microspores more sensitive than diploid microspores. Difference in sensitivity is attributed to differences in chromosome structure and freedom of movement. BA 15-9434

4174
RADIOACTIVE ION DISTRIBUTION IN PROTOPLASMIC GRANULES. Lorin J. Mullins. *Proc. Soc. Exptl. Biol. Med.* 45(3), 856-8(1940).

Internodal cells of *Nitella* species were immersed for 0.25-8 hr in 0.01 M radioactive K^*Cl or $Na_2HP^*O_4$, then centrifuged to displace all granules longitudinally. Radioactive determinations of bisected cells show that radioactive elements concentrate in granules during immersion. BA 15-9463

4175
STUDIES ON THE TWORT-D' HERRELLE PHENOMENON. VI. EVALUATION OF THE SIZES OF BACTERIOPHAGES BY MEANS OF X-RAYS. E. Wollman and A. Lacassagne. *Ann. Inst. Pasteur* 64(1), 5-39(1940). (In French)

Radioresistance of bacteriophage is apparently dependent upon particle size. (Several phages on agar plates were subjected to x rays and plates were then inoculated with appropriate organisms. Observations on these were compared with observations when phase suspensions were irradiated first and then spread on plates along with bacteria). BA 15-8856

4176
EFFECTS OF FAST NEUTRONS UPON PLANTS, II. ABNORMAL BEHAVIOR OF MITOSIS IN *VICIA FABA*. Y. Nishina, Y. Sinoto, and D. Sato. *Cytologia* 10(3), 406-21(1940).

Primary effects of fast neutrons on mitosis in *V. faba* root-tips are: precocious chromosome formation, aberration and acceleration of mitotic process from metaphase to telophase. Chromosome formation ceases 40 hr after irradiation, commences again after 96 hr, showing such secondary effects as fragmentation, fusion of chromosomes, and irregular divisions. BA 15-14132

4177
AN ANALYSIS OF X-RAY INDUCED SINGLE BREAKS IN NEUROBLAST CHROMOSOMES OF THE GRASSHOPPER (*CHORTOPHAGA VIRIDIFASCIATA*). J. Gordon Carlson. *Proc. Natl. Acad. Sci. U. S.* 27(1), 42-7(1941).

Hypothesis that a single chromosomal break results from a single ionization or excitation is supported by:

(1) linear proportionality between dosage (r units) and number of breaks, (2) absence of threshold below which no breaks occur, (3) close correspondence between observed and expected distribution of breaks among different cells after each dose. Only a small percentage of ionizations produced are effective in producing breaks. BA 15-14187

4178
MECHANISM OF THE ORIGIN OF THE X-RAY INDUCED NOTCH DEFICIENCIES IN *DROSOPHILA MELANOGASTER*. M. Demerec and U. Fano. *Proc. Natl. Acad. Sci. U. S.* 27(1), 24-31(1941).

Most short deficiencies (including less than 15 bands on chromosome) probably arise as result of a "single event" process, having a radius of action of about 600 A. Deficiencies of more than about 15 bands result from two independent events. BA 15-14188

4179
THE TIME INTERVAL BETWEEN X-RADIATION OF SPERM OF *DROSOPHILA* AND CHROMOSOME RE-COMBINATION. B. P. Kaufmann. *Proc. Natl. Acad. Sci. U. S.* 27(1), 18-24(1941).

Sperm of *D. melanogaster* was x irradiated with two equivalent doses, one continuously, one fractionally. No appreciable "healing" occurred, even with 16-day interval between fractions. Presence of multiple-break, complex rearrangements following fractionated treatment supports theory that breakage precedes reunion. BA 15-14196

4180
ON A SET OF SERIAL INVERSIONS IN THE X-CHROMOSOME OF *DROSOPHILA VIRILIS*. Taku Komai and Takesi Takaku. *Japan J. Genetics* 16(1), 10-13(1940). (In Japanese, Eng. sum.)

Strain bearing two independent inversions on X chromosome was obtained by x irradiation. When inversions exist together, crossing-over is suppressed in parts included in inversion, also in uninverted intercalary segment. Part distal to both of them shows only slight suppressing effect. BA 15-14197

4181
THE EFFECT OF RADIATION ON AMPHIBIAN SKIN BEFORE AND AFTER METAMORPHOSIS. Wolfgang Luther. *Naturwissenschaften* 27(43), 713-20(1939). (In German).

Effects of 235-1100 r x ray dose on macroscopic and microscopic characters of salamander larvae skin include: increased black pigment granules in epidermal cells, blocking of reproduction in tissues, absence of multicellular glands, inhibition of regeneration (complete at 660 r), slow development, eventual death due to epidermolysis. BA 15-14330

4182
STUDIES ON THE GLUTATHIONE CONTENT OF THE TISSUES OF RABBITS IN WHICH PART OF THE HYPOPHYSIS HAD BEEN IRRADIATED WITH X-RAY. Takao Yaguchi. *Sei-i Kai Med. J.* 59(6), 700-14(1940). (In Japanese with English Summary).

Small x ray doses directed to hypophysis of rabbits increase the glutathione content of the ovary. Large dose causes a remarkable increase in glutathione content of suprarenal glands. BA 15-14331.

4183
CONTRIBUTION TO THE STUDY OF THE ACTION OF POLONIUM ON PLANT CELLS. R. Villars. *Compt. rend. soc. biol.* 131(19), 677-80(1939). (In French)

Polonium hydrochloride solution containing 0.8% NaCl, traces of HCl, 200 microcuries of Po(RaF) per cc, acting upon meristems of radicles of *Vicia faba*, *Pisum sativum*, and *Pinus pinea*, affected cells in mitosis but did not affect spindle. Hence, polonium is a poison

for chromatin (unlike colchicine-type chemicals); does not affect chondriome. BA 15-15549

4184

THE INFLUENCE OF X-RAY DOSAGE ON GERMINATION. K. Froler and A. Gustafsson. Svensk Botan. Tidskr. 35, 43-56(1941).

X ray effect on seeds of winter wheat and barley were studied. Mortality diagrams are presented and discussed in relation to variations in water content of seeds. BA 15-15570

4185

THE EFFECT OF GAMMA RADIATION ON THE PERMEABILITY OF THE CELL. J. Petrova. Beih. Bot. Centr. 60A(1/2), 843-87(1940). (In German).

In *Zygnema*, hard γ rays of Ra reduced absorption of KNO_3 , permeability of cells to M solution of urea, and absorption of dilute (0.05-0.1 M) KI solution. Both absorption and cell division exhibited wave of injury, recovery, and again injury. Biological effects of β and γ rays are apparently the same when equal amounts of energy are absorbed. BA 15-15574

4186

THE EQUIVALENT EFFECT OF X-RAYS OF DIFFERENT WAVE LENGTH ON THE CHROMOSOMES OF *TRADESCANTIA*. A. C. Faberge. J. Genetics 40(3), 379-84(1940).

Chromosome bodies in *Tradescantia* pollen grain divisions were scored after treatment with 1500 r at 0.44 A and 0.077 A. Means were 8.27 and 8.16, respectively, their difference being less than its S. E. No evidence of a differential wave-length effect on chromosome breakage was found. BA 15-10006

4187

TWO EXTREME X-RAY MUTATIONS OF MORPHOLOGICAL INTEREST. Ake Gustaffson and Ewert Aberg. Hereditas 26(3/4), 257-61(1940).

Irradiated barley of Golden var. (*Hordeum distichum* var. *nutans*) produced: (1) 2-flowered mutant (2 flowers within each lemma) yielding a segregation of 3 normal to 1 mutant, the latter being sterile; (2) mutant with lemma-like glumes with a long awn (normal glume in this variety is linear with short awns). BA 15-10008

4188

GOITER INCIDENCE IN NEW ZEALAND CORRELATES WITH RA EMANATION IN CITY WATER. R. R. D. Milligan. Trans. Proc. New Zealand Inst. 58, 283-5(1927).

Ra emanation experimentally fed to rabbits did not produce goiter.

4189

EFFECTS OF X-RAYS ON THE PERMEABILITY OF ERYTHROCYTES TO WATER AND CERTAIN NON-ELECTROLYTES. T. P. Ting and Raymond E. Zirkle. J. Cellular Comp. Physiol. 16(3), 268-76(1940).

Following 33,000 x ray dose, beef erythrocytes exhibited the following increase in permeability as compared with non-irradiated controls: to water, 20%, to thiourea, 6%, and to ethylene glycol, 3.5%. BA 15-10255

4190

EFFECTS OF X-RAYS ON THE VAPOR PRESSURE OF BLOOD AND ITS COMPONENTS. T. P. Ting and Raymond E. Zirkle. J. Cellular Comp. Physiol. 16(3), 277-83(1940).

After 33,000 r x ray dose, human and beef erythrocytes and whole blood exhibited easily measurable decreases in vapor pressure. Practically all the change occurred in erythrocytes. BA 15-10256

4191

STUDIES ON THE CELL DIVISION IN IRRADIATED TUMORS. Luigi Gallavresik. Tumori 26(3/4), 171-263(1940). (In Italian).

Following intense irradiation of 3 cases of mouth epithelioma and 1 case of skin spindle cell sarcoma there

was a definite decrease in number of mitoses and an increase in atypical mitoses. Appearance of multinucleated cells was observed over a long period. Occurrence of amitosis was little influenced showing greater resistance of this process to irradiation. Effects of fractionated and prolonged exposures are compared. BA 15-10578

4192

AN UNSTABLE BACTERIAL MUTANT OBTAINED EXPERIMENTALLY. S. Ghelelovitch. Ann. Inst. Pasteur 64(3), 255-63(1940). (In French).

A *Sarcina* with salmon colored colonies was derived from a strain with yellow colonies by irradiation, when Ra-irradiated again 9 months later, a non-pigmented variant resulted which dissociated after 4-6 days into salmon colored form with properties of original culture. Salmon colonies fermented dextrose and liquefied gelatin; colorless forms did not. BA 15-11054

4193

EFFECT OF X-RADIATION ON THE GERMINATION OF CHLAMYDOSPORES OF *USTILAGO HORDEI*. H. A. Rodenhiser and L. R. Maxwell. Phytopathology 31(2), 175-81(1941).

Chlamydospore germination was not materially affected by doses to 100 kilo-roentgens (kr); non-viable spores and germination time of viable ones increased with dosage up to 1000 kr which is LD₁₀₀. Effects of certain doses on promycelium length and sporidium development are described. Doses of 50 and 100 kr apparently had no effect on mutation rate of *U. hordei* in these studies. BA 15-11381

4194

DOMINANT VS. RECESSIVE MUTATION. E. R. Dempster. Proc. Natl. Acad. Sci. U. S. 27(6), 249-50(1941).

After x ray, Oregon R strain of *D. melanogaster* exhibited both a lower recessive and higher dominant lethal mutation rate than did the Swedish-b strain. Sensitivity of sperm chromosomes to induction of dominant lethal mutations increased with age of the males (1% in 1-day old, 60% when 16 days old). Neutron-produced ions used in the induction of recessive sex-linked mutations were only 0.75 as efficient as x ray produced ions. BA 15-23116

4195

HEMATOLOGICAL STUDIES ON PATIENTS TREATED BY TOTAL-BODY EXPOSURE TO X-RAYS. B. V. A. Low-Beer and R. S. Stone. p. 338-418 of Industrial Medicine on the Plutonium Project. (NNES IV-20). Robert S. Stone, ed. New York, McGraw-Hill Book Co., Inc. 1951.

Patients were exposed to x-rays (100, 200, or 1000 Kv). The most consistent change was a decrease in absolute number of lymphocytes. Decrease of nuclear lobes per 100 neutrophils; increase of monocytes; deviations in total white blood cell count were also observed. (from authors' summary).

4196

FURTHER INVESTIGATIONS ON THE TRANSMISSION OF INDUCED TUMORS IN FOWL. J. B. Murphy and E. Sturm. Cancer Research 1(8), 609-19(1941).

X ray given in sufficient amount to damage tumor cells, but in an amount insufficient to inactivate filterable agents, destroys transplantability of induced tumors. Results confirm earlier reports on necessity of intact living tumor cells for positive transplanting in fowls and mammals. BA 15-23697

4197

FURTHER STUDIES ON THE EFFECT OF X-RAYS ON A TUMOR OF KNOWN GENETIC CONSTITUTION. M. C. Reinhard, S. G. Warner, and H. L. Glotz. Cancer Research 1(8), 653-55(1941).

Simpson tumors were exposed in vivo to radiation doses of 25-1000 r; after 1 week they were transplanted to mice (C₅₇ Black) which failed to support growth of non-irradiated tumor (934 animals). Doses of 25 r increased takes to 34%, 400 r to 70%, while doses above 400 r decreased percentage of takes. Results are explained as genetic change caused by x rays. BA 15-23698.

4198
BLOOD VARIATIONS IN CANCER CASES TREATED WITH REMOTE, ULTRA-DEEP X-RAY THERAPY. A. H. Roffo and B. Luchetta. Bol. inst. med. exptl. estud. cancer (Buenos Aires) 18(56), 241-76(1941). (In Spanish).

Changes probably due to radiation included reduction of thrombocytes, reduction of lymphocytes, at times with appearance of early forms, rarely immature polymorphonuclear leukocytes, some tendency to shift to left in Schilling differential. BA 15-23703

4199
ALTERATIONS ON PH VALUE OF BLOOD ASSOCIATED WITH HIGH VOLTAGE ROENTGEN THERAPY. A. H. Roffo and A. E. Roffo, Jr. Bol. inst. med. exp. estud. cancer (Buenos Aires) 18(56), 137-48(1941). (In Spanish).

During application of radiation therapy from 400-600 kv, a fall in blood pH occurred, although the fall was not proportional to dosage. Decrease occurred during course of irradiation; after fluctuating, reached stationary level 0.4 pH units lower than the normal, reattaining normal value about a week later. BA 15-23705

4200
THE INACTIVATION OF BACTERIOPHAGES BY X-RAYS: INFLUENCE OF THE MEDIUM. S. E. Luria and Frank M. Exner. Proc. Natl. Acad. Sci. U.S. 27(8), 370-5 (1941).

X rays have an "indirect" effect in water of saline suspensions of bacteriophages. Some agent may be produced in the medium which oxidizes or reduces the phages. In presence of foreign proteins bacteriophages are also inactivated by x rays, but radiosensitivity is reduced, the effect in this case being "direct" effect on phage itself. BA 15-23914

4201
STUDIES ON THE PRODUCTION OF ABNORMAL TYPES OF FERN SPORES AND GAMETOPHYTES. Wilhelm Rottmann. Beitr. Biol. Pflanz. 26(1), 1-80(1939). (In German).

Numerous morphological and cytological abnormalities were induced by treatment of Aspidium filix mas, Pteris aquilina, and P. serrulata spores with varying temperatures, Ra and x ray. Numbers of nucleoli and chromosomes were increased by Ra and x ray, increasing dosages causing reduced germination but the reduction was not directly proportional to dose. BA 14-1925

4202
CROSS-FERTILIZATION, X-RAYS, SHORT WAVE RADIATION AND MUTATIONS IN THE GRAINS OF PROVENCE. Schribaux. Compt. rend. acad. agr. France 25(13), 503-9(1939). (In French). BA 14-1926

4203
THE EFFECT OF ROENTGEN-RAY ON THE BLOOD CODEHYDROGENASES I AND II. William B. Bean, Richard W. Vilter, and Tom D. Spies. Ann. Internal Med. 13(5), 783-86(1939).

Levels of blood codehydrogenases I and II were measured before and after x irradiation in eight subjects. X radiation caused 60-90% fall in the two enzymes within 12 hr, return to normal levels within 24 hr. Nicotinic acid before radiation gave slower fall in enzyme activity (to 50% of original). Authors believe that Roentgen sickness is probably due to changes in oxidative and reductive enzyme systems. BA 14-2117

4204
THE EFFECT OF SINGLE ROENTGEN DOSES ON THE BONE MARROW OF WHITE MICE. H. Langendorff and W. Papperitz. Strahlentherapie 65(4), 624-9(1939). (In German).

The entire body of 3 mos old male white mice was exposed to single x ray dose (180 kv, 4 ma, 0.5 Cu, 21 r/min, dose given 400 r). Histological changes in bone marrow beginning 30 min after exposure are presented graphically and reveal cyclic reactions. Karyolysis was observed 2-3 hr after exposure. Normal status of bone marrow was seen again after 100 days. BA 14-2142

4205
EXPERIMENTAL INVESTIGATION OF THE EXCRETION AND DISTRIBUTION AND BIOLOGICAL EFFECT OF RADON D, E, F INJECTED INTO ORGANISMS. Mituo Miwa and Hisao Yamashita. Gann 32(5), 395-431(1938).

Ra D, E, and F were given intravenously to adult rabbits in 100-600 mc amounts (single or divided doses), to young rats in 5-25 mc amounts. Excretion, retention, and distribution of elements, change in peripheral blood picture, and pathological changes in various organs were studied and observations are reported. BA 14-2143

4206
THE ACTION OF IONISING RAYS ON SEA-URCHIN. IV. THE EFFECTS OF ALPHA RAYS UPON UNFERTILIZED EGGS. Mituo Miwa, Hisao Yamashita, and Kazuo Mori. Gann 33(4), 323-31(1939).

Following moderate doses of α irradiation, eggs of Strongylocentrotus purcherrimus were severely damaged and first cleavage was retarded. At higher doses some eggs were killed immediately. Bombarding eggs with α rays of various ranges showed nucleus to be the most sensitive structure, although some eggs were severely damaged when cytoplasm only was irradiated. BA 14-2144

4207
THE EFFECT OF IONIZING RAYS ON THE SEA URCHIN. III. FURTHER OBSERVATIONS OF RECOVERY FROM THE EFFECTS OF BETA RAYS UPON UNFERTILIZED EGGS AND SPERM, WITH ADDITIONAL STUDIES ON THE TIME FACTOR PROBLEMS. Kazuo Mori, Mituo Miwa, and Hisao Yamashita. Gann 33(4), 316-22(1939).

The occurrence of recovery in eggs of Pseudocentrotus depressus and Strongylocentrotus purcherrimus and its absence in sperm is due to an essential difference in composition between eggs and sperm. BA 14-2145

4208
ROENTGEN RAY THERAPY. Daniel G. Morton. Calif. and Western Med. 31(5), 298-302(1939).

Results of 100 cases of cervical cancer treated with 200 kv radiation indicate the superiority of x ray therapy over the use of Ra alone. Severe immediate reactions appeared in about one fifth of the cases especially when more than 3000 r per field was given. There were six deaths associated either directly or indirectly with x ray therapy. BA 14-2146

4209
RESUME OF COMPARATIVE STUDIES CONCERNING THE ACTION OF BENZOL AND THORIUM X ON LEUCOCYTIC REACTIONS. Gunter Wallbach. Sang 13(7), 719-38(1939). (In French).

Author's previous publications on action of benzol and thorium X on the blood are summarized. BA 14-2615

4210
A CYTOLOGICAL STUDY OF THE PROGENY OF X-RAYED CREPIS CAPILLARIS WALLS. G. A. Lewitsky. Cytologia 11(1), 1-29(1940).

C. capillaris seedlings were x rayed; aberrant mature plants selected for study. Cytological study of F₁ root tips revealed 17.1% (84) aberrations of which 74 were structural chromosome changes, 10 were numerical (polyploid) changes. BA 15-16191.

4211

X-RAY INDUCED CHROMOSOME REARRANGEMENTS IN THE FEMALES OF SCIARA. J. Paul Reynolds. Proc. Natl. Acad. Sci. U.S. 27(4), 204-8(1941).

In *Sciara* eggs, all rearrangements seem to be induced by x rays before the end of the first meiotic division. After treatment, viability of the eggs is low (1-3%). BA 15-16223

4212

CHROMOSOMAL ALTERATIONS INDUCED BY X-RAYS IN BAJRI, (*PENNISETUM TYPHOIDES*, STAPF AND HUBBARD). N. Krishnaswami and Rangaswami Ayyangar. J. Indian Bot. Soc. 20(3), 111-18(1941).

Dry resting seeds were exposed to x rays (15 ma, 42,000 kvp., target distance 19 cm, Cu anticathode) for 1.2 and 3 hr. A three hr exposure proved lethal. Green and albino seedlings, from seeds exposed for 1 and 2 hr, showed 4 plants with ring formation at meiosis with inversion bridges in one of these. Plants were semisterile. Cytological behavior of plants is described. BA 15-16248

4213

BIOLOGICAL STUDIES RELATING TO THE EFFECTS OF RADIATION AND METALS. Samuel Schwartz. p. 197-242 of Industrial Medicine on the Plutonium Project. (NNES IV-20). Robert S. Stone, ed. New York, McGraw Hill Book Co., Inc. 1951.

Biochemical effects of radiation was studied in: ten patients after total-body exposure to x-ray in total dose of 75 to 310 r, 5 patients given 20 to 36 millicuries of P^{32} ; and 5 workers accidentally exposed. Investigations of liver function, white blood cell chemistry, urinary constituents are described. (from author's abstract).

4214

REDUCTION OF BLOOD CO AFTER X-RAY TREATMENT. John A. Cameron. Proc. Soc. Exptl. Biol. Med. 46(4), 558-60(1941).

Rats and monkeys given slightly sub-lethal exposures to CO recover within few minutes after 700-1000 r treatment; controls recover slowly and laboriously. Hilger Spekker spectrophotometric and Hilger (medium quartz) spectrographic analysis of untreated, CO exposed, and CO plus x ray exposure blood of albino rats showed a significant reduction of CO content in the blood of x rayed as compared to unrayed animals (7 completed experiments). BA 15-16532

4215

THE BIOLOGICAL FUNDAMENTALS AND RADIATION THERAPY. Friedrich Ellinger. (Eng. Transl. by Reuben Gross) New York, Elsevier Publishing Co., Inc., 1941. 360p.

Author presents a brief summary of x, γ and ultraviolet ray effect on tissues with emphasis on therapeutic effects. Biological effects are omitted or noted only briefly. BA 15-16533

4216

LOW TEMPERATURE AND RADIOSENSITIVITY OF SKIN OF NEW-BORN RATS. II. RESISTANCE AT DIFFERENT DOSAGES. T. C. Evans, W. A. Robbie, J. P. Goodrich, and J. C. Slaughter. Proc. Soc. Exptl. Biol. Med. 46(4), 662-4(1941).

Lowering temperature to 0-8°C increases skin resistance to roentgen radiation; dosage increase of 1200-1700 r were required to produce comparable injury to that produced by radiation at room temperature. Ratio of dose required at low temperature to that at room temperature can be read from a graph showing the "units" of injury at doses of 300-3300 r (in steps of 300 r) for rats irradiated at room temperature and rats irradiated while packed in ice. BA 15-16534

4217

COMPARATIVE EXPERIMENTAL STUDIES OF 200 KILOVOLT AND 1000 KILOVOLT ROENTGEN RAYS. III. THE BIOLOGICAL EFFECT ON THE SKIN OF THE ALBINO RAT. Edward A. Gall, James R. Lingley, and John A. Hilcken. Am. J. Pathol. 17(3), 319-33(1941).

Histologic changes were studied in two groups of rats given graded x ray doses (600-3000 r) at 200 or 1000 kv to skin of thigh. Doses of 1800-3000 r (200 kv) caused severe permanent injury to skin; equal dose of 1000 kv rays caused only mild transient changes. In another study, 3000 r (1000 kv) was given directly or through wax sheath encasing the limb. Ensheathed skin lesions after 1000 kv x radiation were identical with lesions after same dose of 200 kv rays to bare skin. BA 15-16535

4218

HYPERTHERMIA AS SECONDARY RAY SENSITIZER IN ROENTGEN IRRADIATION. W. Wynen. Strahlentherapie 22, 503-13(1926). (In German)

The effects of the Roentgen rays were observed in tissue made hyperthermic by diathermic by diathermy or sympathectomy. Experiments were made on dogs.

4219

EFFECTS OF RADIATION ON DROSOPHILA EGGS. V. THE DAMAGE BY ROENTGEN RADIATION IN 6 HOUR OLD EGGS IN RELATION TO WAVE LENGTH. H. Langendorff and K. Sommermeyer. Strahlentherapie 68(4), 656-68(1940). (In German).

Killing curves for 6 hr old eggs were determined using x rays having mean wave lengths of 0.16, 0.51, 0.95, 1.23, and 20 Å. On basis of quantum "hit" theory, the number of "hits" required to kill at these wave lengths were 18, 16, 10, 8, and 6, respectively. No variation with wave length was found for 3 hr old eggs. BA 15-16538

4220

ON A POSSIBLE APPLICATION OF RADIOCHEMICAL REACTIONS IN AQUEOUS SOLUTIONS TO RADIOBIOLOGICAL EFFECTS. K. G. Zimmer. Fundamenta Radiol. 5(5/6), 168-75(1940). (In German).

Experimental data on course of in vitro reactions under the influence of x rays are summarized with regard to their applicability to behavior of radiated biological systems. No obvious interpretation of radiobiological reactions in terms of radiochemical reactions in aqueous solutions seems evident. BA 15-16540

4221

ON THE STATISTICAL ANALYSIS OF THE EFFECT OF HARD RAYS ON BIOLOGICAL OBJECTS. I. K. Sommermeyer. Strahlentherapie 68(4), 845-55(1940). (In German).

The quantum "hit" theory of biological effects of x rays is discussed with reference to an ionization path of a fast electron constituting a "hit". Expectations are discussed for variations in wave length, hit-number, half-value dose, and for radiochemical yield. BA 15-16539

4222

WHETHER AND IN WHICH EMBRYONIC STAGE DOES THE RETINA OF CHICKENS BECOME SENSITIVE TO VARIOUS RADIATIONS? Bun-ichi Hasama. Pflugers Arch. ges. Physiol. 244(3), 337-46(1941). (In German)

Neither x ray, Ra radiation, nor other radiation produced pigment change in chick embryo retinae taken from eggs kept in dark. BA 15-17292

4223

THE EFFECT OF PROLONGED X-RADIATION ON THE CONGO RED INDEX OF RABBITS. Cornelia Hoch-Ligeti. Cancer Research 1(1), 28-33(1941).

Whole body of rabbits (except heads) was exposed to 150 r applied in equal parts to both sides of body (55 mc,

0.5 Cu-filter, 140 kv, 5 ma). Total dose of 300-1050 r was given during a year at different intervals. Congo-red indices of exposed rabbits fluctuate more than do those of rabbits untreated or treated with no carcinogenic hydrocarbons; but fluctuate less than those of animals treated with carcinogenic hydrocarbons. BA 15-17627.

4224

TUMORS OF THE SPLEEN IN RABBITS BY MEANS OF INJECTIONS OF THOROTRAST. C. J. van Mervennee and P. A. ten Thije. Ned. Tijdschr. Geneesk. 83(4), 5622-31(1939). (In Dutch).

The injection of 3 to 4 cc of thorotrast per kg kills rabbits in 8-10 hr. After the injection of repeated smaller doses, development of tumors in the spleen (with metastases) was observed. BA 15-17652.

4225

THE INFLUENCE OF THE NATURAL CONTENT OF RADIUM EMANATION (RADON) IN THE ATMOSPHERE UPON THE ORIGIN OF RICKETS. J. L. Dols and B. C. P. Jansen. Ned. Tijdschr. Geneesk. 84(3), 3050-52(1940). (In Dutch).

Of two groups of a litter of new born rats kept on a rachitogenic diet, those housed 10 meters (upper story) above ground developed severe rickets while those housed in the basement (where radon content was higher due to emanations from the ground) had no rickets at all. Both rooms were darkened. BA 15-17772

4226

IS IT POSSIBLE TO KILL NORMAL TISSUES WITH ROENTGEN RADIATION? Paul Busse Brawitz. Arch. pathol. Anat. u. Physiol. 906(9), 570-7(1940). (In German). BA 15-17936

4227

EFFECT OF TEMPERATURE DURING IRRADIATION ON THE X-RAY SENSITIVITY OF MAIZE SEED. J. H. Kempton and Louis R. Maxwell. J. Agr. Research 62(10), 603-18(1941).

In temperatures ranging from -187 to 66°C, maximum x ray sensitivity of air dry (8% moisture) maize seed occurred in the range from 0°C to room temperature. Increases or decreases of seed temperature from these values resulted in a reduction of x ray sensitivity. BA 15-19807.

4228

RADIOBIOLOGIC ACTION AND THE KILLING EFFECTS OF X-RAYS ON ACHROMOBACTER FISCHERI. K. P. Lorenz and P. S. Henshaw. Radiology 36(4), 471-81 (1941).

Average survival percent following irradiation (2925-35100 r) gives exponential curve when graphed, indicating that A. fischeri is destroyed in single "hit to kill" manner. BA 15-18575.

4229

THE SIGNIFICANCE OF ANATOMICAL CHANGES ACCOMPANYING REGENERATION OF X-RAYED BRYOPHYLLUM LEAVES. B. N. Singh and S. N. Mehra. J. Indian Botan. Soc. 19(5/6), 263-72(1940).

Bryophyllum leaves were x irradiated at notches (54 kv, 5 ma, 15 cm, for 2-35 min). A 2-min exposure caused slight stimulation, higher doses inhibited regeneration. After 35-min exposure regenerating leaves were asymmetrical, thick, rolled with an entire margin and a mosaic appearance associated with decreased chlorophyll. Other morphologic changes are also described. BA 15-19808

4230

THE FLUORESCENT-MICROSCOPE ANALYSIS OF ALPHA RADIATION EFFECTS. Ferdinand Hercik. Protoplasma 32(4), 527-35(1939). (In German).

Effect of radiation on epidermal cells of Allium cepa was studied by intra-vital staining with fluorescein and

microscopic examination in ultraviolet. Cells subjected to α irradiation of 34×10^{-7} α /mm for 1-2 hr could be classified into four groups: (1) healthy unaffected cells (nucleus and cytoplasm light green), (2) cells with dye stored in vacuole, plasma and nucleus unstained, (3) plasma and nucleus both stained, (4) cells nearly fluorescein-free and dead. BA 15-19850

4231

STUDIES ON THE EFFECT OF X-RAYS ON THE PATHOGENICITY OF EIMERIA TENELLA. Anthony A. Albanese and Hans Smetana. Am. J. Hyg. 26(1), 27-39 (1937).

Chicks were infected with irradiated suspensions of E. tenella. Infection with oocysts given 9000 r at 75 r/min was less severe than that of controls; 13,500 r at 75/min was the minimum prophylactic dose. Oocysts given 22500-4500 r at 75 r/min caused increased production of organisms during latent period and a stimulating effect of sublethal doses is suggested. High intensity x rays (104 r/min) were more damaging than low intensity. Non-sporulated oocysts were 15 times more sensitive than sporulated ones. BA 12-5096

4232

THE BEHAVIOR OF X-RAY INDUCED CHROMOSOMAL ABERRATIONS IN ALLIUM ROOT TIP CELLS. Karl Sax. Genetics 26(4), 418-25(1941).

Both chromatid and chromosome aberrations were produced by irradiation of growing root tip cells, aberrations accompanied by deficiencies being eliminated after few cell generations. Cells of dormant bulbs were more sensitive than those of dry seeds. Delayed germination of irradiated onion seed increased aberration frequency but delayed germination of bulbs had no such effects. BA 15-21071

4233

THE EFFECTS OF X-RAYS ON MITOTIC AND MEIOTIC CHROMOSOMES AND CELL DIVISION IN CHORTHIPPUS LONGICORNIS. Margaret Creighton. J. Exptl. Zool. 87(3), 347-68(1941).

Mitosis in spermatogonia and embryo cells is very sensitive to x rays, primary spermatocytes are more radioresistant. Most sensitive stage for mitotic chromosomes is 3 hr before anaphase, for meiotic chromosomes, 9 hr before anaphase. In embryo also, cells just prior to prophase or in early prophase are most sensitive to inhibition of mitosis by x rays. BA 15-21076

4234

THE FREQUENCY OF ABNORMAL PLANT PHENOTYPE IN F_1 GENERATION FROM POLLEN OF ANTIRRHINUM MAJUS, VARIOUSLY SWOLLEN AND IRRADIATED. R. Kaplan. Z. indukt. Abstamm. -u. Vererb. 77(4), 568-79 (1939). (In German).

Pollen of A. majus was subjected to shrinking in $MgCl_2$, swelling in NaCl solutions and irradiation. Results indicated that chromosomes are more susceptible to x ray breakage when in hydrated condition. BA 15-21095.

4235

THE INFLUENCE OF NUTRITION IN FORMING GENETIC CHANGES. H. Stubbe. Angew. Chem. 52(38), 599-602 (1939). (In German).

Data are presented from experiments in which mutation-induction was studied in Antirrhinum majus under (1) irradiation and (2) deficiencies of N, P, and S. BA 15-21118

4236

THE QUESTION OF INCREASING THE MUTATION RATE BY ROENTGEN RADIATION THROUGH THE INTRODUCTION OF SALTS OF HEAVY METALS INTO THE ORGANISM. II. H. J. Born and K. G. Zimmer. Z. indukt. Abstamm. -u. Vererb. 78(2), 246-50(1940) (In German).

Flies fed salts of Fe and U exhibited a 1% increase in x ray absorption, mutation rate in fed flies increased 30-50%. Authors conclude that the marked increase in mutation rate in fed flies cannot be accounted for by greater absorption of x rays. BA 15-21125

4237

THE VARIABILITY OF THE MUTATION RATE IN *DROSOPHILA MELANOGASTER* THROUGH SEVERAL GENERATIONS DUE TO EXPOSURE TO CHEMICALS. H. Dotterweich. Z. indukt. Abstamm. -u. Vererbl. 78(2), 261-72(1940). (In German).

Addition of the alkaloid-pilocarpine to culture medium prior to irradiation of males (2900 r) increased the x ray-induced mutation rate. A 2% solution of the agent gave most marked increase, 0.3% and 1% solutions being less effective. Results are attributed to a sub-threshold effect of the alkaloid, made evident by x rays. An apparent adaptive process occurs with return to normal mutation rate after several generations. BA 15-21128.

4238

A STATISTICAL STUDY OF THE LATE EFFECTS OF HEAVY ROENTGEN IRRADIATION ON HEALING OF SKIN WOUNDS. W. H. H. Dobbs. Am. J. Roentgenol. Radium Therapy 45(1), 107-8(1941).

Wounds of rats receiving irradiation showed considerable decrease in tensile strength as compared with normal wounds. X rays were applied to 4 x 1 cm ventral skin field, total dosage 4,500 r in weekly fractions of 1,500 r each (95 kv, 4 ma, 25 cm, 152 r/min.) Incisions were made and closed surgically 60 days post exposure. BA 15-21291.

4239

AN ERYTHEMATOUS SKIN REACTION PRODUCED BY AN ALPHA-PARTICLE BEAM, CASE REPORT. J. C. Larkin. Am. J. Roentgenol. Radium Therapy 45(1), 109-10(1941).

Exposure of hand to beam of 32,000,000 volt α particles for approximately 1 sec caused erythema. Effects of exposure were still evident 4 mo later. BA 15-21296

4240

HEREDITARY SEMISTERILITY IN ROENTGEN RADIATED MICE, DUE TO RECIPROCAL CHROMOSOME TRANSLOCATIONS. P. Hertwig. Z. indukt. Abstamm. -u. Vererbl. 79(1), 1-27(1940). (In German).

Progeny from male mice of which sperm were irradiated were studied. Reduced fertility due to lethality of both gametes and zygotes was found. Transmission ratios of semisterility indicate the presence of translocation. Some individuals homozygous for the translocation survive. BA 15-21132.

4241

THE EFFECT OF ROENTGEN RAYS ON THE PRODUCTION OF PIGMENT IN RABBIT HAIR. E. Lubnow. Z. indukt. Abstamm. -u. Vererbl. 77(4), 516-32(1939). (In German).

X irradiation of 1000-1500 r does not affect growth of new hairs but destroys pigment and lipochondria. BA 15-21135

4242

THE EFFECT OF ROENTGEN RADIATION ON THE SEGREGATION OF ATTACHED X-CHROMOSOMES IN *DROSOPHILA MELANOGASTER*. F. Mainx. Z. indukt. Abstamm. -u. Vererbl. 78(2), 238-45(1940). (In German).

Among progeny of x rayed attached x females, 254 female and 168 male disjunctional exceptions were found. There was a significantly higher frequency of exceptions at 4000 and 4500 r than expected on basis of linear relation found at lower doses, suggesting that each separation is not due to an intramolecular process. BA 15-21139

4243

COSMIC RAYS AND THE MUTATION RATE IN *DROSOPHILA MELANOGASTER*. B. N. Rajewsky and N. W. Timofeeff-Ressovsky. Z. indukt. Abstamm. -u. Vererbl. 77(4), 488-500(1939). (In German).

Mutation rates in *D. melanogaster* were determined after exposing groups of males to cosmic radiation by keeping flies (1) in wooden boxes, (2) boxes with 15 mm, and (3) 60 mm Pb walls, (2) and (3) being included in order to observe effects of secondary rays. There were no statistically significant difference among mutation rates under the three sets of conditions. BA 15-21140

4244

RECOVERY OF CARBON MONOXIDE POISONED MONKEYS UNDER X-RAY TREATMENT. John A. Cameron. Radiology 36(4), 486-7(1941).

Monkeys were exposed to 12.5% CO by volume in air. Some of the monkeys were exposed for 5-6 min to x rays (140 kvp, 4 ma, distance of 10", 130 r/min). Results: x ray therapy shortened time required to attain various phases of recovery from CO poisoning. BA 15-21289

4245

SOME EFFECTS OF X-RAYS ON THE GERM CELLS OF *CHORTHIPPUS LONGICORNIS* (ORTHOPTERA). Margaret Creighton and Byron H. Evans. J. Morphol. 69(1), 187-202(1941).

Male grasshoppers were x rayed with 3000 r. Spermatogonia and secondary spermatocytes exhibit many chromosome abnormalities during division within 90 min after irradiation and division was stopped by 12 hr. As a result of inhibition of division, primary and secondary spermatocytes differentiate directly into spermatozoa, forming giant spermatids. Capacity to differentiate into spermatozoa is evidently independent of maturation divisions. BA 15-21290

4246

RADIOSENSITIVITY OF SKIN OF NEW-BORN RATS. III. SENSITIVITY AT DIFFERENT TEMPERATURES. T. C. Evans, J. P. Goodrich, and J. C. Slaughter. Proc. Soc. Exptl. Biol. Med. 47(2), 434-7(1941).

New born rats were irradiated (2010 r) at temperatures of 0-40°C. Skin sensitivity increased with increase in temperature. Since rate of heart beat and O₂ consumption respond to temperature in same manner as radiosensitivity, it is thought that temperature exerts its effect on radiosensitivity through its control of such metabolic processes as these. BA 15-21292

4247

EFFECTS OF ROENTGEN IRRADIATION AT LOW TEMPERATURE ON THE SKIN OF YOUNG RATS. Titus Carr Evans. Am. J. Roentgenol. Radium Therapy 45(6), 888-94(1941).

Rats irradiated with 130 kv x rays while in chilled state showed markedly less reaction than did litter mates exposed in same manner at room temperature. BA 15-21293

4248

EXPERIMENTAL STUDIES WITH "CONTACT" ROENTGEN RAYS. THE TIME-INTENSITY FACTOR OF THE "TUMOR DOSE" FOR RAT SARCOMA 39 IN SITU. J. Gershon-Cohen, Harry Shay, and S. S. Fels. Am. J. Roentgenol. Radium Therapy 45(4), 600-4(1941).

Using Chaoul contact x ray apparatus at 60 kv, 0.12 mm Cu filter, 3 cm focal-skin distance, 45 r/min. lethal dose for rat sarcoma 39 in situ was 10,000 r given in single dose (tumor 10-15mm in diam.). With divided doses, effect was less, the decrease in effect becoming more marked as total irradiation period became greater. BA 15-21294

4249

EFFECTS ON THYMUS AND TESTIS OF THE RAT WHEN THE THYMUS IS IRRADIATED. B. Jolles. Am. J. Roentgenol. Radium Therapy 45(2), 259-264 (1941).

Rats received 4 doses of 550 r, 130 kv x rays to thymus on 4 consecutive days between 1 and 5 days of age. No changes were observed in testis up to 92 days. Complete atrophy of thymus occurred within a few days. BA 15-21295.

4250

CYTOLOGICAL CHANGES IN VAGINAL SMEARS IN RADIUM AND ROENTGEN IRRADIATION OF UTERINE CARCINOMA AND THEIR PROGNOSTIC SIGNIFICANCE. A. M. Nielsen. Acta Radiol. 37, 479(1952).

4251

THE DEPENDENCE OF THE BIOLOGICAL EFFECT OF RADIATION ON INTENSITY AND WAVE LENGTH, AS MEASURED BY THE DELAYED LETHAL ACTION ON CHICK EMBRYOS. D. E. Lea. Am. J. Roentgenol. Radium Therapy 45(4), 605-13(1941).

Chick embryos were irradiated with γ rays, 160 kv x rays, or 60 kv x rays after 6 days' incubation. Doses necessary to produce same effect were in ratio 1.0:0.6:0.55. When dose was delivered in single exposure at intensity greater than 10 r/min. effect was practically independent of intensity. For lower intensities or divided doses, effect of given dose was less. Theory of recovery under such conditions is presented. BA 15-21297

4252

THE EFFECT OF HIGH VOLTAGE ROENTGEN RAYS ON THE HEART OF ADULT RATS. John E. Leach and Kanematsu Sugiura. Am. J. Roentgenol. Radium Therapy 45(3), 414-25(1941).

Lethal single dose of 200 kv x rays given over whole body of rats was 400 r; given over heart only, at least 10,000 r. Myocardial changes produced: hemorrhage, round cell infiltration, myocardial degeneration, and necrosis. Pericardium and endocardium withstand single doses up to and including 20,000 r. BA 15-21298

4253

THE EFFECTS OF ROENTGEN RADIATION ON SPINAL GANGLIA OF ALBINO RATS. W. C. Ma and Chien-Liang Hsu. Am. J. Cancer 40(3), 335-42(1940).

In a parallel cytological study of direct and indirect x ray effects on spinal ganglia of rats, using special stains, it was found that extent of cellular change varied directly with dosage. Effects: shrinkage and irregularity of cell-outlines, decrease in size and staining quality of nuclei, decrease or increase in mitochondria, loss of Nissl substance and reduction of Golgi apparatus. BA 15-21299

4254

THE PRIMARY REACTION IN THE BIOLOGICAL EFFECT OF RADIATION. K. Sommermeyer. Argew. Chem. 52(6), 140(1939). (In German).

Review article. BA 15-21300

4255

THE EFFECT OF GAMMA RADIATION ON CELLS IN VIVO. F. G. Spear and A. Glucksmann. Brit. J. Radiol. 14(158), 65-77(1941).

Tadpoles were exposed to 538 r of γ rays in single exposures of low or high intensity, or in two treatments separated by various intervals. Mitotic counts in brain and eye cells were made at various subsequent times. In every case mitotic action was reduced, greater effects being noted with high intensity radiation over short intervals. Radiation also increased number of degenerate cells. BA 15-21301

4256

SKIN REACTIONS PRODUCED BY 200 KV AND 1000 KV

RADIATIONS: A COMPARISON. Robert S. Stone and J. Maurice Robinson. Calif. and Western Med. 55(1), 11-14(1941). BA 15-21302

4257

STUDIES ON THE LIBERATION OF SULFURIC ACIDS FROM THE GRANULES OF THE MAST CELLS IN THE SUBCUTANEOUS CONNECTIVE TISSUE AFTER EXPOSURE TO ROENTGEN AND GAMMA RAYS. (Preliminary Report) Bengt Sylven. Acta Radiol. 21(2), 206-12(1940).

A 25 cm² abdominal field of rats was exposed to 1000 or 1500 r of x rays, or to 1050, 1575, or 2100 r of γ rays. Histological examination of tissues 2 days postirradiation indicated some of the sulfuric acid in mast cell granules had left cytoplasm and spread diffusely through connective tissue. Effect was more pronounced after γ rays than after x rays. BA 15-21303

4258

THE ROENTGEN RADIATION OF PAPILLOMA VIRUS (SHOPE). II. THE EFFECT OF X-RAYS UPON PAPILLOMA VIRUS IN VITRO. J. T. Syverton, G. P. Berry, and S. L. Warren. J. Exptl. Med. 74(3), 223-4(1941).

Virus preparations derived from naturally-occurring papillomas in rabbits were x irradiated (90 kv, 40 ma, no filter distance 6 cm, 10400 r/min). Doses of 1-4 million r lowered titer, prolonged the incubation period, decreased size attained by papillomas. Dosages in excess of 5 million r were required to inactivate virus completely. BA 15-22235.

4259

THE INFLUENCE OF ROENTGEN RAYS UPON THE NITROGEN FIXATION BY AZOTOBACTER. R. M. Whelden, E. V. Enzmann, and C. P. Haskins. J. Gen. Physiol. 24(6), 789-96(1941).

Nitrogen fixation decreased markedly and linearly with increasing doses of x rays in A. Chroococcum, A. vinelandii, and A. agilis, respiration apparently was affected only indirectly at these dosages, by some inhibition of cell multiplication. Slight transient increase in rate of O₂ uptake under light x irradiation was observed. BA 15-22369

4260

EFFECT OF X-RADIATION UPON THE GROWTH OF LEMNA MINOR. Edna Louise Johnson. Colo. Univ. Studies. Ser. D. 1(3), 165-75(1941).

Following light and medium x ray doses to parent plants, number of daughter fronds produced was reduced. Doses of 2000 and 2500 r were followed by still slower increase in number of daughter fronds and caused early etiolation and frequent deformity of daughter fronds. BA 15-22679

4261

INFLUENCE OF X-RAYS UPON THE FORMATION OF LEAVES IN NICOTIANA RUSTICA. E. K. Zankevich. Izvest. Akad. Nauk SSSR. Otdel Mat. Estestven Nauk. Ser Biol. 1940(4), 621-7(1940).

X raying of germinated seeds (750-6000 r) induced these leaf changes: undulate and curly leaf membrane, narrow asymmetrical leaves, double and triple leaves, double and split stems. BA 15-22680

4262

DELAYED KILLING OF MAIZE SEEDS X-RAYED AT LIQUID AIR TEMPERATURE. Louis R. Maxwell and J. H. Kempton. J. Wash. Acad. Sci. 29(9), 368-74(1939).

Delayed death was unaffected by 70,000 r at -187°C. Cooled, irradiated plants, however, grew significantly taller than those exposed without cooling. BA 13-16180

4263

MUTATION RATE IN DROSOPHILA MELANOGASTER FOLLOWING IRRADIATION AT VARIOUS TEMPERATURES.

N. W. Timoffeff-Ressovsky and K. G. Zimmer. Biol. Zentr. 59(7/8), 358-62(1939). (In German).

Doses of 1200 r at 7°, 32° and 2750 r at 3°, 33° produced sex-linked mutations by CLB method at same average rate. Mutation was constant (average rate per/t) about 2.88×10^{-5} , for all temperatures. Authors, conclude that x-ray effect is independent of temperature at time of irradiation. BA 13-16206

4264
PHYSIOLOGICAL EFFECTS OF RADIATION. III. THE LETHAL EFFECT OF ROENTGEN RADIATION PRODUCED BY VARIOUS KILOVOLTAGES (50 to 1000 kv) UPON THE BROWN-PEARCE RABBIT EPITHELIOMA. Roger A. Harvey, Richard Dresser, and Stafford L. Warren. Am. J. Roentgenol. Radium Therapy 42(1), 110-21(1939).

No definite wavelength effect found in an experiment using 50, 90, 200 and 1000 kv x ray. Completely lethal dose was between 5000 and 6000 r to the tumor. BA 13-16320

4265
STUDIES ON LEUKEMIA WITH THE AID OF RADIOACTIVE PHOSPHORUS. John H. Lawrence, K. G. Scott, and L. W. Tuttle. New intern. Clinics 3, 33-58(1939).

Studies on six leukemic patients treated with radioactive phosphorus are reported. Response in the patients is compared with response of patients with the same disease to x radiation. BA 13-16321

4266
EFFECT OF ROENTGEN RAYS ON THE TOXICITY OF BLOOD. David J. Maacht. Am. J. Roentgenol. Radium Therapy 41(5), 709-12(1939).

Blood from irradiated mammals was more toxic than that from unirradiated to root growth of Lupinus albus seedlings grown in 1% whole blood or serum in standard physiological solution. Amount of toxic substances was maximum 24 hr after irradiation. BA 13-16322

4267
SOME INDICATIONS FOR ROENTGEN RAY TREATMENT. U. V. Portmann. Calif. and Western Med. 51(3), 151-4 (1939).

Author lists conditions in which x ray and Ra treatment are useful. Suggested as probable mechanisms of therapeutic effectiveness in inflammatory diseases: destruction of phagocytic blood cells and liberation of antibodies and other protective substances. BA 13-16323

4268
BIOLOGICAL EFFECTS OF GAMMA RADIATION. (SERIES II) S. Russ and G. M. Scott. Brit. J. Radiol. 12(139), 440-1(1939).

Authors compared effects of continuous exposure of rats to γ rays (a) without interruption and (b) with 2 days interruption (lost days made up by extending time of exposure so that total dose was the same as in (a)). Biological effects were equally marked in (a) and (b). Radiation increased the death rate during experimental period; accelerated aging, decreased fertility. BA 13-16324

4269
PHYSIOLOGICAL EFFECTS OF RADIATION. II. THE IN VITRO LETHAL SINGLE MASSIVE ROENTGEN-RAY DOSE (AT 200 KV) FOR THE BROWN-PEARCE RABBIT EPITHELIOMA. Otto de Puy Sahler and Stafford Warren. Am. J. Roentgenol. Radium Therapy 41(6), 954-61(1939).

X ray dose lethal to tumor in vitro was studied by irradiating: (1) tumor fragments, (2) tumor mass in vitro and cutting it into fragments for implantation, (3) tumor in situ followed by removing and fragmenting it. Tumor-lethal dose lay between 5000 and 6000 r for (1), (2), and (3). BA 13-16325

4270
CONTINUED OBSERVATION OF IRRADIATED CELL

NUCLEI. Kurt Wottge. Arch. exp. Pathol. Pharmacol. 193(1), 96-106(1939). (In German).

Dark field examination of protein coagulation processes that were initiated by sublethal x ray treatment showed increased permeability of the nuclear membrane following irradiation of Unio tumidus eggs. BA 13-16325

4271
THE DEVELOPMENT OF HIGH VOLTAGE X-RAY TUBES AT THE CALIFORNIA INSTITUTE OF TECHNOLOGY. Charles C. Lavritsen. Radiology 31(3), 354-61(1938).

Total x ray energy which can be administered to a human through a fixed area (human skin reaction being the limiting factor) was calculated for voltages up to 1000 kv. Depth doses at high and low voltages were compared. At 500 kv or more where range of electrons becomes large, there may be a change in biological effectiveness. BA 13-16391

4272
THE INFLUENCE OF ROENTGEN RADIATION ON IMMUNITY TO SHOPE FIBROMA VIRUS. Johannes Clemmesen. Am. J. Cancer 35(3), 378-85(1939).

After roentgen irradiation, rabbits given Shope fibroma virus intravenously show prolonged growth of the fibroma following injection, prolonged resorption of fibroma and generalized fibromatosis. Development of immunity to repeated injections was delayed in x rayed rabbits. Results suggest that roentgen rays act on reticuloendothelial system. BA 13-16845

4273
THE PRODUCTION OF TRANSPLANTABLE CARCINOMA AND SARCOMA IN GUINEA PIGS BY INJECTIONS OF THOROTRAST. L. Foulds. Am. J. Cancer 35(3), 363-73 (1939).

Four of 9 guinea pigs had tumors produced by 4 injections of 0.2-0.3 cc thorotrast at base of nipples; average induction time was 37 mo. Carcinoma, sarcomata and fibrosarcoma were produced and all were transplantable. BA 13-16851

4274
GROWTH OF WHEAT PLANTS FROM DRY AND SOAKED IRRADIATED GRAINS. Edna L. Johnson. Plant Physiol. 14(3), 493-504(1939).

Author studied survival of wheat grains irradiated (1) dry and (2) soaked. Doses up to 10,000 r were without effect, 20,000 r proved lethal to more than 50%; more than 20,000 r killed all of (1). After only 5000 r, all of (2) died within 3 weeks, and all of (2) (even after lowest doses) made less growth than controls and (1). There was evidence of increased growth and tillering of (1) after doses up to 10,000 r. BA 13-17714

4275
EXPERIMENTS ON THE EFFECT OF X-RAY ON PENNISETUM TYPHOIDEUM RICH., NICOTIANA TABACUM LINN. AND BRASSICA JUNCEA HK. F. AND T. L. S. S. Kumar and W. V. Joshi. Indian J. Agr. Sci. 9(4), 675-84(1939).

Impaired seed production and germination resulted from x irradiation (varying frequency) of anthers, seeds, and ovaries of P. typhoideum and seeds of mustard and tobacco. Soaked seeds were injured more than dry ones. X rayed soaked tobacco seed gave plants deficient in leaf number, height, and leaf factor. X irradiated plants showed weakening. BA 14-9859

4276
THE EFFECT OF X-RAYS ON SEX IN DROSOPHILA SUBOBSCURA AND ACCOUNT OF SOME SEX-LINKED CHARACTERS. A. L. M. Christie. J. Genetics 39(1), 47-60(1939).

Treatment with 578 and 775 r yielded 2.3% and 5.4% of verified sex-linked lethals; 1.02% of sex-linked visible

mutations produced at 578 r. For given dose, frequency of induced lethals in *D. subobscura* approximates that in *D. melanogaster*, but frequency of visibles was higher in the former. Ten autosomal dominant and two autosomal recessive mutants also found in treated cultures and six spontaneous mutants were found. Linkage map for 9 loci of the x chromosome is presented. BA 14-9868

4277

X-RAYS IN DIAGNOSIS AND TREATMENT OF GAS GANGRENE. James F. Brailsford. Brit. Med. J. 1940 (4128), 247-9(1940).

Treatment by x rays morning and evening for three days over all involved tissue was found to be curative in many cases. X irradiation is recommended in cases where infection has extended beyond reasonable bounds for amputation or where surgery is contra-indicated.

BA 14-10011

4278

PATHOLOGY OF IRRADIATION SICKNESS; A NEW METHOD FOR INDUCING SHOCK. Virgil H. Moon, Karl Kornblum, and David R. Morgan. Proc. Soc. Exptl. Biol. Med. 43(2), 305-6(1940).

Dogs given abdominal x irradiation developed delayed sickness. Vomiting, diarrhea, low blood pressure, hemoconcentration, prostration, and death resulted. Postmortem findings were those of shock; capillo-venous congestion, petechial hemorrhages in mucosae and serosae, edema of soft tissues and parenchymatous degeneration. X ray injury caused delayed necrosis of intestinal mucosa, syndrome of shock is attributed to this. BA 14-10013

4279

CLINICAL ASPECT OF ELECTRICALLY PRODUCED GAMMA RAYS. Albert Soiland Calif. and Western Med. 52(4), 172-6(1940).

There was little apparent difference in results obtained in California Institute of Technology where radiation between 600 and 1200 kv was used and at Los Angeles Tumor Institute which operated within range of 600 kv. Numerous patients with neoplastic lesions showing little response to standard x ray technique may be successfully treated by electrically produced γ rays, however. BA 14-10014

4280

PROTECTION OF THE RADIATION WORKER. G. W. C. Kaye. Nature 145(3671), 370-3(1940).

Author describes various precautionary measures now in use for protection of both operators and patients; X ray protection, Ra protection, electrical precautions, ventilation and lighting, and neutron protection. Historical notes are included. BA 14-10503

4281

RADIORESISTANCE OF HOG CHOLERA VIRUS AND THE VIRUS OF AUJESKY'S DISEASE. G. Hirt. Arch. wiss. u. prakt. Tierheilk. 75(2), 144-9(1939). (In German).

Virulence and invasiveness of the virus of Aujeszky's disease resisted x ray doses equal to 165 skin erythema doses; virus of hog cholera resisted 193 skin erythema doses. BA 14-10781

4282

THE SIZE OF THE TOBACCO MOSAIC PARTICLE FROM X-RAY DETERMINATIONS. John W. Gowen. Proc. Natl. Acad. Sci. U. S. 26(1), 8-10(1940).

Tobacco virus and several derivatives were irradiated with x rays from Cr, Cu, and Ag, having effective wavelengths of 2.1, 1.5, and 0.7 Å. Inactivation rates were used to compute size of entity inactivated. Computed values corresponding to absorption data; average size of "vital volume" of mosaic particle 7.5×10^{-18} cm³, atomic volume 940,000; molecular wt 15,000,000. BA 14-11237

4283

ELIMINATION OF RADIOACTIVE ELEMENTS IN PATIENTS WHO HAVE RECEIVED THOROTRAST INTRAVENOUSLY. Wilhelm Stenstrom and Irwin Vigness. Proc. Soc. Exptl. Biol. Med. 44(1), 18-22(1940).

Patients were studied 6 and 7 yr after intravenous thorotrast. Found: thorium X and small amounts of mesothorium 1 in feces, unidentified radioactivity in ashed urine, thorium B from breath (thoron gas).

BA 14-11992

4284

DEVELOPMENTAL EFFECTS RESULTING FROM EXPOSURE TO X-RAYS. I. EFFECT ON THE EMBRYO OF IRRADIATION OF FROG SPERM. Roberts Rugh. Proc. Am. Phil. Soc. 81(3), 447-71(1939).

Sperm suspensions were irradiated with 15-50,000 r of 200 kv x rays then used to inseminate eggs. Even 15 r caused exo-gastrulation in some embryos. Exponential curve was obtained when percent hatching was plotted against dose (97.8% hatched at 15 r, 1.6% at 10,000 r). With doses greater than 10,000 r, higher percent hatched, reflecting gynogenetic development of eggs activated by severely damaged sperm. BA 14-12129

4285

AN EXPERIMENT ON CHROMOSOME FRAGMENTATION IN TRADESCANTIA BY X-RAYS. A. C. Faberge. J. Genetics 39(2), 229-48(1940).

Analysis of variance within data shows that the effect of increasing dosage is linear. Amount of rejoining is an inverse function of initial number of breaks. Higher temperatures allow more breaks to rejoin, unlike the situation in *Drosophila*. Amount of rejoining depends on total dose. Effect of dose fractionation is also reported. BA 14-12885

4286

INDUCTION BY FAST NEUTRONS OF MUTATIONS IN ANTIRRHINUM. II. GENETICS. Roy Milton Chatters. Am. Naturalist 74(752), 289-5(1940).

Mutations were produced (or hastened) by irradiating dry seeds with fast neutrons. Mutants, after self pollination, produced like progeny in significantly large number of cases. BA 14-12903

4287

HISTOLOGICAL AND RADIOBIOLOGICAL STUDY OF TUMORS OF THE UTERINE CERVIX TREATED WITH RADIATION. G. Frola. Arch. intern. med. exptl. 8, 289(1933). (In French).

4288

THE EFFECT OF RADIATION FROM RADIOACTIVE INDICATORS ON THE PENETRATION OF IONS INTO NITELLA. Lorin J. Mullins. J. Cellular Comp. Physiol. 14(3), 403-5(1939).

Studies made with radioactive Na indicate that it is physiologically identical with the stable isotope except that when concentration of radioactive ion is raised, increasing intensity of radiation above 1 mc/l, the amount of ion penetrating internodal cells of *Nitella* is decreased. Comparable x irradiation also produced such a decrease. BA 14-15376

4289

VARIATION IN PELT COLOR OF DESCENDANTS OF ROENTGEN IRRADIATED RABBITS. Rolf Danneel and Ernst Lubnow. Biol. Zentr. 59(11/12), 588-97(1939). (In German).

Black Alaska male rabbits, Abcdg/anBCDg, given 1000 r, regained fertility within 6 mo after treatment; produced 53 young from 9 matings. Young showed high mortality. Six survivors were strikingly lighter on posterior half of body. Color effect disappeared with

first shedding of hair, and recurred more weakly in some F_2 and F_3 progeny. Similar results followed treatment of another male with 1600 r. BA 14-12932

4290
A RADIATION METHOD FOR DETERMINING THE NUMBER OF GENES IN THE X-CHROMOSOME OF DROSOPHILA. D. E. Lea. J. Genetics 39(2), 181-8(1940)

Densely ionizing radiation (neutrons) was less efficient than x rays in producing sex-linked **lethal mutations**. X rays ionize less densely by a ratio of 1-1.6. Average target size was calculated to have radius of 1.89×10^{-7} cm. From target volume the number of genes in X chromosome capable of lethal mutation is estimated at 1860. BA 14-12943

4291
THE PROBLEM OF ROENTGEN THERAPY OF CARCINOMAS. E. G. Mayer. Z. Krebsforsch. 49(3), 290-1(1939). (In German).

Determination of dosage is considered to be the essential problem of irradiation therapy. Systemic reactions and behavior of tumors vary greatly and cannot be predicted. Reactions of normal irradiated tissue also vary. Types of reactions encountered are considered. BA 14-13376

4292
REPORT ON THE SCHNEEBERG INVESTIGATIONS B. Rajewsky. Z. Krebsforsch. 49(3), 315-40(1939). (In German).

Author discusses geological distribution of emanative material in dust, water, and rocks, and deposition of emanation in miners and the general population, with special regard to determining lethal and tolerance levels. Some pulmonary cancer cases showed excessive emanative activity; others did not. Author places tolerance of emanative activity between 30 and 3 M. E. BA 14-13384

4293
A PRELIMINARY REPORT OF THE EFFECT OF X-RAY ON TRICHINOSIS IN THE RAT. Ralph F. Honess. J. Colorado-Wyoming Acad. Sci. 2(6), 44(1940).

Normal infestation was reduced about 26% by using 800 r; in rats fed irradiated Trichina, 800 r reduced infestation about 85%. BA 14-14045

4294
THE EFFECT OF FAST NEUTRONS ON THE CHROMOSOMES OF TRADISCANTIA. Norman Giles. Proc. Natl. Acad. Sci. U. S. 26(9), 567-75(1940).

There is no qualitative difference in results following neutron and x ray treatment of chromosomes. Quantitatively, neutrons are 16-17 times as effective as x rays in producing dicentric chromatid aberrations. There is a linear relationship between exchange-break aberrations produced and neutron dosage; an exponential relationship exists with x ray dosage due to difference in ionization paths produced by x rays and neutrons. BA 15-1832

4295
A COMPARISON OF CHROMOSOMAL ABERRATIONS INDUCED BY X-RAY AND ULTRA-VIOLET RADIATION. Carl P. Swanson. Proc. Natl. Acad. Sci. U.S. 26(6), 366-73(1940).

X irradiation of the generative nucleus (g. n.) in Tradescantia pollen grains splits chromosomes into sister chromatids, both having aberrations at identical loci. Irradiation of g. n. in pollentube produces considerable number of chromatid deletions, occasional chromatid exchanges. Ultraviolet radiation of g. n. in pollen tube induces only simple chromatid deletions. BA 15-1843

4296
UNEQUAL BREAKS IN TWO SISTER CHROMATIDS INDUCED BY X-RAYS IN DROSOPHILA MELANOGASTER. M. Demerec and Eileen Sutton. Proc. Natl. Acad. Sci. U. S. 26(8), 532-6(1940).

Cytogenetic analysis of N264-86, obtained from an x rayed male showed 2 strands affected in x chromosome. One strand was deficient from 3C8 to 3E5 inclusive and showed changes in fa and rst loci, while a piece from 3C7 to 3E5, inclusive, was lacking from the other strand and inserted into the chromocenter of 4. Thus, right breaks occurred at the same point, left breaks occurred at different points but close to each other BA 15-1870

4297
AN ANALYSIS OF THE PROCESS OF STRUCTURAL CHANGE IN CHROMOSOMES OF DROSOPHILA. H. J. Muller. J. Genetics 40(1/2), 1-66(1940).

Frequency of gross structural changes induced by irradiation of chromosomes in spermatozoa is proportional to ionization produced regardless of wavelength (50 kv x rays - γ rays), concentration of dose in time, fertilization immediately or after 1 mo, radiation intensity (0.04 - 250 r/min), and temperature (5° - 37°C). Primary radiation effects accumulate independently until fertilization. BA 15-1876

4298
CYTOLOGY AND DEVELOPMENT OF THE EMBRYOS OF X-RAYED ADULT DROSOPHILA MELANOGASTER. B. P. Sonnenblick. Proc. Natl. Acad. Sci. U.S. 26(6), 373-81(1940).

Adult males and females were x rayed and mated with untreated flies. Embryonic mortality among their offspring was high. Mature oocytes were very susceptible, development, meiosis, and mitosis were distorted. BA 15-1878

4299
THE FAILURE OF INTRAPERITONEAL INJECTION OF 3, 4-BENZOPYRENE SOLUTION TO INCREASE THE GENERAL SUSCEPTIBILITY TO CANCER. S. Beck. Brit. J. Exptl. Pathol. 21(3), 133-5(1940).

Mice (110) were injected intraperitoneally with 1 mg of 3, 4 benzopyrene in 0.5 cc olive oil and 3 mo later subjected to cauterization, x rays and ultraviolet light. No tumors occurred at irritated sites. BA 15-2332

4300
THE EFFECT OF COLCHICINE AND X-RAY ON A TRANSPLANTABLE MAMMARY CARCINOMA IN MICE. John W. Hirshfeld, Robert Tennant, and Ashley W. Oughterson. Yale J. Biol. and Med. 13(1), 51-60(1940).

Combination of x rays (single dose of 2500 r) and colchicine (0.0010 mg/g) producing maximum accumulation of mitosis, yielded slightly higher rate of curability of Yale Ca, No. 1 than did x ray alone. BA 15-2345.

4301
ON THE PREVENTION OF ROENTGEN LEUCOPENIA. C. Carrie. Acta Unio. Intern. contra Cancrum 4, 816-7(1939). (In German).

Leukopenia is considered to be a C-avitaminosis. BA 15-2366

4302
X-RADIATION AND GROWTH SUBSTANCES AS AFFECTING PLANT PRIMORDIAL TISSUES. Virginia C. Irvine. Proc. Soc. Exptl. Biol. Med. 43(3), 453-5(1940).

In sunflower, zinnia, and tomato seedlings after moderate x ray doses the meristematic region becomes divided into 2 or 3 parts with separate groups of leaves, leading to distortion or fasciation of leaves, disturbed phyllotaxy and stunted growth of whole plant. Application of β -naphthoxyacetic acid in lanolin paste gives similar results. BA 15-2920

4303
YEAST GROWTH: A POSSIBLE TEST ORGANISM FOR X-RADIATION. Oscar W. Richards. Radiology 34(3), 317-26(1940).

X irradiation of pure strains of *Saccharomyces cerevisiae* with 9500-28,000 r at 70 kv, and with 200-38,000 at 200 kv x rays; retards the increase in number of cells per unit volume, increases optical densities of populations with doses up to 15,000 r, decreases the densities with higher doses. BA 15-2923

4304

STUDIES ON *CLONORCHIS SINENSIS* IN VITRO. IV. COMBINED EFFECT OF GENTIAN VIOLET AND X-RAYS. H. J. Chu and Chien-Liang Hsu. Chinese Med. J., Suppl. 3, 260-6(1940).

Gentian violet (1/400,000) combined with 4000 r or 2000 r of x rays was more destructive to *Clonorchis* than either agent alone. X rays did not increase the effect of 1/40,000 gentian violet (a therapeutic concentration). BA 15-3224

4305

X-RAY STUDIES ON THE FIELD BEAN. Clarence F. Genter and Hubert M. Brown. J. Heredity 32(1), 39-44 (1941).

Dormant and germinated *Phaseolus vulgaris* seeds were x rayed (2160, 6500, 13,000, and 26,000 r). Of 1434 second generation progenies grown from treated seed, 150 showed mutations. Characters affected: plant size, branching, leaf size, shape, texture; fertility; earliness of maturity. Chlorophyll abnormality was the most common irregularity. BA 15-11772

4306

ON THE QUESTION OF INCREASED X-RAY MUTATION RATE BY DEPOSITION OF SALTS OF HEAVY METALS IN THE ORGANISM. W. Buchmann and K. G. Zimmer. Z. indukt. Abstamm. -u. Vererb. 78(1), 148-54(1940). (In German).

D. melanogaster males were fed ferrum oxydatum saccharatum liquidum and irradiated with hard and soft x rays. No statistically significant difference was found in mutation rate as compared with similarly irradiated flies fed a standard medium. BA 15-11802

4307

ABSENCE OF A TIME FACTOR IN THE PRODUCTION OF TRANSLOCATIONS IN *DROSOPHILA* SPERM BY X-IRRADIATION. Everett R. Dempster. Am. Naturalist 75(757), 184-7(1941).

Genetical tests of translocations produced in *Drosophila* sperm by 5000 r of x rays (220 kvp, $\frac{1}{2}$ mm Cu and 1 mm Al filter) showed 117 translocations (17.2 + 1.46 %) when irradiation was applied at 167 r/min and 136 translocations (17.0 + 1.33%) when applied at 12.5 r/min. BA 15-11808

4308

ON THE LOCUS OF BOBBED GENE IN THE Y-CHROMOSOME OF *DROSOPHILA VIRILIS*. Sukeichi Fugii. Japan J. Genetics 16(3), 91-6(1940).

Mutual translocation involving Y and 2nd chromosomes was obtained by x irradiation. Breakage points and resulting phenotype are described. BA 15-11813

4309

RADIATION AND THE CELL. Paul F. Henshaw. J. Natl. Cancer Inst. 1(3), 277-90(1940).

There is a close, if not direct, relationship between certain radiobiologic results observed and the initial irradiation effect produced. Three types of direct cell response are indicated; single-event action and multiple-event actions in which effect is manifested in (1) holistic fashion or (2) by degree. Implications of the three types of events with regard to biology are discussed. BA 15-11976

4310

COMPARATIVE EXPERIMENTAL STUDIES OF 200 KILOVOLT AND 1000 KILOVOLT ROENTGEN RAYS. II. THE BIOLOGICAL EFFECTS ON THE BONE MARROW OF THE ALBINO RAT. James R. Lingley, Edward A. Gall,

and John A. Hilcken. Am. J. Pathol. 16(6), 845-954 (1940).

Rats were given 600-3000 r of 200 or 1000 kv x rays in region of femoral bone marrow. Cell changes in the marrow are described. Results showed no essential difference in effect on marrow of equal amounts of the two types of rays. Effects on marrow was proportional to dose. BA 15-11977

4311

COMBINED INFLUENCE OF X-RAY INTENSITY AND INTRACELLULAR ACIDITY ON RADIOSENSITIVITY. Raymond E. Zirkle. J. Cellular Comp. Physiol. 17(1), 65-70(1941).

Germinating fern spores were x irradiated in presence of graded concentrations of CO₂ and ammonia. Author found radiosensitivity to be maximal and minimal at definite concentrations of the penetrating acid and base. Heights of maxima and minima were modified by change in x ray intensity, while concentrations at which maxima and minima occur were not changed by x radiation. BA 15-11978

4312

THE VALUE OF LIVER EXTRACT IN CASES INTOLERANT TO ARSENICALS, HEAVY METALS, AND RADIATION. George Miller MacKee and Girsch David Astrachan. J. Invest. Dermatol. 3(5), 409-42(1940).

Of 107 patients, 5 exhibited unfavorable reactions to radiation therapy, which are described. Liver extract injections improved blood counts and proved valuable as a therapeutic or prophylactic agent in cases of drug and radiation intolerance. BA 15-12508

4313

TUMORS IN MICE INJECTED WITH COLLOIDAL THORIUM DIOXIDE. H. B. Andervont and M. B. Shimkin. J. Natl. Cancer Inst. 1(3), 349-53(1940).

Two spindle-cell sarcomas and one hemangioma were induced in 9 mice 15-18 mo. following subcutaneous injection of colloidal thorium dioxide. The compound did not induce primary pulmonary tumors in strain A mice following intravenous injection of 0.2 to 0.8 cc. BA 15-12552

4314

EFFECT OF CARCINOGENS ON SMALL FREE-LIVING ORGANISMS. I. *EBERTHELLA TYPHI*. R. R. Spencer and M. B. Melroy. J. Natl. Cancer Inst. 1(2), 129-34 (1940).

E. typhi, exposed continuously to methylcholanthrene for 240 consecutive transfers, and to γ rays of Ra for 192 transfers, showed no structural, functional, or immunological changes other than immediate stimulation of cell division. Earlier reports are confirmed. BA 15-12593

4315

LOCALIZATION OF LITHIUM IN TUMOR TISSUE AS A BASIS FOR SLOW NEUTRON THERAPY. Paul A. Zahl and Franklin S. Cooper. Science 93(2403) 64-5(1941).

By injection of Li salts of dyes into tumor bearing mice, an increase of about 43% in radiation dosage to the tumor over that delivered to other tissues was obtained. BA 15-12599

4316

INFLUENCE OF DEEP RADIATION UPON PLANT GROWTH. Vincenzo Rivera. Nuovo Gior. Bot. Ital. 47(3), 559-71(1940). (In Italian).

Vicia sativa seedlings, grown in lead boxes, were subjected to deep radiation: one set (a) shielded with heavy Pb cover, the other set (b) left exposed. After treatment, (a) were heavier than (b) (average wt of seedlings, 5.01 gm, average wt of 17 irradiated seedlings 4.56 g). Stem length averaged 3.6 (a), 1.5 cm (b); root length, 3.2 cm (a); 1.5 cm (b). BA 15-13579.

4317

ROOT-MODIFICATIONS INDUCED IN *VICIA FABA* BY

IRRADIATING DRY SEEDS WITH SOFT X-RAYS. G. F. Smith and H. Kersten. *Plant Physiol.* **16**(1), 159-70 (1941).

Unsoaked *V. faba* seeds were exposed to radiation from gas x ray tube (Cu target, Al window, 30 kv, 10 ma, at 8 cm for 20 min). Roots of seedlings from these seeds exhibited these external modifications; absence of lateral roots, poor development of root tip, and occurrence of "delayed Killing" after 8-day germination period. Histological modifications are also described. BA 15-13580.

4318
X-RAY EFFECTS ON THE GROWTH AND REPRODUCTION OF WHEAT. D. J. Wort. *Plant Physiol.* **16**(2), 373-83 (1941).

Marquis spring wheat seedlings were x irradiated (19-228 r, 1 mm Al screen). Regardless of seed age (9 or 57 mo), greatest growth rate and height produced by 114 r. Greatest fresh and dry weights of plants from older seeds resulted from 76-4 dose, of fresh seeds, from 57 r. Heading and flowering accelerated in plants from old seed by 76-114 r, retarded by same dose in those from fresh seed. Height and weight of Fulhio winter wheat seedlings increased by all doses used, maxima at 114 r. BA15-13582

4319
DISSOCIATION OF PNEUMOCOCCUS BY RADON IRRADIATION. T. T'ung and Chien-Liang Hsu. *Proc. Soc. Exptl. Biol. Med.* **43**(4), 744-46(1940).

Dissociation of *Pneumococcus* type I by culturing in presence of γ rays of radon took place after eleventh generation, much earlier when combined with immune serum. The effect (appearance of R colonies) was more abrupt with γ rays alone than with serum alone, although dissociants were morphologically, culturally and serologically identical. Radon dissociants (not serum cultured dissociants) however, were avirulent and irreversible by animal passage. BA 14-12434

4320
FURTHER STUDIES WITH SEEDLINGS ON THE QUESTION OF WAVELENGTH DEPENDENCE OF RADIOBIOLOGICAL REACTIONS. P. S. Henshaw and D. S. Francis. *Am. J. Cancer* **35**(3), 386-400(1939).

Triticum and *Lycopersicum* seedlings were exposed to 200 and 700 kv x rays. Harder radiation was more effective. BA 14-12615

4321
THE COMBINATION ACTION OF ROENTGEN RAYS AND SULFANILAMIDE ON *STAPHYLOCOCCUS AUREUS*. Rubin Flocks, O. N. Fellowes, and H. Dabney Kerr. *Am. J. Roentgenol. Radium Therapy* **44**(1), 115-16(1940).

Staphylococcus aureus cultured in meat broth containing 0.4% prontosil soluble or sulfanilamide. After incubation, colony count was less in those cultures which had been irradiated with 100 and 200 r of low voltage x rays. *Staphylococcus*-infected mice had slightly lower survival rate when treated with drug plus x ray than when treated with either one alone, i. e., there was no synergistic reaction between drug and x ray. BA 14-16074.

4322
ENZYMES IN ONTOGENESIS (ORTHOPTERA). XII. SOME PHYSIOLOGICAL CHANGES IN EGGS THE EMBRYOS OF WHICH HAVE BEEN DESTROYED BY X-IRRADIATION. Joseph Hall Bodine, Loren D. Carlson, and O. Malcolm Ray. *Biol. Bull.* **78**(3), 437-43(1940).

Six-day-old grasshopper eggs (*M. differentialis*) were x irradiated with 1000 r. The embryo was destroyed but there was no apparent effect on rest of egg. Amounts of protyrosinase and its natural activator, as well as O₂ consumption were determined in control and irradiated egg. BA 14-16268

4323
THE QUALITATIVE AND QUANTITATIVE HISTOLOGICAL EXAMINATION OF BIOPSY MATERIAL FROM PATIENTS TREATED BY RADIATION FOR CARCINOMA OF CERVIX UTERI. A. Glucksmann and F. G. Spear. *Brit. J. Radiol.* **18**, 313(1945).

4324
THE ATTENUATION BY X-RAYS OF HUMAN TUBERCLE BACILLI. W. F. Drea. *Am. Rev. Tuberc.* **41**(4), 507-11 (1940). (Second Paper.)

Subcultures of H37, x irradiated for 36 hr, (60, 480 r) showed attenuated virulence. Effect more pronounced with treatment of successively transplanted cultures (exposures of 360 to 1,092 hr, 628, 992 to 2,044, 224 r). than with single treatment of initial culture for 36 hr. Direct action of x rays upon bacilli indicated as cause of attenuation. BA 14-16309

4325
THE EFFECT OF ROENTGEN RAYS ON SKIN REACTIVITY TO HISTAMINE AND BACTERIAL VACCINE WITH REVIEW OF THE LITERATURE AND A DISCUSSION OF THE MODE OF ACTION OF THE ROENTGEN RAYS IN INFLAMMATORY PROCESSES. Bertram Shaffer. *J. Invest. Dermatol.* **3**(3), 159-91(1940).

Following intracutaneous injection of histamine into x irradiated skin (125 r or 3 daily doses of 125 r), size of wheal, size, and intensity of flare were less than in non-irradiated skin. Injection of catarrhal vaccine resulted in papule generally larger on irradiated skin (3 daily doses of 125 r) than on control sites. BA 14-15811

4326
ON THE NATURE OF X-RAY INDUCED DELETIONS IN TRADESCANTIA CHROMOSOMES. Charles M. Rick. *Genetics* **25**(5), 466-82(1940).

X ray doses of 200-500 r were delivered to inflorescences of a clone derived from cross *T. canaliculata* X *T. humilis* while in post-meiotic resting stage cells were examined while in gametophytic mitosis. Several types of simple deletions were produced in addition to, and independently of, formation of ring and dicentric chromosomes. X rays applied at 3°C produced more chromosome deletions than same dose applied at 33°C. Dose-effect relation is discussed. BA 14-15648

4327
THE TIME FACTOR IN X-RAY PRODUCTION OF CHROMOSOME ABERRATIONS. Karl Sax. *Proc. Natl. Acad. Sci. U. S.* **25**(5), 225-99(1939).

X irradiation at high intensity was more effective than at low, and continuous irradiation was more effective than intermittent in producing chromosomal aberrations in *Tradescantia* microspores. The effect of time-intensity factor was due to the fact that aberrations depend upon two independent x ray hits, limited in time and space. Time-intensity factor has no effect upon 1-hit chromatid aberrations. BA 14-15649

4328
GLAUCOMA FOLLOWING IRRADIATION. Louis Bothman. *Arch. Ophthalmol. (Chicago)* **23**(6), 1198-1212(1940).

Influence of x rays and Ra on eye tissues is discussed and experimental studies on rabbits are reviewed. Report of a case of glaucoma from irradiation is included. BA 14-15806

4329
THE PRODUCTION OF GIANT SPERMATOCYTES IN *PHILOSAMIA CYNTHIA* BY MEANS OF X-RAYS. Pauline H. Dederer. *J. Morphol.* **67**(1), 159-70(1940).

X irradiation caused formation of giant spermatocytes during growth period, abnormal cells increasing with dosage from 2000-8000 r. Spermatogonia were relatively unaffected, no specific effect on chromosomes was

observed. Similar cells in testis were affected unequally; some degenerated as spermatocytes, others completed formation of spermatozoa. BA 14-15808

4330
BIOLOGICAL EFFECT OF X-RAYS AND GAMMA RAYS. Brit. Med. J. 1940(4122), 21(1940).

LD_{50} (x rays) for Colpidium culture was 330,000 r, for calliphora eggs, 40 r. "Absorption theory" of x and γ ray effects and "Catalytic theory" of x ray effects is discussed. Authors favor the latter as offering a better explanation for the remarkable differences in radiosensitivity among living organisms and for certain "stimulating" effects of radiation (ovaries and R-E system). BA 14-15812.

4331
BIOLOGICAL EFFECTS OF NEUTRONS. Brit. Med. J. 1940(41-44) (1940).

Lethal effects of neutrons upon *B. coli*, spores of *B. mesentericus*, as well as degenerative effects upon rat retina indicate qualitative similarity of neutron radiation to that of γ and x rays. Quantitative biological differences exist which depend on ionic density. Effects of neutrons on mitosis of bean root cells are described. BA 14-15813.

4332
RADIATION AND THE HEREDITARY MECHANISM. M. Delbruck. Am. Naturalist 74(753), 350-62(1940).

Critical review. BA 14-14217

4333
ON THE RADIOACTIVITY THEORY OF ENDEMIC GOITRE. H. Lederer and M. Messerli. Schweiz. med. Wochschr. 69(1), 408(1939). (In German).

Authors find no correlation of goitre with local Ra emanation content of air in Canton Waadt, rather, increased atmospheric radioactivity is associated with low goitre incidence. Others arrived at same conclusion in Austria. BA 14-14298

4334
NEW RACES WITH STRUCTURALLY CHANGED CHROMOSOMES IN THE PROGENY OF THE X-RAYED *CREPIS CAPILLARIS* WALLR. G. A. Levitskii. Arkh. Anatomii. Gistologii i Embriologii (Arch. Russes Anat., Hist. et Emb.) 25(1), 3-23(1940). (English Summary) (In Russian).

Of 491 F_1 plants (from aberrant parents derived from x rayed seedlings), 84 had aberrant chromosomes, 69 showed structural changes in single chromosomes, 10 were polyploid. None produced any specific morphological changes. Selfing of F_1 plants also produced aberrant F_2 plants. BA 15-7473

4335
NATURE OF THE HEREDITARY FACTORS FOR RESISTANCE AND SUSCEPTIBILITY TO PULLORUM DISEASE IN THE DOMESTIC FOWL. E. Roberts, J. M. Severens, and L. E. Card. World's Poultry Congr. Proc. 7, 52-4(1939).

Resistance of domestic fowl to pullorum disease increases with increased number of lymphocytes in the blood which normally occurs with aging. Decrease of lymphocyte count by x raying lowers resistance. BA 15-7538

4336
A COMPARISON OF X-RAY INDUCED AND NATURALLY OCCURRING CHROMOSOME VARIATIONS IN *DROSOPHILA PSEUDOBOESCA*. R. G. Helfer. Genetics 26, 1-22(1941).

Distribution of 347 breaks induced by x ray treatment in the chromosomes of *D. pseudoobscura* was studied. Frequencies of breaks and induced inversions were compared with those occurring naturally. Results appear to favor "breakage first" rather than "contact" hypothesis on origin of chromosomal aberrations. BA 15-7534

4337
CONTRIBUTION TO THE PROBLEM OF THE BIOLOGICAL EFFECT OF RADIATION. THE ESTABLISHMENT OF SUSCEPTIBILITY OF ORGANS TO ROENTGEN RADIATION

IN VIVO WITH THE AID OF A BIOCHEMICAL METHOD. Rudolph Abderhalden. Strahlentherapie 68(1), 17-29 (1940). (In German).

Using as an index the amount of urinary ferment present in the urine after irradiation of organs and capable of acting upon proteins of treated organs only, lower limit of radiosensitivity in rabbit organs was found to be; liver 330 r, brain 247.5 r, and hypophysis 165 r. Injurious doses to hypophysis affected whole endocrine system. BA 15-7683

4338
QUALITATIVE ROENTGEN RADIATION AND SKIN REACTION. Heinz Bade. Strahlentherapie 68(1), 53-62(1940). (In German).

Skin of 25 rats exposed to 2000 and 2500 r of soft rays (50 kv, HVL in Al 1.0 mm), or hard rays (180 kv, HVL in Cu 1.7 mm) showed no difference histologically or in gross skin reaction when only small areas were exposed. For large fields, tolerance dose for short waves was lower than for radiation of longer waves. BA 15-7685

4339
SOME ASPECTS OF THE BIOLOGICAL ACTION OF IONIZING RADIATIONS (JANEWAY LECTURE, 1939). G. Failla. Am. J. Roentgenol. Radium Therapy 44(5), 649-64(1940).

Author discusses physical and molecular changes in cells following irradiation with special reference to cellular osmotic pressure and comparison of irradiated mouse sarcoma in vivo and in vitro. Generalizations from experimental data are employed to interpret certain findings in radiation therapy. BA 15-7687

4340
SOME EXPERIMENTS UPON THE BIOLOGICAL EFFECTS OF FAST NEUTRONS. L. H. Gray, J. C. Mottram, John Read, and F. G. Spear. Brit. J. Radiol. 13(155), 371-89 (1940).

Methods of measuring neutron dosage are described: one based on ionization, one on radio-activation of P. Neutron and γ ray inhibition of mitosis in chick embryo fibroblast cultures and in broad bean roots are compared. Neutron effect curve is exponential, γ ray curve sigmoidal. There is no intensity dependence in neutron experiments. Sensitive volume was found to be about 2μ for the chick fibroblast and 3μ for bean roots. A hypothesis to account for the relatively greater efficiency of neutrons as compared with γ rays is proposed. BA 15-7688

4341
FURTHER INVESTIGATION OF THE PROCESS OF CELL DIVISION IN THE ROENTGEN IRRADIATED SKIN OF SALAMANDER LARVAE. Wolfgang Luther. Strahlentherapie 68(2), 185-205(1940). (In German).

X irradiation of salamander skin with 500 r inhibits mitosis. Fractional doses of 100 r/sitting gives curve which depends on chromosome injury, thus x ray effect is considered secondary. Difference was noted in recovery time of two cell types: when epidermal cells have returned to normal, connective tissue cells in cornea show abnormal mitosis. BA 15-7689

4342
EFFECTS OF X-RAY UPON THE SNOWY TREE CRICKET, *DECANTHUS NIGRI CORNIES ARGENTINUS*. Edith Penfield Beach. Trans. Kansas Acad. Sci. 41, 303-15 (1938).

Irradiation of adults reduces number of eggs laid, inhibits cell division, causes polyploidy. Chromosomes tend to fragment, and to show other abnormalities. Some evidence was found indicating breaks are caused by x ray effect upon chromosome matrix. BA 13-51

4343
SOME EFFECTS OF X-RADIATION ON THE NEUROBLAST

CHROMOSOMES OF THE GRASSHOPPER, CHORTOPHAGA VIRIDIFASCIATA. J. Gordon Carlson. *Genetics* 23(6), 596-609(1938).

Mitosis of grasshopper embryo neuroblasts treated with 100, 125, 250, 500, 750, and 1000 r was prevented for intervals proportional to dosage. Hypothesis is suggested to account for 3 forms (V's, rings, and pairs of rods) assumed by chromatids of fragments lacking spindle attachments when separating at early anaphase. BA 13-58

4344
MUTATION STUDIES ON THE MOSS, PHYSCOMITRIUM PIRIFORME. A. Barthelmess. *Z. Indukt. Abstamm. -u. Vererbh.* 74(3/4), 479-518(1938). (In German).

Many mutant gametophytes resulted from irradiation of spores with α and x rays. Mutations described include changes in: size and structure of spores, cell form, size, habit, development of protonema, stem length, reproductive ability, sex differentiation, cells of perichaetial leaves, paraphyses; antheridia, and archegonia. BA 13-64

4345
X-RAY INDUCED CHROMOSOMAL ALTERATIONS IN DROSOPHILA MELANOGASTER. Hans Bauer, M. Demerec, and B. P. Kaufmann. *Genetics* 29(6), 610-30(1938).

Chromosome rearrangements were studied by salivary chromosome analysis of 1765 F₁ larvae from a cross of untreated females and x rayed males. Data are given on: frequency of breaks and relation to dosage, distribution of breaks within the chromosome and among various chromosomes; relation of breaks to each other. BA 13-87

4346
NON-EFFECT OF IRRADIATION OF THE HYPOPHYSIS IN STERILE MONKEY FEMALES. Carl G. Hartman and Charles Smith. *Proc. Soc. Exptl. Biol. Med.* 39(2), 330-2(1938).

Single x ray dose (between 60 and 400 r) administered to pituitary gland of non-ovulating rhesus monkeys failed to cause increase of ovarian size in 11 cases. (No harmful sequelae followed treatment) 1/3 of monkeys ovulated and conceived later. BA 13-202

4347
DOSIMETRIC AND RADIOBIOLOGICAL STUDY WITH FAST NEUTRONS. I. Karl G. Zimmer. *Strahlentherapie* 63(3), 517-27(1938). (In German).

Results indicate that small ionization chambers with walls containing H are suitable for measuring fast neutrons. Results obtained with ionization method and Ag-indicator agreed within 20%. Using 1-2.0 (15 Aerion) condenser chamber, ionization current of 1 ESU for 3.9 million volt neutrons corresponds to an ionization in tissue of 1.8 r. BA 13-202

4348
DOSIMETRIC AND RADIOBIOLOGICAL STUDY WITH FAST NEUTRONS. II. K. G. Zimmer and N. W. Timofeeff-Ressovsky. *Strahlentherapie* 63(3), 528-36(1938). (In German).

Definite increase in mutation rate in fruitfly followed exposure to fast neutrons and the increase was directly proportional to dose. Effect per dose unit or per pair of ions produced in tissue was less than that of roentgen or γ rays. Results are in good agreement with those calculated according to target theory. BA 13-205

4349
GROWTH OF WHEAT PLANTS FROM IRRADIATED DRY AND SOAKED GRAINS. Edna L. Johnson. *J. Colorado-Wyoming Acad. Sci.* 2(4), 24(1938).

Plants from seeds soaked before x irradiation with 5000 r or over died within 3 wk, dry groups given 1000-5000 r exceeded controls in tillering, height, and weight. Seedlings from soaked grains surpassed controls only in tillering. BA 13-1385

4350
STUDY OF THE EFFECT OF X-RAY ON APOCYNUM VENETRUM. E. Saurow. *Genet. agrar.* 20, 409-22(1938). (In German)

X irradiation of A. venetum with 11 dosages ranging from 125-32,000 r did not shorten developmental cycle. In first year's growth: growth was stimulated by light doses, depressed by heavy doses which caused mutation-like variants, second year's growth: depressing effect of heavy doses was absent, stimulating effect of 500 and 2000 r was undetectable. Certain doses affected fiber length, all doses increased fineness of fibers. BA 13-1387

4351
SOME EXPERIMENTS IN BIOPHYSICS. Malcolm C. Hyland. *J. Colorado-Wyoming Acad. Sci.* 2(4), 18(1938).

Tulip bulbs affected with Botrytis, disease causing break down of flower colors, were x rayed with doses of 1,500 to 12,000 r in attempt to kill the parasite. In first season after treatment, no effect was evident. BA 13-1466

4352
THE PRODUCTION OF MUTATIONS IN AMERICAN UPLAND COTTON BY RADIATIONS. W. R. Horlacher and D. T. Killough. *Proc. Sixth Intern. Congr. Genet.* 2, 87(1932), Ithaca, N. Y. BA 8-151

4353
CHROMOSOME UNBALANCE AND THE ASYNAPTIC CONDITION AS INDUCED IN NICOTIANA BY X-RADIATION. T. H. Goodspeed. *Proc. Sixth Intern. Congr. Genet.* 2, 67(1932), Ithaca, N. Y. BA 8-151

4354
A STUDY OF THE INHERITANCE OF ANATOMICAL DEFECTS OCCURRING IN THE DESCENDANTS OF X-RAYED MICE. Halsey J. Bagg. *Proc. Sixth Intern. Congr. Genet.* 2, 5(1932), Ithaca, N. Y. BA 8-151

4355
THE EFFECT OF X-RAYS ON THE FERTILITY OF THE MALE HOUSE MOUSE. George D. Snell. *Proc. Sixth Intern. Congr. Genet.* 2, 188(1932), Ithaca, N. Y. BA 8-151

4356
FURTHER STUDIES ON REGULARITIES IN CHROMOSOME TRANSFORMATIONS IN CREPIS CAPILLARIS INDUCED BY X-RAYS. G. Levitsky and M. Sizova. *Compt. rend. acad. sci. URSS* 4(1/2), 71-5(1935).

X-ray translocations in Crepis were mostly reciprocal and came about as result of two independent breaks at metaphase and two subsequent translocations. BA 11-15447

4357
A DETERMINATION OF THE MAGNITUDE OF THE CELL "SENSITIVE VOLUME" ASSOCIATED WITH THE WHITE-EYE MUTATION IN X-RAYED DROSOPHILA. C. P. Haskins. *Proc. Natl. Acad. Sci. U. S.* 21(10), 561-6(1935).

Homozygous eosin stock of D. melanogaster were exposed as eggs or young larvae to x rays (Coolidge tungsten target tube, 85 kv, 10 ma, focal distance 5 in., 78.1 r/min measured by Failla ionization chamber). Results, when substituted in modified Curie expression for "sensitive volume", give radius for locus of white eye of 7.62×10^{-7} cm on assumption that genic locus is spherical. BA 11-15466

4358
FACTORS INFLUENCING RECOVERY AFTER WHOLE BODY RADIATION. E. Paterson. *J. Fac. Radiol.* 5, 189-99(1954).

4359
THE VASCULAR REACTION IN THE WEB OF FROGS (RANA TEMPORARIA) AFTER ROENTGEN IRRADIATION. Bjarne Dahl. *Acta Radiol.* 17(3), 275-83(1936). (In German).

Circulatory reaction of frog to x rays was observed in web of foot. Doses of 2000 r were followed by retardation of the blood stream, 2000 to 4000 r caused edema leading to necrosis. No true stasis or vasoconstrictor action was observed. Vascular reaction was similar to that after application of mustard oil. BA 11-15814

4360
THE PHYSIOLOGY OF COLD DARKENING IN BLACK RABBITS. II. THE INFLUENCE OF ROENTGEN RAYS ON PIGMENT PRODUCTION. Rolf Danneel and Ernst Lubnow. *Biol. Zentr.* 56(11/12), 572-84(1936). (In German).

X-irradiation of de-haired spots on black Alaska rabbit caused new hair to grow in gray-mottled, or with higher dose (1920 r) white. Threshold dose for positive effect was between 750 and 960 r. Author suggests that x rays destroy pigment production function of mitochondria of hair-forming cells. BA 11-15815

4361
ACTION OF ROENTGEN THERAPY. L. Insulin and Adrenalin. F. Eichholtz, H. G. Zwerg, and L. Kluge. *Arch. Exptl. Pathol. Pharmacol.* 174(1/2), 210-16(1934). (In German).

Rats were given one unit of insulin/kg subcutaneously 2 hr before x-ray treatment of rat sarcoma. The insulin injection approximately doubled the growth-inhibiting action of treatment (judged by lactic acid measurements in tumor). Subcutaneous adrenalin (0.1 cc of 1:1000) 2 hr before exposure produced increased growth of sarcoma. BA 11-15816

4362
STUDY OF POSSIBLE BIOLOGICAL EFFECTS OF COSMIC RAYS. Rolf Bull Engelstad and N. H. Moxnes. *Acta Radiol.* 16(4), 485-97(1935). (In German).

Two groups of white mice were kept for 10 mo. either in mine at depth of 350 m or in cellar. Ratio of ionization inside to that outside was 4.63 to 8.58. In four generations of mice, no anatomical or radiographic differences were observed. Only result of life underground was slightly higher average weight. Possible inhibitory effect of cosmic radiation on growth is suggested by author. BA 11-15817

4363
ON THE EFFECT OF ROENTGEN RAYS ON VARIED HARDNESS AND INTENSITY ON THE AUTOLYTIC FERMENT OF CANCER TISSUE. Alexander Farago. *Strahlentherapie* 55(3), 481-97(1936). (In German).

Autolytic activity of pepsinase and tryptase were tested in minced human breast tumor tissue buffered with acetate and phosphate after x irradiation (180 kv, 6 ma, 0.8 Cu + 0.5 mm Al or 100 kv, 6 ma, 1.0 mm Al) for 90 r/min or 10 r/min. Action of ferments was enhanced by doses to 2500 r, with further increase in dose the activity decreased. Radiation effect was dependent on radiation intensity, provided dosage was the same BA 11-15818

4364
RADIATION-INDUCED LYMPHOPENIA. David R. Goodfellow. *Brit. J. Radiol.* 9(107), 695-711(1936).

Total and differential blood counts were made before and after exposure on blood samples from thumb and from ulcerating area undergoing x or γ ray treatment in ten cases of carcinoma. Author found virtually identical figures for both regions in all cases. Suggest migration of lymphocytes does not account for lymphopenia, and that better explanation is (1) destruction of circulating cells, (2) damage of lymphogenic centers, and (3) lymphocyte withdrawal into bone marrow. BA 11-15820

4365
THE FIBRINOGEN LEVEL OF THE BLOOD UNDER THE

INFLUENCE OF ROENTGEN IRRADIATION AND THE PRIMARY RADIATION EFFECT. A. Held and H. Hulbach. *Strahlentherapie* 51(4), 664-71(1934). (In German).

Rabbits recieved total body exposure to x rays in doses of 5, 10, 30, and 50% HED, 180 kv, 4 ma, focus skin distance 50 cm through 0.5 mm Cu + 1 mm Al. Fibrinogen level of venous blood fell to minimum at 10 min, then rose to normal (2-3 hr) and above. Fibrinogen content of lienalis artery blood of irradiated dogs rose after few hours, in lienalis vein there was pronounced and prolonged diminution of fibrinogen content. BA 11-15821

4366
THE ROENTGEN IRRADIATION OF MONGOLIAN IDIOTS. E. Hofmann-Lydtin. *Z. Kinderheilk* 58(2), 155-64(1936). (In German).

Nineteen mongolian idiots, 2 mo-11 yr old were repeatedly x irradiated for varying periods (6 mo to 1 yr). In no case was improvement of bodily stigmata observed. There was no evident effect on dentition. Resistance to infection was not modified, nor was there any objective evidence of facilitation of speech or improvement of intelligence. BA 11-15822

4367
EFFECT OF ROENTGEN RAYS ON THE PERMEABILITY OF THE BARRIER BETWEEN BLOOD AND CEREBROSPINAL FLUID. Y. K. Hsu, C. P. Chang, C. K. Hsieh, and R. S. Lyman. *Chinese J. Physiol.* 10(3), 379-90(1936).

Heads of deteriorated schizophrenic patients were x irradiated through 6 portals: skin dosage 180-270% ESD/portal, even distribution through brain of about 400% ESD. Analyses of blood and cerebrospinal fluid showed drop of bromide quotient, rise of ratios of distribution of chlorides and sugar, implying increased permeability between blood and cerebrospinal fluid $4\frac{1}{2}$ to $6\frac{1}{2}$ wk postirradiation. Irradiation of thighs for control had no such effect. BA 11-15823

4368
SOME X-RAY EFFECTS ON GLUTATHIONE, PHOSPHATASE, ESTERASE AND A THEORY OF THE ACTION OF SHORT-WAVE RADIATIONS. V. Everett Kinsey. *Univ. Pittsburgh Bull.* 32(1), 163-71(1935).

Glutathione, phosphatase, esterase, and vitamin C were exposed to varying amounts of x rays (0.56 A) up to 100,000 r. Only glutathione was affected by these doses; destruction of potency varying in linear relation with dosage. Evidence is presented suggesting production of H in tissues may be a mechanism by which radio-biological changes are produced. BA 11-15824

4369
THE INFLUENCE OF STRONG DOSES OF RADIUM ON GLYCOLYSIS (FORMATION OF LACTIC ACID) IN TISSUE-CULTURES. M. I. Kolomietz. *Voprosy Onkologii* (Problems of Oncology) 6, 94-9(1934). (In Russian English and French summary).

Irradiation of cultures of embryonic fibroblasts for 8 hr. with 10 mgm Ra reduced amount (after 48 hr) of new-formed lactic acid to one half that in control cultures (on average amount formed being 22.9 mgm % instead of 44.2 mgm %). Strong doses of Ra inhibited glycolysis (formation of lactic acid) in tissue cultures. BA 11-15825

4370
COMPARATIVE EFFECTS OF X-RAYS AND NEUTRONS ON NORMAL AND TUMOR TISSUE. John H. Lawrence, Paul C. Aebersold, and Ernest O. Lawrence. *Proc. Natl. Acad. Sci. U. S.* 22(9), 543-47(1936).

Mice were whole-body irradiated with various doses of 200 kv x rays and neutrons. Qualitatively, lethal effects of neutrons were similar to those of x rays: destruction of hemopoietic and lymphoid tissues, epithelium of small

intestine, and of Sarcoma 180 irradiated in vitro.
BA 11-15826

4371

ON THE SIGNIFICANCE OF THE TIME FACTOR IN THE DETERMINATION OF THE QUANTITATIVE BIOLOGICAL REACTION TO A GIVEN DOSE OF RADIATION. Wm. H. Love. *Brit. J. Radiol.* **10**(109), 38-46(1937).

Mathematical analysis is made of expected effect on different constituents of a cell group, depending on percentage of cells passing through radiosensitive stage during irradiation period. Quantitative reaction to given dose may (1) increase with time factor, reach maximum and then decrease, (2) remain independent of time factor temporarily, then decrease, or (3) decrease continuously. Analysis can be made for any type of survival curve.
BA 11-15828

4372

OUR CHANGING CONCEPTS REGARDING THE SKIN DOSE, WITH SOME NOTES ON THE PRODUCTION OF EPIDERMOLYSIS. Walter L. Mattick. *Am. J. Roentgenol. Radium Therapy.* **34**(4), 491-7(1935).

Writer has computed and tabulated tissue recovery coefficients for various wave lengths of x rays and Ra
BA 11-15831

4373

A FURTHER CONTRIBUTION ON THE SPACING OF RADIATION ACCORDING TO VARIATION IN RADIO-SENSITIVITY. J. C. Mottram. *Brit. J. Radiol.* **10**(114), 494-7(1937).

In general, given amounts of x radiation administered continuously in short time had greater injurious effect on tissues than same amount administered fractionally over long time. When fractional doses were spaced to irradiate cells in stage of active growth, situation was reversed and spaced treatments produced greater effect. This is demonstrated by studies on mouse carcinoma.
BA 11-15833

4374

THE EFFECT OF SINGLE AND DIVIDED DOSES OF HIGH INTENSITY X-RAYS ON THE EGGS OF *DROSOPHILA*. Charles Packard. *Am. J. Cancer* **30**(1), 130-8(1937).

High intensities (125-135 r/min) are more effective than low intensities (10-30 r/min) on developing *Drosophila* eggs, difference being most clearly seen after large doses. When high intensity dose is divided into two parts, effect of total dose is equal to or greater than that of single dose, depending on interval between exposures. BA 11-15835

4375

EXPERIMENTAL RADIUM POISONING. II. CHANGES IN THE TEETH OF RABBITS PRODUCED BY ORAL ADMINISTRATION OF RADIUM SULPHATE. Maurice Rosenthal. *Am. J. Med. Sci.* **193**(4), 495-501(1937).

Observations on animals given Ra sulphate per os show that radium is stored not only in the alveolar bone of the jaw but also in the teeth themselves, producing pronounced alteration of entire morphologic picture of tooth, which is described. BA 11-15836

4376

THE CARCINOGENIC ACTION OF RADIUM IN THE RABBIT, THE EFFECT OF PROLONGED IRRADIATION WITH SCREENED RADIUM. Joan M. Ross. *J. Pathol. Bacteriol.* **43**(2), 267-76(1936).

When Ra-filled Pt tubes 1 cm in length (filtration 0.55 mm Pt) containing 0.1 mg Ra element, were implanted into tissues of 9 rabbits, 7 developed malignant new growths in area of tubes. Five sarcomas and two squamous cell carcinomas developed. Author concludes that γ radiation of weak intensity but long duration (97-167 wk) was carcinogenic factor in these cases and that type of growth depends on nature of tissue in which tube is embedded.
BA 11-15837

4377

ON THE EFFECT OF PENETRATING ENVIRONMENT (NATURAL) RADIATION ON THE DEVELOPMENT RATE OF *DROSOPHILA MELANOGASTER*. Rolf M. Sievert. *Strahlentherapie* **56**(2), 354-60(1936). (In German).

D. melanogaster eggs placed within iron chamber 15 cm thick as screen against natural radiation developed at slower rate than control eggs. Chamber of 1 cm thick seemed to retard rate of lesser degree. BA 11-15838

4378

CERTAIN PHYSIOLOGICAL EFFECTS OF X-RAYS ON *EUPLANARIA DOROTOCEPHALA*. H. H. Strandkov. *Physiol. Zool.* **10**(1), 14-20(1937).

Flatworms were exposed to various dosages of x rays, then cut into pieces at various intervals post exposure. Maximum degree of regeneration decreased with increased dosage, also with each increase in interval between irradiation and time of cutting. Visible disintegration followed longer exposures. All pieces surviving disintegration of anterior regions retained their power to regenerate. BA 11-15839

4379

EFFECTS OF A GIVEN X-RAY DOSE ON CYSTS OF *COLPODA STEINI* AT SUCCESSIVE STAGES OF THEIR INDUCED EXCYSTMENT. C. V. Taylor, M. G. Brown, and A. G. R. Strickland. *J. Cellular Comp. Physiol.* **9**(1), 105-16(1936).

Effect of constant dose (38,400 r) of intense soft x rays on time required for induced excystment of *C. steini* cysts was studied. Diverse reactions suggest difference in time of transition from stage of low x ray susceptibility to one of marked susceptibility. Transition period was found to be about 7 min during which profound changes associated with cytoplasmic reorganization take place.
BA 11-15840

4380

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF FAST NEUTRONS AND X-RAYS UPON DIFFERENT ORGANISMS. Raymond E. Zirkle, Paul C. Aebersold, and Everett R. Dempster. *Am. J. Cancer* **29**(3), 556-62(1937).

Relative effectiveness of fast neutrons and x rays, per unit of ionization, were determined for *Drosophila* eggs, wheat seedlings, and fern spores. Neutron: x ray ratios of effectiveness were, respectively, 2.1, 5, and 2.5. Authors believe that the relative susceptibility of various types of cells to neutrons may differ greatly from their relative x ray susceptibility. BA 11-15843

4381

PRODUCTION OF NEPHRITIS IN DOGS BY ROENTGEN RAYS. Irvine H. Page. *Am. J. Med. Sci.* **191**(2), 251-6(1936).

Blood changes in irradiation-produced nephritis include: slow rise in urea-N and total lipid N, and maintenance of total lipids, total, free and ester cholesterol, lipid amino N and lipid P, within limits normal for dogs on same diet. Kidney lesions were produced by repeated irradiation of kidneys which had been transplanted to flank beneath the skin. Lesion produced lead to death in course of a few months. BA 11-16160

4382

INULIN AND CREATININE CLEARANCES IN DOGS WITH NOTES ON SOME LATE EFFECTS OF URANIUM POISONING. A. A. Richards, B. B. Westfall, and P. A. Bott. *J. Biol. Chem.* **116**(2), 749-55(1936).

While plasma clearance of injected inulin and creatinine studied in 11 dogs were found the same under all ordinary experiments circumstances, a dog previously poisoned with U excreted inulin at faster rate than creatinine. This is interpreted as back-diffusion of creatinine, possibly owing to tubular damage. BA 11-16164

4383

THE EFFECT OF RADIATION UPON RETICULUM IN SQUAMOUS CELL CARCINOMA OF THE UTERINE CERVIX. Zola K. Cooper and M. G. Seelig. *Am. J. Cancer* 30(1), 32-8(1937).

No correlation was demonstrable between amount of reticulum in tumor and its radiosensitivity, nor with clinical results following x-ray treatment. There was some indication that inconsequential increase in amount of reticulum occurs after application of Ra. Neither x ray nor Ra has any qualitative histological effect upon reticular fibrils. BA 11-16372

4384

ON TRANSPLANTATION OF TUMOR CELLS TO NORMAL AND PREIRRADIATED HETEROLOGOUS ORGANISMS. Johannes Clemmesen. *Am. J. Cancer* 29(2), 313-32 (1937).

Crocker mouse sarcoma 180 inoculated operatively into rats previously irradiated with 500-600 r, produced transient growths in all animals still alive on 14th day. Successful achievement of serial passages through period of 85 days is held to be proof that x irradiation creates conditions for tumor growth in heterologous organism superior to conditions in normal rats. BA 11-16411

4385

OCCUPATIONAL CANCER OF THE LUNG. L. Teleky *J. Ind. Hyg. and Toxicol.* 19(2), 73-85(1937).

It does not appear that dust inhalation gives rise to lung cancer. Two industrial causes for its development that have been determined are: inhalation of chromate dust, which also may produce cancer of the digestive tract and inhalation of Ra and Ra-containing dust. The disease has also been observed in workers in Ra laboratories. BA 11-16442

4386

ON THE DEPENDENCE OF DIFFERENTIATION OF THE NERVOUS SYSTEM DURING REGENERATION IN *LUMBRICUS VARIEGATUS*. L. Zhinkin. *Wilhelm Roux' Arch. Entwicklungsmech. Organ.* 134(2), 251-61(1936). (In German).

Using *L. variegatus* the author performed three series of experiments: (1) tail cut off 24 hr after irradiation, (2) irradiation 12 hr after amputation, (3) irradiation 2 days after amputation. Results indicate that the nervous system is regenerated only where neoblasts are or have been present, they act as inductors. Presence of mesoderm is also necessary. BA 11-17215

4387

RECESSIVE MUTATIONS INDUCED IN *OENOTHERA BLANDINA* BY X-RAYS. D. G. Catcheside. *Genetics* 19(1/3), 134-42(1937).

Three recessive genes, buckled leaf (bk), helicoid leaf (he) and narrow leaf (nl) are reported for progeny of about 36 F₂ families whose grand-parental pollen had been subjected to x rays. BA 12-69

4388

MUTATIONS IN PARTHENOGENETIC CLADOCERA INDUCED BY X RADIATION. John B. Harris, Arthur F. McBride, Alan W. Fraser, and Vasil Obreshkove. *Physiol. Zool.* 10(3), 269-75(1937).

X-ray induced mutations in *Simoclethrus vetulus* females are described: a change in structure of terminal post-abdominal claws and a temporary physiological change. Critical period of radiosensitivity of egg to x-ray dose used was 2 hr before eggs were laid. BA 12-133

4389

X-RADIATION AND THYROID-INDUCED METAMORPHOSIS IN ANURAN LARVAE. William O. Puckett. *J. Exptl. Zool.* 67(2), 303-2(1937).

Rana sylvatica tadpoles subjected to sub-lethal dosages of x rays and subsequently fed thyroid substances showed heightened susceptibility to thyroid treatment; accomplished early regressive phases of metamorphosis more quickly than controls; but were hampered in later stages of differentiation. Further experiments strengthened theory of x-ray inhibition of cellular differentiation. BA 12-652.

4390

EFFECTS OF ROENTGEN RADIATION ON EMBRYONIC ORGANIZATION AND REGULATION IN *MELANOPLUS DIFFERENTIALIS* (ORTHOPTERA). Titus Carr Evans. *Physiol. Zool.* 10(3), 258-68(1937).

Irradiation of grasshopper eggs 6-8 days old (25°C) resulted in many duplications of parts and aberrant growths from the head, some of the latter outgrowths being extensive enough to show tendency to form one or more secondary embryos. Stage yielding most frequent aberrations after irradiation was comparable to gastrulation (likewise susceptible in vertebrates and other insects). BA 12-2027

4391

EXPERIMENTAL OBSERVATIONS ON THE OPALINID INFUSORIANS WITH SPECIAL REFERENCE TO THE INFLUENCE OF RADIUM RADIATION UPON THE CYTOPLASMIC INCLUSIONS. E. S. Horning. *J. Morphol.* 61(2), 285-300(1937).

Following Ra irradiation mitochondria are reoriented so they assume transverse polarity to longitudinal axis of organism, and later are segregated by radiations so that they lie apart from the vegetative granules with which they are normally in close association. BA 12-2048

4392

ON THE OCCURRENCE OF THREE DIFFERENT SEX-REALIZORS IN THE LIVERWORT. Gerhard Lorbeer. *Planta* 27, 708-17(1938). (In German).

X-irradiation of haploid gametophytes changed female sex realizor γ of *Riella helicophylla* and *Marchantia polymorpha* to σ (synoecous realizor) or to α (male sex realizor). It was not possible to obtain σ in *Sphaerocarpus donellii*. BA 12-7454

4393

HEREDITARY EFFECTS OF X-RAY RADIATION. M. Demerec. *Radiology* 30(2), 212-21(1938).

Review of work (1928-38) on x-ray-induced mutations. Difference in x-ray sensitivity of various strains of *Drosophila* explained by differences in gene environment. Differential action of x rays on various tissues accounted for in same manner. BA 12-2430.

4394

EFFECTS OF X-RAYS ON SEEDS. A. A. Bless. *Plant Physiol.* 13(1), 209-11(1938).

Radish, bean, lettuce, and corn seed were subjected to varying doses of 100,000 volts filtered x rays. There was no significant effect on mature corn and radish plants. Substantial weight increase over controls was observed in beans and lettuce after certain doses. BA 12-2594

4395

ON THE USE OF *DROSOPHILA MELANOGASTER* AS A TOOL IN THE STUDY OF DELAYED KILLING BY X-RAYS. E. V. Enzmann and C. P. Haskins. *Am. Naturalist* 72(739), 184-9(1938).

In study of morphological and physiological modifications of x rayed *D. melanogaster*, a marked difference in x-ray sensitivity was found between larval and imaginal tissue during larval life. BA 12-2643

4396

THE EFFECTS OF IRRADIATION ON THE NORMAL BLOOD CELLS AS DETERMINED BY THE BLOOD COUNT. Karl Kornblum, Fred Boerner, and Samuel G. Henderson. *Am. J. Roentgenol. Radium Therapy.* 39(2), 235-60 (1938)

Group of 120 patients undergoing radiation therapy had blood counts a day before exposure and weekly afterward. No significant effect was noted on red cell count or Hb. There was a general drop in leucocyte count, with greatest decrease in lymphocytes. White cells returned to the normal pre-irradiation state in 5 wk. No relation between effect on leukocytes and part of body irradiated was apparent. BA 12-2644

4397
THE EFFECT OF ROENTGEN RAYS ON THE COLLOIDAL PROPERTIES OF ERYTHROCYTES. Helen Quincy Woodard. J. Phys. Chem. 42(1), 47-54(1938).

Volume and susceptibility to hemolysis of erythrocytes were increased when exposed in fresh preparation, effect reversed in cells irradiated after storage in physiological saline for several days at low temperature. Hb of fresh cells is believed to be split into compounds of smaller molecules by x rays, while that of aged cells is coagulated. BA 12-2645

4398
THE EFFECT OF ATROPHY OF THE THYMUS FOLLOWING ROENTGEN IRRADIATION. NOTES ON CHANGES OBSERVED ON BODY GROWTH, THE GONADS, PITUITARY, AND ADRENALS. J. Gershon-Cohen, Harry Shay, S. S. Fels, T. Meranze, and D. Meranze. Am. J. Roentgenol. Radium Therapy 39(2), 263-70(1938).

Rats were irradiated over thymus daily from second day after birth (130 kv, 5 ma, 25 cm, 2 mm Al filter, portal 8-10 mm diam, 6 min exposure giving 550 r). With doses of 2000 r, atrophy of thymus results; testes development is suppressed; pituitary and adrenals enlarge. Growth was stunted after 20 days of irradiation. BA 12-2827

4399
THE DIVERSIFIED CLINICAL AND PATHOLOGICAL PICTURES OF FAILING OVARIAN FUNCTION. Rita S. Finkler and Milton Friedman. Endocrinology 22(1), 104-10(1938).

Six cases of ovarian hypofunction are described in detail. Treatment with hormone and x rays was felt to be beneficial in some cases. BA 12-2908

4400
THE EFFECT OF X-RADIATION ON THE BLOOD AND LYMPHOID TISSUE OF TUMOR-BEARING ANIMALS. J. R. Clarkson, W. V. Mayneord, and L. Dorothy Parsons. J. Pathol. Bacteriol. 46(2), 221-35(1938).

Growth of mouse sarcoma in whole body irradiated rats was more rapid, percentage of graft takes was higher, and tumor was larger than in nonirradiated rats. Diminution in lymphoid tissue, anaemia and changes in gland structure were among x ray effects. Deposit of Fe in tissues of x rayed and tumor-bearing animals is described. BA 12-3120

4401
THE PATHOLOGICAL PHYSIOLOGY OF RADIATION INJURY IN THE MAMMAL. I. PHYSICAL AND BIOLOGICAL FACTORS IN RADIATION ACTION. H. M. Patt. p. 919-58 of Radiation Biology, Vol. I, Part 2. A. Hollaender, ed. New York, McGraw Hill Book Co., Inc. 1954.

This is a comprehensive review and discussion.

4402
THE EFFECT OF HYPERTROPHIC CARTILAGE ON BONE MARROW GROWTH. Charles Huggins and Kenneth McLane Smith. J. Exptl. Med. 67(1), 41-7(1938).

Colloidal ThO₂ injected into rabbits was deposited in reticuloendothelial cells of bone marrow; could not be displaced by anemia or plethoria. In zones of subsequent growth, macrophages of new marrow were Th-free, and revealed growth pattern of marrow which is described. Marrow is thus shown to increase in length principally in region of hypertrophic cartilage at metaphyses, facilitated

by presence of macrophages which assist in destruction of wasted cartilage cells. BA 12-3707

4403
INVESTIGATIONS ON THE PROBLEM OF RADIUM POISONING. II. EXPERIMENTAL DETERMINATION OF RADIUM DEPOSITION IN THE HUMAN BODY. A. Jantzky, A. Krebs, and B. Rajewsky. Strahlentherapie 61(2), 254-68 (1938). (In German).

Absolute amount of Ra deposits, distribution in various body tissues, and emanation emitted were measured. Amounts of radioelements as small as 1 μ gm in body were found sufficient to produce irreparable damages. BA 13-3575

4404
EFFECT OF ROENTGEN RAYS ON GERMINATION AND GROWTH OF SOME SEEDS. David I. Macht. Am. J. Physiol. 126(3), 572(1939). BA 13-12643

4405
EFFECTS OF FAST NEUTRONS ON CHROMOSOMES IN MITOSIS. A. Marshak. Proc. Soc. Exptl. Biol. Med. 41(1), 176-80(1939).

Abnormal anaphases in mouse tumors following various doses of neutron and x ray radiation were qualitatively similar. Tumors were affected approximately the same by a given neutron dose, but exhibited a differential response to an x ray dose. Difference in effect of the two radiations is explained on the basis of the ionization pattern produced. BA 13-12698

4406
THE EFFECT OF ROENTGEN RADIATION ON THE MEIOTIC CHROMOSOMES OF VICIA FABA L. A. de Sausa da Camara. Bol. soc. Broteriana Ser. 2, 13, 187-209(1938-9). (In German).

Flower buds were x rayed (64 kv, 5 ma, at 30 cm, no filter, for 15-20 min). After 24 hr many cells showed chromosome fragmentations translocations, segmental interchanges, and polyploidy. BA 15-12

4407
THE MODE OF ACTION OF A SINGLE GENE FOR COAT COLOR IN THE RABBIT. R. Danneel. Zool. Anz. Suppl. (Verhandl. deut. zool. Ges. 41) 12, 237-44(1939). (In German).

Following local x irradiation, hair of black rabbits falls out and is replaced by white hair. Histological study shows cause is prevention of lipochondria formation in matrix cells of hair root producing pigment. BA 15-51

4408
CONCERNING THE INFLUENCE OF CHEMICALS ON THE MUTABILITY OF DROSOPHILA MELANOGASTER. H. Dotterweich. Zool. Anz. Suppl. (Verhandl. deut. zool. Ges. 41) 12, 244-53(1939). (In German).

Using the C1B-cross, percentage of sex-linked lethal mutants was increased in cultures in which pilocarpin, caffeine, seawater, or progynon were mixed with food. Normal and chemically treated flies were x irradiated. Mutation rate (unaltered by chemical treatment alone) was increased by single x ray treatment after one or more generations had been reared on chemically altered food. BA 15-53

4409
TWO X-RAY INDUCED MOSAICS IN DROSOPHILA PSEUDOOBSCURA. R. G. Helfer. Proc. Natl. Acad. Sci. U. S. 26(1), 3-7(1940).

One set of mosaic salivary glands contains four tissues, five possibilities of their origin are discussed. Another set contains two tissue types due to chromosome inversion. BA 15-57

4410
THE INDUCTION BY IRRADIATION WITH NEUTRONS OF HEREDITARY CHANGES IN MICE. George D. Snell. Proc. Natl. Acad. Sci. U. S. 25(1), 11-14(1939).

Of 44 F₁ animals in the experimental group there were: 3 semisterile, 1 almost completely sterile male, and 3 completely sterile males with abnormal spermatogenesis. These conditions were absent or very rare in controls. No evidence was found for occurrence of recessive visible mutations following neutron irradiation. BA 15-59

4411
ACTION OF X-RAYS ON EXTERIORIZED CIRCULATING BLOOD. J. Ducuing, L. Bugnard, and O. Miletzky. *Acta Unio contra Cancrum* 4, 825-31(1939). (In French).

Pathogenesis of slow and progressive anemia following irradiation of animal in toto was studied by exteriorizing circulating blood on 6 dogs and irradiating blood only. No progressive anemia developed. Syndrome consisting of leucopenia, thrombopenia, and progressive anemia is not an expression of direct injury to blood, author believes. BA 15-566

4412
LETHAL AND DISSOCIATIVE EFFECTS OF X-RAYS ON BACTERIA. Sol Haberman and Louis D. Ellsworth. *J. Bacteriol.* 40(4), 483-503(1940).

Purified cultures of *Staphylococcus aureus* and *Serratia marcescens* were more effectively killed by hard x rays of Cu and Mo than by soft rays of same intensity. Linear survival curve (percentage of cells surviving plotted semilogarithmically against exposure time) was obtained. X rays increase dissociation rates, especially in proliferating cells. BA 15-975

4413
RELATIONSHIP BETWEEN VARIOUS CHROMOSOMAL CHANGES IN *DROSOPHILA MELANOGASTER*. M. Demerec. *Cytologia (Tokyo) (Fuj. Jub. Vol.)*, 1125-32(1937).

X irradiation of *D. melanogaster* with 2500-3000 r produced 61 lethals at known loci of the X chromosome. Inversions and translocations were induced in 26 of these, in 92.3% of cases, breakage point of chromosome aberration coincided with region of lethal. X-ray-induced chromosome aberrations increase with dosage. BA 15-3690

4414
THE NATURE AND CAUSE OF THE HEMOLYSIS PRODUCED BY X-RAYS. T. P. Ting and Raymond E. Zirkle. *J. Cellular Comp. Physiol.* 16(2), 189-95(1940).

The hemolysis observed in defibrinated beef or human blood 15-20 hr after exposure to 33,000 r of x rays is attributed to increased permeability to salts. BA 15-3772

4415
THE KINETICS OF THE DIFFUSION OF SALTS INTO AND OUT OF X-IRRADIATED ERYTHROCYTES. T. P. Ting and Raymond E. Zirkle. *J. Cellular Comp. Physiol.* 16(2), 197-206(1940).

After exposure to 33,000 r of x rays, human erythrocytes became permeable to Na and K ions, remained impermeable to Mg ions. Behavior of irradiated beef erythrocytes was qualitatively similar to that of human cells. BA 15-3773

4416
ROENTGEN-PIGMENTATION IN THE GOLDFISH. Friedrich Ellinger. *Proc. Soc. Exptl. Biol. Med.* 45(1), 148-50 (1940).

Roentgen pigmentation (spread of astrospherical black chromatophores) also occurs in albino fish *Carassius auratus*. Formation of glia fibers was observed in chromato-motor nerve center in medulla oblongata of irradiated goldfish brains. Roentgen pigmentation in mammals is a photochemical process; in the goldfish it depends on disturbance of the chromato-motoric nervous system and may extend over total innervated area (not confined to irradiated site). BA 15-3799

4417
COMPARATIVE EXPERIMENTAL STUDIES OF 200 KILOVOLTS AND 1000 KILOVOLTS ROENTGEN RAYS.

I. THE BIOLOGICAL EFFECTS ON THE EPIPHYSIS OF THE ALBINO RAT. Edward A. Gall, James R. Lingley, and John A. Hilcken. *Am. J. Pathol.* 16(5), 605-18(1940).

Single x-ray doses of 600-3000 r at 200 or 1000 kv were given to rats 50-54 days old. Radiation was directed at thighs and knees of one hind leg. Growth was impeded by all doses, completely inhibited by higher dosages. There was no detectable difference in effect produced by equal doses of the two intensities. BA 15-3801

4418
FURTHER STUDIES ON THE ACTION OF ROENTGEN RAYS ON THE GAMETES OF *ARBACIA PUNCTULATA*. I. DELAY IN CELL DIVISION CAUSED BY EXPOSURE OF SPERM TO ROENTGEN RAYS. Paul S. Henshaw. *Am. J. Roentgenol. Radium Therapy.* 43(6), 899-933 (1940).

All possible combinations of normal and x-rayed eggs and sperm of *Arbacia punctulata* as well as zygotes were irradiated at various periods up to 45 min after insemination and were studied for delay in cleavage time and associated cytological changes. Eggs were more radiosensitive than sperm for doses of 7800-31,200 r, zygote more sensitive than either. Effect of O₂ uptake and temperature on sensitivity was observed, and abnormal cleavage (multipolar in high percent if dose was large enough) after radiation was noted. BA 15-3802

4419
THE VARIATION WITH WAVELENGTH OF THE BIOLOGICAL EFFECT OF RADIATION. Ilse Lasnitzki and D. E. Lea. *Brit. J. Radiol.* 13(149), 149-62(1940).

Inhibition of mitosis in tissue cultures by x- and γ-ray doses of 20 to 200 r was measured. X-rays with effective wave lengths of 0.107, 0.150, and 0.363 Å were not significantly different in effect per roentgen, γ rays were much less effective. Data from other experiments show variation in x-ray dose biologically equivalent to 1 r of γ rays depending on reaction studied. BA 15-3804

4420
THE EFFECT OF X-RAYS ON CELLS CULTIVATED IN VITRO. Ilse Lasnitzki. *Brit. J. Radiol.* 13(152), 279-84 (1940).

Tissue cultures of 9-11 day old chick embryo choroid and sclerotic were x rayed (97 r, 160 kv). Fall in mitosis was followed by attempted recovery in cell division, accompanied by appearance of degenerate cells. Degeneration occurred in 24 hr due mainly to breakdown of cells which had completed prophase. Radiation effect is believed to be independent of effect on blood circulation, since these *in vitro* effects were closely similar to those following *in vivo* exposure. BA 15-3805

4421
EFFECTS OF IRRADIATION ON LEUKEMIC CELLS IN MARROW CULTURES. Edwin E. Osgood. *Proc. Soc. Exptl. Biol. Med.* 45(1), 131-5(1940).

There was no apparent tendency for irradiation to hasten maturation of leukemic cells, onset of mitotic or amitotic division was apparently prevented. Doses used clinically do not kill directly either normal or leukemia cells. Relative radiosensitivity of lymphocytes and progranulocytes is the same with doses of 50 r and 400 r, and increment of effect is only 1.7 when the dose is increased from 50 r to 400 r. BA 15-3807

4422
ACTION OF X-RAYS ON WATER AND ITS CONSEQUENCES. C. Piffault. *Compt. rend. soc. biol.* 130(1), 43-44(1939). (In French).

Exposure of water to x rays makes it toxic to protozoa. The effect is attributed to formation of H₂O₂. BA 15-3808

4423
THE EFFECT OF X-RAYS UPON TUMOR GROWTH WHEN

THE TUMOR ITSELF IS NOT IRRADIATED. S. Suss and G. M. Scott. Brit. J. Radiol. 13(152), 267-272(1940).

Pairs of rats with inoculated tumors of Jensen rat sarcoma were simultaneously exposed to 1200 r x rays. In one of each pair, only the tumor was irradiated, in the other, only the tumor bed. With dose direct to tumor, 70% of tumors disappeared, dose to tumor bed: 37% and in unirradiated controls; 7% of tumors disappeared. BA 15-3811

4424
SOME IN VIVO EFFECTS OF LOCALIZED NUCLEAR DISINTEGRATION PRODUCTS ON A TRANSPLANTABLE MOUSE SARCOMA Paul A. Zahl, Franklin S. Cooper, and John R. Dunning. Proc. Natl. Acad. Sci. U. S. 26(10), 589-98(1940).

Transplantable mouse sarcomas were injected with various forms of slow-neutron-capturing material. When injected tumor-animal was irradiated with slow neutrons, a significant increase in tumor regression resulted. BA 15-4401

4425
EFFECTS OF X-RAYS UPON THE REGENERATION OF FEATHERS IN THE COMMON FOWL. Benjamin De Boer. J. Morphol. 67(2), 299-318(1940).

Feather regeneration after irradiation with from 2000 to 3000 r in pre- and post-plucked, and desiccated-thyroid injected birds is described. Results show that pre-epidermal melanophore cells of feather are localized in follicle of juvenile bird, and that these cells or follicle cells, destroyed by x rays, are not replaced by migration or overgrowth of cells from uninjured areas. BA 15-4489

4426
THE EFFECTS OF CASTRATION BY PARASITES AND X-RAYS ON THE SECONDARY SEX CHARACTERS OF PRAWNS (LEANDER SPP.) H. G. Callan. J. Exptl. Biol. 17(2), 168-179(1940).

Breeding Leander females develop an elaborate incubatory chamber under the abdomen. This did not develop in parasitized females (which did not carry eggs) and in 30 surviving females castrated by x rays. BA 15-4527

4427
THE EFFECTS OF ULTRAVIOLET RADIATION AND OF ROENTGEN RAYS UPON BACTERIOPHAGE. Arthur Isaac Kendall and Charlotte Anne Colwell. Intern. Congr. Microbiol., Rept. Proc., 3rd Congr., New York, 294-9 (1939-40). BA 15-4697

4428
FACTORS INFLUENCING THE INACTIVATION OF THE RABBIT PAPILLOMA VIRUS BY X-RAYS. William F. Friedewald and Rubert S. Anderson. Proc. Soc. Exptl. Biol. Med. 45(2), 713-15(1940).

Berkefeld filtrates, which contained large amounts of virus were inactivated by exposure to 2-4 million r of x irradiation. A dose of 400,000 to 800,000 r had same effect when virus was partially purified by differential centrifugation. Normal rabbit serum and noninfectious supernatant fluids from centrifuged virus filtrates protected virus suspended in them. Thus, both the virus concentration and extraneous material present influence effect of x rays on virus. BA 15-4703

4429
AN ATTEMPT TO DIFFERENTIATE BETWEEN INFECTIVE AND NONINFECTIVE TUMOURS AND THEIR RESPONSE TO RADIUM TREATMENT. P. R. Peacock. Intern. Congr. Microbiol., Rept. Proc., 3rd Congr., New York, 334-47(1940). BA 15-4716

4430
THE ACTION OF RADIOACTIVE RADIATIONS ON BACTERIA. R. B. Hanes and D. E. Lea. Intern. Congr. Microbiol., Rept. Proc., 3rd Congr., New York, 264(1940). BA 15-4728

4431
THEORETICAL INVESTIGATION OF THE KILLING OF MICROBES BY RADIATION. P. Jordan. Intern. Congr. Microbiol., Rept. Proc., 3rd Congr., New York, 263(1940). (In German). BA 15-4728

4432
THE RADIOBIOLOGICAL IMPORTANCE OF THE ENERGY DISTRIBUTION ALONG IONIZATION TRACKS. Raymond E. Zirkle. J. Cellular Comp. Physiol. 16(2), 221-35 (1940).

Role of linear energy absorption (E_L) along tracks of ionizing particles was investigated by irradiation (1) spores of *Aspergillus*, (2) vegetative cells of *Saccharomyces cerevisiae*, and (3) cells of *Bacterium coli*. X-ray action (low E_L) was compared to that of α rays (high E_L). With increased E_L , effectiveness per unit dose on (1) increases sharply, on (2) increases slightly, on (3) decreases. BA 15-6396

4433
DIRECT AND INDIRECT EFFECTS OF ROENTGEN RADIATION ON THE BLOOD-FORMING ORGANS OF RATS. Chien-Liang Hsu and W. A. Ma. Am. J. Cancer 39(3), 319-33(1940).

Albino female rats, 6-9 mo old, 350-450 gm wt, received daily doses of 125 r in 10 min on skin of posterior surface of hind leg to maxima of 1000, 2500, and 5000 r, 100 kv, 4 ma, 4 mm Al, at 30 cm. After 24 hr, examination of spleen, submaxillary lymph nodes and femoral marrow revealed decrease in marrow cells in proportion to dosage, and decrease in lymphoid cells in nodes and spleen. BA 15-8400.

4434
COMPARABLE ACTION OF X-RAYS ON THE DYSENTERY BACTERIOPHAGES. A. Lacassagne and E. Wollman. Compt. rend. soc. biol. 131(20), 857-9(1939). (In French).

Irradiation (monochromatic x rays of 0.53 Å with molybdenum anticathode tube) of phages in bouillon with about 210,000 γ (calculated for surface of liquid) inactivated elements of C. 16 while in S. 13 about 825,000 γ were required for same result. Lysates of C. 16 and S. 13 had same titer. S. 13, having greater volume, is more resistant to x rays than C. 16. BA 15-18442

4435
THE INFLUENCE OF ULTRA-VIOLET AND ROENTGEN RADIATION OF SPLEEN ON THE RELATIONSHIP BETWEEN CEPHALIN AND PROTEIN FRACTION IN THE BLOOD PLASMA OF RABBITS. Norio Yosida. J. Biochem. (Tokyo) 32, 1-9(1940). (In German).

X-rays induce marked and persisting increase of cephalin, ultraviolet irradiation produces temporary increase. Changes in cephalin concentration are accompanied by counter changes in concentration of euglobulin. BA 16-1383.

4436
DISSOCIATION OF STAPHYLOCOCCI BY X-RAYS: TOXIN-PRODUCING ABILITIES OF X-RAY VARIANTS. Sol Haberman. J. Bacteriol. 42(1), 148-9(1941).

An abstract. BA 16-1500

4437
THE SENSITIVITY OF THE ACTINOMYCETALES TO RADON. N. A. Krasil'nikov. Mikrobiologiya 7, 721-31(1938).

Great difference in sensitivity to Rn exists between strains of bacteria as well as between species. All red, yellow, and yellow-green pigment strains (*Proactinomyces ruber*, *citreus*, *Myco-bacterium luteum*, and others) are more sensitive to Rn. Rn was found to stimulate growth of *P. ruber* and *M. rubrum* but not that of *P. album* and *M. album*. BA16-1509

4438

THE ROENTGEN RAY TREATMENT OF BRONCHIAL ASTHMA. J. von Palugyay. *Wien. klin. Wochschr.* 53, 783(1940).

Best results were obtained from two series of irradiation treatments to lung and spleen at intervals of 4-6 wk in patients who had asthma for only a short time. In 15 or 20% of cases there was no response to treatment, in 25-30% results were excellent. Author advises that x-ray therapy be used in conjunction with allergic treatment. BA 16-1678

4439

THE BACTERIAL ACTION OF X-RAYS, NEUTRONS AND RADIOACTIVE RADIATIONS. D. E. Lea, R. B. Haines, and E. Bretscher. *J. Hyg.* 41(1), 1-16(1941).

Aqueous suspensions of *E. coli* and *B. mesentericus* were irradiated with gamma rays, neutrons, and hard x rays. Rates of killing were constant, LD varied with different radiations, was largest for vegetative cells with radiations of highest ion density (not true for spores). LD was independent of intensity and temperature. Target theory discussed in interpreting results. Bactericidal action is considered explicable on basis of production of lethal mutations in bacterial cell. BA 16-1843

4440

ADVENTITIOUS ROOTS OF RAGI (*ELEUSINE CORACANA*, GAERTN.). N. Krishnaswamy and G. N. Ranswamy Ayyangar. *Current Sci. (India)* 10(2), 79-80(1941).

In plants grown from x-rayed seeds, long, thin, and wiry roots developed in almost every node, down along the stem to leaf sheath base, where they encircled the stems. BA 16-2767

4441

EXPERIMENTAL AND THEORETICAL INVESTIGATION OF THE MECHANISM OF GERMINATION INJURY BY ROENTGEN RADIATION IN POLLEN OF *ANTIRRHINUM MAJUS*. Reinhard Kaplan. *Biol. Zentr.* 60(5/6), 298-318 (1940). (In German).

The percentage of injured pollen grains tended to increase exponentially with increasing x-ray doses under various conditions. Doses of $180-400 \times 10^3$ r produced 50% injured grain and depended on dried or swollen state of pollen before and after exposure. Results are considered in light of "poison" hypothesis and quantum-hit theory. BA 16-2795

4442

THE EFFECT OF PH ON THE INACTIVATION OF TOBACCO-MOSAIC VIRUS BY X-RAYS. Alfred Marshak and William N. Takahashi. *Phytopathology* 31(9), 862 (1941).

An abstract. BA 16-2915

4443

ON THE REACTION OF *PHYCOMYCES BLAKESLEEANUS* TO ROENTGEN AND γ -RAYS. Arne Forssberg. *Acta Radiol.* 22(12), 252-9(1941). (In German).

P. blakesleeanus was irradiated with x rays and γ rays over a wide range of doses and intensities. A reduction in growth rate was observed after doses as small as 0.001 r. BA 16-11805

4444

THE PROBLEM OF ROENTGEN IRRADIATION OF NORMAL LUNG ON THE PREVENTION OF SUBSEQUENT METASTATIC TUMOR GROWTH. Robert P. Barden. *Radiology* 37(5), 608-15(1941).

Rabbits were subjected to x irradiation of right lung, then inoculated intratesticularly with tumor. Irradiation prevented pulmonary metastasis and this effect is attributed to effect on blood supply which prevents implantation of neoplasms. (Radiation: 120 kv, 4 mm Al filter, 5 ma, 78 r/min. 20 cm distance, 300-900 r single dose or divided into two doses given on successive days.) BA 16-15891

4445

THE ROENTGEN PATHOLOGY OF MITOSIS. III. FURTHER INVESTIGATIONS OF THE SECONDARY EFFECTS OF ROENTGEN RADIATION ON THE HAPLOID MITOSIS OF *BELLVALIA ROMANA*. H. Marquandt. *Z. Botan* 36(6/8), 273-386(1941). (In German). BA 16-11561

4446

CHROMOSOME BREAKAGE AND STERILITY IN THE MOUSE. P. C. Koller and C. A. Auerbach. *Nature* 148 (3756), 501-2(1941).

Hereditary partial sterility was produced in three strains of mice by x rays. BA 16-11575

4447

GENETIC CONTROL OF BIOCHEMICAL REACTIONS IN *NEUROSPORA*. G. W. Beadle and E. L. Tatum. *Proc. Natl. Acad. Sci. U. S.* 27(11), 499-506(1941).

X-rays induce mutant strains in *Neurospora* which are characterized by: loss of ability to synthesize vitamin B₆ (which is differentiated by a single gene from ability to elaborate this vitamin), absence of ability to synthesize thiazole half of vitamin B₁, non-synthesis of para-aminobenzoic acid. It was later established that inability to synthesize both thiazole and p-aminobenzoic acid is also inherited as though differentiated from normal by single genes. BA 16-11592

4448

PRODUCTION OF SOMATIC MUTATIONS IN THE PIGEON WITH X-RAYS. Leon J. Cole and Harold E. Finley. *Anat. Record*, 81(4), Suppl. 48(1941). BA 16-11618

4449

X-RAY INDUCED CHANGES IN *DROSOPHILA* AND SELECTIVE FERTILIZATION. John W. Gowen. *Anat. Record*, 81(4), Suppl. 112-13(1941).

An abstract. BA 16-11621

4450

THE EXPERIMENTAL MODIFICATION OF THE SENSITIVITY OF YEAST TO ROENTGEN RAYS. Robert S. Anderson and H. Turkowitz. *Am. J. Roentgenol. Radium Therapy* 46(4), 537-41(1941).

Cultures of *Torula cremoris* were irradiated in presence or absence of atmospheric O₂, with 190 kv x rays (unfiltered) at 190 r per min. Air was removed by de-aerating culture or by allowing culture to grow until so crowded that O₂ lack was produced, controls were aerated by vigorous shaking. In either case, cells irradiated in presence of O₂ were more sensitive to x rays than those which lacked it. BA 16-11800

4451

STABILITY OF THE STANDARD DOSAGE-EFFECT CURVE FOR RADIATION. C. I. Bliss and Charles Packard. *Am. J. Roentgenol. Radium Therapy* 46(3), 400-4(1941).

Standard dosage-effect curve for *Drosophila* eggs and x irradiation was tested for statistical accuracy and possessed greater stability in both slope and position than had been generally reported in investigation on toxic effects. BA 16-11801

4452

EXPERIMENTAL MODIFICATION OF INJURY PRODUCED BY ROENTGEN RADIATION. T. C. Evans, J. P. Goodrich, and J. C. Slaughter. *Anat. Record* 81(4), Suppl. 33(1941).

Radiation injury to the skin of young rats was decreased by lowering the temperature during irradiation, lowering the breathing rate and by blocking circulation. Radio-resistance of *Arbacia* sperm was increased by decreasing the amount of water present, packing sperm to reduce their mobility and by adding substances such as egg albumin, gelatin and *arbacia* egg jelly to the suspension. BA 16-11802

4453

INHIBITION OF EMBRYO FORMATION IN CERTAIN NEMATODES BY ROENTGEN RADIATION. T. C. Evans,

A. J. Levin, and N. M. Sulkin. Proc. Soc. Exptl. Biol. Med. **48**(3), 624-8(1941).

Studies with *Trichinella* and *Rhabditis pello* are described. BA 16-11803

4454

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF ROENTGEN RAYS AND NEUTRONS ON THE REGENERATION OF THE FORELIMB OF AMBLYSTOMA LARVAE.

Edward C. Horn. Am. J. Roentgenol. Radium Therapy **46**(5), 727-31(1941).

Forelimbs in 3 digit stage were amputated immediately following irradiation with different doses of neutrons from cyclotron beam or of 60 kv x rays. Animals receiving more than 62 n of neutrons or more than 850 r of x rays showed no evidence of regeneration. On this basis an x ray dose of 13-14 times that of the neutron dose, as measured with a Victoreen 100 r chamber, is required to prevent regeneration. BA 16-11806

4455

NON-HARMFUL EFFECTS OF IRRADIATION OF THE PITUITARY REGION OF RABBITS. J. Kotz, Joseph F. Elward, and Elizabeth Parker. Am. J. Roentgenol. Radium Therapy **46**(4), 543-9(1941).

Twenty adult male rabbits, under light nembutal anesthesia treated with varying x ray doses ranging from 200 - 500 r in region of pituitary and killed at varying intervals. Pituitary, ovaries, thyroid, and adrenals were examined histologically. No evidence of degenerative changes was observed. Lack of anatomical changes is not indicative of lack of functional change, however. BA 16-11807

4456

EFFECTS OF REPEATED SMALL DOSES OF ROENTGEN RAYS ON CANINE BLOOD AND BONE MARROW. R. M. Mulligan. Proc. Soc. Exptl. Biol. Med. **48**(3), 607-11(1941).

X-ray doses of 75-100 r applied to caudal half of left thorax and cranial half of left abdomen of four dogs under nembutal anesthesia, at intervals of a week or more for several months, caused depression of total leucocyte count, shift to left in neutrophile granulocyte line, occasional eosinophilia, and moderate anemia in peripheral blood, hypoplasia and decrease in myeloid-erythroid ratio in bone marrow, and no evidence of interference with general activity of the animals. BA 16-11808

4457

STUDIES OF IRRADIATION EFFECTS ON CANCER CELLS. I. PRELIMINARY REPORT: THE PRODUCTION OF LIVER CANCER IN WHITE RATS. G. Z. Williams, M. K. Cary, and J. T. Williams. Virginia Med. Monthly **69**(2), 93-5(1942).

Liver cancer was produced in 78 rats by feeding butteryellow and a deficient diet. Roentgen irradiation, totaling 2000 r was applied over the liver in one group previous to cancer development and in another group following cancer development. Irradiation had no effect on incidence or mortality. The strain of rats used showed a tumor incidence of 85% while a strain of hooded rats showed 75% incidence. BA 16-12158

4458

CHANGES OF CYTOPLASMIC ELASTICITY IN SPIROGYRA. Y. Sinoto and D. Sato. Botan. and Zool. (Syokubutu Ovobi Dobutu) **9**(1), 9-16(1940).

By subjecting *Spirogyra* cells to centrifugation in a lateral direction, the authors studied the effects of neutrons, acenaphten (0.003%), colchicine (0.5%) and chlorhydroxylamine (0.05%) on intracellular migration of chloroplasts. Both neutrons and chemical agents facilitated migration. Observed effect is attributed to decrease in structural viscosity of protoplasm. BA 16-13375

4459

TYPES AND FREQUENCIES OF CHROMOSOMAL ABERRATIONS INDUCED BY X-RAYS. K. Sax. Cold Spring Harbor Symposia Quant. Biol. **9**, 93-101(1941).

Frequency of x ray-induced breaks in only 1 of the 2 sister chromatids increases, while breaks involving both sister chromatids decrease in frequency, as prophase stage develops and sister chromatids become more widely separated. BA 16-15756

4460

CHROMOSOME MUTATIONS DUE TO ROENTGEN RADIATION IN *DROSOPHILA MELANOGASTER*. Hans Bauer. Z. Zellforsch. u. mikroskop. Anat. Abt. B. Chromosoma. Z. Zellkern-u. Chromosomenforsch. **1**(3), 343-90(1939). (In German).

Cytological study of salivary glands of 3404 female larvae from offspring of x rayed males is reported. BA 16-15761

4461

ON THE MECHANISM OF RADIATION-INDUCED CHROMOSOME MUTATIONS IN *DROSOPHILA MELANOGASTER*. K. Eberhardt. Z. Zellforsch. u. mikrosk. Anat. Abt. B. Chromosoma; Z. Zellkern -u Chromosomenforsch. **1**(3), 317-35(1939). (In German).

Frequency of x ray-induced changes of cubitus interruptus is taken as an index of total frequency of break induced within a certain region of the 4-chromosome and is found to be approximately proportional to x ray dosage. BA 16-15764

4462

HEREDITARY SUSCEPTIBILITY TO X-RAY INJURY IN *TRITICUM MONOCOCCUM*. Luther Smith. Am. J. Botany **29**(2), 189-91(1942).

Einkorn wheat mutant was found which is more severely injured by 4000-20,000 r x ray treatment of dormant seeds than are other mutants or normal varieties tested. In one trial, germination of normal line was reduced 12% by 20,000 r, in susceptible mutant was reduced 84%. Injury was exhibited by greater flecking on leaves, slower growth, and death from smaller doses than are required to produce similar effects in nonsusceptible seeds. BA 16-14156

4463

AN ANALYSIS OF GROUP DIFFERENCES ARISING FROM A POISSON DISTRIBUTION OF OBSERVATIONS OBTAINED FROM IRRADIATION EXPERIMENTS. Holly Clair Fryer. Iowa State Coll. J. Sci. **16**(1), 49-51(1941). BA 16-14163

4464

INVESTIGATION OF THE INFLUENCE OF RADIUM EMANATION ON PLANT GROWTH. C. Mayer. Balneol. **5**(6), 260-5(1938). (In German).

Growth was stimulated by regular feeding with emanation-containing water. BA 16-15362

4465

THE RELATION BETWEEN XYLEM THICKENING IN PRIMARY ROOTS OF *VICIA FABA* SEEDLINGS AND ELONGATION AS SHOWN BY SOFT X-RAY IRRADIATION. G. F. Smith and H. Kersten. Bull. Torrey Botan. Club **69**(3), 221-34(1942).

Type of secondary wall thickening found in vessels is determined by extent of elongation in surrounding tissues. Histological study was made of roots of seedlings from irradiated unsoaked seeds (soft x rays, 30 kv, 10 ma, 8 cm distance for 0, 15, 30, 60, 90, 120 min). Roots showed decreasing total elongation with increasing doses of x rays. BA 16-15365

4466

HISTAMINE IN BLOOD AND TISSUES UNDER THE INFLUENCE OF SHORT WAVES, DIATHERMY AND

FANGO (RADIOACTIVE MUD). F. Hildebrandt. Arch. exptl. Pathol. Pharmacol. 197(2), 148-60(1941). (In German).

Shortwave therapy, diathermy or fango (radioactive mud) packing, in cats, dogs and rabbits increased histamine content of blood, drawing histamine from tissues. The degree, speed of onset and duration of the effect differed markedly in individual animals. BA 16-17630

4467
THE EVOLUTION OF EXPERIMENTAL RADIATION ULCERS OF THE INTESTINE. N. B. Friedman and S. Warren. Arch. Pathol. 33(3), 326-33(1942).

Irradiation of rabbit intestine resulted in an altered and damaged mucous membrane which was especially susceptible to ulceration. Ulceration, though focal, was not localized by vascular occlusion, appeared to be the chance effect of mechanical trauma and subsequently infection acting on a mucosa and bowel wall structurally and functionally damaged by radiation and imperfectly regenerated. BA 16-17789

4468
BLOOD CHANGES IN 27 CANCER CASES TREATED WITH ULTRADEEP TELERADIOLOGY. A. E. Roifo and B. Luchetta. Bol. inst. med. exptl. estud. cancer (Buenos Aires 18(57)), 607-26(1941).

Studies of blood of patients with various cancers, treated with ultra-deep high voltage (600 kv) roentgen radiation showed, in 40%, a definitely increased red cell content. In remaining 60% there was less definite evidence of diminished blood destruction. Thrombocytes and lymphocytes were reduced in number. Immature members of lymphocytic series were not seen. BA 16-18173

4469
ANTI-LEUCOCYTIC SHEEP SERUM AS SENSITIZING AGENT IN CHRONIC MYELOID LEUKEMIA REFRACTORY TO DEEP X-RAY THERAPY. J. B. Thiersch. Med. J. Australia 29(8), 225-9(1942).

Patients who ordinarily became refractive to x rays remained sensitive to ray therapy after administration of anti-leucocytic serum. Serum caused strong reactions in the patient and did not cure the leukemia (acute myeloblastic) or prolong life. BA 16-18218

4470
RADIATION EFFECTS ON NERVOUS SYSTEM AND ROENTGEN-PIGMENTATION OF GOLDFISH (CARASSIUS AURATUS). Charles Davison and Friedrich Ellinger. Proc. Soc. Exptl. Biol. Med. 49(3), 491-5(1942).

Histological examination of central nervous system of x irradiated goldfish revealed pronounced pathological changes, predominantly in medulla oblongata, extending into anterior horns of spinal cord. Extent of damage was dependent upon dose. Destruction of chromatomotoric nerve center is believed to be the cause of roentgen pigmentation occurring post-exposure. BA 16-17586

4471
THE ABSORPTION OF RADIOPHOSPHOROUS IN IRRADIATED AND NON-IRRADIATED MICE. L. D. Marinelli and J. M. Kenney. Radiology 37(6), 631-7(1941).

Mice were given tracer doses of P^{32} intraperitoneally as Na_2HPO_4 immediately after exposure and sacrificed at various intervals. P^{32} content/g of muscle or skin was the same in irradiated and control legs, higher in irradiated bone than in control bone. BA 16-17587

4472
THE BIOLOGICAL EFFECTS OF ROENTGEN RAYS OF LONG AND SHORT WAVELENGTH ON THE TOTALLY IRRADIATED RAT. J. Craig Potter. Radiology 37(6), 724-5(1941).

Comparative lethal effects of three different wave lengths, and irradiation effects on rat fertility following

ovarian irradiation were studied (total of 500 rats over 8 yr period). BA 16-17588

4473
THE INFLUENCE OF ROENTGEN RAYS ON VARIOUS SYMPATHOMIMETIC HORMONES AFFECTING THE BLOOD SUGAR LEVEL. I. STUDIES WITH ADRENALIN. Eiskoku Sai. Japan J. Med. Sci. IV. Pharmacol. 14(1), 1-12(1941). (In German).

Hyperglycemic action of adrenalin in rabbits was intensified by x raying adrenalin solution with doses up to 4800 r, effect was proportional to dose, above this the effect decreased. After 9000 r the hyperglycemic action of adrenalin was diminished. Erythrosin, tryptaflavin, methylene blue act as photocatalyzers in augmenting x ray effect. BA 16-17590

4474
THE INFLUENCE OF ROENTGEN RAYS ON VARIOUS SYMPATHOMIMETIC HORMONES AFFECTING THE BLOOD SUGAR LEVEL. II. STUDIES WITH TYRAMINE. Eiskoku Sai. Japan J. Med. Sci. IV. Pharmacol. 14(1), 31-42(1941). (In German).

X-irradiation of tyramine with doses to 300 r increased the hyperglycemic action of tyramine in rabbits; 2400 r resulted in decreased action. Addition of erythrosin, tryptaflavin, methylene blue, or rose bengal to solution before exposure had a photocatalytic effect. BA 16-17590

4475
IN VITRO RESPONSE OF LYMPHOCYTES TO MINIMAL DOSES OF X-RAYS. Wilhelm K. Stenstrom, Austin F. Henschel, and Joseph T. King. Proc. Soc. Exptl. Biol. Med. 49(4), 525-7(1942).

Response of lymphocytes from rabbit mesenteric lymph node to small doses of x rays was studied. Migration rate in tissue culture clots was measured at 24 hr after exposure. A 5.3% inhibition was noted after 20 r. At $\frac{1}{2}$ this dose the results were of questionable significance. BA 16-17591

4476
ELIMINATION OF RADIOACTIVE ELEMENTS BY PATIENTS AND RABBITS AFTER THE INJECTION OF THOROTRAST. Wilhelm Stenstrom. Radiology 37(6), 698-703(1941).

Each of three rabbits received 2 cc of colloidal thorotrast intravenously. Five hours later, almost all thorotrast was cleared from blood and 10% of Th X formed in 24 hr was excreted in urine and feces. In rabbit killed 127 days after injection, radioactivity per gram of tissue was in following amounts relative to amount in liver: spleen, 20, bone marrow. There was relatively little in bones. Activity in blood and lymph nodes was due mostly to Th X. BA 16-17592

4477
PHYSICAL AND BIOLOGICAL CONSIDERATIONS IN THE USE OF SLOW NEUTRONS FOR CANCER THERAPY. Paul A. Zahl and Franklin S. Cooper. Radiology 37(6), 673-682(1941).

Injected Li salts were used in combination with neutron therapy in treatment of spontaneous mammary tumors and implanted sarcoma 180 tumors in mice. Neutron absorption was increased by previously introduced B or Li. BA 16-17593

4478
REGARDING WOUND HORMONES. B. C. G. Science and Culture (India) 7(6), 299(1941).

Cells injured by lethal doses of ultraviolet or x rays release "wound hormones" which promote cellular proliferation. Similar substances seem to be produced by irradiated tumor cells (Mitchell). These hormones may be of purine and pyrimidine nature according to earlier experiments on irradiated Saccharomyces cerevisiae (other investigators). BA 16-19027

4479

THE LESIONS PRODUCED IN THE GASTRO-INTESTINAL TRACT BY IRRADIATION. GENERAL REVIEW WITH AN ILLUSTRATIVE CASE REPORT. R. M. Mulligan. Am. J. Pathol. 18(3), 315-26(1942).

Literature on radiation damage to gastrointestinal tract is summarized, including literature on human and experimental cases. Effect on epithelium per se and on vascular supply are considered as well as role of bacterial invasion through the injured wall in development of roentgen ray intoxication. BA 16-19791

4480

CLINICOPATHOLOGIC CONFERENCE. J. W. Pickren. N. Y. State J. Med. 57, 1083-90(1957).

A male had a radical retroperitoneal lymph node dissection followed by deep x-ray therapy from a 1,000,000-volt generator. A dose of about 5000 r was delivered. Treatment was followed by severe radiation changes of the skin and soft tissues with chronic radiation dermatitis and immobilization of the spine due to surrounding fibrosis. A case history of his symptoms is presented.

4481

PATHOLOGY AND PATHOLOGIC DIAGNOSIS OF RADIATION LESIONS IN THE GASTRO-INTESTINAL TRACT. Shields Warren and Nathan B. Friedman. Am. J. Pathol. 18(3), 499-510(1942).

Thirty-eight cases are presented in which stomach or intestinal lesions developed following irradiation. Histologic alteration in epithelial, vascular, connective, and muscle tissue is described. BA 16-19809

4482

THE INFLUENCE OF ROENTGEN RADIATION ON THE VARIOUS SYMPATHOMIMETIC HORMONES AFFECTING THE BLOOD SUGAR LEVEL. III. USING PHENYLETHANOLAMINE. IV. USING SYMPATOL. Eiskoku Sai. Japan J. Med. Sci. IV. Pharmacol. 14(1), 91-8, 125-9 (1941). (In German).

X-irradiation of phenylethanolamine does not increase its hyperglycemic action in rabbits and large doses diminish or abolish it. In presence of dyes, irradiation causes even greater loss of hormonal effect. Sympatol, irradiated with doses up to 600 r, had increased effect; higher doses decreased its action. BA 16-20132

4483

THE PROGNOSIS IN CASES OF BRAIN TUMOR AND THE RESULTS OF SURGERY AND RADIATION THERAPY. Ricardo Morea. Rev. neurol. 6(4), 423-42(1941). (In Spanish).

Results of radiotherapy in cases of brain tumor extremely variable. Author suggests augmenting x-ray effect by use of lipiodol within tumor where secondary rays are given off. BA 16-20195

4484

SERUM AND TISSUE PHOSPHATASE DETERMINATIONS AS AN AID IN EVALUATING THE RADIATION THERAPY OF BONE TUMORS. H. Q. Woodard and N. L. Higinbotham. J. Am. Med. Assoc. 116(15), 1621-7(1941).

An x ray dose of 4000 r inactivates phosphatase-producing mechanism of tumors and decreases serum phosphatase content. After radiation therapy of metastatic bone tumors, serum phosphatase values decrease only after healing. BA 16-20212

4485

THE INACTIVATION OF TOXIC BACTERIAL FILTRATES BY ROENTGEN RADIATION. Charles M. Carpenter, Herbert E. Stokinger, Helen Ackerman and Stafford L. Warren. J. Bacteriol. 43(1), 75-7(1942).

An abstract. BA 16-20448

4486

THE MECHANISMS OF X-RAY EFFECTS ON CELLS. Karl Sax. J. Gen. Physiol. 25(4), 533-7(1942).

Irradiation of resting nuclei of *Tradescantia* microspores did not increase their sensitivity at prophase. Frequency of x-ray induced chromosomal aberrations at prophase was slightly reduced by previous irradiation at resting stage, due to production of less sensitive acentric chromosome fragments. Deleterious x-ray effect on single cells is believed to be due to "direct hit" mechanism. BA 16-21080

4487

SIGNIFICANT DIFFERENCES IN X-RAY SENSITIVITY AMONG VARIOUS SPECIES AND STRAINS OF YEASTS. Raymond E. Zirkle. J. Bacteriol. 43(1), 119(1942).

An abstract. BA 16-21081

4488

MUTATION OF *PHYTOMONAS STEWARTII* BY X-RAY IRRADIATION. Ralph E. Lincoln and John W. Gowen. Genetics 27(4), 441-62(1942).

Mutations were observed in colony color, surface appearance, and size of colonies. Rate of mutation was increased above the spontaneous mutation rate by x-irradiation. (X rays applied so that 1×10^8 viable cells suspended in broth were reduced to about 1×10^3 in 25 min of treatment.) X-ray-induced mutations differ from spontaneous mutations only in frequency of occurrence. BA 15-21125

4489

ON THE QUESTION OF THE RELATIONSHIP BETWEEN RADIATION-INDUCED POINT- AND CHROMOSOME-MUTATIONS IN DROSOPHILA. N. W. Timofeef-Ressovsky. Z. Zellforsch. u. mikroskop. Anat. Abt. B; Chromosoma; Z. Zellkern. -u Chromosomenforsch. 1(3), 310-6(1939). (In German).

Frequency of x-ray-induced sex-linked lethals was proportional to x-ray dose, in spite of the fact that lethals are partly due to chromosomal rearrangements, the frequency of which is roughly proportional to the square of the dose. BA 16-15771

4490

RELATIVE EFFECTS OF X-RAYS AND NEUTRONS ON CHROMOSOMES IN DIFFERENT PARTS OF THE "RESTING STAGE." Alfred Marshak. Proc. Natl. Acad. Sci. U. S. 28(2), 29-35(1942).

Chromosome abnormalities were directly proportional to dose at all stages if allowance was made for multiple hits. Ratio of neutrons to x-ray efficiency (n/x) was constant for different species at prophase, and was increased by a factor of 2 during nuclear resting stage of single species. Neutrons were more effective than x rays on chromosomes of resting nucleus. Daily "safe dose" for neutrons is less than for x rays. BA 16-15772

4491

ON THE BIOLOGICAL EFFECT OF ULTRA-VIOLET LIGHT QUANTA. P. Jordan. Proc. Indian Acad. Sci. 8A, 281-8(1938). (In German).

Theoretical interpretation of inactivation curves obtained with x rays and ultraviolet on bacteria, yeast, and urease is presented. Radiation effect is compared with function of such toxic substances as phenol and $HgCl_2$. Genetical interpretation of killing curves is suggested. BA 16-15888

4492

THE PHYSIOLOGICAL EFFECTS OF NEUTRON RAYS. Paul C. Aebersold and John H. Lawrence. Ann. Rev. Physiol. 4, 25-48(1942). BA 16-15890

4493

CLEAVAGE DELAY IN *ARBACIA PUNCTULATA* EGGS IRRADIATED WHILE CLOSELY PACKED IN CAPILLARY TUBES. Irving Cohen. Radiology 35(5), 561-2(1940).

With both high and low voltage, eggs packed in glass capillaries were more radioresistant than those in sea water. Criterion for x-ray effect was a delay in appearance of initial cleavage. BA 16-15892

4494

CHANGES IN THE EPITHELIUM OF BLOOD VESSELS AFTER ROENTGEN IRRADIATION. L. Eiskind. Acta Pathol. Microbiol. Scand. 17(4), 481-93(1940). (In German).

Rabbits (30) were given single dose of 2500 r to aorta and large veins; 5 men were given total doses of 3500-4500 r in fractionated exposure. Epithelium of aorta and large veins exhibit considerable radioresistance. Nonspecific changes observed: nuclei became rounder, stained darker; perinuclear cytoplasmic vacuoles appeared; multinucleate cells which appeared to be result of normal mitoses without subsequent cytoplasmic cleavage were observed. BA 16-15893

4495

THE GOLDFISH AS A NEW BIOLOGIC TEST OBJECT IN EXPERIMENTAL RADIATION THERAPY. Friederich Ellinger. Radiology 35(5), 563-74(1940).

Irradiation effects appeared between second and third weeks after exposure depending on dosage. Brownish-black pigmentation appeared on both sides of trunk. Autopsy revealed: atrophy and shrinkage of lymphoid tissue, pyknosis of lymphocytes, increased fibrosis, complete disappearance of lymphoid elements from spleen accompanied by proliferation of macrophages. BA 16-15894

4496

DEPTH DOSAGE MEASUREMENTS BY MEANS OF GOLDFISH. Frederick Ellinger and Reuben Gross. Radiology 37(6), 717-21(1941).

Author compares mortality curves obtained following administration of a lethal dose at the surface with mortality curves for the calculated depth dose. Anticipated depth effect did not occur (lethal effect from depth dose exceeded expected effect). BA 16-15895

4497

RADIATION THERAPY. Stephan Epstein. Dermatologica 82, 400(1940). (In German).

Survey of radiobiology and therapy with x rays, Bucky rays, radioactive substances, short and long ultraviolet rays, and short waves. BA 16-15896

4498

THE INACTIVATION OF VACCINIA VIRUS BY RADIATIONS. D. E. Lea and M. H. Salaman. Brit. J. Exptl. Pathol. 23(1), 27-37(1942).

Inactivation of suspensions of Vaccinia virus by α , γ , and x rays was determined from results of intradermal inoculation of serial dilutions in rabbits. Effect appears to be due to single ionization in a sensitive constituent of the virus that occupies approximately 1/2 per cent of total virus volume. Results are contrasted with observations on the size of the sensitive volume in small plant viruses and phages and the implications of the difference are discussed. BA 16-16651

4499

CYTOLOGICAL IRREGULARITIES INDUCED IN PETUNIA BY X-RAY TREATMENT OF POLLEN. Charles M. Rick. Genetics 27(1), 164(1942). BA 16-8701.

4500

CANCER OF THE LUNG IN THE MINERS OF THE JACHYMOV (JOACHIMSTAL). A. Pichan and H. Siki. Am. J. Cancer 16, 681-721(1932).

In five cases studied there was dissemination by way of the lymphatics as well as via the blood stream. The bones were involved in 4 cases. In 3 there was compressive myelitis due to metastases in the vertebrae.

4501

CELL-LINEAGE STUDIES IN ROOT MERISTEMS BY MEANS OF X-RAY INDUCED CHROMOSOME REARRANGEMENTS. R. T. Brumfield. Genetics 27, 135(1942).

Meristems of primary root tips of *V. faba* and *C. capillaris* grown (3 wk) from seed irradiated during

germination, were in many cases found to be chimeras. Both normal and rearranged chromosome complements occurred in the same root. BA 16-8741

4502

AN ANALYSIS OF THE INTENSITY FACTOR IN X-RAY INDUCED CHROMOSOMAL ABERRATIONS IN TRADE-SCANTIA. N. H. Giles and B. R. Nebel. Genetics 27, 143-3(1942).

The number of chromosome aberrations per cell was determined for microspores exposed to 308 r of x rays at intensities ranging from 1.3 to 1200 r/min. BA 16-8746

4503

X-RAY AND ULTRA-VIOLET INDUCED MUTATIONS IN NEUROSPORA. I. X-RAY MUTATIONS. Carl C. Lindegren and Gertrude Lindegren. J. Heredity 32(11), 404-12 (1941).

X-irradiation of unnucleate spermatia of *N. crassa* induced both gene mutations and chromosomal aberrations, one of which was specifically identified as an inversion. BA 16-8756

4504

X-RAY DOSAGE CURVES IN TRADESCANTIA. B. R. Nebel, G. B. Wilson, and L. Marinelli. Genetics 27(1), 158 (1942). BA 16-8762

4505

CYTOLOGICAL DEMONSTRATIONS OF CHROMOSOME BREAKS SOON AFTER X-IRRADIATION. D. W. Bishop. Genetics 27(1), 132(1942).

An abstract referring to studies on *Chortophaga viridifasciata* and *Melanoplus bivittatus*. BA 16-8783

4506

SENSITIVITY OF SPERMATOCYTE CHROMOSOMES TO ABERRATIONS INDUCED IN THE EMBRYOS BY X-IRRADIATION. D. W. Bishop. Genetics 27(1), 132-3 (1942).

An abstract referring to studies on grasshoppers (*Circotettix verruculatus*). BA 16-8784

4507

THE PRODUCTION OF SOMATIC MUTATIONS IN THE PIGEON WITH X-RAYS. Leon J. Cole and Harold E. Finley. Genetics 27(1), 138(1942).

Authors describe x ray-induced flecking in feathers of the pigeon wing following exposure of the empty follicles to 750 r - 1000 r, localized exposure. The increased flecking is attributed to x-ray induced mutations in feather germs. BA 16-8793

4508

GENETIC EFFECTS PRODUCED BY NEUTRONS IN DROSOPHILA MELANOGASTER. M. Demerec, B. P. Kaufmann, and E. Sutton. Genetics 27(1), 140(1942). BA 16-8798

4509

X-RAY SENSITIVITY OF FIRST MEIOTIC PROPHASE AND METAPHASE IN HABROBRACON EGGS. Anna R. Whiting. Genetics 27(1), 174-5(1942).

Hatchability percentages (survival curves) are presented (and analyzed) for unfertilized eggs x irradiated in late prophase I and late metaphase I. Injury in both stages represents chromosome breaks. BA 16-8851

4510

THE REACTION OF KIDNEY TUBULES IN TISSUE CULTURE TO ROENTGEN RAYS. Robert Chambers and Gladys Cameron. Radiology 37(2), 186-93(1941).

Hanging drop cultures of teased fragments of mesonephros from a 10-day chick embryo were exposed to 200 kv x rays, 30 ma through each tube (dual tube machine), 2700 r/min at treatment point. Doses: 5000-75,000 r. Cultures proved to be highly radioresistant. Sensitivity was greater when phenol red was added (this is a secretory stimulant).

Damages were not related to production of toxic products.
BA 16-9050

4511
ROENTGEN RADIATION IN EXPERIMENTAL CLOSTRIDIUM WELCHII INFECTION (GAS GANGRENE) IN DOGS: PRELIMINARY REPORT. Andrew H. Dowdy and Robert L. Sewell. *Radiology* 37(4), 440-2(1941).

Irradiation in experimentally produced *C. welchii* infection permitted a greater number of recoveries than in unirradiated controls. Best results were obtained when radiation therapy was begun within 4 hr of inoculation with *C. welchii*. Radiation of 120 kvp (half value layer of 3.55 mm Al) was more effective than 200 kvp x rays (half value layer of 0.95 mm Cu). BA 16-9051

4512
THE EFFECT OF ROENTGEN RADIATION ON THE JELLY OF NEREIS ZYGOTE. T. C. Evans. *Biol. Bull.* 81(2), 298(1941).

Unirradiated Nereis eggs exude their jelly through the cell membrane (to form a protective coat around the zygote) within a few minutes after insemination. After an x ray dose of 44,000 r this phenomenon is prevented and fertilization is followed by extreme swelling of the fertilization membrane. BA 16-9052

4513
THE ROENTGEN TREATMENT OF EXPERIMENTAL PNEUMONIA IN THE GUINEA PIG. Carl Fried. *Radiology* 37(2), 197-202(1941).

Non-lethal lesions can be produced in lungs of guinea pig by introducing into the bronchi an emulsion of *Staph. aureus hemolyticus*. Such animals, irradiated 6, 12, or 24 hr after infection, exhibited well-defined clinical improvement not shown by controls. Microscopic examination of lung tissue indicates that irradiation interrupted full development of pneumonia even when applied late in the disease. BA 16-9055

4514
EFFECT OF ROENTGEN IRRADIATION UPON LYMPHATIC FLOW IN RATS. Philip J. Hodes and John Q. Griffith. *Radiology* 37(2), 203-4(1941).

In studies on rats combining x irradiation and injection of thorotrast, convincing evidence was found to support the assumption that x-ray therapy interferes with lymphatic flow. BA 16-9057

4515
EFFECT OF RADIO-PHOSPHOROUS ON BLOOD OF MONKEYS. K. G. Scott and J. H. Lawrence. *Proc. Soc. Exptl. Biol. Med.* 48(1), 155-158(1941).

Administration of radio-phosphorous lowers absolute numbers of red cells, lymphocytes, and granulocytes in the blood. Monkeys tolerate doses of 0.76 and 0.71 mc of P^{32} /lb of body weight, but 1.04 mc of P^{32} /lb was fatal. BA 16-9212

4516
CARCINOMA FROM THE STANDPOINT OF TISSUE TOXICOLOGY. E. Gross. *Angew. Chem.* 53(3)/32, 368-72(1940) (In German)

Industrial cancers due to radiation (heat, ultraviolet, x rays, and Ra), tar products, arsenic, asbestos, and chromate are discussed, together with bladder cancers. BA 16-9671

4517
THE EFFECT OF THORIUM DIOXIDE ON NORMAL AND ESTRINIZED TUMOR-BEARING RATS. J. Heiman. *Cancer Research.* 2, 25-7(1942).

Thorotrast did not produce malignant epithelial changes in benign epithelial tumors. Combined thorotrast and estrogen did not induce malignant change in either spontaneous or transplanted benign epithelial tumors, nor did these combined elements elicit malignant epithelial

tumors in normal rats. Granuloma and sarcoma were induced by thorotrast whether or not the rat bore spontaneous or transplanted benign fibroadenoma. BA 16-9675

4518
INVESTIGATIONS ON THE INFLUENCE OF THE TIME-FACTOR IN X-RAY TREATMENT OF A TRANSPLANTABLE MOUSE-CARCINOMA. Otto Kaalund-Jorgensen. *Ugeskrift Laeger* 102(51), 1365-7(1940).

Greater effect upon tumor tissue apparently results from protracted in contrast to fractionated irradiation with doses of 1500 and 2250 r. BA 16-9679

4519
THE EFFECT OF COMBINING BACTERIAL TOXINS AND X-RAY IRRADIATION IN THE TREATMENT OF A TRANSPLANTABLE MOUSE CARCINOMA. E. A. Lawrence and F. Duran-Reynals. *Yale J. Biol. and Med.* 14(2), 177-81(1941).

Length of life of groups of strain A mice bearing a transplantable mammary carcinoma and treated with *Coli*, Paratyphoid B and typhoid toxins plus x irradiation is compared with that of mice treated with x ray alone. Data indicate that toxins have no effect in prolonging length of life over what is obtained with x ray alone. BA 16-9682

4520
THE EFFECT OF ROENTGEN THERAPY UPON INFECTIONS PRODUCED IN THE SKIN OF RABBITS WITH CULTURES OF *STREPTOCOCCUS HAEMOLYTICUS* AND *STAPHYLOCOCCUS AUREUS*. Murray Angevine and Allan Tuggle. *Am. J. Roentgenol. Radium Therapy.* 46(1), 96-103(1941).

X-irradiation (100 kv, at 25 cm) of skin before infection has no influence on the course of infection. In skin irradiated after infection, necrosis developed earlier in treated than untreated lesions and irradiated lesions were larger than those in controls. More organisms were recovered from irradiated lesions and lymph nodes. BA 16-9989

4521
BOTANICAL SCIENCE HELPS TO DEVELOP A NEW RELIEF FOR HUMAN SUFFERING. C. L. Horn. *J. New York Botan. Gard.* 42(496), 88-92(1941).

Leaves of *Aloe vulgaris* described as being an effective remedy for common burns and for x-ray and Ra burns. BA 16-10190

4522
EFFECT OF TEMPERATURE ON THE X-RAY SENSITIVITY OF MAIZE SEEDS. Louis R. Maxwell, J. H. Kempton, and Vernon M. Mosley. *J. Washington Acad. Sci.* 32(1), 18-24(1942).

Dry seeds were subjected to 35 kilo-roentgens. Seeds were heated or cooled before, during, or after irradiation. To decrease radiosensitivity, high or low temperatures must prevail during exposure. A varying amount of recovery occurred during the time elapsing between irradiation and planting for all treatments used. BA 16-10836

4523
THE INDUCTION OF MULTIPOLAR CELL DIVISION WITH X-RAYS AND ITS POSSIBLE SIGNIFICANCE. Paul S. Henshaw. *Radiology* 36(6), 717-24(1941).

Irradiation of either gamete of *Arbacia punctulata* before fertilization caused production of several rather than two blastomeres. Doses of 50,000 r did not affect sperm motility or ability to fertilize. Multipolar cleavage, caused by exposure of either gamete, was evident by late prophase. BA 16-6208

4524
TWO INDEPENDENT INVERSIONS IN THE X-CHROMOSOME OF *DROSOPHILA VIRILIS* AND THEIR EFFECTS ON CROSSING OVER AND DISJUNCTION. T. Komai and T. Takaku. *Cytologia* 11(2), 245-60(1940).

A strain of *D. virilis* with two inversions in the X-chromosome was obtained by x radiation. BA 16-6210

4525

THE BIOLOGIC ACTION OF RADIATIONS IN RELATION TO THE MUTATIONS IN PLANTS. Federico Worschitz. Agronomia (Buenos Aires) 30(1), 37-50(1940).

Author presents general observations on mutation and modification in plant morphology and affirms that effective rays are those lying between beginning of ultraviolet and x rays. Mutations vary in quantity and quality with variation in dosage and with stage and condition of vegetative material under study. BA 16-6235

4526

EFFECTS OF ROENTGEN IRRADIATION UPON LINEAR RATE OF FLOW IN CUTANEOUS LYMPHATICS OF HUMANS. J. N. Ane and George E. Burch. Proc. Soc. Exptl. Biol. Med. 48(2), 471-3(1941).

Data indicate that small x ray doses (220-450 r) applied to skin of humans are not likely to disturb linear flow of lymph in cutaneous lymphatics, while larger doses sufficient to produce a first degree skin reaction will probably reduce rate of lymph flow. BA 16-6378

4527

ANALYSIS OF THE CONVULSIVE PHENOMENA INDUCED IN THE FROG BY IRRADIATION OF THE CENTRAL NERVOUS SYSTEM WITH RADIUM EMANATION. E. I. Bakin. Fiziol. Zhur. SSSR 30(5), 568-73(1941).

Complex convulsive fits of epileptiform character, lasting 1-5 days, were produced in frog by exposure of various segments of spinal cord to Ra emanation. No attacks were produced if cerebral cortex or lower division of cerebrum were irradiated. Mechanism by which Ra emanation produces convulsions is considered similar to that for strychnine. BA 16-6379

4528

STUDIES ON RADIOSENSITIVITY OF ANIMAL CELL IN VITRO. I. RADIOSENSITIVITY OF MUSCULAR AND CILIARY MOVEMENT. G. Goldhaber and A. Back. Proc. Soc. Exptl. Biol. Med. 48(1), 150-51(1941). BA 16-6381

4529

ON THE INFLUENCE OF EMANATION ON THE DEVELOPMENT OF EXPERIMENTAL RICKETS IN YOUNG RATS. J. van Niekerk. Acta Brevia Neerl. Physiol., Pharmacol., Microbiol. 11(6/7), 142-7(1941).

Rats kept on rachitogenic diet in atmosphere with high content of emanation did not show healing of rachitic bone deformations. Controls were kept in (1) normal atmosphere, (2) an almost ionless atmosphere, or (3) an ionless atmosphere with shielding against Ra emanation and cosmic rays. Development of rickets was the same in all groups over period of two weeks. BA 16-6382

4530

STUDIES OF THE ROENTGEN ERYTHEMA OF THE HUMAN SKIN. I. SKIN CAPILLARY CHANGES AFTER EXPOSURES TO UNFILTERED RADIATION. E. A. Pohle. Radiology 6, 236-45(1926).

After exposure to 1/2-1 skin unit dose of unfiltered roentgen radiation, very characteristic changes occur in the skin capillaries, as observed by Mueller. Complete restitution ad integrum takes place in one to three months.

4531

p^{32} UPTAKE BY NUCLEI. A. Marshak. J. Gen. Physiol. 25(2), 275-91(1941-42).

An x ray dose of 200 r altered the distribution of p^{32} in lymphoma. Concentration in the nucleus was remarkably increased shortly after irradiation; concentration in cytoplasm was decreased. Decrease was greater the longer the time after exposure. Altered distribution may be correlated with x-ray induced mitotic inhibition. BA 16-7068

4532

IMMUNIZATION AGAINST CECAL COCCIDIOSIS IN CHICKENS BY THE USE OF X-RAY ATTENUATED OOCYSTS. S. H. Waxler. J. Am. Vet. Med. Assoc. 99(777), 481-5(1941).

Eimeria tenella oocysts, attenuated by exposure to 9000 r, caused a decrease in Hb concentration but no deaths when fed to 35-day-old chicks. Chicks infected with standardized x-ray attenuated dose resisted a subsequent heavy reinfection almost as well as did survivors of severe infection. BA 16-7393

4533

THE SIZE OF STREPTOCOCCUS BACTERIOPHAGES AS DETERMINED BY X-RAY INACTIVATION. Frank M. Exner and S. E. Luria. Science 94(2443), 394-5(1941).

Using x-ray inactivation technique, three phages showed sensitive volume diameters of 26, 33, 43 $m\mu^3$ respectively. BA 16-7456

4534

THE RELATIONSHIP OF CATALASE RATIO TO GERMINATION OF X-RAYED SEED AS AN EXAMPLE OF PRETREATMENTS. B. N. Singh. J. Am. Soc. Agron. 33(11), 1014-6(1941).

Author anticipates that catalase ratio may serve as useful guide in some agronomic practices as it is a sensitive test of metabolic status of tissues, and a rather precise indicator of physiological responses of developing seeds to pre-sowing treatments such as irradiation. BA 16-8011

4535

THE CYTOLOGICAL EFFECT OF DIFFERENT SEED-TREATMENTS IN X-RAYED BARLEY. Olov E. V. Gelin. Hereditas 27(3/4), 209-19(1941).

After 10,000 r of x rays, seeds with 10% moisture showed 12.66% disturbed divisions; with 15% moisture, 27.99%. Seeds soaked 23 hr in water or 0.01% heteroauxin had 53.8 and 50.99%, respectively. Cells first entering division were disturbed most. Proportion of bridges to fragments was 1:2 and was about the same for all division stages. BA 16-3517

4536

EFFECTS OF FAST NEUTRONS UPON PLANTS. IV. CYTOPLASMIC CHANGES IN SPIROGYRA. Y. Nishina, Y. Sinoto, and D. Sato. Cytologia 11(2), 311-18(1940).

Elasticity of Spirogyra cytoplasm, measured by centrifuge method, decreased when exposed to neutron rays. Effect is attributed chiefly to alteration in condition of peripheral cytoplasm, especially to Rinneplasma, which connects chloroplasts to cell membrane. BA 16-3530

4537

GERMINATION AND VITALITY IN OATS AND WHEAT FOLLOWING VARIOUS ROENTGEN DOSES. Kare Froier. Hereditas 27(3/4), 360-70(1941). (In German).

X-ray dosage necessary to decrease percent of germination to 5-20% in di-, tetra-, and hexaploid oats and wheat was determined to be 45,000-55,000 r for Victory (hexaploid oat); 15,000 r was insufficient for *Triticum monococcum* (diploid wheat), 15,000 r and 25,000 r were too low for *T. dicoccum* and *T. durum* (tetraploids), respectively; and 25,000 r was insufficient in *T. vulgare* (hexaploid) wheats. BA 16-3563

4538

MUTATION EXPERIMENTS IN BARLEY. Ake Gustafsson. Hereditas 27(3/4), 225-42(1941).

Seeds of "Golden" barley were x rayed with 5000 and 10,000 r. Three degrees of seed hydration were used; 10 and 15% moisture and seed soaked for 24 hr in water or auxin solution. Author believes direct proportionality (in barley) between dosage and mutation rate is only apparent, not real. BA 16-3567

4539

AUTOSOMAL AND SEX CHROMOSOMAL TRANSLOCATIONS

AND VIABILITY IN APOTETTIX EURYCEPHALUS HANCOCK.

Robert K. Nabours, Florence M. Stebbins, and W. R. B. Robertson. J. Exptl. Zool. 88(2), 239-60(1941).

Two x-ray-induced translocations of chromatin were found in A. eurycephalus; (1) an exchange between 1st and 4th autosomes with depletion in amount of chromatin for former and augmentation of the latter; (2) an exchange between a 1st autosome and the sex chromosome, with increase in chromatin and an extra centromere for the latter. In (1) both aberrant autosomes survived, in (2) donor autosome, deprived of centromere, did not. BA 16-3609

4540

THE BIOPHYSICAL ANALYSIS OF THE PROCESS OF KILLING OF DROSOPHILA EGGS BY RADIATION. Karl G. Zimmer. Biol. Zentr. 60(5/6), 287-98(1940). (In German).

Data from 40 papers are analyzed. Killing of Drosophila eggs by x rays, γ rays, and fast neutrons follows as S-shaped curve with increasing dosage, similar to that required by quantum-hit theory for a reaction which requires several hits. Mortality is independent of wave length; LD₅₀ is dependent on ionization density. Half-value dose changes with increasing age of developing eggs, decreases with increasing temperature during irradiation. BA 16-3618

4541

ON A TYPE OF LESION PRODUCED IN PARAMECIUM CAUDATUM BY X-RAYS. A. Back. Compt. rend. soc. biol. 131(22), 1103-6(1939). (In French).

After irradiation with 2/3-5/6 of lethal dose (600,000 r, Ott tube, 35 kv and 30 ma; Al window 0.3 mm thick, distance between Cu-anticathode and surface of drop with infusoria 37 mm), paramecia can live for several weeks without dividing. BA 16-3779

4542

A NOTE ON THE EFFECT OF DERMAL AND ENTERAL IRRADIATION BY RADIOPHOSPHORUS ON THE BLOOD LEVELS OF DOGS. L. A. Erb. Am. J. Med. Sci. 202(5), 650-4(1941).

Beta-radiation (emitted by radio-P) applied dermally to dogs was followed by a slight decrease in the absolute number of circulating lymphocytes; applied internally, by significant decreases. BA 16-3780

4543

EFFECTS OF ROENTGEN RADIATION ON THE JELLY OF THE ARBACIA EGG. T. C. Evans, H. W. Beams, and Marshall E. Smith. Biol. Bull. 80(3), 363-70(1941).

X-ray doses of 6,100 r removed jelly from eggs, 61,000 r made jelly negative to Janus green test (test was positive when jelly was mechanically removed but not radiated). Jelly was not affected by solutions previously irradiated. Radiation produced slight shift in pH of unbuffered egg-water toward acid side. BA 16-3781

4544

GRENZ-RAY TREATMENT OF EXPERIMENTAL INFECTION OF THE CORNEA. E. Gallardo, R. Pfeiffer, and R. Thompson. Am. J. Ophthalmol. 23(1), 41-6(1940).

Lesions and resulting scars produced by intracorneal injections of staphylococci in rabbits were definitely and consistently smaller in eyes treated by application of Grenz rays following the infection than were those in the untreated eyes of the same animals. BA 16-3782

4545

RESISTANCE VARIATIONS TO MUTAGENIC AGENTS IN ESCHERICHIA COLI. I. X-RAYS AND U.-V. RAYS. L. L. Cavalli and N. Visconti di Modrone. Ricerca sci. e ricostruz. 18(7), 785-9(1948). (In Italian).

Survival curves of x-irradiated strain of E. coli and of isolated mutant B/r were studied. Curve of coli B/r is of "single hit" type for whole range of doses examined,

that of coli B is not. A theoretical and mathematical discussion indicates that coli B strain is composed of at least 3 types of organisms, sensitive, phenotypically resistant, and genotypically resistant, namely, B/r. BA 23-24046

4546

THE EFFECT OF ROENTGEN RADIATION ON PIGMENT PRODUCTION IN THE BIRD FEATHER. Walter Grete. Biol. Zentr. 60(5/6), 258-67(1940). (In German).

First generation feathers grown from irradiated follicles (500, 700, 1000, 1250, 1500, or 2000 r) on breast of carrier pigeons exhibited effects ranging from weak brightening of feather tip to complete inhibition of pigment formation and retarded feather growth. BA 16-3783

4547

ATROPHY OF GERMINAL EPITHELIUM OF THE RABBIT'S TESTIS INDUCED BY ROENTGEN RAYS. C. K. Hu and C. N. Frazier. Proc. Soc. Exptl. Biol. Med. 48(1), 44-8(1941).

Testes of adult rabbits subjected to a series of x ray doses aggregating 2268 r (4.4 E.S.D.) over a period of 15 days showed complete atrophy of germinal epithelium. Secretory function (judged by maintenance of normal sized penis and scrotal sacs, and by normal psycho-sexual behavior of animals) was unaffected as long as 6 mo following irradiation. BA 16-3784

4548

A COMPARATIVE STUDY OF NEUTRON- AND X-RADIATION UPON BIOLOGICAL TISSUES IN THE CANCER PROBLEM. Isador Lampe. Ohio J. Sci. 41(3), 135-8(1941).

Qualitative similarities in tissue reactions to neutrons and x rays include: mutation production, suppression of mitosis, inhibition, and impairment of embryological development, suppression of cell division and tissue growth, destructive action on mammalian tissues. Quantitative comparisons using various biological test objects indicate that neutrons are apparently more efficient per unit quantity of ionization than are x rays. BA 16-3786

4549

INFLUENCE ON DEVELOPMENT OF CERTAIN DOMINANT LETHALS INDUCED BY X-RAYS IN DROSOPHILA GERM CELLS. B. P. Sonnenblick and P. S. Henshaw. Proc. Soc. Exptl. Biol. Med. 48(1), 74-9(1941).

An x-ray-induced dominant lethal which is expressed in cellular multiplication without differentiation, is apparently due to absence or deficiency of gene loci necessary for development. At an age when normal embryos are highly differentiated, some of embryonic offspring of irradiated parents were virtually sacs of cells without any vestige of structure or organization. About 1 in 30 treated gametes produced this effect. BA 16-3787

4550

COMPARATIVE EFFECTS OF NEUTRONS AND X-RAYS ON THREE TUMORS IRRADIATED IN VITRO. Dorothy Axelrod, Paul C. Aebersold, and John H. Lawrence. Proc. Soc. Exptl. Biol. Med. 48(1), 251-6(1941).

Three tumors of Strong-A strain mouse, a mammary carcinoma, a lymphoma and a lymphosarcoma were exposed to neutrons or x rays (220 kv). Appearance of irradiated tumors was uniformly delayed compared to controls, mammary carcinoma more so than others. X ray/neutron doses at 50% survival point: lymphoma-5.8, mammary carcinoma-6.1, lymphosarcoma-7.5. BA 16-4333

4551

THE SPERM OF SEA-URCHIN AS A BIOLOGICAL TEST OBJECT IN ROENTGEN DOSIMETRY. Mituo Miwa,

Hisao Yamashita, and Kazuo Mori. *Gann* **35**(2), 127-32 (1941).

Study of x- and γ -ray effects upon fertilized eggs of *Pseudocentrotus depressus* and *Strongylocentrotus pulcherrimus* is reported. Relation between dosage and cleavage delay appears to be independent of wave length. Depth-dose, determined by this biological method, showed discrepancy when compared with ionization chamber measurements. BA 16-4357

4552

THE EFFECT OF HIGH AND LOW BODY TEMPERATURES UPON THE GROWTH OF IRRADIATED MOUSE SARCOMA 180. Kanematsu Sugiura. *Radiology* **37**(1), 85-93(1941).

Tumor regression following x-irradiation was enhanced by short wave exposure. Effectiveness of x-ray exposure on this sarcoma was reduced by cold. BA 16-4370

4553

LOCALIZATION OF COLLOIDAL DYES IN ANIMAL TUMORS. Paul A. Zahl and L. L. Waters. *Proc. Soc. Exptl. Biol. Med.* **48**(1), 304-10(1941).

X-irradiation treatment did not appreciably alter the amount of Evans blue and Li-carmin localized in tumors of mice. BA 16-4376

4554

INFLUENCE OF EXTRANEEOUS PROTEIN AND VIRUS CONCENTRATION ON THE INACTIVATION OF THE RABBIT PAPILLOMA VIRUS BY X-RAYS. William F. Friedwald and Rubert S. Anderson. *J. Exptl. Med.* **74**(5), 463-87(1941).

Dose of 2-4 million r was required to inactivate crude papilloma extracts (Shope); 100,000 r or less to inactivate purified samples. Addition of normal rabbit serum or crystalline egg albumin increased amount of radiation required for inactivation. The percent destruction of virus in purified suspensions varied inversely with concentration of suspension. As little as 3000 r inactivated much of virus in very dilute suspensions. Indirect effect of x rays is discussed. BA 16-4782

4555

A TRANSLOCATION BETWEEN THE B- AND D-CHROMOSOMES AND THE TRISOMIC EFFECT OF THE B-CHROMOSOME IN *CREPIS TECTORUM* L. Helen Gerassimova. *Izvest. Akad. Nauk SSSR, Otdel. Mate. i Estest. Nauk. Ser. Biol.* **1940**(1), 31-44(1940). (With English Summary).

Mature megagametes of *C. tectorum* were x rayed; and resulted in a plant with reciprocally interchanged B- and D-chromosomes. Break occurred within satellite of D, near kinetic constriction of B. BA 16-143

4556

ON THE SIZE OF THE SATELLITES OF THE CHROMOSOMES. Helen Gerassimova. *Izvest. Akad. Nauk SSSR, Otdel. Mat. i Estest. Nauk. Ser. Biol.* **1940**(1), 45-55(1940).

Chromosome with a "gigantic" satellite was formed as translocation product of an x-rayed female gamete of *Crepis tectorum*. BA 16-144

4557

CHROMOSOME ABNORMALITIES PRODUCED IN INTER-PHASE NUCLEI WITH X-RAYS AND NEUTRONS. A. Marshak. *Genetics* **26**(1), 161(1941).

An abstract. Experiments with root tips of *Vicia faba*, *Pisum*, and *Allium* are reported briefly. BA 16-151

4558

EVIDENCE OF DELAY IN REATTACHMENT OF CHROMOSOME FRAGMENTS FOLLOWING X-RADIATION OF SPERM OF *DROSOPHILA MELANOGASTER*. B. P. Kaufmann. *Genetics* **26**(1), 157(1941).

An abstract. Continuous vs. fractionated exposure were compared with respect to chromosome breaks and rearrangement. BA 16-167

4559

NEW INVESTIGATIONS ON THE EXPERIMENTAL PRODUCTION OF MUTATIONS. H. Stubbe. *Biol. Zentr.* **60**(3/4), 113-29(1940). (In German).

In *Antirrhinum majus*, mutation frequency for leaf and flower form, and leaf and flower color were increased if nutrient medium was N, P, or S deficient. When *N. crassa* and *A. majus* were x rayed (6000 r) mutation frequency was significantly increased in P-deficient pollen. BA 16-170

4560

EXPERIMENTALLY PRODUCED HAPLOIDS IN *NICOTIANA TABACUM* BY MEANS OF X-RAYS. N. P. Badenhuizen. *Natuurw. Tijdschr. Ned. Indie.* **101**(8), 240-2(1941).

Pistils were fertilized with x-ray treated pollen (5000 r) of a dwarf mutant. Higher x-ray doses produced a majority of nongerminating seeds. Many aberrant types were obtained, often due to chromosomal change in pollen mother cells. Seven haploids were found with somatic chromosome number of 24, all scattered over entire spindle. Haploids have smaller flowers than diploids but otherwise resemble them closely. BA 16-176

4561

DIFFERENTIAL REACTIONS OF VARIOUS SCUTE STOCKS OF *DROSOPHILA MELANOGASTER* TO X-RADIATION. R. Blanc and C. Villee. *Genetics* **26**(1), 140(1941).

An abstract. Effects of x rays on bristles were found to differ with different stocks. BA 16-237

4562

THE B^S TRANSLOCATION IN *D. MELANOGASTER* AND MODIFICATIONS OF THE BAR EFFECT THROUGH IRRADIATION. A. B. Griffen. *Genetics* **26**(1), 154-5 (1941).

An abstract. BA 16-259

4563

THE INDUCTION OF CHROMOSOME LOSSES IN *DROSOPHILA* SPERM AND THEIR LINEAR DEPENDENCE ON DOSAGES OF IRRADIATION. G. Pontecorvo. *J. Genetics* **41**(2/3), 195-215(1941).

At dosages of 0, 1000 r, and 4000 r the frequencies of nonlethal losses vary approximately as a linear function of the dosage. BA 16-281

4564

POSTIRRADIATION CHANGES IN THE LEVELS OF ORGANIC PHOSPHOROUS IN THE BLOOD OF PATIENTS WITH LEUKEMIA. J. C. Abels, J. M. Kenney, Lloyd Craver, L. D. Marinelli, and C. P. Rhods. *Cancer Research* **1**(10), 771-5(1941).

Ingestion of subtherapeutic dose of P³² by 5 leukemic patients was followed by rapid and marked change in concentration of organic acid-soluble phosphorous of leukocytes and erythrocytes. No such change was seen after ingestion of comparable amount of non radioactive P(P³¹). Results indicate that "tracer doses" may in some cases disturb normal cell function. BA 16-1063

4565

VAGINAL ESTRUS IN IRRADIATED MICE. RELATIONSHIP OF VAGINAL ESTRUS TO OVARIAN CHANGES AND PRODUCTION OF BIOLOGICALLY ACTIVE OVARIAN TUMORS AFTER ROENTGEN IRRADIATION. Samuel H. Geist, Joseph A. Gaines, and George C. Escher. *Endocrinology* **29**(1), 59-63(1941).

Effects of x irradiation on estrous cycle of female mice was studied by daily smears over 14½ mo. Vaginal changes reflect those within ovaries and are described in correlation with them. BA 16-1088

4566

HISTOLOGICAL CHANGES PRODUCED IN ORAL SQUAMOUS CELL EPITHELIOMAS BY FRACTIONAL EXTERNAL

IRRADIATION. John W. Hall and Milton Friedman. Am. J. Pathol. 17(4), 625(1941). BA 16-1089

4567

INDUCED CHROMOSOMAL CHANGES AND THEIR SIGNIFICANCE IN GROWTH AND DEVELOPMENT.

J. M. Beal. Am. Naturalist 76(764), 239-52(1942).

Types of changes induced by x rays and other agents are reviewed. BA 16-21479

4568

THE ACTION OF X-RAYS ON THE CELL. I. THE CHROMOSOME VARIABLE. H. B. Newcombe. J. Genet. 43(1/2), 145-71(1942).

Action of x rays on division in tulip, hyacinth, Allium, Tradescantia pollen grains, and Drosophila sperms are described. BA 16-21493

4569

CONTRIBUTION TO THE CYTOLOGICAL STUDY OF THE EFFECT OF X-RAYS ON PLANT CELLS. R. Villars. Compt. rend. soc. biol. 131(21), 947-50(1939). (In French).

In Pinus pinea, Vicia faba, Lupinus albus, Helianthus uniflorus, and Hyacinthus ammuus, atypic divisions become less and less frequent with time after exposure. About 3 hr after irradiation (50 kv, 30 ma, dose 450 r/sec, without filter, anticathode distance 12.5 cm), a resting phase commences, being more or less prolonged according to species and dose. BA 16-21501

4570

THE ACTION OF X-RAYS ON THE CELL. II. THE EXTERNAL VARIABLE. H. B. Newcombe. J. Genetics 43(1/2), 237-48(1942).

Of x-ray induced chromosomal changes in Tradescantia pollen grain mitosis, simple chromosome breaks vary as the square of dose or above, 2-break changes vary as 1.5 power; minute fragments (mostly ring) are intermediate. All types vary at higher power of dose when duration of dose is kept constant than when intensity is constant. Intensity effect is attributed to inhibition of both restitution and new reunions of broken ends by irradiation, the inhibitory effect increasing with dosage more rapidly when dose is administered more rapidly. BA 16-21523

4571

AN ANALYSIS OF DATA ON X-RAY INDUCED VISIBLE GENE MUTATIONS IN DROSOPHILA MELANOGASTER H. C. Fryer and John W. Gowen. Genetics 27(2), 212-27 (1942).

Results show: (1) genes within sets observed have same basic mutation rate, (2) mutation rate at specific locus is directly proportional to radiation dosage, (3) if sets of genes used are representative of their respective chromosomes, fundamental mutation rates in these chromosomes are the same, (4) for particular gene and fixed dosage, wave length of x rays used does not affect mutation rate. BA 16-21536

4572

AQUA VIVA. H. Tschelnitz. Anais Paulistas Med. e Cir. 43(3), 199-205(1942).

Author suggests possible physiochemical reactions of radioactive waters on colloidal systems and furnished possible explanation of how such waters may effect living protoplasm when used medicinally. BA 16-21680

4573

NATURE OF THE X-RAY EFFECT IN CO RECOVERY. John A. Cameron. Proc. Soc. Exptl. Biol. Med. 50(2), 234-6(1942).

CO-poisoned animals, x irradiated, showed less CO in blood than others CO-poisoned but not x rayed (spectrographic examination). Change occurs too soon post-irradiation to be due to newly-released red cells or reserve

cells from spleen. In vitro experiments with CO-saturated water or blood revealed no significant changes in content after x irradiation, hence direct chemical change is not indicated. CO-poisoned animals exhibit improved ventilation following irradiation. BA 16-21686

4574

INDIVIDUAL ACTION AND SUMMATION EFFECTS OF X-RADIATION AND COMMONLY USED DERMATOLOGICAL PREPARATIONS ON THE SKIN OF THE ALBINO RABBIT. Frank E. Cormia and William W. Bryan. J. Invest. Dermatol. 5(1), 15-28(1942).

Mild dermatological preparations may be safely used in conjunction with fractional doses of x radiation, but tar and other strongly stimulating preparations should not be combined with x radiation except when an extraordinary stimulation of an extremely chronic and thickened process is desired. (Authors studied effect of (1) fractionated doses with locally applied preparations and (2) large x ray doses before or after topical therapy.)

BA 16-21687

4575

TEMPERATURE AND RADIOSENSITIVITY OF SKIN OF NEW-BORN RATS. IV. EFFECTS OF DECREASED CIRCULATION AND BREATHING DURING IRRADIATION. T. C. Evans, J. P. Goodrich, and J. C. Slaughter. Radiology 38(2), 201-6(1942).

New-born rats were irradiated under conditions in which metabolic rate was lowered. In all cases, radio-resistance of skin to x ray was increased. BA 16-21688

4576

THE EFFECT OF ROENTGEN RAYS UPON THE GROWING LONG BONES OF ALBINO RATS. I. QUANTITATIVE STUDIES OF THE GROWTH LIMITATION FOLLOWING IRRADIATION. Charles L. Hinkel. Am. J. Roentgenol. Radium Therapy 47(3), 439-56(1942).

Growing epiphyseal regions of right hind legs of albino rats of various ages were x irradiated with 200 kv filtered rays in various doses. Degree of stunting was proportional to dose, age is a definitely a factor affecting recovery. BA16-21690

4577

THE X-RAYS. Claude Pascal. Bol. Inst. Portugues Oncol. 8(11), 1-3(1941).

Short survey of the nature, production, and various applications of x rays is presented. BA 16-21691

4578

THE 1941 YEARBOOK OF RADIOLOGY. Charles A. Waters et al. Chicago, Year Book Publishers Inc. 1941. 440p.

A summary of radiological literature of the world is presented in digest form, including sections on radiation biology and radiation in general medicine. BA 16-21693

4579

SOME CYTOLOGIC EFFECTS OF REPEATED DOSES OF RADIATION ON MOUSE SARCOMA 180. L. C. Fogg and S. Warren. Cancer Research 2(7), 517-20(1942).

Quantitative study of cumulative effect of repeated x-ray doses (1200 r at 10 day intervals) on production of abnormal mitoses and multicentriolar cells in mouse sarcoma 180, using C₅₇ black mice is reported. Five consecutive doses produced gradual increase in cells with more than 2 centrioles. Results suggest that one radiation effect is prolonged suppression of cleavage without cessation of kinetic apparatus function. BA 16-22286

4580

Argonne National Lab., Lemont, Ill.
CARCINOGENIC EFFECTS OF DIFFUSE AND POINT-SOURCE BETA IRRADIATION ON RAT SKIN: FINAL SUMMARY. p.31 of QUARTERLY REPORT FOR AUGUST, SEPTEMBER, AND OCTOBER 1952, DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH. Austin M. Brues, ed. 78p. (ANL-4932).

A total of 159 tumors appeared in the 405 experimental rats. Carcinomas were three times as frequent in those treated with diffuse sources as in those treated with point sources.

4581

AN ANALYSIS OF NEUTRON AND X-RAY EFFECTS ON REGENERATION OF THE FORELIMB OF LARVAL AMBLYSTOMA. Edward C. Horn. *J. Morphol.* 71(1), 185-219(1942).

Exposure of amputated forelimbs to 62 n of neutron radiation prevents regeneration; 42 n allows some cartilage replacement. Histological studies following dosage of 62 n, 42 n, 20r, and 10 n reveal that the ability of blastema cells to produce cartilaginous structures varies with the dose. BA 16-22400

4582

National Committee on Radiation Protection and Measurement. MAXIMUM PERMISSIBLE RADIATION EXPOSURES TO MAN. A PRELIMINARY STATEMENT. *Radiology* 68, 260-1(1957). NSA 11-4256

4583

ON THE RELATIONSHIP BETWEEN THE CONDITION OF THE STROMA AND THE RADIATION EFFECT ON MALIGNANT TUMORS, WITH PARTICULAR REGARD TO THE DIFFERENCES BETWEEN SQUAMOUS CELL CARCINOMAS OF THE UPPER RESPIRATORY AND DIGESTIVE TRACTS. G. Stahl. *Z. Krebsforsch.* 50(2), 99-120(1940). (In German).

Study of 128 squamous cell carcinomas of upper respiratory and alimentary passages, with reference to irradiation effects, indicates no constant relation between character of stroma and response to irradiation. In 75 cases studied before irradiation by biopsy and again postirradiation, tumors with dense stroma were more affected by x rays than those with loose, delicate stroma. BA 16-22311

4584

THE EFFECT OF IONIZING RADIATIONS ON THE BROAD BEAN ROOT. I. GENERAL CONSIDERATIONS. II. THE LETHAL ACTION OF GAMMA RADIATION. III. THE LETHAL ACTION OF NEUTRON RADIATION. L. H. Gray and John Read. *Brit. J. Radiol.* 15(169), 11-17; (170), 39-43; (171), 72-7(1942).

For γ radiation, data on 50 beans give mean lethal dose, for neutron radiation, data on 146 beans give lethal dose 1/9 as great as for γ rays. BA 16-23086

4585

ANONYMOUS. A THERAPEUTIC USE OF RADIOACTIVE SUBSTANCES. *J. Am. Med. Assoc.* 121(1), 54(1943). BA 17-16122

4586

HYPOTHYROIDISM FOLLOWING ROENTGEN THERAPY FOR HYPERTHYROIDISM. Arnold L. Bachman and Irving S. Dichter. *Radiology* 39(4), 482-5(1942).

Case report and literature review are presented. BA 17-8552

4587

STUDIES ON X-RAY TREATMENT OF PHLOX. John S. Bangson. *Univ. Microfilm Publ.* 253, 1-69(1940).

X-ray doses were administered to (1) buds, (2) dry seeds, (3) soaked seeds, (4) pollen, (5) pollen and buds of two strains of *Phlox drummondii*. Many buds were killed, survivors set fewer buds and irradiated seeds showed reduced germination, especially irradiated soaked seeds. Seedlings were stunted and many died. Much of the treated pollen was not visible. BA 17-222

4588

THE EFFECT OF ROENTGEN IRRADIATION ON EPIPHYSEAL GROWTH. I. EXPERIMENTAL STUDIES ON THE WHITE RAT. Joseph S. Barr, James R. Lingley, and Edward

A. Gall. *Am. J. Roentgenol. Radium Therapy* 49(1), 104-15(1943).

Histologic and roentgenographic examination of groups of 30, 90, and 180-day old albino rats with one knee joint subjected to x-ray doses of 665-1165 r revealed moderately severe changes. Doses of 1335-1800 r showed severe damage; disruption of cartilage cell columns and destruction of chondrocytes. No evidence of stimulation; almost none of regeneration of epiphyseal cartilage. No degenerative or traumatic changes in joints even after 9 mo. All doses retarded growth; doses above 1300 r stopped growth. BA 17-13006

4589

BLOOD. REVIEW OF THE RECENT LITERATURE. Frank H. Bethell, Cyrus C. Sturgis, Robert A. Hetting, and Otto Tod Mallery, Jr. *Arch. Internal Med.* 69(5), 856-926(1942).

Articles on formed elements and coagulation published in 1941, including radiation effects, are reviewed. BA 17-896

4590

EXPERIMENTAL STUDIES OF THE MECHANISM OF ACTION OF X-RAY THERAPY UPON INFECTION. J. Dewey Bisgard, Howard B. Hunt, Orvis A. Neely, and Paul Scott. *Radiology* 39(6), 691-6(1942).

Rabbits were inoculated with *Escherichia coli* and irradiated with x-ray doses of 100-200 r. There were no survivals when irradiation took place after inoculation. If radiation was given 24 hr prior to inoculation, half the animals survived. Protection reached its peak in 48 hr and then was rapidly lost. Possible mechanism of protection by pre-inoculation irradiation is discussed. BA 17-13007

4591

SPERMATOCYTE CHROMOSOME ABERRATIONS IN GRASSHOPPERS SUBJECTED TO X-RADIATION DURING EMBRYONIC STAGES. David W. Bishop. *J. Morphol.* 71(2), 391-429(1942).

Chromosome aberrations in *Circotettix verruculatus*, constrictions and breaks, were produced during first meiotic anaphase in tetrad chromosomes, regardless of how many cell generations had intervened since treatment. Aberrations were not distributed at random, more than 1/3 of aberrations occurring in one of the smallest chromosomes. BA 17-4160

4592

COMMERCIAL LEAD AS A POSSIBLE INCITING FACTOR IN BRONCHIOGENIC CARCINOMA. REPORT OF TWO CASES. Charles E. Black. *Arch. Pathol.* 35(3), 366-72(1943).

Two cases of bronchiogenic carcinoma are reported, apparently due to inhalation of commercial Pb containing Ra D. BA 17-18533

4593

PHENOCOPIES AND X-RADIATION IN *DROSOPHILA MELANOGASTER*. Richard Blanc and Werner Braun. *Univ. Calif. (Berkeley) Publs. Zool.* 49(1/7), 31-50(1942).

Pupae of inbred Oregon-R stock were x rayed at 0-12 hr (1/4 to 4-1/2 min at 940 r/min). Percentage of flies showing phenocopies increased with dose to 100% at 3290r, with S-curve showing linear relation from 235 to 2115 r. Increase in phenocopies per fly was in linear proportion to radiation increase from 1410 to 3290 r. The typical mortality curve showed a sharp drop in viability from 2350 to 3290 r. BA 17-301

4594

THE EFFECT OF X-RADIATION UPON THE BRISTLE PATTERN IN *DROSOPHILA MELANOGASTER*. Richard

Blanc and Claude A. Villee, Jr. Univ. Calif. (Berkeley) *Publs. Zool.* 49(1/7), 51-60(1942).

Effects of x radiation on bristle reduction were compared for wild Canton-S controls and several scute and heterozygous scute stocks and compounds with genetic suppression of various bristles. Number and percentages of suppression effects and differences between treated and control males and females are tabulated. Most cases of extreme increase following treatment occur for suppression of bristles which are genetically affected in some of controls. BA 17-302

4595
ARTIFICIAL RADIOACTIVITY AND ITS APPLICATION IN PROBLEMS OF MODERN SCIENCE. Marietta Blau. *Ciencia (Mex.)* 2(4), 145-54(1941). (In Spanish).

Biological applications are briefly described. BA 17-822

4596
STIMULATION OF THE DEVELOPMENT OF THE AVIAN EMBRYO BY X-RAYS. Arthur A. Bless and Alexis L. Romanoff. *J. Cellular Comp. Physiol.* 21(2), 117-21 (1943).

Moderate x ray doses reportedly stimulated early embryonic development in chicken eggs, 250 r dose being most effective. Large doses inhibited early growth and increased embryo mortality, 5000 r being 100% lethal. X-ray action on preheated eggs was not much different from that on cooled eggs. Hatching time was relatively unaffected by heavy x-ray doses. Studies employed Coolidge W target, 55 kv, 10 ma, 1.2 mm Al. BA 17-18584

4597
RADIATION EFFECTS ON BLOOD VESSELS. I. II. III. J. Borak. *Radiology* 38(4), 481-92, (5), 607-17, (6), 718-27(1942).

This is a review article consisting of a discussion centered around author's own theory that observations on capillaries are to be explained as direct effects of radiation on endothelial cells. Part I deals with skin erythema and edema. In Part II, inflammation produced by irradiation, degeneration, suppression of growth capacity of capillaries, retrogression of blood vessels and radionecrosis are discussed. Part III deals with etiology of teleangiectasis and the effects on lymph vessels. BA 17-823

4598
THE BRITISH EMPIRE CANCER CAMPAIGN. ANNUAL REPORT. E. Boyland. *Nature* 151(3833), 451-2(1943). BA 17-21658

4599
EFFECTS OF IRRADIATION ON OOCYTES OF *SCIARA*. M. L. Bozeman. *Genetics* 28(1), 71(1943).

Cytological studies on salivary gland preparations from larvae produced by adult females irradiated 20-55 hr after eclosion are described. Aberrations included inversions, deletions, transpositions and repeats. BA 17-12729

4600
THE DIFFERENTIAL ACTION OF X-RAYS ON THE ANTERIOR AND POSTERIOR REGIONS OF *TUBIFEX TUBIFEX*. H. Branson and H. Kersten. *Radiology* 34(2), 200-4(1940).

Changes in *T. tubifex* after exposure of somites at anterior tip or heart region to intense collimated x-ray beam included formation of tuberosities at site of irradiation and disintegration progressing away from site of irradiation. Irradiation of middle section was followed by breaking apart at point of exposure. With x-ray dose too small to produce 100% killing, survivors showed either no apparent change or death of posterior region only. BA 17-10802

4601
CELL-LINEAGE STUDIES IN ROOT MERISTEMS BY MEANS OF CHROMOSOME REARRANGEMENTS INDUCED BY X-RAYS. Robert T. Brumfield. *Am. J. Botany* 30(2), 101-10(1943).

Primary root meristems in germinating seeds of *Crepis capillaris* and *Vicia faba* were x rayed and allowed to grow for 3 wk. Cytologic study of chromosomes showed many chromosomal chimeras which are described. BA 17-16938

4602
METABOLISM OF INDUCED AND SPONTANEOUS LEUKEMIAS IN MICE. Dean Burk, Herbert Sprince, Juliet M. Spangler, Mary C. Boon, and Jacob Furth. *J. Natl. Cancer Inst.* 3(3), 249-75(1942).

Metabolism (Q value) and derived quotients of lymphoid, myeloid, monocytic, and atypical leukemias induced in two stocks of mice Rf and Rf/Ak by methyl cholanthrene painting were the same with or without x irradiation. BA 17-13597

4603
EFFECTS OF LOCALIZED X-RADIATION ON REGENERATION OF THE URODELE LIMB. E. G. Butler and J. P. O'Brien. *Anat. Record* 84(4), 407-13(1942).

A limb, having been incapable of manifesting any regenerating capacity after amputation through the x-irradiated region, was able to regenerate only when a new level of amputation was established proximal to the radiated zone. BA 17-11583

4604
THE EFFECTS OF CONTINUOUS IRRADIATION BY TRITIUM ON CELLS CULTIVATED IN VITRO. A. N. Stroud. *Ann. N. Y. Acad. Sci.* 67, 11-34(1956).

Effects of continuous exposure to β radiation on tissue culture cells, especially on their mitotic activity, using chick embryo skeletal muscle and tritium as a radiation source are described. Mitosis, especially metaphase, is prolonged so that metaphases tend to accumulate in cultures.

4605
IMMEDIATE EFFECTS OF 31 R OF X-RAYS ON THE DIFFERENT STAGES OF MITOSIS IN NEUROBLASTS OF *CHORTOPHAGA*. J. Gordon Carlson. *J. Morphol.* 71(3), 449-62(1942).

Treatment of neuroblasts of grasshopper (*C. viridifasciata*) with 31 r of x rays at 200 r/min leads to alterations in average number of middle prophase, late prophase, metaphases, anaphases, and early telophases per embryo. Some evidence suggesting that mitosis is altered mainly through x-ray effect on prophase chromosomes is presented. BA 17-10666

4606
CAUSES OF CELL DEATH IN IRRADIATED HUMAN TISSUES. B. D. Pullinger. *J. Pathol. Bacteriol.* 35, 527-40(1932).

Hyperaemia is an essential reaction to therapeutic irradiation with radium and x rays. Thin-walled loosely supported capillaries and veins are most readily affected and react in deep structures as well as at surfaces.

4607
THE EFFECT OF ROENTGEN RAYS ON THE BLOOD. E. Kolta and J. Forester. *Strahlentherapie* 21, 644-67 (1926).

4608
THE INFLUENCE OF ROENTGEN-RAY TREATMENTS OF THE HYPOPHYSIS ON REPRODUCTIVE SYSTEMS OF THE GROUND SQUIRREL AND RAT. Rollin Henry Denniston, II. *J. Exptl. Zool.* 91, 237-63(1942).

Annual-breeding ground squirrels, *Citellus tridecemlineatus* were x rayed with 7-4000 r over the

pituitary at various times during annual breeding cycle. No stimulating effect of x rays was observed. Gonads and pituitaries of quiescent animals were resistant to massive x-ray doses. Age-correlated effects followed x-ray exposure of rat pituitaries, 1000 r reducing growth rate of young rats 50%, 2000 r inhibiting spermatogenesis in similar animals, 6000 r being required to depress adult gametogenesis. BA 17-11129

4609

A RE-EXAMINATION OF THE PROBLEM OF MANIFOLD EFFECTS OF GENES IN *DROSOPHILA MELANOGASTER*. Th. Dobzhansky and A. M. Holz. *Genetics* 28(4), 295-303(1943).

X-ray treatment induced 10 alleles of yellow, 4 of white, 2 of ruby, and 1 each of vermilion, dusky, and forked. All of whites, 9 of the 10 yellows, and the vermilion modified the shape of the spermatheca. Therefore, genes of white, yellow and vermilion have manifold effects, they are "pleiotropic" genes. BA17-21051

4610

RADIOBIOLOGICAL STUDIES ON TISSUE CULTURES. I. THE IMMEDIATE EFFECT OF X-RAYS ON CELL OUTGROWTH IN CULTURES OF FIBROBLASTS. L. Doljanski and G. Goldhaber. *Growth* 6(3), 235-49(1942).

Chick fibroblast cultures were x rayed with doses of 500-300,000 r; intensity of 10,500 and 85,000 r/min. X-ray effects were detectable at 2500 r, and were very noticeable at 5000 r. With doses of 5000-100,000 r growth rate was gradually depressed. Effects of 100,000 r or more; with increasing dose, more and more cultures showed no outgrowth. All outgrowth in all cultures was stopped by 260,000 r. Dose-effect curve suggest that there are two main x-ray effects namely, inhibition of mitosis and alteration of outwandering. BA 17-1626

4611

EFFECT OF RADIATION THERAPY ON THE MORPHOLOGY AND BIOCHEMISTRY OF THE BLOOD IN PATIENTS WITH CANCER OF THE UTERINE CERVIX. G. L. Dozortseva and R. S. Mariasin. *Bull. Eksp. Biol. Med.* 12, 94-6 (1941). BA 17-4383

4612

THE DIFFERENCES BETWEEN 200 KILOVOLT AND SUPERVOLTAGE ROENTGEN THERAPY. R. Dresser, J. C. Rude, and B. J. Cosman. *Radiology* 34(1), 13-16 (1940).

Effect of 200,000 and 1,000,000 volt x rays on *Drosophila* eggs both on surface and in depths of phantom are described and clinical observations on skin and tumors are presented. Advantages of million volt rays: larger depth dose with greater biological effect, depth dose independent of size of portal of entry, less general reaction in patient, more satisfactory immediate regression of deep-seated neoplasms. BA 17-8187

4613

HYPOCHLOREMIA IN SURGERY. M. Dubinskis. *Latvijas Biol. Biedrības Raksti Acta Biol. Latvica* 9, 19-24(1939). (In German).

Indispositions often resulting from x-ray therapy were relieved by administration of NaCl in wafer form in fifty cases. BA 17-10907

4614

THE PROBLEM OF RECOVERY FROM RADIATION EFFECTS. F. Ellinger. *Radiology* 40(1), 62-71(1943).

Recovery from radiation effects is discussed from point of view of cellular physiology, photochemistry, and clinical application. "True recovery," "pseudo-recovery," and "clinical recovery" are defined. BA 17-15498

4615

CHANGES IN THE CENTRAL NERVOUS SYSTEM OF GOLD-FISH IRRADIATED IN THE DEPTHS OF A WATER

PHANTOM. F. Ellinger and C. Davison. *Radiology* 39(1), 92-5(1942).

Histologic examination of brains of goldfish x irradiated in depths of water phantom revealed marked changes in medulla oblongata: disappearance of nerve cells, chromatolysis, shadow cell appearance, ischemia, and severe cell changes in nissl bodies. Results agree with previous findings that a greater lethal effect and more pronounced pigmentation are produced by x-ray doses in depths of a water phantom. BA 17-4329

4616

AN EXPERIMENTAL STUDY OF THE EFFECTS OF ROENTGEN RAYS ON THE GONADS OF THE SEXUALLY MATURE DOMESTIC FOWL. J. M. Essenberg and R. J. Karrasch. *Radiology* 34(3), 358-65(1940).

In 71 animals (10 were controls), initial injury to ovarian follicles was produced by 400 r, follicular disintegration by 800 r, and total destruction of follicles by 1800-2200 r. Initial injury to germinal epithelium occurred with 400 r, total destruction with 1200 r. Acclimatization to effects of cumulative x-ray doses was noted in testes and ovaries of treated birds. Gonads of birds appear to be more radioresistant than gonads of mammals. BA 17-10803

4617

INFLUENCE OF THE MEDIUM ON RADIATION INJURY OF SPERM. T. C. Evans, J. C. Slaughter, E. P. Little, and G. Failla. *Radiology* 39(6), 663-80(1942).

Identical x-ray doses were administered to *A. punctulata* sperm in concentrated form and in sea water suspensions of increasing dilution. Irradiation inactivated an increasingly larger percentage of sperm the more dilute the suspension. Addition of seminal fluid, egg water, egg albumen, gelatin, gum arabic, glycylglycine (pH 8.2), and glycine (pH 8.2) decreased the percentage of sperm inactivated by a given dose of x rays. BA 17-13009

4618

INFLUENCE OF THE MEDIUM ON RADIATION INJURY OF SPERM. T. C. Evans, J. S. Slaughter, G. Failla, and E. P. Little. *Anat. Record* 84(4), 492(1942). BA 17-13008

4619

OBSERVATIONAL AND EXPERIMENTAL EVIDENCES RELATING TO THE ORIGIN AND DIFFERENTIATION OF THE DEFINITIVE GERM CELLS IN MICE. N. B. Everett. *J. Exptl. Zool.* 92(1), 49-91(1943)

X-ray treatment of ovaries of post-partum mice (*Peromyscus* and albino) destroys all germ cells and results in permanent sterility. Since somatic epithelial cells are not affected by x rays, it is concluded that they lack the capacity to form germ cells. Possibility of somatic sex reversal after x-ray treatment is suggested. BA 17-13740

4620

ON THE INTERPRETATION OF RADIATION EXPERIMENTS IN GENETICS. U. Fano. *Quart. Rev. Biol.* 17(3), 244-52(1942).

Lack of wave length effect of x rays in their genetic action is understandable independent of the hit theory. A generalized treatment of the dependence of radiation effectiveness on ion density enables one to consider the influence of several hitherto neglected factors. A modified pattern of biophysical analysis of x-ray action is suggested. BA 17-17813

4621

NEUTRON-INDUCED LETHALS IN *DROSOPHILA*. U. Fano. *Genetics* 28(1), 74-5(1943). BA 17-12795

4622

GENERAL RADIOCHEMISTRY. W. Fertiknecht. *Radiol. Clin* 10(2), 17-35(1941). (In German).

Primary processes involved in absorption of radiation are examined. Significance of quantum yields of various photochemical reactions are related to primary processes and behavior of free atoms and radicals. Energies of various types of radiation are compared (in tables) with chemical binding energies. Characteristics of the action of ionizing radiations are discussed. BA 17-4330

4623

A PHYSICAL-CHEMICAL THERAPY PROCEDURE FOR OSTEOMYELITIS. Francisco Finocchiaro. *Anais Paulistas med. e cir.* 44(2), 95-147(1942).

Tissues of affected areas were saturated with Durate's I solution and then x irradiated. Secondary emanations from irradiated I atoms increased sensitivity of cells and cures were much more rapid than those obtained by either I injection or x ray treatment alone. BA 17-13636

4624

THE SUSCEPTIBILITY OF THE SOUTH AFRICAN GERBILS (GENUS TATERA) TO RICKETTSIAL DISEASES AND THEIR USE IN THE PREPARATION OF ANTI-TYPHUS VACCINE. J. Gear and D. S. H. Davis. *Trans. Roy. Soc. Trop. Med. Hyg.* 36(1), 1-7(1942).

X-ray treatment makes gerbils (*T. brantsi* and *T. afra*) susceptible to heavy infections with three types of rickettsial organisms (murine typhus, endemic typhus, and tick-bite fever). BA 17-5437

4625

COMPARATIVE STUDIES OF THE CYTOGENETICAL EFFECTS OF NEUTRONS AND X-RAYS. Norman H. Giles, Jr. *Genetics* 28(5), 398-418(1943).

Author compared effect of neutrons and x rays on *Tradescantia paludosa* by cytological analysis of chromosomal rearrangements induced in developing microspores. Rearrangements produced were the same qualitatively but different quantitatively. For equal total tissue doses of ionization, neutrons were more efficient than x rays in breaking chromosomes, 7.5 mev neutrons more efficient than 15 mev neutrons. Results of similar study on *D. melanogaster* are included. BA 17-23009

4626

RELATION BETWEEN RADIATION EFFECTS AND CELL VIABILITY AS INDICATED BY INDUCED RESISTANCE TO TRANSPLANTED TUMORS. Anna Goldfeder. *Radiology* 39(4), 426-31(1942).

Tumors in mice produced by implants of sarcoma 180 previously irradiated with 800 to 2000 r tended to regress and in doing so, to confer resistance to the tumor. Resistance was also induced by tumor implants exposed to 2200-5000 r, which failed to produce detectable tumors. No resistance was induced with implants irradiated with 60,000 r, a dose preventing proliferation of tumor cells of sarcoma 180 in vitro. BA 17-10804

4627

RADIOBIOLOGICAL STUDIES ON TISSUE CULTURES. II. THE DELAYED EFFECT OF X-RAYS ON CELL OUTGROWTH IN CULTURES OF FIBROBLASTS. G. Goldhaber and L. Doljanski. *Growth* 6(4), 357-66(1942).

Chick fibroblast cultures x rayed (Cu anticathode x-ray tube, 35 kv, doses of 2500, 5000, 12,500, 25,000, 50,000 r) with a dose of 2500 r had their growth rate retarded, 5000 r proved lethal after several passages. With increase in dosage to 12,500 and 25,000 r, no shortening of survival period was found, reduced survival occurring only after increasing the dose to 50,000 r. BA 17-13742

4628

EXPERIMENTAL MODIFICATION OF RADIOSENSITIVITY OF EMBRYONIC CELLS. J. P. Goodrich. *Radiology* 40(2), 179-87(1943).

In egg of Grasshopper, *Melanoplus differentialis*, low temperature decreases sensitivity before third day of prediapause development and increases sensitivity during remainder of prediapause and first two days of postdiapause. Dehydration increases sensitivity before fifth day of prediapause and decreases sensitivity during remainder of prediapause and on second day of postdiapause. Possible mechanism through which these effects may be produced are discussed. BA 17-15499

4629

EXPERIMENTAL INDUCTION OF HERITABLE AND OTHER ALTERATIONS IN THE FUNGUS *NEUROSPORA TETRASPERMA*. T. H. Goodspeed. *Proc. Am. Sci. Cong.* 8th Congr., Wash., D. C., 1940 3, 223-9(1942).

N. tetrasperma was exposed to heat treatment, Grenz rays of shorter wave lengths, neutrons, and combination of temperature treatment, and high frequency radiation. Altered pigmentation in substratum, sclerotia, perithecia, or conidiospores, and changes in growth of various parts resulted. Different types of sex reaction were easily induced. Moisture and temperature postirradiation are important influences on production of the observed changes. BA 17-8025

4630

LETHAL AND DISSOCIATE EFFECTS OF X-RAYS ON BACTERIA. Sol Haberman. *Ohio State Univ. Abstr. of Doctoral Dissett.* 36, 135-46(1941, 1942).

Staph. aureus suspensions were x rayed (Cu tube at 36 kv, 20 ma for 5, 10, 20, 40, 80 min. Killing was dependent on exposure time and was proportional to number of bacteria present. Short wave lengths were more effective than long wave lengths of same intensity. X-ray effects on hereditary mechanisms of (1) *Staph. aureus*, (2) *Staph. albus*, (3) *Serratia marescens*, and (4) *Leuconostoc mesenteroides* were compared. X-rays increased dissociation rate in (1) and (3) to greater extent in activity proliferating cells. BA 17-16356

4631

THE EFFECT OF X-RAYS ON SINGLE COLONIES OF PANDORINA. L. Halberstaedter and A. Back. *Brit. J. Radiol.* 15(172), 124-8(1942).

Death was produced within 45 min after irradiation with 300,000-600,000 r, 35 kv x rays. All daughter cells of same clone were killed by approximately the same dose. In wild cultures however, lethal dose varies over the above range, indicating that different colonies have varying degrees of radiosensitivity. With doses of 3000-300,000 r, cells behave normally until time for division, then become immobile and cytolyse. Doses below 3000-4000 r do not produce demonstrable effects. No recovery was observed. BA 17-2971

4632

THE USE OF RADIOACTIVE TRACERS IN BIOLOGY AND MEDICINE. Joseph G. Hamilton. *Radiology* 39(5), 541-72(1942).

This is a review article emphasizing important therapeutic possibilities in the use of selective irradiation. BA 17-10805

4633

THE EFFECTS OF ROENTGEN RADIATION ON TUMOR INCIDENCE IN *DROSOPHILA MELANOGASTER*. E. W. Hartung, Jr. *Cancer Research* 2(12), 837-40(1942).

Drosophila eggs, strain T3, were exposed to x-ray doses of 250-5000 r. Tumor incidence increased with doses at doses greater than 500 r, reaching a peak value of 48.3% at 1500 r. With increasing doses from 1500-5000 r the incidence decreased, and was below control value (15%) at 5000 r. Wild strain, irradiated with doses of

1000-5000 r, failed to show increase or decrease comparable to that found in tumor-bearing strains. BA 17-11458

4634

PECULIAR GROWTH LESIONS IN FROGS INDUCED BY IRRADIATION OF SPERM CELLS WITH X-RAYS. Paul S. Henshaw. J. Natl Cancer Inst. 3(4), 409-17(1943).

Changes responsible for abnormal growth lesions apparently occur in nucleus of irradiated cell. Sperm nucleus after heavy x irradiation will enter the egg but will not fuse with egg nucleus. Growth abnormalities were not obtained in those cases in which sperm nucleus was not functional. BA 17-18473

4635

RESPONSES OF DROSOPHILA PUPAE TO X-RAYS. P. S. Henshaw and I. M. Golomb. Radiology 34(6), 721-30(1940).

Drosophila pupae maintain strikingly uniform radiosensitivity during first 18 hr of pupal period; after this resistance increases rapidly. Three phases in normal development were observed: 0.-2 hr, destruction and removal of larval organs; 24-48 hr, relative quiescence; 48-96 hr, active organogenesis. Positive correlation was found between O_2 uptake and developmental activity (decrease during phase 1, minimal during 2, increased during 3), but not between either of these and radiosensitivity. BA 17-15198

4636

THE EFFECT ON THE EMBRYOS OF X-RADIATION OF THE MALE RAT. Margaret Henson. Anat. Record 84(4), 467(1942). BA 17-13406

4637

THE EFFECT OF ROENTGEN IRRADIATION OF SPERM UPON THE EMBRYONIC DEVELOPMENT OF THE ALBINO RAT (MUS NORVEGICUS ALBINUS). Margaret Henson. J. Exptl. Zool. 91(3), 405-33(1942).

Mature rats with scrotal region irradiated with 100 or 500 r and mated with normal females during subsequent week, produced litters of normal size but poor survival value; litters from later matings had normal viability. Matings after scrotal exposure of 1000 r produced small litters with low viability, histological evidence of resorption and regression of germinal epithelium within one month. No litters were produced when 3000 r was used. Irradiation did not affect mortality or fertilizing capacity of sperm. BA 17-13010

4638

THE CYCLOTRON AS A MEDICAL INSTRUMENT. Fred Jenner Hodges. Radiology 39(4), 440-54(1942). BA 17-10806

4639

STUDIES ON THE MODE OF ACTION OF RADIATIONS ON BACTERIOPHAGES. Fernand Holweck, Salvatore Luria, and Eugene Wollman. Compt. rend. 210, 639-42 (1940). (In French).

Dysentery bacillus bacteriophage was exposed to: (1) monochromatic x rays of 17 kv; (2) non-monochromatic x rays (200 kv); (3) particulate radiation (radon and active deposit). For all radiations studied, proportion of active virus diminished exponentially as a function of radiation dose. BA 17-1939

4640

CONTROL BY RADIUM OF GASTRIC ACIDITY. James A. Jenkins and Murray McGeorge. Arch. Internal Med. 70(5), 714-21(1942).

Gastric hyperacidity in cases of duodenal ulceration was reduced by intragastric radiation of gastric mucosa with Ra. BA 17-11088

4641

IRRADIATION OF THE SPLEEN AND PITUITARY FOR

CONTROL OF PUERPERAL BLEEDING. BIRTH OF A NORMAL CHILD FOLLOWING TREATMENT OF THE MOTHER. Ira I. Kaplan. J. Am. Med. Assoc. 121(15), 1199-1201 (1943). BA 17-19924

4642

STIMULATIVE EFFECTS OF X-RAYS ON PLANTS. H. J. Kersten, H. L. Miller, and G. F. Smith. Plant Physiol. 18(1), 8-18(1943).

Primary root growth was stimulated by x raying dry seeds of corn at voltages of 17.5 to 20 peak kv, but not at lower or higher voltages. BA 17-14617

4643

FAILURE OF ROOT TIPS OF TOMATO SEEDLINGS GERMINATED FROM X-RAYED SEEDS TO GROW IN VITRO. H. Kersten and G. F. Smith. Plant Physiol. 17(2), 321-3(1942).

Root modifications in seedlings from x rayed seeds are believed to represent direct effects of x raying on meristem development and not to depend upon abnormalities occurring elsewhere in the seedling. X-irradiation in this study was supplied by Cu target gas x ray tube at 30 kv, 10 ma for 0.30 min, seeds 8 cm from focal spot. BA 17-2972

4644

PERMANENT CHANGES OF CHLOROPLASTS INDUCED BY X-RAYS IN THE GAMETOPHYTE OF POLYPODIUM AUREUM. Lewis Knudson. Botan Gaz. 101(4), 721-68 (1940).

Abnormal chloroplasts produced in prothallia of P. aureum by x raying of spores are described. Growth rate decreased after 10,000 r dose to spores; decreased progressively more with higher doses. Doses greater than 30,000 r to spores decreased percentage germination as well. BA 17-6958

4645

THE ADDITIVE EFFECTS OF RADON AND NEUTRAL RED UPON CHAOS CHAOS. V. Koehring. Radiology 35(3), 229-35(1940).

X-irradiation of C. chaos with doses up to 10,000 r in one session, or exposure to Ra radiation (4,225 mc/hr of Rn) was not directly harmful to weakly stained or unstained amoebae. C. chaos is resistant to neutral red, granular staining concentrations of this dye producing no permanent effects. By simultaneous irradiation and staining, however, the amoeba becomes much less radiation-resistant; is then killed with smaller doses of Rn emanation. BA 17-20937

4646

X-RAY-INDUCED STRUCTURAL CHANGES IN THE CHROMOSOMES OF DROSOPHILA PSEUDO-OBSCURA. P. C. Koller and I. A. R. S. Ahmed. J. Genetics 44(1), 53-72(1942).

When males were treated with 4500 r of x rays, changes occurred in 40% of treated sperms. (Salivary glands of 425 larval offspring were examined for induced chromosomal breaks.) BA 17-15201

4647

NORMAL AND ABNORMAL RADIOACTIVITY OF HUMAN AND ANIMAL TISSUE. Adolf Kreds. Fundamenta Radiol. 5, 89-112(1939).

Content of radioactive matter in normal human tissue is stated to be of the order of magnitude of 10^{-12} gram-equivalent of radioactive matter per gram. Tissue activity increases with age. Concentration of 10^{-10} gram-equivalent of Ra per gram may lead to serious injury and death. BA 17-8188

4648

CERTAIN ABNORMALITIES IN MILLETS INDUCED BY

X-RAYS. N. Krishnaswami and G. N. R. Ayyangar. Proc. Indian Acad. Sci. Sect. B., 16, 1-9(1942).

Alterations in chlorophyll characters and in panicles are the most common mutations observed in progenies of x-rayed seeds of *Eleusine coracana* and *Pennisetum typhoides*. BA 17-8027

4649
SOME PHYSIOLOGICAL CHANGES IN THE SKIN PRODUCED BY NEUTRONS. John C. Larkin. Am. J. Roentgenol. Radium Therapy. 47(5), 733-9(1942).

Vasodilation and vasoconstriction of capillaries, changes in their sensitivity produced by neutron irradiation, changes produced by injecting chemical substances into skin, and effects of neutron irradiation on skin temperatures were studied with 60-in. cyclotron. In skin showing radiation erythema, scratch test shows persistent white reaction (increased sensitivity of endothelial tubules), no wheal (refractory to histamine). Flare formation is normal. BA 17-826

4650
NUCLEAR PHYSICS AND THERAPY: PRELIMINARY REPORT ON A NEW METHOD FOR THE TREATMENT OF LEUKEMIA AND POLYCYTHEMIA. J. H. Lawrence. Radiology 35(1), 51-60(1940).

Possible uses of artificially radioactive isotopes in medical investigation and therapy are briefly discussed. Preliminary results of treatment of chronic leukemia and polycythemia with radio-P are summarized. Changes in blood picture during such treatment are illustrated. BA 17-16168

4651
THE NEW NUCLEAR PHYSICS AND MEDICINE (THE CALDWELL LECTURE OF THE AMERICAN ROENTGEN RAY SOCIETY). John H. Lawrence. Am. J. Roentgenol. Radium Therapy. 48(3), 283-301(1942)

Author presents a summary of his subject including a detailed explanation of use of radioactive tracers and radioassay of biological material, illustrated by accounts of various experiments. Possibilities for clinical use of radioisotopes and of neutrons are emphasized by statements of results obtained in certain types of diseases. BA 17-13011

4652
INCORPORATION OF PHOSPHORUS-32 AND MUTAGENESIS DURING SPERMATOGENESIS IN DROSOPHILA. Per Oftedal and Jeanne Mossige (The Norwegian Radium Hospital, Oslo). Nature 179, 104-5(1957). NSA 11-4240

4653
THE INACTIVATION OF PLANT VIRUSES BY RADIATIONS. II. THE RELATION BETWEEN INACTIVATION DOSE AND SIZE OF VIRUS. D. E. Lea and Kenneth M. Smith. Parasitology 34(2), 227-37(1942).

Studies on inactivation of viruses of tomato bushy stunt, tobacco necrosis, tobacco ring spot, tobacco mosaic, and potato X by γ , x, and α rays are described. Dose for inactivation increases in the order: γ rays, 1.5 Å x rays, and α rays. Target sizes are calculated for the various viruses. BA 17-22561

4654
LATE EFFECT OF HIGH VOLTAGE ROENTGEN RAYS ON THE HEART OF ADULT RATS. John E. Leach and Kanematsu Suguira. Am. J. Roentgenol. Radium Therapy 48(1), 81-7(1942).

No demonstrable late effects on the heart (similar to those on skin, subcutaneous tissue, muscle, and bone) were detected 2-14 mo after irradiation with single doses up to and including 7500 r. BA 17-827

4655
DIFFERENTIATION BETWEEN THE DIRECT AND INDIRECT EFFECTS OF ROENTGEN RAYS UPON THE ORGANS OF

NORMAL AND ADRENALECTOMIZED RATS. C. P. Leblond and G. Segal. Am. J. Roentgenol. Radium Therapy 47(2), 302-6(1942).

Large x-ray doses produce a series of secondary symptoms in organs distant from field or direct irradiation, namely thymolymphatic atrophy, adrenal hypertrophy, fatty liver, and stomach ulcerations. In adrenalectomized animals, thymolymphatic atrophy and fatty livers are not found, but the gastric lesions and the lethal effects of the rays are increased. BA 17-828

4656
RADIATION EFFECTS ON GENERAL BIOLOGICAL REACTIONS. F. E. Lehmann. Radiol. Clin. 10(2), 76-92(1941). (In German).

Production by x rays of mutations and chromosome deficiencies and their role in "quantum-hit" theory are considered. Suppression of mitosis by x rays in *Amphibia* and viability of tissues deprived of mitosis are discussed. With regard to effects of x rays, two types of biological structures may be distinguished: nonregulative and regulative. BA 17-829

4657
THE EFFECTS OF X-RAYS ON "COLCHICINE TUMORS" ON THE ROOT TIPS OF THE COMMON ONION. Michael Levine. Am. J. Botany 29(10), 13s(1942). BA 17-12767

4658
MECHANISM OF THE BIOLOGICAL EFFECTS OF RADIATION. Ad. Liecht. Radiol. Clin. 10(2), 50-67(1941). (In German).

Characteristics and limitations of ultraviolet and x rays are considered with reference to irradiation of biological systems. Mechanisms of ultraviolet and x-ray action are compared. Primary act of x rays is an emission of secondary electrons, that of ultraviolet is an absorption. Changes in permeability produced by x rays are probably secondary effects and are related to such phenomena as protein denaturation. BA 17-4331

4659
THE THERAPEUTIC USE OF ARTIFICIALLY PRODUCED RADIOACTIVE SUBSTANCES. RADIOPHOSPHORUS, RADIOSTRONTIUM, RADIOIODINE, WITH SPECIAL REFERENCE TO LEUKEMIA AND ALLIED DISEASES. Bertram V. A. Low-Beer, John H. Lawrence, and Robert S. Stone. Radiology 39(5), 573-97(1942).

Authors stress difficulties in dosimetry in this type of radiation therapy and base their discussion on clinical cases studied. BA 17-10807

4660
THE INHERITANCE OF INDUCED MUTATIONS IN *NEUROSPORA TETRASPERMA*. Walter Scott Malloch. Mycologia 34(3), 325-47(1942).

X-irradiations considered to be a good method for production of valuable new strains of fungi. BA 17-263

4661
EFFECTS OF X-RAYS AND NEUTRONS ON MOUSE LYMPHOMA CHROMOSOMES IN DIFFERENT STAGES OF THE NUCLEAR CYCLE. Alfred Marshak. Radiology 39(5), 621-6(1942).

Mouse lymphoma cells are sensitive to neutrons and x rays at onset of prophase and also during resting stage (sensitivity even greater). Since neutrons are more efficient in producing chromosome abnormalities in resting stage, author concludes they will produce regression in tumors resistant to x rays. Radiation factors were: 220 kv, 15 ma, 0.5 mm Cu, field 10 x 10 cm, target surface distance 35 cm. Neutron source was Be target bombarded by 16 mev deuterons produced by a cyclotron. BA 17-13012

4662
THE EFFECT OF FAST NEUTRONS ON CHROMOSOMES

IN MEIOSIS AND ITS BEARING ON PACHYTENE PAIRING. A. Marshak and W. S. Malloch. *Genetics* 27(6), 576-83 (1942).

Neutron sensitivity of pachytene chromosomes in *Vicia faba* was found to be the same as that of somatic chromosomes at onset of prophase. Ratio of neutron to x-ray sensitivity was approximately 6 for somatic chromosomes of several species. Diameter of sensitive portion of chromonema is calculated to be 10^{-7} cm.

BA 17-8029

4663

THE EFFECT OF PH ON INACTIVATION OF TOBACCO MOSAIC VIRUS BY X-RAYS. A. Marshak and William N. Takahashi. *Proc. Natl. Acad. Sci. U.S.* 28(5), 211-16 (1942).

More electrons produced by x rays in suspending medium reach virus particles when the latter carry a net positive charge than when charge is negative. The greater the net positive charge the more electrons will be attached. BA 17-10287

4664

INDUCTION OF LEUKEMIA IN MICE BY METHYL-CHOLANTHRENE AND X-RAYS. D. P. McEndy, Mary C. Boon, and Jacob Furth. *J. Natl. Cancer Inst.* 3(3), 227-47 (1942).

Incidence of leukemia induced in mice by repeated percutaneous applications of methylcholanthrene was higher when application was made in conjunction with x rays. BA 17-13616

4665

THE INACTIVATION OF FERTILIZIN AND ITS CONVERSION TO THE "UNIVALENT" FORM BY X-RAYS AND ULTRAVIOLET LIGHT. Charles B. Metz. *Biol. Bull.* 82(3), 446-54 (1942).

Arbacia sperm, after treatment with fertilizin inactivated by x rays, showed the same resistance to subsequent agglutination by untreated fertilizin as did sperm which had reversed after treatment with unirradiated fertilizin. X-rays are considered to convert fertilizin to a non-agglutinating "univalent" form. BA 17-830

4666

MECHANISM OF THE BIOLOGICAL EFFECTS OF RADIATION. IL W. Minder. *Radiol. Clin.* 10(2), 67-75 (1941). (In German).

Various mathematical formulations for x ray destruction curves are considered. Mathematical functions required do not depend upon any particular hypothesis as to mechanism of action. Such expressions can therefore imply no more than formal agreement with the experimental data. BA 17-4334

4667

STUDIES WITH RADIOACTIVE DI-AZO DYES. III. THE DISTRIBUTION OF RADIOACTIVE DYES IN TUMOR-BEARING MICE. Francis D. Moore, Lester H. Tobin, and Joseph C. Aub. *J. Clin. Invest.* 22(2), 161-8 (1943).

Studies relative to the possibility that radioactive dyes might be taken up preferentially by tumors are reported. Within tumors, accumulation of dye was roughly proportional to vascularity. BA 17-21671

4668

RECOVERY FUNCTION OF IRRADIATED TISSUES; A THEORETICAL AND EXPERIMENTAL STUDY. A. Mutscheller. *Radiology* 38(1), 53-73 (1942).

The four parts of this paper deal with (1) quantitative relations between physical measurements and observable changes from irradiation of biological materials, (2) radiation effects on cells and tissues, (3) tissue injury and recovery equilibrium, (4) biological action rate and cell-killing curves for various tissues. BA 17-4335

4669

THE EFFECTS OF AGE AND IRRADIATION ON CHROMOSOMAL ABERRATIONS IN ALLIUM SEED Charles Nichols, Jr. *Am. J. Botany* 29(9), 755-9 (1942).

X-irradiation of five varieties of *A. cepa* produced chromosomal aberrations of root tip cells and delayed germination. There was no correlation between age of seed and radiosensitivity. Number of aberrations was greater when moisture content of seed was increased during period of delayed germination. BA 17-8030

4670

STUDIES ON THE EFFECTS OF X-RAYS ON REGENERATION IN THE FRAGMENTING OLIGOCHAETE, *NAIS PARA-GUAYENSIS*. John P. O'Brien. *Growth* 6(3), 203-29 (1942).

X-ray inhibition of regeneration results from a selective deleterious effect of the rays on regenerative cells, the effect being local and direct, as demonstrated by regional irradiation experiments BA 17-1642

4671

IS THE ACTION OF ROENTGEN RAYS DIRECT OR INDIRECT? (AN INVESTIGATION OF THIS QUESTION BY THE METHOD OF HUMAN MARROW CULTURE.) Edwin E. Osgood. *Am. J. Roentgenol. Radium Therapy* 48(2), 214-20 (1942).

Suspensions of 100,000,000 nucleated marrow cells (obtained from sternal puncture) in 50 cc of culture medium were used. When medium alone was irradiated and then added to nonirradiated cells, there was no effect on cells. Irradiation of both cells and medium or cells alone caused increasing cell destruction with increasing doses. BA 17-15500

4672

THE TUMOR RESPONSE TO ROENTGEN IRRADIATION AS INFLUENCED BY THE HOST-TUMOR RELATION. A. W. Oughterson, Jules Plaut, and E. A. Lawrence. *Am. J. Roentgenol. Radium Therapy* 47(2), 207-9 (1942).

There is evidence that the environment of a cell *in vitro* or of a tumor *in vivo* may influence the effect of irradiation. Response of a transplantable mammary tumor, inoculated into the groins of mice and subsequently treated with x rays was studied in various host-relations. BA 17-831

4673

RADIATION AND HEREDITARY MAMMARY CANCER S. E. Owen and A. E. Williams. *Radiology* 34(5), 541-4 (1940).

Roentgen rays (140 kv, 0.25 mm Cu, 1 mm Al, or 100 kv, 3.0 mm Al) in small doses did not increase breast cancer incidence in nonbreeding females of high breast tumor strain mice. Doses as low as 100 r decreased late incidence of spontaneous mammary cancer in C3H mice. BA 17-10808

4674

THE BIOLOGICAL MEASUREMENT OF HIGH VOLTAGE RADIATIONS. Ch. Packard. *Radiology* 34(1), 17-23 (1940).

Effects of 200-900 kv x rays on *Drosophila* eggs were studied. With doses of 400-900 kv, biologic dose is about 80% of physical dose. Measurements indicate little increase in biologically measured depth dose when voltage is increased from 500-900 kv. BA 17-8189

4675

GYNANDROMORPHS IN *DROSOPHILA MELANOGASTER*. J. T. Patterson and Wilson Stone. *Univ. Texas Publ.* 3825, 1-66 (1938).

Data are given for 335 gynanders. About 2/3 of mosaics result from elimination of whole or part of a daughter X chromosome at first cleavage division. Irradiation of sperm has differential effect, causing paternal X chromosomes to be eliminated more frequently. In spontaneous gynanders, or gynanders from x-rayed mothers, either X is eliminated with equal frequency. Not all gynanders can be explained by X elimination, however. BA 17-17834

4676

THE IRRADIATION OF TRANSPLANTED BAGG-JACKSON AND YALE CARCINOMAS IN MICE, AS AFFECTED BY

DIET AND FOSTER NURSING. J. A. Plaut, Robert Tennant, and Ashley W. Oughterson. *Cancer Research* 2(8), 546-50(1942).

Hosts to mammary carcinomas were F_1 hybrids obtained by crossing C_{57} Black, A, and Y strains. Foster nursing alone had no influence on radiosensitivity of tumors. This was used as an index of biological behavior of neoplasms. Differences in two diets (commercially used animal foods) did not affect tumors. Baggs-Jackson and Yale tumors behave differently with respect to each other but had same response to diet and host differences. BA 17-5030

4677
RESIDUAL CHROMIC INDEX OF THE PLASMA AFTER TUNGSTIC AND AFTER CADMIUM HYDROXIDE CLARIFICATION. Michel Polonovski and Paul Jarrige. *Compt. rend. soc. biol.* 135, 258-61(1941). (In French).

I.C.R. after tungstic precipitation (I.C.R._T) and after $Cd(OH)_2$ precipitation (I.C.R._{Cd}) was studied in cancerous patients during radiation therapy. Initial index 2.47 was obtained. There was inversion of indices in cancerous patients but not in normal subjects or in a dog subjected to seven treatments of 225 r and then 500 r. Index inversion corresponds well to liberation of oxidizable substance in plasma of cancerous subjects under influence of irradiation. BA 17-5031

4678
INHERITANCE OF MATURE PLANT CHARACTERS IN SORGHUM INDUCED BY RADIATION. J. R. Quinby and R. E. Karper. *J. Heredity* 33(9), 323-7(1942).

Nine new mature plant characters produced by x radiation are described. Characters (zebra stripe, midget, dwarf, and leaf modifications) are inherited as simple recessives with deficiencies of recessive homozygotes in several cases. A total of 72 recessive mutations, each deleterious in effect, consisting mostly of common seedling chlorophyll deficient types, were induced. Although favorable material in which to detect progressive mutation was x rayed, no progressive mutations were produced. BA 17-10681

4679
INHIBITORY EFFECT OF RADIUM ON THE GROWTH OF ROOTS OF LENS ESCULENTA: MODIFICATIONS OF THE MINIMUM GROWTH INHIBITING DOSE BY CERTAIN IONS. A. Sartory, R. Sartory, J. Meyer, and E. Meyer. *Compt. rend.* 198, 386-8(1934). (In French)

4680
A PRELIMINARY REPORT ON THE EFFECT OF X-RAYS ON A TUMOR OF KNOWN GENETIC CONSTITUTION. M. C. Reinhard and S. G. Warner. *Radiology* 34(4), 438-9(1940).

Authors report on x ray effects on spontaneous mouse adenocarcinoma which gave 100% takes when transplanted to other mice of same strain, no takes when transplanted to mice of other pure strains. After exposure of tumor to 100 r, 50% of animals in three strains which previously reacted negatively to nonrayed tumor were susceptible to radiated tumor. BA 17-11489

4681
THE GENETIC NATURE OF X-RAY INDUCED CHANGES IN POLLEN. C. M. Rick. *Proc. Natl. Acad. Sci. U. S.* 28(12), 518-25(1942).

X-radiation of microspores of diploid species of *Tradescantia* shortly after meiosis increases variability in pollen grain length and percentage of aborted grains. Effect was greater after treatment at 3° than at 33°. Similar radiation of autotetraploid species failed to give similar results. BA 17-17820

4682
THE X-RAY INDUCED MUTATION RATE IN POLLEN IN RELATION TO DOSAGE AND THE NUCLEAR CYCLE. Charles M. Rick. *Genetics* 28(3), 237-52(1943).

Mean length and variation of length of pollen grains, and percentage of aborted grains were studied for 2 mo after exposure of diploid *Tradescantia* inflorescences to 62.5, 125, 250, and 500 r. Mutational response of pollen abortion after treatment during post-meiotic period varied approximately linearly with dose, response of length variance was intermediate between linear and squared relationship. Length changes were nearly all toward smaller grains. BA 17-19481

4683
CYTO-GENETIC CONSEQUENCES OF X-RAY TREATMENT OF POLLEN IN PETUNIA. Charles M. Rick. *Botan. Gas.* 104(4), 528-40(1943).

Petunia pollen x irradiated with 10,000-100,000 r was applied to stigmas of untreated plants, pollen exposed to 50,000 r functioned to produce viable seed. Gross chromosomal aberrations were seen in 33 X_1 plants. BA 17-21044

4684
ROENTGENOLOGIC IRRADIATION IN ACUTE PERITONITIS AND ITS EFFECT ON THE CELLS OF NORMAL PERITONEAL FLUID IN GUINEA PIGS. Frank J. Rigos. *Radiology* 39(6), 681-90(1942).

As studied in 8 weeks-old, 420-450 gm male guinea pigs with peritonitis induced by intraperitoneal injection of 1 cc suspension of *E. coli*, roentgenotherapy with doses less than 100 r had little effect on cell count of peritoneal fluid but did cause relative increase of macrophages and lymphocytes. A dose of 100 r increased total cell count, 200 r or more caused a decrease of cell count but a relative increase in percentage of macrophages. BA 17-13014

4685
THE EFFECT OF ULTRAPENETRATIVE IRRADIATION ON ANIMAL CELLS GROWN IN VITRO. A. E. Roffo, Jr. *Bol. inst. med. exptl. estud. cancer* (Buenos Aires) 19(60), 531-58(1942). (In Spanish).

Using x rays with voltages from 100-600 kv, it is shown that with 200 r, lethal effect on cultivated cells (normal chick heart embryo and rat sarcoma) begins at 300 kv and becomes more pronounced at higher voltages. Effect appears to have no relation radiation frequency but is associated with its absorption. BA 17-23850

4686
THE INFLUENCE OF OXYGEN ON THE PHYSIOLOGICAL EFFECTS OF X-RADIATION IN THE MICROSPORES OF *TRADESCANTIA PALUDOSA*. A. V. Beatty and J. W. Beatty. *Genetics* 39, 958(1954).

4687
THE EFFECT OF X-RAY STIMULATION ON BIOELECTRIC POTENTIALS OF THE AVIAN EGG. A. L. Romanoff and A. A. Bless. *Proc. Natl. Acad. Sci. U. S.* 28(8), 306-11(1942).

P. D. between blastoderm and albumen was measured every 6 hr for 24 hr following irradiation of fresh white leghorn eggs in vivo and in vitro at 0.24-0.36 A with 8-5000 r at 600 r/min. Potential difference was increased up to a maximum of 250% normal at 250 r, larger doses were inhibitory. Stimulating dose was greater for cold eggs than for those preheated 3 hr at incubation temperature. BA 17-13020

4688
EXPERIMENTS SHOWING THE INFLUENCE OF ONE GROWING TUMOR UPON ANOTHER. S. Russ and G. M. Scott. *Brit. J. Exptl. Pathol.* 23(3), 127-33(1942).

The growth of primary normal tumors was slowed down to half that of controls if the second graft on the opposite flank was made from pieces of tumor whose growth had been inhibited by sublethal doses of x rays. (Studies on rats.) BA 17-5041

4689
THE DISTRIBUTION OF X-RAY INDUCED CHROMOSOMAL

ABERRATIONS. Karl Sax. Proc. Natl. Acad. Sci. U. S. 28(6), 229-33(1942).

Relative frequencies of various types of chromosomal aberrations indicate that secondary factors play an important part in determining the frequency of effective breaks induced by x rays. Secondary factors include (1) spatial relations of the chromosomes, (2) stresses imposed by centromere in maintaining polarity, and (3) stage of chromosome development in the nuclear cycle. BA 17-4169

4690

EFFECT OF COMBINED FEVER AND X-RAY THERAPY ON FAR ADVANCED MALIGNANT GROWTHS. H. S. Shoulders, E. L. Turner, L. D. Scott, and W. H. Grant. Radiology 39(2), 184-93(1942).

Authors review the literature on heat therapy combined with x irradiation in treating experimental cancer. Results show that such combined therapy is potentially more effective than x irradiation alone. BA 17-8190

4691

THE EFFECT OF RADIATION ON ORGANIC MATERIALS. R. Signer. Radiol. Clin. 10(2), 36-49(1941). (In German).

Photochemical decomposition of ketones, interconversions of sterols, and hydrolysis of amides are considered as simpler cases of radiation effects on organic systems. X-ray are effects compared with those produced by longer wavelengths. Protein denaturation by x rays is explained in terms of localized heating effects. Complexities of biological systems (e.g. photosynthesis) and attendant difficulties of investigation are emphasized. BA 17-4336

4692

EXPERIMENTAL INVESTIGATION OF THE EFFECT OF RADIUM AND ROENTGEN RAYS ON FERMENTING MICROORGANISMS. III. ON THE CONDITIONS FOR FERMENTATION OF CITRIC ACID BY ASPERGILLIS NIGER RADIUMRASAE III. M. Simo. J. Agric. Chem. Soc. Japan 16(8), 129(1940). BA 17-11872

4693

EXPERIMENTAL INVESTIGATION OF THE EFFECT OF RADIUM AND ROENTGEN RAYS ON FERMENTING MICROORGANISMS. M. Simo. J. Agric. Chem. Soc. Japan 16(10), 148(1940). In Japanese. pp. 965-78. (German Title). BA 17-24499

4694

RADIATION OSTEITIS AND FRACTURES FOLLOWING IRRADIATION. Danely P. Slaughter. Am. J. Roentgenol. Radium Therapy 48(2), 201-12(1942). (With Report of Five Cases of Fractured Clavicle.)

Radiation effect in bone is one of degree, depending on amount of energy absorbed. With light doses, complete recovery is possible. With heavier doses, damage increases until radio-necrosis occurs. This may leave dead bone as a sterile foreign body. Infection may occur if overlying tissues are damaged. Fractures may occur in weight bearing bones. In cases cited, tissue dose in damaged bone varied from 1500-6000 r. BA 17-13015

4695

AUXIN AND CALINES IN SEEDLINGS FROM X-RAYED SEEDS. G. F. Smith and H. Kersten. Am. J. Botany 29(9), 785-91(1942).

Alterations in seedlings from x-rayed seeds include: increase in auxin destruction (production and transport relatively unaffected), inactivation of phylloclaine, interference in caulocline translocation. No indications of x-ray synthesized growth inhibitors were found. BA 17-10201

4696

ROOT MODIFICATIONS INDUCED IN ZE A MAYS SEEDLINGS BY IRRADIATING DRY SEEDS WITH SOFT X-RAYS. G. F. Smith and H. Kersten. Plant Physiol. 17(3), 455-64(1942).

Unsoaked seeds were x rayed with gas-type Cu target x-ray tube at 30 peak kv, 10 ma for 100 min. External modifications and histological changes are described. BA 17-2974

4697

MUTANTS AND LINKAGE STUDIES IN TRITICUM MONOCOCCUM AND T. AEGILOPOIDES. Luther Smith. Research Bull. Missouri Agr. Expt. Sta. 298, 1-26(1939).

Dormant seeds of T. monococcum vars. vulgare and flavescens were subjected to 12,500 r x-ray treatment and 56 of more than 80 mutants produced are described. All mutations tested behaved as recessives except two which were possibly cytoplasmic. Crosses between mutants involving 106 combinations were sufficiently tested in F₂ and F₃ to indicate presence or absence of linkage. BA 17-280

4698

RELATION OF POLYPOIDY TO HEAT AND X-RAY EFFECTS IN THE CEREALS. Luther Smith. J. Heredity 34(5), 131-4(1943).

X-ray tolerance of dormant seeds increases with chromosome number. Heat treatment given before irradiation decreases x-ray injury, heat treatment postirradiation decreases injury. Author describes x-ray effects on mutation frequency, production of chromatic bridges in root tips, production of translocations. Frequency of x-ray-induced translocations, complex rearrangements, and deficiencies increased markedly with polyploidy. BA 17-19462

4699

ROENTGEN RAY TREATMENT OF HYPERTHYROIDISM. Mayo H. Soley and Robert S. Stone. Arch. Internal Med. 70(6), 1002-16(1942).

Of 43 hyperthyroid patients treated with roentgen therapy of 1800-2700 r (22 of which received I in conjunction with treatment) 25 (or 58.1%) were entirely free of hyperthyroidism in an average of 8-7/10 mo from onset of treatment, 8 (or 18.6%) were improved. Both groups (with I and without) had coincidental decrease in size of thyroid to within normal limits. Complications; tracheitis and esophagitis in 15 patients. BA 17-13373

4700

OBSERVATIONS ON THE RADIOBIOLOGICAL DETERMINATION OF GENE NUMBERS IN THE X CHROMOSOME OF DROSOPHILA MELANOGASTER. K. Sommermeyer. Z. indukt. Abstamm. -u. Vererb. 79(2), 240-4(1941). (In German).

"Saturation effect" of Timofeeff-Ressovsky and Zimmer's neutron-induced lethal mutations is related to a greater size of those radiosensitive volumes pertaining to chromosome injury than of those pertaining to recessive lethal mutation, D. E. Lee's calculations of gene number are based on assumption that an ionization within a gene's radiosensitivity volume would almost always induce a recessive lethal mutation. BA 17-15211

4701

RADIATIONS, CELLULAR METABOLISM AND CANCER RESISTANCE. George Sperl Spertl. Studies Inst. Divi Thomae 3(1), 17-38(1941).

Review article. BA 17-8859

4702

THE GENETIC NATURE OF X-RAY AND ULTRAVIOLET INDUCED MUTATIONS AFFECTING THE GENE A IN MAIZE. L. J. Stadler and Herschel Roman. Genetics 28(1), 91(1943).

An abstract. BA 17-12784

4703

THE CORRELATION BETWEEN ROENTGEN DOSAGE AND LYMPHOID CELL MIGRATION IN TISSUE CULTURES. Wilhelm Stenstrom, Joseph T. King, and Austin F. Henschel. Radiology 38(4), 477-80(1942).

Fragments of adult rabbit mesenteric lymph nodes were x rayed (200 kv, 30 ma, 1 mm Al filter, 50 cm target distance, HVL 0.28 mm Cu, 162r/min), cultured, and fixed. Dose of 39 r inhibited cell migration 8.8%. Inhibition increased rapidly with increased dose up to 620 r, more slowly above this level. No lymphoid cells appear ameboid 48 hr after 40,000 r. It is assumed tentatively that lymph nodes contain two groups of cells which differ in radiosensitivity. BA 17-4337

4704

STUDIES ON THE EFFECT OF LIQUID AIR, RAYS, AND EMANATIONS ON HONEY YEASTS. W. A. Stephen. Sci. Agr. 23(2), 117-26(1942).

Effect of these agents on *Zygosaccharomyces barkeri*, *Z. richteri*, *Z. nussbaumeri*, *Z. priorianus*, and *Z. rugosus* were studied. X-rays showed no evidence of killing in agar, possibly some in honey. One hour exposure to Ra had no effect. BA 17-11875

4705

RADIUM POISONING. R. H. Stevens. Radiology 39(1), 39-47(1942).

Patient received total of 440 γ of Ra chloride intravenously for Hodgkin's disease over five year period 1925-1930. Successive roentgenograms of dorsal spine taken from 1936-1941 showed destructive lesions at first attributed to the disease, later found due to Ra poisoning. Radionecrosis of jaw was also observed. Fractional retention after period of 15 yr amounted to 11.4 γ of total 440 γ or 2.5%. BA 17-4338

4706

THE TREATMENT OF CANCER WITH FAST NEUTRONS. Robert S. Stone and John C. Larkin. Radiology 39(5), 608-20(1942).

Author found 1 n equal to 6 r as judged by threshold skin reactions. Of various cancers treated, 17% showed complete regression, 48% showed partial regression. BA 17-11496

4707

DIFFERENTIAL SENSITIVITY OF PROPHASE POLLEN TUBE CHROMOSOMES TO X-RAYS AND ULTRAVIOLET RADIATION. C. P. Swanson. J. Gen. Physiol. 26(5), 485-94(1943).

Increase in total chromosome breaks is progressive up to 4 hr after exposure of pollen tubes of *Tradescantia* to x rays. Thereafter, the total number of breaks decreases. BA 17-19484

4708

THE EFFECTS OF ULTRAVIOLET AND X-RAY TREATMENTS ON THE POLLEN TUBE CHROMOSOMES OF *TRADESCANTIA*. C. P. Swanson. Genetics 27(5), 491-503(1942).

Dosage-break relationship was linear for short (2536A) and long (2967 and 3022A) wave lengths. Breaks (simple deletions) were more frequent near medial and distal regions of chromosome arms. As chromosomes enter prophase stages, they become less resistant to x rays, more resistant to ultraviolet as judged from breakage data. BA 17-201

4709

GENETIC CONTROL OF BIOCHEMICAL REACTIONS IN *NEUROSPORA*: AN "AMINO BENZOICLESS" MUTANT. E. L. Tatum and G. W. Beadle. Proc. Natl. Acad. Sci. U. S. 28(6), 234-43(1942).

X-rays induce mutant strain in *N. crassa* which requires *p*-aminobenzoic acid for growth which is a function of the amount of acid supplied. Mutant differs from normal by single gene, which must therefore control an essential step in the synthesis of *p*-aminobenzoic acid. Both normal and mutant strains are inhibited by sulfanilamide, several substances related to *p*-aminobenzoic acid can replace it but are less adequate than *p*-aminobenzoic acid. BA 17-4181

4710

THE EFFECTS OF IONIZING RADIATIONS ON THE CHROMOSOMES OF *TRADESCANTIA BRACTEATA*. A COMPARISON BETWEEN NEUTRONS AND X-RAYS.

J. M. Thoday and D. E. Lea. J. Genetics 43(1/2), 189-210 (1942).

Neutrons produce same types of chromosome aberrations as x rays, but are more effective per ionization produced. Ratio of x-ray dose to neutron dose required to produce equivalent effects varies with type of aberration: 2.4 for chromatid breaks, 3.6 for isochromatid rejoins, 4.5 for chromosome breaks, and 5-10 for interchanges. BA 17-287

4711

EFFECT OF COMBINING ESTROGEN WITH LETHAL DOSES OF ROENTGEN-RAY IN SWISS MICE. Anne deG. Treadwell, W. U. Gardner, and J. H. Lawrence. Endocrinology 32(2), 161-4(1943).

Groups of mice were exposed to 400-550 r. One-third of mice were also given estrogen during irradiation, one-third given estrogen nine days before irradiation. After four days, survival of irradiated mice was 20.6%, of mice given estrogen and x rays at same time, 11.7% and of estrogen nine days before irradiation, 75%. BA 17-13295

4712

PRESENT STATUS OF RESEARCH IN CANCER. Carl Voegtlin. Am. J. Public Health 32(9), 1018-20(1942).

This is a brief review of experimental research and accomplishments in the last 40 years. There is evidence that excessive exposure to x rays, Ra, or ultraviolet light can produce cancer. Author feels these cases can be reduced by proper construction and handling of apparatus. BA 17-11502

4713

GROWTH AND DETERMINATION IN THE DEVELOPMENT OF *DROSOPHILA*. C. H. Waddington. Nature 149(3775), 264-5(1942).

In larvae irradiated with 7000 r of x-ray for 12 hr before and 18 hr after forming puparium, large numbers of individual cells died. In larvae more than 24 hr past pupation, damage was confined chiefly to bristle and wing morphogenesis. Most general malformations were caused in larvae irradiated 60-90 hr after laying. Many of these anomalies apparently are the same as those of known genetic origin. BA 17-334

4714

THERMOSENSITIVITY OF BACTERIOPHAGES. Eugene Wallman and Elizabeth Wallman. Compt. rend. 211, 270-2(1940). (In French).

The smaller the bacteriophages, the more resistant they are to x rays and the more sensitive they are to heat. Temperature required for protein coagulation increases with their molecular weight. BA 17-24306

4715

PHYSARUM AS A RADIATION TEST OBJECT. Shields Warren and Oliver K. Scott. Proc. Soc. Exptl. Biol. Med. 52(2), 149-51(1943).

P. polycephalum is a moderately sensitive object for β radiation reacting by cessation of growth in the field of radiation and sometimes reversal of protoplasmic streaming. BA 17-17989

4716

BRONCHIAL AND LUNG CANCER. C. Wegelin. Schweiz. med. Wochschr. 72, 1054(1942). (In German).

Author mentions that some irritants undoubtedly give rise to carcinomata, e. g. asbestos dust and Ra emanations in Schneeberg mines. BA 17-18494

4717

HATCHABILITY AND CHROMOSOME CHANGES OF *HABROBRACON* EGGS X-RAYED IN PROPHASE I AND

METAPHASE I. Anna R. Whiting. *Genetics* 28(1), 94-5 (1943).

An abstract. Dose hatchability curves for unfertilized x rayed *Habrobracon* eggs were studied in parallel with cytological examinations of chromosomes. BA 17-12828

4718

THE PREVENTION OF IRRADIATION SICKNESS. William H. Whitmore. *Am. J. Roentgenol. Radium Therapy* 49(1), 83-97(1943).

On the basis of similarity of symptoms of vitamin B₁ deficiency and those of radiation sickness, thiamine chloride was administered to patients undergoing irradiation therapy. Radiation sickness is usually prevented by administration of 6-9 mg daily during therapy; if symptoms of sickness develop, the dose of thiamin may be increased. BA 17-13016

4719

THE OSMOTIC NATURE OF SO-CALLED NONOSMOTIC HEMOLYSIS. W. Wilbrandt. *Pflügers Arch. ges. Physiol.* 245(1), 22-52(1941). (In German).

Effect of x rays (and of several other hemolysins) is characterized by abolition of normal impermeability of erythrocytes to cations. BA 17-13001

4720

EVALUATION OF THE RELATIVE SIZE OF BACTERIOPHAGES BY MEANS OF THEIR RADIOSENSITIVITY. E. Wollman and A. Lacassagne. *Compt. rend. soc. biol.* 131(21), 959-61(1939) (In French).

Classification of seven phages according to decreasing size: phage of *B. subtilis*, T105a, Staph. S3K and C16, phage of megatherium, phage of coli 36, S13. Classification according to radiosensitivity differs in that T105a is slightly larger and more radioresistant than Staph. S3K and C16. BA 17-1962

4721

VARIATION IN *PENICILLIUM NOTATUM* INDUCED BY THE BOMBARDMENT OF SPORES WITH NEUTRONS. Hazel Jean Hanson, W. G. Meyers, Grant L. Stahly, and J. M. Birkeland. *J. Bacteriol.* 51(1), 9-18(1946).

Spore suspensions isolated from strain NRRL 1249. B21 were bombarded with slow neutrons for periods of from 1 hr-134 days. Variants (150) were isolated and characterized by differences in color, texture, rate and quantity of vegetative growth and sporulation, color and amount of transpired fluid, and color of reverse of the colonies. Variants increased with time of exposure; differed greatly in capacity to produce penicillin. BA 20-13262

4722

IMMATURE MALES AND HIGH VISIBLE MUTATION RATE FROM EGGS (OF *HABROBRACON*) IRRADIATED IN PROPHASE I. Anna R. Whiting. (*Genetics* 31(2), 235-6(1946).

Abstract. BA 20-11803

4723

THE INCIDENCE OF LEUKEMIA IN RADIOLOGISTS. Helmuth Ulrich. *New Engl. J. Med.* 234(2), 45-6(1946).

Author studied 34,626 obituaries in AMA Journal for period 1935-44. Incidence of leukemia among 205 physicians listed as radiologists was 3.9% compared to 0.44% among those not listed as radiologists. This is presented as evidence that exposure to radiation is a potential cause of leukemia. BA 20-12715

4724

STUDIES ON THE CELLULAR BASIS OF REGENERATION IN *NAIS PARAGUAYENSIS* AND THE EFFECTS OF X-RAY THEREON. John P. O'Brien. *Growth* 10(1), 25-44(1946).

X-rays inhibit regeneration anteriorly and posteriorly, by way of selective inhibition of those cellular elements through which regeneration is normally accomplished. Neoblasts are more radiosensitive than ectodermal

epithelium. Small knobs, formed anteriorly and posteriorly in x rayed specimens, bear stomodeal and proctodeal invagination but do not represent true regenerative activity. BA 20-12823

4725

A NEW METHOD OF LOCAL TREATMENT OF RHEUMATOID AND TRAUMATIC AFFECTIONS OF THE JOINTS WITH EMPHASIS ON A NEW APPROACH IN THE MANAGEMENT OF ARTHRITIS AND ALLIED CONDITIONS. Otto C. Kestler. *Geriatrics* 1(2), 159-63(1946).

Rn ointment was used to treat arthritis and traumatic conditions. In 65 cases treated, clinical improvement was observed in all but two and no deleterious effects were experienced. BA 20-12649

4726

LOW-DOSAGE IRRADIATION TO THE PITUITARY GLAND AND OVARIES IN AMENORRHEA AND DYSFUNCTIONAL UTERINE BLEEDING. L. Reidenberg. *Am. J. Obstet. Gynecol.* 45, 971(1943).

Author reports observation on a series of 136 patients indicating, he feels, that preconceptional irradiation had no deleterious effect upon generative organs or upon offspring of first generation. BA 20-12432

4727

LOW-DOSAGE IRRADIATION IN THE TREATMENT OF AMENORRHEA. C. Mazer and R. Greenberg. *Am. J. Obstet. Gynecol.* 46, 648(1943).

Low dosage x radiation was delivered to pituitary and ovaries of 92 women with varying degrees of infrequent or no bleeding. Ages of the patients varied from 17-36 years. Authors feel that cure rate is inversely proportional to severity of amenorrhea. BA 20-12427

4728

THROMBOPLASTIC STUDIES ON HEMOPHILIA. David I. Macht and Marcus Ostro. *Science* 103(2674), 402 (1946).

Observations by Moldavsky (in man) that injections of penicillin cause decrease in blood coagulation time are confirmed in experiments using rabbits and cats. Effect was not found in two hemophiliacs but shortening of clotting time was produced in their blood by 200 kv x rays. (Blood exposed *in vitro* to 60-80 r clotted in 1/2 to 1/3 original time.) BA 20-12084

4729

HEALTH PROTECTION ACTIVITIES OF THE PLUTONIUM PROJECT. SYMPOSIUM ON ATOMIC ENERGY AND ITS IMPLICATIONS. Robert S. Stone. *Proc. Am. Phil. Soc.* 90(1), 11-20(1946).

This report gives tolerance doses for x rays, β rays, γ rays, fast, and slow neutron radiations and confirms the general held opinion that radiation acts upon tissues roughly in proportion to specific ionization whether radiation comes from outside or from radioactive element inside the body. BA 20-12005

4730

THE BIOLOGICAL EFFECT OF PENETRATING RADIATIONS. A REVIEW. F. G. Spear. *Brit. Med. Bull.* 4(1), 2-10 (1946).

Topics include: physical dose and biological response, radiochemistry, biological indicators, genetic effects of radiations, lethal and injurious radiation effects, radiations and malignancy. Cell differentiation and division in normal and irradiated tissues of: chick fibroblasts, rat embryo, frog tadpole eye, rat eye are compared. Photomicrographs show genetic effects of radiation on chromosomes in *Tradescantia* and *Drosophila*. BA 20-12004

4731

THE EFFECT OF X-RAYS ON THE OVARIES AND OESTROUS CYCLE OF THE GOLDEN HAMSTER (*CRICETUS*

AURATUS WATERHOUSE). Kathleen P. Saxon. J. Tenn. Acad. Sci. 21(1), 128-34(1946).

Ovaries of adult virgin female hamsters were subjected to 900 r in two equal doses one week apart and studied at intervals of 1 day, 7, 15, 30, and 45 days postexposure. Small follicles appear more radiosensitive than large follicles. Abnormal mitosis and multinucleate ova were among the effects observed. Effect on oestrous cycle is described. BA 20-12003

4732

TREATMENT OF ROENTGEN SICKNESS WITH ORAL ADMINISTRATION OF PYRIDOXINE HYDROCHLORIDE (VITAMIN B₆). Robert J. Reeves. Southern Med. J. 39(5), 405-7(1946).

Daily dose of 100 mg of pyridoxine hydrochloride was found to be most effective drug regimen in treating irradiation sickness. Because of easy administration and effectiveness, oral administration is advocated with reliance on intravenous injection in cases which fail to respond. BA 20-12002

4733

REACTIONS OF THE HEMOPOIETIC SYSTEM TO AGENTS USED IN THE TREATMENT OF DERMATOSES. EFFECT OF LOW VOLTAGE ROENTGEN RAY THERAPY. Frances Pascher and Ben Kanee. Arch. Dermatol and Syphilol. 53(1), 1-5(1946).

Low voltage x irradiation of eight patients with generalized dermatoses of various types was followed by leukopenia, or leukopenia and hyperchromic anemia, quantitative changes similar to those following high voltage irradiation. Individual variations in radiosensitivity and dosage are believed to be the primary influences in development of these changes. BA 20-12001

4734

CHAIN PROCESSES AND THEIR BIOPHYSICAL APPLICATIONS. II. THE EFFECT OF RECOVERY. I. Opatowski. Bull. Math. Biophys. 8(1), 7-15(1946).

Biologic effects of radiations were studied on basis of general probabilistic model of successive transformations (Markoff chains). Recovery process is regarded as series of reverse transitions. Gives methods for calculating probability of subjecting microorganisms to an observable change within an assigned time during process of irradiation of homogeneous aggregate of microorganisms. BA 20-12000

4735

COMPARATIVE STUDIES OF THE BIOLOGICAL EFFECTS OF X-RAYS, NEUTRONS AND OTHER IONIZING RADIATIONS. L. H. Gray. Brit. Med. Bull. 4(1), 11-18(1946).

Author describes studies on measurements of neutron energy absorbed in living cells, comparison of effects of x rays, γ rays, neutrons and other ionizing radiations on enzymes, colloids and numerous plant and animal tissues, both normal and malignant. BA 20-11998

4736

CHAIN PROCESSES AND THEIR BIOPHYSICAL APPLICATIONS. I. GENERAL THEORY. I. Opatowski. Bull. Math. Biophys. 7(4), 161-80(1945).

"Hit theory" involving concepts of "sensitive volume" or "target area" is evaluated and developed. BA 20-11999

4737

EXAMPLE OF NEED FOR DERMATOLOGIC PUBLICITY OF DEVELOPMENTS IN RADIOLOGIC PHYSICS. John C. Belisario and Robert E. Pugh, Jr. Arch. Dermatol. and Syphilol. 53(2), 115-18(1946).

Authors call attention to four professions concerned with x ray doses, and to the need for acceptance and understanding of standards and units. BA 20-11997

4738

DOSAGE AND INTENSITY RELATIONS IN THE IRRADIATION

OF DROSOPHILA. Claude E. Villee. Genetics 31(2), 234 (1946).

Abstract. BA 20-11801

4739

SOME DEVELOPING EFFECTS OF IRRADIATING DROSOPHILA. Claude A. Villee. Genetics 31(2), 233-4(1946).

Abstract. BA 20-11800

4740

GREYING INDUCED BY X-RAYS IN THE MOUSE. Herman B. Chase. Genetics 31(2), 213-4(1946).

Abstract. BA 20-11767

4741

A CASE OF INHERITED RESISTANCE TO RADIATION IN BACTERIA. Evelyn M. Witkin. Genetics 31(2), (1946).

Abstract. BA 20-11760

4742

GENETIC EFFECTS OF RADIATIONS. D. G. Catcheside. Brit. Med. Bull. 4(1), 18-23(1946).

Topics include: stability of chromosomes and genes, radiation-induced mutation in *D. melanogaster*, induced chromosome aberrations. Chromosome break, symmetrical interchange and asymmetrical interchange are diagrammed (*Tradescantia*). BA 20-11766

4743

LINKAGE RELATIONS IN HABROBRACON AND THE EFFECTS OF TEMPERATURE, X-RADIATIONS, AND AGE ON CROSSINGOVER. Arnold M. Clark. Proc. Penna. Acad. Sci. 17, 47-64(1943).

Age, temperature, or x-radiation were not found to alter crossingover in this parasitic wasp. BA 20-76

4744

RELATIONSHIP BETWEEN MORPHOLOGY AND X-RAY EFFECTS IN IMPLANTS OF MOUSE SARCOMA 180 IRRADIATED WITH 5000 AND 60,000 ROENTGEN (IN AIR). A Goldfeder. Radiology 45(1), 49-55(1945).

After irradiation with 5000 or 60,000 r/air (200 kv, 20 ma, 0.5 mm Cu and 1.0 mm Al filter, HVL 0.85 mm Cu, distance 12.5 cm, 612 r/min) implants of mouse sarcoma 180 showed no increase in size during ten successive days. Extensive degenerative changes including nuclear pyknosis and fragmentation, and cytoplasmic changes were observed. No cytologic differences were observed between the two groups of cells. BA20-707

4745

AN UNUSUAL FORM OF RADIUM POISONING IN THE LUMINOUS PAINT INDUSTRY. P. Rossing. Arch. Gewerbepathol. Gewerbehyg. 11(3), 395-401(1942). (In German).

Author describes a case in which midbrain was inadvertently exposed to α rays of radium, causing uncontrollable drowsiness, headaches and leucocytosis, and depressed basal metabolism. Author suggests that radioactive material in upper nasal region (inhaled and introduced by fingers) exerted direct action on sleep center in floor of third ventricle. BA 20-798

4746

ACTION OF IONIZING RADIATIONS ON BACTERIA. Ph. Lasseur, P. Florentin, P. Jacob, A. Dupaix-Lasseur. M. Th. Gavaille, J. Melcion, and R. Giabicani. Trav. lab. microbiol. fac. pharm. Nancy 13, 224-83(1942-44). (In French).

Agar plates inoculated with Ra, Rb, and S types of *Bacillus aurantiacus* Tingitanius, Ra and S types of *B. prodigiosus* (*Serratia marcescens*), and Ra type of *B. lactis niger* were exposed to γ rays of Ra for 16-95 hr, to x rays for 20-60 min and to ultraviolet rays for 2-40 min. Ultraviolet rays were more bactericidal than

others studied. Exposure for 55-65 hr to γ rays was required to produce bactericidal effect (varied with species). With x rays, number of cells killed increased with distance between culture plate and source. None of the radiations produced a permanent change in bacterial type. Observed effects were altered to ionization and variation in effectiveness of the radiations was attributed to differences in absorption. BA 20-976

4747
REVIEW OF IRRADIATION EFFECT ON CELLS AND TISSUES OF THE SKIN. W. F. Harvey. Edinburgh Med. J. 49(9), 529-52(1942).

Damaging effects of x rays and radium emanation on cells and tissues of skin are reviewed. A section on blood vascular system is included. Bibliography given. BA 20-2318

4748
DEGENERATIVE EFFECTS OF LARGE DOSES OF ROENTGEN RAYS ON THE HUMAN BRAIN. T. J. Wachowski and H. Chenault. Radiology 45(3), 227-46(1945).

Case reports of six patients showing definite symptoms of brain damage following intensive x irradiation for brain tumors are presented. Total tumor doses varied between 6150 r in 32 days and 8809 r in 106 days. Cytological and histological changes are also described. BA 20-2319

4749
INDUSTRIAL HYGIENE. Irving R. Tabershaw. New Engl. J. Med. 233(15), 437-43(1945).

A review which considers the following topics: pneumoconiosis, Al therapy and prophylaxis in silicosis, industrial poisons, physical hazards, radioactive substances and dermatitis. BA 20-2832

4750
THE INFLUENCE OF SUBSTRATE ON THE VARIATION OF BR. BRONCHISEPTICA. Lois Dickinson. J. Pathol. Bacteriol. 57(3), 285-94(1945).

The production of a stable, nonpathogenic variant of Brucella bronchiseptica which can be completely suppressed by NaCl concentrations below 0.02 M or cis-acids is described. Monovalent anions and x radiation induced the variant, which then rapidly outgrew the parent form. BA 20-2966

4751
ACTION OF COLD OR REPAIR OF RADIOLESIONS IN A YEAST AND IN A BACTERIUM. Raymond Latarjet. Compt. rend. 217, 186-88(1943). (In French).

Saccharomyces ellipsoideus kept at 5°C remains metabolically active and able to inhibit x-ray damage. In Bacillus "paradysenteriae Y" at 5°C the primary lesions remains latent and develops on rise of temperature. Response of yeast resembles that of Ascaris ova described in Radiology 32, 289(1939). BA 20-3813

4752
X-RAY INDUCED MUTATIONS IN THE PHYSIOLOGY OF OPHIOTOMA. N. Fries. Nature 155(3947), 757-8 (1945).

X-rays induced twelve physiological mutations (strains) in the fungus O. multiannulatum. Physiological properties were heritable. BA 20-2166

4753
IRRADIATION EFFECTS ON GENETIC RESISTANCE OF MICE TO MOUSE TYPHOID. John W. Gowen and M. R. Zelle. J. Infectious Diseases 77(2), 85-91(1945).

Resistance of mice to Salmonella typhimurium decreases exponentially with increased x-ray dosage. Rate of the decrease per r is small and is similar for six strains of mice studied, although the strains vary greatly in their natural resistance to mouse typhoid. Authors consider the possibility that decrease in resistance may be related to decrease in leukocytes. BA 20-4315

4754
DIFFERENCES IN SENSITIVITY, HATCHABILITY CURVES, AND CYTOLOGICAL EFFECTS BETWEEN HABROBRACON EGGS X-RAYED IN FIRST MEIOTIC PROPHASE AND METAPHASE. Anna R. Whiting. Biol. Bull. 89(2), 191(1945).

Abstract. BA 20-4320

4755
ROENTGEN RADIATIONS IN BIOLOGICAL RESEARCH. Ch. Packard. Radiology 45(5), 522-33(1945).

Historical review of various phases in study of biologic effect of x rays and principal results of experimental studies are presented. BA 20-4453

4756
EFFECT OF X-RAYS ON THE TRANSMISSIBILITY OF FOWL SARCOMA IN ITS NON-FILTERABLE PHASE. B. Miszurski, M. Piekowski, G. Goldhaber, and I. Doljanski. Cancer Research 5(7), 422-5(1945).

Five of ten slowly-growing Rous fowl sarcomas were found to be nontransmissible. After irradiation with doses lethal for sarcoma cells, but harmless to causative agent, three of the five tumors could be transmitted, two could not. BA 20-4869

4757
INCREASED PARASITEMIA IN CHICKEN MALARIA (PLASMODIUM GALLINACEUM AND PLASMODIUM LOPHURAE) FOLLOWING X-IRRADIATION. William H. Talaferro, Lucy Graves Talaferro, and Eric L. Simmons. J. Infectious Diseases 77(2), 158-76(1945).

Irradiation induced increased parasitemia in both avian malaras but affected different periods of the two infections. Effectiveness of given x-ray dose varied with age and susceptibility of chicken, species of parasite, period of infection; extent of infection at time of irradiation. Role of lymphocyte destruction in resistance is discussed. BA 20-5886

4758
INFLUENCE OF BIOLOGICAL FACTORS ON THE FORM OF ROENTGEN-RAY SURVIVAL CURVES. EXPERIMENTS ON PARAMECIUM CAUDATUM. A. Back and L. Halberstaedter. Am. J. Roentgenol. Radium Therapy 54(3), 290-5(1945).

X-ray exposure (35 kv, Cu target, Al foil window in roentgen-ray tube) at 90,000 r/min stops all motility within 10-15 min after irradiation. Dose varies between 200,000 and 700,000 r for families, but for any particular family, all individuals died at same dose when immediate descendants were studied. In case of remote descendants (clones) variation among families was the same but individuals within clone died at different doses. BA 20-5945

4759
NEUROSPORA. II. METHODS OF PRODUCING AND DETECTING MUTATIONS CONCERNED WITH NUTRITIONAL REQUIREMENTS. G. W. Beadle and E. L. Tatum. Am. J. Botany 32(10), 678-86(1945).

Among 68,198 single-spore strains of N. crassa and N. sitophila derived from material treated with x rays, ultraviolet radiation or neutrons, more than 380 strains were obtained with altered nutritional requirements for B-vitamins, amino acids, or purine and pyrimidine bases. Genetic study proves that many of these differ by single genes from wild type. One gene-one enzyme relationship is discussed. BA 20-6177

4760
EFFECT OF ROENTGEN RAYS ON BONE GROWTH IN PIGEONS. Leon J. Cole. J. Exptl. Zool. 100(3), 487-95 (1945).

Irradiation of right wings of 1-15 day-old birds caused shortening of bones (most marked in birds exposed at 1-3 days) but affected bones were not different in proportions from those of untreated left wing. Dose of

750 r produced no observable effects; 1000 r, 1500 r, and 2000 r were increasingly effective. Results suggest initial retardation after irradiation and subsequent growth at a normal rate rather than any specific nuclear change in cells which survive and resume division. BA 20-6303

4761

STUDIES ON THE EFFECTS OF X-RAYS ON PHAGOCYtic INDICES OF HEALTHY RABBITS. A PRELIMINARY REPORT. John C. Glenn, Jr. *J. Immunol.* 52(1), 65-9(1946).

Effect of variation in kilovoltage from 90 to 400 (at 100 r) was studied in 4 groups of 4 rabbits each; 2 rabbits used as controls. The effect, studied by measuring phagocytic indices on a strain of hemolytic *Staph. aureus*, was not significantly different except in one group treated with 100 r at 140 kv where a significant rise of phagocytic indices in all animals was observed 48-96 hr following irradiation. BA 20-8542

4762

AN ATTEMPT AT A SYNTHESIS OF THE PHYSIOLOGICAL AND CYTOLOGICAL CONCEPTS OF THE GENE. J. A. Serra. *Bol. soc. Broteriana* 19(2a ser. Pt. I), 327-69 (1944).

Generalizing with respect to the localization of factors in chromomeres, author postulates the existence of active zones and linking zones, extending type of organization visible in salivary chromosomes to elementary chromomeres, or to genes. Effects of a hit in radiated material are discussed in relation to this hypothesis, as are origins of position effects and gross chromosome rearrangements. BA 20-9443

4763

EFFECT OF RADIUM EMANATIONS ON STERIGMATICYSTIS NIGRA. A. Sartory, R. Sartory, and B. Wurth. *Compt. Rend.* 218, 328-9(1944). (In French).

4764

PROTECTION AGAINST X-RAYS AND GAMMA RAYS. E. H. Quimby, R. S. Stone, P. S. Henshaw, R. B. Taft, G. C. Henry, G. Singer, and G. C. Lawrence. *Radiology* 46(1), 57-76(1946).

Topics include: tolerance dose or tolerance intensity, radiation injury, genetic injury; human factors, x-ray protection in industrial fluoroscopy, materials and methods of x-ray protection. The report was prepared for Standardization Committees of the Radiological Society of North America and the American Roentgen Ray Society. BA 20-9767

4765

SUPERFICIAL "BURNS" OF SKIN AND EYES FROM SCATTERED CATHODE RAYS. L. L. Robbins, J. C. Aub, O. Cope, D. G. Cogan, J. L. Langohr, R. W. Cloud and O. E. Merrill. *Radiology* 46(1), 1-23(1946).

"Burns" following few seconds exposure to scattered cathode rays from 1200 kv electrostatic generator are described (six men). BA 20-9768

4766

A COMPARISON OF TWO LEVELS OF ROENTGEN AND NEUTRON IRRADIATION ON NORMAL AND LYMPHOMATOUS MICE, USING RADIOPHOSPHORUS AS AN INDICATOR OF CELLULAR ACTIVITY. K. G. Scott. *Radiology* 46(2), 173-5(1946).

Neutrons and x rays depress phosphorous uptake of lymphomatous tissue in mice as measured by radio-phosphorus. Technique is useful as another method for study of effects of radiations on normal and neoplastic tissues. BA 20-9769

4767

RADIATION SICKNESS IN NAGASAKI. PRELIMINARY REPORT. Joseph J. Timmes. *U. S. Naval Med. Bull.* 46(2), 219-24(1946).

Some of effects observed and described; skin burns, alopecia, aplastic anemia, agranulocytosis, loss of platelets, petechiae, gross haemorrhage, and oral damage. BA 20-9770

4768

MOTHERLESS MALES FROM IRRADIATED EGGS. Anna R. Whiting. *Science* 103(2669), 219-20(1946).

Unmated females of an inbred wild type stock of *Habrobracon* were heavily x rayed, then mated to untreated males with recessive mutant traits. Progeny included, among expected wild type males and females, a few males normal in structure and behavior and with recessive mutant traits. Breeding tests showed that their gonads were also paternal in origin. Their normal fertility was proof of their haploidy. BA 20-9496

4769

EFFECT OF RADON-CONTAINING OINTMENT ON CUTANEOUS LYMPH FLOW AND MINUTE VESSELS OF THE SKIN. J. Q. Griffith, Jr., E. P. Pendergrass, C. R. Perryman, and J. Hooker. *Proc. Soc. Exptl. Biol. Med.* 61(1), 70-2(1946).

Results of studies on men and rats suggest that Rn ointment produces active hyperemia and increases lymph formation and lymph flow without increasing capillary permeability to colloids. Therapeutic effect of ointment may be apparent in cases where lymph flow is diminished. Other evidence suggests that lymph flow is diminished in a limb previously exposed to excessive x radiation. BA 20-9810

4770

INDUCED MUTATIONS AND POSSIBLE MECHANISMS OF THE TRANSMISSION OF HEREDITY IN ESCHERICHIA COLI. M. Demerec. *Proc. Natl. Acad. Sci. U. S.* 32(2), 36-46(1946).

Rate of mutation from sensitivity to resistance to bacteriophage T₁ in B strain (radioresistant) of *E. coli* was measured after x irradiation with 10,000-50,000 r. Mutation rates increased initially but returned to normal within 13 generations. Increase in mutation rate was higher with higher doses BA 20-11736

4771

MUTATION OF ASPERGILLUS NIGER VAN TIEGHEM BY MEANS OF SOFT X-RAYS. Violet M. Diller, Alfred A. Tytell, and H. Kersten. *J. Bacteriol.* 51(3), 404(1946).

Abstract describes a mutant form differing from the parent strain in appearance, growth and metabolism BA 20-11737

4772

THE INFLUENCE OF SEED SIZE AND HULLS ON X-RAY SUSCEPTIBILITY IN CEREALS. K. Froier and A. Gustafsson. *Hereditas* 30(4), 583-9(1944).

Increase in seed size caused better germination and more vigorous growth postexposure except following the highest dose used. Hull covering in barley and oats makes seeds more radioresistant. BA 20-11742

4773

GENES AND THE CHEMISTRY OF THE ORGANISM. G. W. Beadle. *Am. Scientist* 34(1), 31-53, 76(1946).

Genes can be inactivated (in *Neurospora crassa*, an organism favorable for genic and biochemical analysis) by treatment with x rays, ultraviolet radiation, and neutrons. The experimental method is described by which it can be ascertained that strains modified by such treatment usually differ from normal strain by one unit of inheritance. BA 20-14668

4774

GENETICAL STUDIES ON THE CHLOROPHYLL APPARATUS IN OATS AND WHEAT. K. Froier. *Hereditas* 32, 297-406 (1946).

Dry seeds of oat and wheat diploids exposed to low-medium x-ray dosages develop a great number of chlorophyll mutations. Exposure of hexaploid oats and wheat varieties yields very high chlorophyll mutation frequency in oats, no such mutations in wheat which produced speltoids and compactoids. BA 20-14672

4775

DRASTIC MORPHOLOGY MUTATIONS IN BARLEY.

A. Gustafsson. *Hereditas* 32, 120-2(1946).

Three groups of morphological mutations in barley, artificially induced, required differences in irradiation for their induction. Highly intense x-ray action was required to produce drastic mutations (profoundly altered flower and spikelet structure). The more drastic a mutation, the lower its yield production. BA 20-14674

4776

TRANSLOCATIONS IN *SCIARA*. THEIR BEARING ON CHROMOSOME BEHAVIOR AND SEX DETERMINATION.

H. V. Crouse. *Res. Bull. Missouri Agr. Expt. Sta.* 379, 1-75(1943).

X-irradiation of mature sperm with 5000-6500 r yielded: 4 translocations involving X chromosome of *S. reynoldsi*, 5 involving X chromosome of *S. coprophila*, and 5 involving autosomes of *S. coprophila*. BA 20-14700

4777

SOME EFFECTS OF X-RAYS ON DEVELOPMENT IN *DROSOPHILA*. Claude A. Villee. *J. Exptl. Zool.* 101(2), 261-80(1946).

Drosophila larvae, prepupae and pupae of 11 genotypes and a variety of ages were irradiated with 1096-7000 r at different intensities. Phenocopies produced varied with age of fly, stock, and intensity and total dose of irradiation. Pupation was retarded by all but smallest doses, high intensity radiation (5540 r/min) caused much higher lethality than lower intensity radiation (78 r/min). Waddington's concept of an indirect action of x rays is discussed. BA 20-14715

4778

THE PRIMARY BIOLOGIC EFFECT OF RADIATIONS AND THE STRUCTURE OF MICROORGANISMS. Raymond Latarjet. *Rev. canadienne biol.* 5(1), 9-47(1946). (In French).

Author states that the primary effect of radiation on cell or microorganism is to initiate a chain reaction leading to **observable injury**. Photochemical event affects limited number of molecules. Effects in yeast, bacteria virus, and bacteriophages are described, with reference to the amount of energy required to produce chemical change. BA 20-14901

4779

SOME PROSPECTIVE MEDICAL USES OF ATOMIC ENERGY.

Wm. F. Bale. *J. Am. Pharm. Assoc. Pract. Pharm. Ed* 7(3), 81-2(1946). BA 20-14904

4780

THE EFFECT OF ROENTGEN THERAPY ON EXPERIMENTAL VIRUS PNEUMONIA I. ON FELINE VIRUS PNEUMONIA.

G. J. Baylin, I. N. Dubin, and W. G. Gobbel, Jr. *Am. J. Roentgenol. Radium Therapy* 55(4), 473-7(1946).

Control animals infected with feline virus pneumonia were acutely ill for an average of 10.3 days, while infected animals treated with x rays 25 hr after onset of symptoms were sick only 5 days. Similar x-ray therapy given 48 hr after initial appearance of symptoms had no appreciable influence upon course of disease. No differences were seen in tissues of control and test animals. BA 20-14905

4781

EARLY CHANGES INDUCED IN PURKINJE CELLS OF RABBIT BY SINGLE MASSIVE DOSES OF ROENTGEN RAYS. Berry Campbell, Stanley C. Peterson, and Rosalind Novick. *Proc. Soc. Exptl. Biol. Med.* 61(4), 353-5(1946).

Immediate and severe changes seen in Purkinje cells of cerebellum after doses of 1000-4000 r include: chromatolysis, vacuolization, appearance of clear marginal zone. Changes were transient and were replaced within 24 hr by pyknosis and neuronophagia. BA 20-14906

4782

THE EFFECT OF ROENTGEN THERAPY ON EXPERIMENTAL VIRUS PNEUMONIA. II. ON PNEUMONIA PRODUCED IN WHITE MICE BY SWINE INFLUENZA VIRUS. I. N. Dubin, G. J. Baylin, and W. G. Gobbel, Jr. *Am. J. Roentgenol. Radium Therapy* 55(4), 478-81(1946).

X-ray therapy instituted 24 hr after inoculation of mice with swine influenza virus had no effect upon mortality of this disease. Similar therapy given 48 hr before infection of animal produced significant (1/3) decrease in mortality. BA 20-14907

4783

STUDIES ON THE EFFECTS OF RADIOACTIVE SODIUM AND OF ROENTGEN RAYS ON NORMAL AND LEUKEMIA MICE. T. C. Evans and Edith H. Qumbly. *Am. J. Roentgenol. Radium Therapy* 55(1), 55-66(1946).

Radioactive Na and whole body x rays were equally effective in reducing white and red blood counts and in shortening life. Mice with enlarged nodes and extremely high leukocyte counts were especially sensitive to radio-sodium. Marked response was apparently due to radio-sensitivity of abnormal leukocytes rather than to any selective concentration of material in lymph nodes. BA 20-14908

4784

THE HISTOLOGIC EFFECTS OF RADIOPHOSPHORUS ON NORMAL AND LYMPHOMATOUS MICE. W. S. Graff, K. G. Scott, and J. H. Lawrence. *Am. J. Roentgenol. Radium Therapy* 55(1), 44-54(1946).

Characteristic radiation effects on hematopoietic tissues were observed. There was no evidence of increased radiosensitivity of neoplastic cells. Limiting factors in use of x rays and P³² in leukemia therapy are discussed. BA 20-14909

4785

THE COAGULOGRAM AS A CRITICAL INDICATOR OF IRRADIATION EFFECT. J. Kaufmann. *Am. J. Roentgenol. Radium Therapy* 55(4), 464-72(1946).

Coagulogram, which includes: platelet count, bleeding time, clot retraction, prothrombin time, fibrin time, and complete coagulation, appears to be most important in revealing early changes due to irradiation. Fibrin, prothrombin, and coagulation times are reportedly lengthened before changes appear in red or white cell count. BA 20-14910

4786

TIME COURSE OF CHANGES IN SENSORY CELLS OF TRIGEMINAL GANGLION OF THE RABBIT FOLLOWING IRRADIATION. Rosalind Novick. *Proc. Soc. Exptl. Biol. Med.* 61(4), 355-8(1946).

In series of rabbits irradiated in head with single dose of 3000 r, examination of Nissl-stained trigeminal ganglion cells reveals injury which may be separable, by time course, into three histological phases which are described. BA 20-14911

4787

STUDIES ON ROENTGEN DEATH IN MICE. I. SURVIVAL TIME AND DOSAGE. H. Quastler. *Am. J. Roentgenol. Radium Therapy* 54(5), 449-56(1945).

Mice weighing 20 g were irradiated with high voltage x rays of 200-25,000 r, irradiation was uniform throughout body. Reactions were classified as subacute (200-600r), acute (1175-12,000r), hyperacute (12,000-25,000r). Survival time was used as quantitative measure of irradiation effect and simple mathematical formulae for survival time-dosage relations are given. BA 20-14912

4788

STUDIES ON ROENTGEN DEATH IN MICE. II. BODY WEIGHT AND SENSITIVITY. H. Quastler. Am. J. Roentgenol. Radium Therapy 54(5), 457-61(1945).

Survival time after administration of definite dose of x rays to mice of same age is proportional to weight, provided this time is between 11 1/4 and 3 1/3 days. Infant mice survive longer than adults after the same dosage. BA 20-14913

4789

BIOLOGICAL EVALUATION OF 20 MILLION VOLT ROENTGEN RAYS. L. ACUTE ROENTGEN DEATH IN MICE. Henry Quastler and Robert K. Clark. Am. J. Roentgenol. Radium Therapy 54(6), 723-8(1945).

Effects of twenty million volt x rays (produced by betatron) and those produced by 200 kv x rays on mice are qualitatively the same. Quantitative comparison was made using Victoreen r-meter as physical measure, and survival time of mice postirradiation as biological measure. One r of 20 million volt rays were found to be equivalent to about 0.78 r of 200 kv rays. BA 20-14914

4790

THE EFFECT OF X-RAYS ON THE SURVIVAL OF CELLS. STUDIES IN VITRO ON CELLULAR PHYSIOLOGY. R. Schrek. Radiology 46(4), 395-410(1946).

Cellular suspensions from thymus, spleen, bone marrow, and testes (rabbits), and leukocytes of normal and leukemic human blood were exposed to 20-5000 r x rays (250 kv, 10 ma, 50 cm distance, 1 mm Al filter, 120 r/min, HVL 0.7 Cu) and examined periodically by unstained cell counts and dry smears. Rapid decrease in unstained thymus and spleen cells began about 3 hr after 1000 r; irradiated normal and leukemic leukocytes had shortened survival time. BA 20-14915

4791

DETERMINATION OF THE EFFECT OF IRRADIATION BY X-RAY ON P-AMINOBENZOIC ACID, USING CLOSTRIDIUM ACETOBUTYLICUM FOR ASSAY. Ivan C. C. Tchaperoff. Can. J. Research 24E, 49-54(1946).

As determined by assay with *C. acetobutylicum*, p-aminobenzoic acid in concentration of 1×10^{-4} g/ml is inactivated by x-ray dose of 50 r at 190 kv. Significance of this inactivation in connection with treatment of infective lesions is discussed. BA 20-15091

4792

THE ACTION OF TOXINS ON CELLS IN DIVISION. Paul Senten. Montpellier, Imp. Causse. 252p. 1941. (In French).

Combined x rays (300 r) and colchicine (0.001%) were tested on Bufo tadpoles. Radiation banished prophase and accelerated degeneration of blocked premetaphases. Another section describes an ulcerated pigmented epithelioma injected three times in 48 hr with colchicine 0.005 g/ml oil, then irradiated. Primary neoplasm healed, but cutaneous metastases developed. Three injections into an abdominal metastasis of an ovarian neoplasm blocked mitosis; regression followed radiation therapy BA 20-15424

4793

THE BACTERIOSTATIC ACTION OF IONIZING IRRADIATION AS SHOWN BY RESPIRATORY STUDIES. P. Bonet-Maury, R. Perault, and M. C. Erichsen. Ann. inst. Pasteur 69, 189-92(1943). (In French).

Studies on the effect of radon emanations on suspensions of *E. coli* indicated that, within certain limits of suitably arranged irradiation doses, it was possible to prepare bacterial suspensions in which respiratory O_2 consumption remained unaffected while the power of bacterial multiplication was destroyed. BA 20-15617

4794

INHERITED DIFFERENCES IN SENSITIVITY TO RADIATION

IN *ESCHERICHIA COLI*. E. M. Witkin. Proc. Natl. Acad. Sci. U. S. 32(3), 59-68(1946).

Strain B of *E. coli* yields variants resistant to both ultraviolet and x rays, detectable by selective action of these radiations. Resistance is a stable heritable character. Number of resistant bacteria in normal cultures determined after irradiation with 50 ergs/mm. This permits 100% survival of resistant organisms. Subsequent incubation (3 hr) and re-exposure (700 ergs/mm) gives one visible colony for each resistant individual. BA 20-15636

4795

SUMMATION EXPERIMENTS WITH U. -V. AND X-RAYS ON *V. FABA EQUINA*. Vincenz Rosli. Univ. Berne, Dissertation. 15 p. 1942. (In German). BA 20-16207

4796

THE INFLUENCE OF X-RAYS ON THE GROWTH OF *V. FABA EQUINA*. Anton Salzmann. Univ. Berne, Dissertation. 15p. 1942. (In German). BA 20-16208

4797

THE ACTION OF X-RAYS ON THE CYTOPLASM OF VEGETATIVE PLANT CELLS. Hans Wanner. Schweiz. Z. Pathol. u. Bakteriologie 8(suppl.) (1945). (In German).

Author describes irradiation-induced changes in cytoplasm. First changes are vacuolation, morphological changes of mitochondria, sudden decrease of cytoplasmic viscosity (reversible). Water uptake of entire plant is accelerated by irradiation. Retarding effect of intense irradiation on melanin formation of cultured potato tissue is also mentioned. BA 20-16210

4798

RADIATION AND MUTATIONS. E. Guyenot. Arch. Julius Klaus-Stift. 20(3/4), 431-42(1945). (In French).

General review and discussion of radiation-induced mutation. BA 20-16661

4799

A PRELIMINARY NOTE ON THE X-RAY MUTANTS OF PUSA (52) WHEAT. Shri Ranjan. Proc. Indian Acad. Sci. 12A, 62-6(1940).

Of eleven mutant types produced by x-ray treatment of young Pusa (52) wheat seedlings, four are awned and the rest awnless—the degree of awnlessness varying from short to no awns. Spikes of mutants, in first yr are much smaller than those of Pusa(52). Spikes of all eleven mutant types show much greater length in next generation. BA 20-16672

4800

QUANTITATIVE HISTOLOGICAL ANALYSIS OF RADIATION-EFFECTS IN HUMAN CARCINOMATA. Alfred Glucksmann. Brit. Med. Bull. 4(1), 26-30(1946).

As radiation continues, number of viable resting and mitotic cells decreases, and non-viable differentiating and degenerating cells may increase if radiation therapy is effective. BA 20-17492

4801

BACTERIAL NUCLEI. ELECTRON MICROSCOPE OBSERVATIONS AND BIOPHYSICAL ANALYSES WITH X-RAYS IN *ESCHERICHIA COLI*. L. Cavalli. Atti ist. botan. "Giovanni Briosi" e lab. crittogam univ. Pavia 6V(1), 5-25(1945).

Analysis of lethal action of x rays on *E. coli* is presented along with following conclusions: (1) death of bacteria (all ages) is due to hitting single vulnerable point, (2) target volume is smaller in old than in young bacteria. BA 20-17777

4802

PENICILLIN PRODUCTION BY A SUPERIOR STRAIN OF MOLD. Marvin J. Johnson, J. J. Stefaniak, F. B. Gailey, and B. H. Olson. Science 103(2678), 504-5(1946).

Several penicillin-producing mold cultures were tested. X-ray mutant strains of *Penicillium chrysogenum* (Culture

No. X-1612) were found to produce yield greatly in excess of that produced by normal strain (Culture No. 1951-B25). Yield was greatly influenced by nutrition, aeration, and agitation. Yield was a function of corn steep liquor level used in presence of excess lactose. BA 20-18107

4803

THE EFFECT OF BETA RADIATION ON THE PRODUCTION OF PENICILLIN. M. W. Jennison and J. W. Irvine, Jr. J. Bacteriol. 51(5), 598(1946).

Beta radiation from P^{32} inhibited penicillin production by the fungus in culture as judged by standard assay procedures. In submerged cultures, activity of about 100 $\mu\text{C}/\text{ml}$ of medium was required to reduce the amount of penicillin significantly. BA 20-18106

4804

THE EFFECTS OF COLCHICINE AND ACENAPHTHENE IN COMBINATION WITH X RAYS ON PLANT TISSUE.

Michael Levine. Bull. Torrey Botan. Club 72(6), 563-74 (1945), 73(1): 34-59; (2), 167-83(1946).

Author describes studies on root tips of Allium cepa. Colchicine was used as 0.01% solution; x-rays in 900, 1500, or 3000 r dose. X-radiation (all doses) impaired growth; recovery time was shorter than that after combined x-ray chochine treatment. Combination of acenaphthene and x rays gave results similar to those with x rays alone. BA 20-18598

4805

A COMPARISON OF THE EFFECTS OF HEAT AND X-RAYS ON DORMANT SEEDS OF CEREALS WITH SPECIAL REFERENCE TO POLYPOIDY. Luther Smith. J. Agr. Research 73(4), 137-58(1946).

Tolerance to x rays increased with number of chromosomes in diploid, tetraploid, and hexaploid species of wheat and oats; in diploid and autotetraploid barley maize, and rye; and in Aegilops uniaristata and an amphidiploid hybrid of A. uniaristata and diploid wheat. Frequency of bridges in root tips, number of translocations, and frequency of mutations were increased by x raying. BA 20-19301

4806

CHANGES IN THE BLOOD VESSELS AFTER INTRAVENOUS INJECTION OF THORIUM DIOXIDE (THOROTRAST). L. Efskind. Acta Chir. Scand. 84, 177-86(1941).

Thorotrast (3 ml) was injected in ear vein of rabbits. Histological examination made 1-160 days later revealed deposits of thorotrast in vessel walls which had been epithelialized and had caused wide-spread degeneration in elastic tissue. Thorotrast was not phagocytized by vascular epithelium. No pathologic cell division was observed in vessels. BA 20-19881

4807

LOCALIZED CHANGES AFTER INTRAPERITONEAL INJECTION OF THORIUM DIOXIDE (THOROTRAST). L. Efskind. Acta Chir. Scand. 84, 79-95(1941). (In German).

Histological study made at intervals up to six months after intraperitoneal injection of thorotrast showed slow absorption of material via lymph channels; most of it was deposited locally. Degenerative changes which develop, reaching maximum at 8-12 wk, are similar to changes after x irradiation. BA 20-19949

4808

THE EFFECT OF GAMMA RADIATION UPON MIMOSA PUDICA L. A. Lima-de-Faria. Portugaliae Acta Biol. 1A(2), 95-109(1945).

Large gamma ray dose inhibits seismonastic movements of M. pudica leaves during period of 2-10 days. Author concludes that inhibitory power of radiation is inversely proportional to the wave length. BA 20-21107

4809

RECTAL PATHOLOGY DUE TO RADIATION. J. C. Ahumada and Raul M. Chevalier. Rev. asoc. med. argentina 57(505/506), 86-91(1943). (In Spanish).

Twenty cases with rectal lesions following Ra therapy of uterus are summarized. BA 18-4362

4810

X-IRRADIATION OF RABBIT SPERMATOZOA IN VITRO. E. C. Amoroso and A. S. Parkes. Nature 152(3852), 244 (1943).

Rabbits injected with gonadotrophin to produce superovulation were artificially inseminated with x irradiated semen and subsequently killed. Tubal or uterine contents were examined 40 hr, 9 days, or 28 days after ovulation. Doses: 50-100,000 r. Irradiated sperm penetrated eggs at all doses. Doses over 1000 r prevented implantation. At 100,000 r polar bodies formed and sperm pronuclei migrated to, but did not fuse with egg pronuclei. BA 18-6041

4811

SAFE HEALTH PRACTICES IN THE USE AND HANDLING OF RADIOACTIVE LUMINOUS PAINTS. Anonymous. Publ. Massachusetts Dept. Labor and Indust. Div. Indust. Hyg. 290, 1-8(1942).

Various requirements applying to factories in Massachusetts in which radioactive luminous compounds are stored or applied are summarized. Included are: qualifications of employees, allowable exposure to radon and γ rays, protective clothing, personal hygiene, plant operating rules, general and equipment requirements, ventilation, and lighting. BA 18-8657

4812

RADIO-ACTIVE ELEMENTS FOR CANCER. Anonymous. Science and Culture (India) 10(1), 46(1944).

Treatment of 100 patients with combinations of x rays, radio-active phosphorus and iodine, etc., resulted in definite improvement in cases of leukemia, lymphosarcoma, plasma cell myeloma, Hodgkin's disease and polycythemia vera. Certain tissues are susceptible to specific substances. Radioactive Zn is deposited in pancreas, S in skin, and Sr in bone cortex. BA 19-2751

4813

DIFFERENCES BETWEEN DISSOCIANTS OF LACTOBACILLI. F. W. Barber and W. C. Frazier. J. Bacteriol. 47(5), 418(1944).

Dissociation was induced in Lactobacillus bulgaricus, L. helveticus, and L. lactis by variations of time, temperature and medium for growth and by ultraviolet and x-ray irradiation. Fuzzy (R), disc (S), and intermediates were studied. BA 18-13700

4814

STUDIES ON THE INDIRECT EFFECT OF ROENTGEN RAYS IN SINGLE AND PARABIOTIC MICE. W. A. Barnes and O. B. Furth. Am. J. Roentgenol. Radium Therapy 49(5), 662-81(1943).

Two of four mice in each group were joined in parabiosis. In 2-4 wk one single mouse and one twin were irradiated with 300-6000 r of 200 kv lightly filtered x rays, other twin and single mouse were shielded. Slight leukopenia occurred in shielded parabiont after exposure of twin to 800-1000 r. Leukopenia was less severe in irradiated parabiont than in irradiated single animal. BA 18-221

4815

MALIGNANCY IN RELATION TO ORGANIZATION AND DIFFERENTIATION. N. J. Berrill. Physiol. Rev. 23(2), 101-23(1943).

In reference to "tumor induction," the following agents for inducing tumors are discussed in relation to protein synthesis, cell division (cytology and surface conditions), and organizing forces: radium, x ray, ultraviolet, polycyclic hydrocarbons, sex hormones, tumor extracts, butter yellow, arsenic, and viruses. BA 18-880

4816

THE INFLUENCE OF IRRADIATION OF THE OVARIES

UPON ESTRUS AND NEOPLASTIC DEVELOPMENT IN MARSH-BUFFALO MICE. F. Bischoff, H. J. Ullmann, and L. P. Ingraham. *Radiology* 43(1), 55-8(1944).

Groups of 40 Marsh-Buffalo mice received x-ray doses of 200 or 400 r (HVL 1.15 mm Cu) over ovaries following establishment of vaginal canalisation. Lower dose reduced estrus markedly, higher dose suppressed it entirely. Recovery is described, X-ray effect on incidence of adenocarcinoma of breast and incidence of lymphoid tumors was also studied. BA 18-18745

4817

EFFECT OF X-RAY IRRADIATION UPON BACTERIAL TOXEMIA IN RABBITS. J. D. Birgard, H. B. Hunt, and R. H. Dickinson. *Radiology* 43(4), 330-2(1944).

Doses of 100 r/air were administered to 24 rabbits (140 kv, 15 ma, 3 mm Al and 0.5 mm Cu and 1 mm Al filtration, 50 cm distance, intensity 20 r/mm). Either chest or extremities were exposed, rest of body lead-shielded. Minimal lethal dose of diphtheria toxin or hemolytic *E. coli* was given 48 hr post exposure. All untreated controls died within 48 hr after injection while irradiated animals injected with diphtheria toxin survived and 9 of 12 injected with *E. coli* toxin lived. Minimal protective dose was 20 r/in air. Authors conclude that irradiation causes the release of a non-specific antitoxin from tissues, regardless of specific body region irradiated. BA 19-3008

4818

FURTHER RADIATION EXPERIMENTS WITH *VICIA FABA EQUINA*, WITH SPECIAL REGARD FOR THE TIME FACTOR. Karl Bolken. Berne, Dissertation. 1941. 25p. (In German). BA 19-20935

4819

THEORIES ON THE EFFECTIVENESS OF ROENTGEN THERAPY IN INFLAMMATORY CONDITIONS. J. Borak. *Radiology* 42, 249-54(1944).

X-ray induced dilation of capillaries is called a "heat-like" effect, narrowing of arterioles, a "cold-like" effect. Author believes x irradiation embodies properties of both physical agents, heat and cold, known to be effective in treating inflammations. BA 18-13414

4820

THE EFFECT OF HEPARINIZATION ON EXPERIMENTAL POST-IRRADIATION TISSUE CHANGES IN THE LUNG. F. Boys and I. D. Harris. *Am. J. Roentgenol. Radium Therapy* 50(1), 1-8(1943).

Rabbits were heparinized to keep coagulation time above 20 min. Entire thorax was irradiated with a total dose of 4200-4900 r in 2 wk. Lung damage was less than in nonheparinized animals given same radiation dose BA 18-6097

4821

ALTERATION OF ERYTHROCYTE PERMEABILITY BY ROENTGEN RADIATION. Kasper Burgen. Berne, Dissertation. 1942. 15p. (In German). BA 19-21248

4822

THE PROBLEM OF CHROMOSOMAL FRAGMENTATION INDUCED BY X-RAYS, STUDIED IN *T. MONOCOCCUM*. A. Camara. *Agronomia Lusitana* 3(4), 341-59(1941).

Seeds of *T. monococcum* var. *vulgare* were x irradiated with 1000, 2000, or 3000 r (115 kv, 5 ma, 13.5 cm distance, 1 mm Al filter). Various types of chromosome fragmentation are described, measurements of fragments and altered chromosomes are presented. BA 18-9796

4823

CROSSING-OVER IN MALES OF *D. MELANOGASTER* INDUCED BY X-RAYS. A. Camara and Sarah de Vasconcellos. *Agronomia Lusitana* 3(3), 195-208(1941).

Dose of 242 r/min induced 26 verified cross-overs among 275 male res/+ pupae 2-3 days of age. Salivary

chromosomes of larvae, obtained by back-crossing to res/res were examined for transpositions of heterochromatic regions. Nearly 50 per cent of cross-overs in males were accompanied by transposition of heterochromatic material. BA 18-2032

4824

EFFECTS OF IONIZING RADIATIONS ON CHROMOSOMES. D. G. Catcheside. *Biol. Rev. Cambridge Phil. Soc.* 20(1), 14-28(1945).

Information about process of chromosome breakage and structural change in somatic chromosomes, especially of *Tradescantia*, is reviewed, effectiveness of x rays, α particles, and neutrons in producing such changes is discussed. BA 19-20917

4825

THE EFFECT OF IONIZATION DISTRIBUTION ON CHROMOSOME BREAKAGE BY X-RAYS. D. G. Catcheside and D. E. Lea. *J. Genetics* 45(2), 186-96(1943).

Chromatid breakage in pollen grain and pollen tube nuclei is maximal with x rays of 4.1 Å, falls off slowly with decreasing wave lengths of 1.5-0.15 Å and rapidly with increasing wave lengths up to 8.3 Å. This is interpreted as meaning that only densely ionizing tails of the electron tracks are effective in breaking chromosomes and only then if they completely traverse the chromosome. Since the electron track of Al-K radiation (8.3 Å) is shorter than a chromatid diameter, it is relatively ineffective. BA 18-9816

4826

EFFECTS OF TOTAL SURFACE BETA RADIATION. John R. Raper. *Radiology* 49, 314-24(1947).

Tumor induction was particularly striking in rats exposed to doses of 4000 and 5000 rep. All animals developed a great multiplicity of tumors.

4827

TISSUE CULTURE, A BIOLOGICAL MEANS OF EXPERIMENTATION. N. N. Das. *Science and Culture (India)* 9(4), 161-4(1943).

Use of tissue culture in studying action of x rays, neutrons, and Ra on living cells is described briefly. BA 18-13581

4828

FREQUENCY OF DOMINANT LETHALS INDUCED BY RADIATION IN SPERMS OF *DROSOPHILA MELANOGASTER*. M. Demerec and U. Fano. *Genetics* 29(4), 348-60(1944).

Frequency of dominant lethals is a function of radiation dosage, in agreement with Pontecorvo's concept of the origin of dominant lethals. Relationship between dosage and modification of the sex ratio, however, requires some modification of Pontecorvo's interpretation. Proportion of organisms dying during larval stage is approximately the same for different radiation treatments of parent males, and equal treatments are approximately equally effective in inducing dominant lethals in different stocks of flies. BA 18-18607

4829

RADIOBIOLOGICAL CONTRIBUTION TO THE STUDY OF THE OVARY. P. Desave. *Arch. biol. (Liege)* 51, 587-922(1940). (In French).

Disappearance or alteration of meiosis is the most typical x-ray lesion of the follicle maturation stages. BA 18-6333

4830

DELAYED LETHAL EFFECT OF X-RAYS ON FIBROBLASTS CULTIVATED IN VITRO. L. Doljanski and G. Goldhaber. *Proc. Soc. Exptl. Biol. Med.* 53(2), 114-16(1943).

Irradiation with; 3000 r does not produce permanent damage of cell cultures except for a few cultures which, after several passages show a normal growth rate. After 4000 r, 11 cultures succumbed in the course of

succeeding transfers, 6 cultures survived. Prolonged cultivation of cell colonies is impossible after 5000 r. Dose of 5000 r is considered to be minimal "delayed lethal dose" for chick fibroblasts. BA 18-222

4831

COMPARATIVE STUDIES ON THE RADIOSENSITIVITY OF NORMAL AND MALIGNANT CELLS IN CULTURE. II. THE DELAYED LETHAL EFFECT. L. Doljanski, G. Goldhaber, and L. Halberstaedter. *Cancer Research* 4(2), 106-9(1944).

Delayed lethal dose of x rays for rat sarcoma cells cultivated in vitro is 2000 r. This is less than half the equivalent dose for chicken normal fibroblasts, whose proliferative capacity is irreversibly checked only after irradiation with 5000 r. BA 18-10622

4832

EFFECT OF RADIOACTIVE ELEMENTS (RA) AND RARE EARTHS (TR) UPON YIELD AND RUBBER CONTENT OF KOK-SAGHYZ. A. A. Drobkov. *Compt. rend. acad. sci. URSS* 32(9), 667-8(1941). (In Russian).

Ra was more effective than rare earths in increasing root yield, but less effective in increasing rubber content. BA 18-17761

4833

THE EFFECT OF ROENTGEN RAYS, RADON AND RADIOACTIVE PHOSPHORUS ON THIAMIN CHLORIDE. C. E. Dunlap and F. C. Robbins. *Am. J. Roentgenol. Radium Therapy* 50(5), 641-7(1943).

Exposure to Rn and radioactive P in vitro partially destroyed activity of aqueous solutions of thiamin chloride as tested on *Phycomyces* and *Phytophthora*. Large x-ray doses had no effect. Heavy irradiation in vivo produced no detectable change in thiamin content of mouse blood or liver. BA 18-4184

4834

TRANSPLANTABLE OSTEOGENIC SARCOMAS INDUCED IN RATS BY FEEDING RADIUM. Charles E. Dunlap, Joseph C. Aub, Robert D. Evans, and Robert S. Harris. *Am. J. Pathol.* 20(1), 1-18(1944).

Osteogenic sarcomas appeared in vertebrae and pelvic bones in 9 of 13 rats after feeding each animal 100 γ of Ra. Induction time from Ra feeding to discovery of tumors averaged 365 days. In addition to osteogenic sarcomas, rats showed widespread necrosis of bone and atypical new bone formation. Bone marrow was hypoplastic and showed generalized immaturity and abnormal deposits of hemosiderin. BA 18-8589

4835

CHANGES INDUCED IN YEAST CELLS BY X-RAYS AND CHEMICAL SUBSTANCES. I. Hans von Euler, Lucie Ahlstrom, and Bertil Hogberg. *Hoppe-Seyler's Z. physiol. Chem.* 277(1/2), 1-17(1942). (In German).

Irradiation caused a decrease in reproduction rate of yeast cells and a decrease of 10-20% in nucleic acid in cells. BA 18-3066

4836

CHANGES INDUCED IN YEAST CELLS BY X-RAYS AND CHEMICAL SUBSTANCES. II. H. von Euler, Lucie Ahlstrom and Bertil Hogberg. *Hoppe-Seyler's Z. physiol. Chem.* 277(1/2), 18-25(1942). (In German).

This study to determine whether colchicine increases radiosensitivity of yeast cells yielded inconclusive results. BA 18-3067

4837

PROTECTION OF RADIUM DIAL WORKERS AND RADIOLOGISTS FROM INJURY BY RADIUM. Robley D. Evans. *J. Ind. Hyg. Toxicol.* 25(7), 253-69(1943).

A review including: real value of Rn determinations of expired air against alleged value of cytologic blood examinations of Ra dial painters; technique of obtaining

samples of respired air for analysis for radon; importance of inhalation of Ra-bearing dusts as a pathogenic factor; and the theory of practice of protective measures to be taken against poisoning by radioactive materials in industry. BA 18-999

4838

MODIFICATION OF RADIOSENSITIVITY OF THE SKIN. VI. EFFECTS OF COMPRESSION AND LOW TEMPERATURE ON THE ROENTGEN IRRADIATION REACTION OF HUMAN SKIN. T. C. Evans and H. D. Kerr. *Am. J. Roentgenol. Radium Therapy* 50(5), 629-35(1943).

Slight, variable decrease in radiation reaction was observed in cancer patients undergoing radiotherapy when area of exposure was chilled during treatment. BA 18-4185

4839

THE USE OF RADIO-ACTIVE TRACER ATOMS IN CHEMICAL AND BIOLOGICAL RESEARCH. F. Fairbrother. *Chemistry and Industry* 1945(9), 7(1945). BA 19-21221

4840

EXPERIMENTS ON MUTATIONS INDUCED BY NEUTRONS IN *DROSOPHILA MELANOGASTER* SPERMS. U. Fano. *Genetics* 29(4), 361-9(1944).

New measurement of frequency of neutron-induced dominant lethals is reported, but comparative efficiency of neutrons and x rays in producing various types of chromosomal change in *Drosophila* sperm is not satisfactorily elucidated thereby, according to author. BA 18-18609

4841

RADIOTHERAPY COMBINED WITH IODINE IN PULMONARY MYCOSIS. M. Finocchiaro. *Annali Paulistas med. e cir.* 46(1), 29-32(1943). (In Italian).

Combining iodine injections with radiotherapy increases the probability and rapidity of recovery from pulmonary conditions due to the presence of various types of mold infections. BA 18-13976

4842

THE EFFECTS OF ROENTGEN RAYS ON CELL-VIRUS ASSOCIATIONS. FINDINGS WITH VIRUS-INDUCED RABBIT PAPILLOMAS AND FIBROMAS. William F. Friedwald and Robert S. Anderson. *J. Exptl. Med.* 78(4), 285-304(1943).

Virus-induced papillomas of cottontail and domestic rabbits regress completely within a few weeks after a 5000 r x-ray dose. X-rays do not kill papilloma cells immediately, but lead to death by inhibiting cell division and producing pathological changes in cells which then continue to differentiate. Virus persists in undiminished amounts during regression. BA 18-2152

4843

ENHANCEMENT OF LEUKEMOGENIC ACTION OF METHYLCHOLANTHRENE BY PRE-IRRADIATION WITH X-RAYS. J. Furth and M. C. Boon. *Science* 98(2536), 138-9(1943).

Pre-irradiation of mice greatly enhanced the leukemogenic action of small doses of methylcholanthrene and hastened the onset of leukemia. X-rays alone were less leukemogenic than methylcholanthrene. BA 18-893

4844

THE EFFECT OF X-RAYS UPON THE ACTION OF A SPECIFIC GENE IN *DROSOPHILA MELANOGASTER*. Bentley Glass. *Genetics* 29(5), 436-46(1944).

Embryos, 10 hr old, of brown scarlet (bw; st) stock were exposed to 1000 r and maintained at 26°C. Of 221 flies emerging as adults, 94.1% had growth from center of one or both eyes, varying from mere protrusion in the central area to eruption of a palp-like structure bearing bristles; sometimes segmented. There was no such effect on other stock. Effect is due to semidominant gene in chromosome 3, and to semidominant gene in chromo-

some 2 of bw;st stock. One semidominant gene is suppressor of the other, x ray inactivates the suppressor. BA 18-20999

4845

FURTHER STUDIES ON THE EFFECT OF IRRADIATION ON PROLIFERATION AND METABOLIC PROCESSES OF NORMAL AND MALIGNANT TISSUES. IV. EFFECTS PRODUCED BY DIFFERENT DOSAGE RATES OF X-RAY RADIATION ON THE PROLIFERATION OF VARIOUS TISSUES GROWN IN VITRO. A. Goldfeder. Radiology 35(2), 210-28(1940).

Freshly excised fragments of (1) kidneys and (2) spleen of day old rats, (3) chick embryo hearts (7-8 days old), (4) mouse sarcoma 180, are x irradiated. Critical dosage (i.e. one permitting only limited recovery processes) using 936 r/min are (1) 90,000-95,000 r, (2) 50,000-60,000 r, (3) 140,000-160,000 r, (4) 50,000-60,000 r. Influence of time factor is discussed. Criteria for x-ray effect, latent period, extent of new growth and time of earliest cell degeneration. BA 18-223

4846

COMPARATIVE STUDIES ON THE RADIOSENSITIVITY OF NORMAL AND MALIGNANT CELLS IN CULTURE. III. FURTHER STUDIES ON THE INHIBITORY EFFECT OF X-RAYS ON CELL OUTGROWTH. G. Goldhaber, L. Doljanski, and L. Halberstaedter. Cancer Research 4(2), 110-12(1944).

Minimum x-ray dose causing appreciable inhibition of growth rate in an irradiated sarcoma cell culture is 500 r. The corresponding dose for normal chicken fibroblast is 2500 r. BA 18-10625

4847

GROSS EFFECTS OF BETA IRRADIATION ON RESTRICTED SURFACE OF RABBITS. IN: BIOLOGICAL EFFECTS OF EXTERNAL BETA RADIATION. (National Nuclear Energy Series IV. 22E). p. 42-62. Raymond E. Zirkle, ed. New York, McGraw Hill Book Co., Inc. 1951.

Skin tumors were induced in mice and rats, but not in guinea pigs or rabbits, by single sublethal surface doses of β rays. Effect was more striking in rats after doses of 4000 and 5000 rep. Tumors of virtually every known type were observed in the rats.

4848

METABOLIC CHANGES OCCURRING AS THE RESULT OF DEEP ROENTGEN THERAPY. I. THE EFFECT OF 200 KILOVOLT ROENTGEN THERAPY. Douglas Goldman. Am. J. Roentgenol. Radium Therapy 50(3), 381-91(1943).

N partition studies show some increase, during periods of x-ray therapy, in total and in uric acid N excretion, and in total acidity of urine, followed by retention of amino-acid N after irradiation was stopped. Definite relation between chloride metabolism and x-ray sickness is suggested. Creatinine and Ca excretion were unaffected by x irradiation. No specific radiation-induced changes were found in all patients. BA 18-4186

4849

TREATMENT OF CANCER BY FAST NEUTRONS. L. H. Gray and J. Read. Nature 152(3845), 53-4(1943).

Fast neutrons from 60-inch cyclotron did not damage skin, but did injure deep tissues. BA 18-6486.

4850

THE GENETICS OF THE MOUSE Hans Gruneberg. New York, MacMillan Co. 1943. xii + 412p.

Author includes an account of x-ray studies. BA 18-4052

4851

THE EFFECT OF X-RAYS ON DEVELOPMENT OF INSECTS. I. IRRADIATION IN LARVAL STAGE. L. Halberstaedter, G. Goldhaber, and O. Hecht. Growth 7(4), 413-25(1943).

Death of Caliphora larvae is produced almost uniformly by 300,000 r. Almost all larvae given 30,000 r form pupae, pupae from larvae given 4000 to 5000 r never produced

adults. Development of larvae into imagos is virtually unaffected by doses below 1000 r. Larval stages of Culex are killed by 12,000 r and below, doses of 3000 r or less are without apparent effect on subsequent imago formation. (Cell division is vital to larval development in Culex, not in Calliphora.) BA 18-10044

4852

THE USE OF FEVER THERAPY IN THE TREATMENT OF THE CHRONIC LEUKEMIAS. Frederick L. Hartmann. Clinics (Philadelphia) 4(1), 81-6(1945).

Roentgen irradiation over spleen, long bones, and lymph nodes has heretofore been the most successful measure, but there is evidence that the use of typhoid vaccine to produce fever enhances effect of x-ray treatment during the febrile period and may restore susceptibility at least temporarily when the leukemia has become resistant to radiation alone. BA 19-21848

4853

SEASON, NUTRITION, IMMUNITY, DRUGS, AND X-RAY AS FACTORS INFLUENCING THE COURSE OF A COCCIDIAN INFECTION. Theodore Hauschka. J. Parasitol. 30(3), 162-72(1944).

Unfiltered x ray (1000-7000 r) interferes with host fission and produces aberrant sporogony in 30-100% of total zygotes in *Dero limosa*. BA 19-3924

4854

ROENTGEN RADIATION INDUCED MUTATIONS IN *PELLIA NEESIANA*. E. Heitz. Verhandl. Schweiz. naturforsch. Ges. 120, 170-1(1940). (In German).

X-ray effects on chromosomes of *P. neesiana* and *Sphaerocarpus* are compared. BA 19-20945

4855

FURTHER PROBLEMS IN X-RAY PROTECTION. II. IRRADIATION INJURY AND TOLERANCE DOSE. P. S. Henshaw. Radiology 44(6), 569-80(1945).

There is a "threshold dose" or level of exposure for effects such as skin ulceration, sterility, anemia and death in the sense that relatively large doses are required. Such doses may be delivered in relatively short periods in certain radiation workers and in clinics. Other changes, such as premature aging and carcinogenesis, may occur long after exposure. There appears to be no threshold for genetic effects. BA 19-21128

4856

INFLUENCE OF IRRADIATION-KILLED CELLS ON TUMOR GROWTH. Paul S. Henshaw. J. Natl. Cancer Inst. 4(3), 303-7(1943).

Results of this study indicate that irradiation-killed cells or their decomposition products exert no inhibitory influence on growth potentiality of viable tumor cells. BA 18-6491

4857

INCIDENCE OF LEUKEMIA IN PHYSICIANS. Paul S. Henshaw and James W. Hawkins. J. Natl. Cancer Inst. 4(4), 339-46(1944).

Leukemia was found 1.7 times more frequently among physicians than among white males in the general population. This observation is in accord with findings in experimental studies of radiation-induced leukemia in animals. BA 18-16204

4858

EXPERIMENTAL ROENTGEN INJURY. I. EFFECTS ON THE TISSUES AND BLOOD OF C_3H MICE PRODUCED WITH SINGLE SMALL WHOLE-BODY EXPOSURES. Paul S. Henshaw. J. Natl. Cancer Inst. 4(5), 477-84(1944).

After applications of 50-r x-ray dose to C_3H mice, slight leukocytosis developed in 2-4 hr followed in 6-12 hr by mild, persistent leukopenia. There was a small amount of nuclear debris in lymph nodes at 204 hr; this disappeared and mild hyperplasia developed in 8-12 hr. Seminiferous tubules of testis showed reduction in spermatogonia and

primary spermatocytes at 1 wk and of secondary spermatocytes at 2. Tubules appear normal again in 4-6 wk. BA 18-16200

4859

EXPERIMENTAL ROENTGEN INJURY. II. CHANGES PRODUCED WITH INTERMEDIATE-RANGE DOSES AND A COMPARISON OF THE RELATIVE SUSCEPTIBILITY OF DIFFERENT KINDS OF ANIMALS. Paul S. Henshaw. J. Natl. Cancer Inst. 4(5), 485-501(1944)

Doses of 50, 100, 200, and 400 r were applied to whole bodies of C₃H and LAF₁ mice and to guinea pigs. Hematologic and histopathologic changes were studied postexposure. Lymphoid organs, bone marrow, and testis were studied histologically. BA 18-16201

4860

EXPERIMENTAL ROENTGEN INJURY. III. TISSUE AND CELLULAR CHANGES BROUGHT ABOUT WITH SINGLE MASSIVE DOSES OF RADIATION. Paul S. Henshaw. J. Natl. Cancer Inst. 4(5), 503-12(1944).

Guinea pigs, rabbits, and mice were given a 50,000 r x-ray dose. Guinea pigs died during treatment, rabbits within 3-6 hr, mice within 24-48 hr. Death appeared to be due to distinctive type of shock, symptoms of which were generalized toxemia, hyperthermia, hyperesthesia with intermittent seizures and cyanosis. Widespread tissue destruction was observed. BA 18-16202

4861

EXPERIMENTAL ROENTGEN INJURY. IV. EFFECTS OF REPEATED SMALL DOSES OF X-RAYS ON BLOOD PICTURE, TISSUE MORPHOLOGY, AND LIFE SPAN IN MICE. Paul S. Henshaw. J. Natl. Cancer Inst. 4(5), 513-22(1944).

Small daily doses of 5, 10, 15, 20, 25 r/day were applied to whole bodies of C₃H mice. Leucocyte level fell due to lymphocyte loss, amount of fall varied progressively as treatments proceeded and the decrease varied directly with size of daily dose. Leukemia developed in some mice receiving 15 and 20 r daily. Life span was shortened BA 18-16203

4862

THE EFFECT OF ROENTGEN RAYS UPON THE GROWING LONG BONES OF ALBINO RATS. II HISTOPATHOLOGICAL CHANGES INVOLVING ENDOCHONDRAL GROWTH CENTER Charles L. Hinkel. Am. J. Roentgenol. Radium Therapy 49(3), 321-48(1943).

Female Sherman strain albino rats of various ages were irradiated with 600-2500 r of filtered 200 kv x rays over a 5 mm field including femoral growth center, left femur served as control. Stunting and injury to vessels. Osteoblasts and marrow cells are described. Cartilage was still able to regenerate after 2000 r. BA 18-224

4863

THE EFFECT OF IRRADIATION UPON THE COMPOSITION AND VASCULARITY OF GROWING RAT BONES C. L. Hinkel. Am. J. Roentgenol. Radium Therapy 50(4), 516-26(1943).

Roentgen irradiation of femora of young growing rats was followed by an almost immediate increase in bone ash and fat content, associated with drop in matrix and water. Several days postirradiation there follows a diminution in number and caliber of metaphyseal blood vessels. Slow return toward normal content of ash, matrix and fat was observed during a period of several months after irradiation. BA 18-4187

4864

IRRADIATION SICKNESS. A HYPOTHESIS CONCERNING THE BASIC MECHANISM AND A STUDY OF THE THERAPEUTIC EFFECT OF AMPHETAMINE AND DEXTRO-DESOXYEPHEDRINE. E. L. Jenkinson and W. H. Brown. Am. J. Roentgenol. Radium Therapy 51(4), 496-503(1944).

Irradiation sickness is explained as an increased capillary permeability which results in disturbance of intracellular and extracellular equilibrium of electrolytes and fluids, followed by local congestion, edema, and stasis of circulating blood. A cycle is set in motion by reduced blood volume and tissue anoxia. Action of drug is to maintain peripheral circulating blood volume and prevent visceral stasis. (Of 69 cases treated, 55 are well controlled by one of the two medications). BA 18-16106

4865

STUDIES ON SYNERGISM OF LEUKEMOGENIC AGENTS IN MICE. Henry S. Kaplan and Arthur Kirschbaum. Proc. Soc. Exptl. Biol. Med. 55(4), 262-4(1944).

Irradiation, when used in conjunction with methylicholanthrene, failed to increase the incidence or to accelerate the onset of carcinogen-induced leukemia in strain Db a and strain F mice. BA 18-16208.

4866

INDUCTION OF LEUKEMIA IN MICE. Arthur Kirschbaum and Henry S. Kaplan. Science 100(2599), 360-1(1944).

Various strains of mice differed greatly in their tendency to develop spontaneous leukemia and leukemia after x ray or methylcholanthrene administration. BA 19-2731

4867

THE EFFECT OF RADIATION ON POLLEN GRAIN DEVELOPMENT, DIFFERENTIATION AND GERMINATION. P. C. Koller. Proc. Roy. Soc. Edinburgh 61B (Pt. 4, paper no. 29), 398-429(1943).

A 360-r x ray dose (at 16-24°C) applied to *Tradescantia bracteata* pollen grains suppresses beginning of prophase, which reduces rate of change from 1 to 2 nuclei. Cells within 1 hr of pollen grain mitosis are apparently unaffected. Prophase-suppressing effect is greatest 3 hr after radiation, lasts 2 hr. Metaphase is prolonged, sometimes to 3 hr. BA 18-54

4868

SEGMENTAL INTERCHANGE IN MICE P. C. Koller. Genetics 29(3), 247-63(1944).

Three interchange lines, A, B, and T, each from different male, were obtained by irradiation (600-900 r). BA 18-12651

4869

DIFFERENTIAL TISSUE RESPONSE TO NEUTRON AND ROENTGEN RADIATIONS. J. Lampe and F. J. Hodges. Radiology 41(4), 344-50(1943).

Complete aspermatogenesis and failure of scrotal skin to heal were observed in rabbits (20) exposed to 2100 r of neutron irradiation. A dose of 700 n caused aspermatogenesis and severe cutaneous damage, 313-650 n produced complete aspermatogenesis without permanent skin damage in half the cases. Sterilization without severe damage to scrotal skin was apparently impossible with x rays. BA 18-2153

4870

THE EFFECT OF X-RAYS ON CELLS CULTIVATED IN VITRO. II. RECOVERY FACTOR. Ilse Lasnitzki. Brit. J. Radiol. 16(132), 61-7(1943)

Cultures of 9-11 day chick choroid and sclerotic were exposed to 160 kv x rays (100 r once, or twice, separated by 48 or 96 hr, 1000 r once, or twice separated by 10 days). Effects: marked fall in mitosis with temporary small wave of abnormal mitosis. Subsequently: recurrence of cell division and appearance of degenerate cells, followed by second wave of abnormal mitosis. Recovery occurred 48 hr after 100 r, 10 days after 1000 r. BA 18-225

4871

THE RESPONSE OF CELLS IN VITRO TO VARIATIONS IN X-RAY DOSAGE. Ilse Lasnitzki. Brit. J. Radiol. 16(185), 137-41(1943).

Cultures of 9-11-day-old chick embryo choroid and sclerotic were irradiated with 160 kv lightly filtered x rays and fixed. Doses of: 100-1000 r temporarily inhibited mitosis; 2500, 5000, and 10,000 r allowed no mitotic recovery, produced many degenerated cells. Results indicated degeneration is due to breakdown of resting cells. BA 18-226

4872

THE SPATIAL DISTRIBUTION OF IONIZATION IN IRRADIATED TISSUE, AND ITS RELATION TO BIOLOGICAL EFFECTS. D. E. Lea. Brit. J. Radiol. 16(191), 338-9 (1943).

Neutrons are much more effective per ionizing particle than x rays in producing chromosome breaks. Author attributes this to denser ionization path of the proton ejected by the neutron (in comparison to the electron ejected by x rays). Ejected electron gives dense ionization only at end of path, and only this portion is considered capable of producing chromosome break. BA 18-6043

4873

SOME OF THE EFFECTS OF ROENTGEN IRRADIATION ON THE CARDIOVASCULAR SYSTEM. J. E. Leach. Am. J. Roentgenol. Radium Therapy 50(5), 616-28(1943).

Single dose of 10,000 r of high voltage x rays was necessary to produce microscopic evidence of myocardial damage in adult rats. Those receiving up to 7500 r showed no late changes over a period of a year. Disturbances in heart and circulation observed in patients given x-ray therapy are attributed to incidental effects or to cancer itself, rather than to the x-ray therapy. BA 18-4188

4874

EFFECT OF ROENTGEN THERAPY ON THE HEART. John E. Leach. Arch. Internal Med. 72(6), 715-45(1943).

Group of 86 patients treated with high voltage x-ray therapy were studied before, during and after therapy by means of roentgenograms of chest and serial electrocardiograms. One group received therapy not over chest, another group was treated over many body regions including thorax; third group treated over thorax only. Heart was apparently unaffected by x rays in these patients. ECG changes in patients treated over thorax are due largely to changed relation of heart to other structures. BA 18-8493

4875

RADIOACTIVITY AND LUNG CANCER: A CRITICAL REVIEW OF LUNG CANCER IN THE MINERS OF SCHNEEBERG AND JOACHIMSTHAL. Egon Lorenz. J. Natl. Cancer Inst. 5(1), 1-15(1944).

While it is generally assumed that radon is the only factor responsible for high incidence of pulmonary cancer, animal experiments have not shown that inhalation of Rn will induce pulmonary tumors. Author concludes: opinion that radon is sole cause of lung cancer in miners cannot be maintained and other contributing factors exist. BA 18-21748

4876

RADIOBIOLOGICAL INVESTIGATION WITH THE PUPAE OF THE FRUIT FLY, DROSOPHILA MELANOGASTER. Helene Lowy. Bern. Dissertation. 1940. (In German).

Course of lesions induced in *Drosophila* pupae by x rays depends on irradiation conditions. Independence of wave length was not proven but seems probable. Results confirm that x and γ rays under same irradiation conditions damage pupae qualitatively and quantitatively in same manner. Lesion curves for x and γ rays are sigmoids, those for ultraviolet light are exponential. BA 18-18614

4877

TWO CASE HISTORIES OF RADIUM NECROSIS OF THE MYOCARDIUM. E. Renter. Cancer 4, 431-41(1927).

4878

THE EFFECT OF RADIATION THERAPY IN CLOSTRIDIUM INFECTION IN SHEEP. E. A. Merritt, A. J. Den, and U. V. Wilcox. Radiology 43(4), 325-9(1944).

X-ray exposure of sheep following injection of *C. welchii* reduced severity of disease, as compared with controls. Dose of x ray varied according to the severity of the disease. Recoveries were not complete and were faster in animals receiving initial dose of 300 r and a second dose of at least 200 r within 6 hr. BA 19-3316

4879

METABOLIC EFFECTS OF THERAPEUTIC DOSES OF X AND GAMMA RADIATIONS. J. S. Mitchell. Brit. J. Radiol. 16(191), 339-43(1943).

Disturbances of carbohydrate metabolism by irradiation were studied by measuring inhibition of glycolysis, disturbances of nucleic acid metabolism by comparing ultraviolet absorption spectra of irradiated and nonirradiated tissues. Ionic efficiencies were of same order for disturbances of both types of metabolism, and effects are believed due to enzyme inactivation. BA 18-6044

4880

DISTURBANCE OF NUCLEIC ACID METABOLISM PRODUCED BY THERAPEUTIC DOSES OF X AND GAMMA RADIATIONS.

I. METHODS OF INVESTIGATION. J. S. Mitchell. Brit. J. Exptl. Pathol. 23(6), 285-95(1942).

Detailed description for quantitative estimation of the effect of therapeutic doses of x and γ rays on the nucleic acid metabolism of tissues is presented. Method employs monochromatic ultraviolet light of 2537 Å for photomicrographically recording results of examination of unstained specimens. BA 18-220

4881

DISTURBANCE OF NUCLEIC ACID METABOLISM PRODUCED BY THERAPEUTIC DOSES OF X AND GAMMA RADIATIONS. II. ACCUMULATION OF PENTOSE NUCLEOTIDES IN CYTOPLASM AFTER IRRADIATION. J. S. Mitchell. Brit. J. Exptl. Pathol. 23(6), 296-309 (1942).

Data indicate that therapeutic doses of x and γ radiations increase capacity of normal and neoplastic tissues to absorb ultraviolet light due to production of pentose nucleotides. BA 18-2154

4882

DISTURBANCE OF NUCLEIC ACID METABOLISM PRODUCED BY THERAPEUTIC DOSES OF X AND GAMMA RADIATIONS. III. INHIBITION OF SYNTHESIS OF THYMONUCLEIC ACID BY RADIATION. J. S. Mitchell. Brit. J. Exptl. Pathol. 23(6), 309-13(1942).

Study with microphotometer indicates that x and γ rays in therapeutic doses inhibit thymonucleic acid synthesis in nuclei of neoplastic tissues, allowing ribonucleotides to accumulate in cytoplasm. BA 18-2155

4883

CHARACTERISTICS OF A LIPOSARCOMA GROWN IN VITRO. Margaret R. Murray and Arthur Purdy Stout. Am. J. Pathol. 19(5), 751-60(1943).

Explants were made of a myxoid type liposarcoma which developed in the forearm of a 64 yr old negro, and metastasized to upper arm. Explants grew readily and were maintained for 51 days. X-irradiation of cultures with light doses had little effect but heavier dosages lengthened lag period before growth began, produced greater numbers of bizarre cells incapable of reproduction and profoundly affected the nutrition of cells. BA 18-913

4884

TISSUE CHANGES PRODUCED IN C_3H MICE BY 50 R WHOLE BODY EXPOSURE. A. Nettelshp. Radiology 42(1), 64-70(1944).

Whole body exposure of C₃H mice to 50 r/air of hard x rays produced these tissue changes: swelling and eosinophilic staining of cell cytoplasm with reduced nuclear staining; cell destruction within lymph node follicles; lymphopenia; reduction of mitotic rate and destruction of spermatogenic cells with slow return to normal. Changes were small and are considered to be threshold irradiation effects. BA 18-10045

4885

CELLULAR CHANGES IN LYMPH NODES OF EXPERIMENTAL MICE WITH SPECIAL REFERENCE TO PLASMA CELL DEVELOPMENT. L. Dorothy Parsons. J. Pathol. Bacteriol. 55(4), 397-407(1943).

Occurrence of generalized plasmacytosis in glands of x-irradiated and tumor-bearing mice is described. Fixed reticulum cells proliferating in these lymph nodes are suggested as direct precursors of plasma cells. BA 18-6500

4886

EFFECTS OF RADIATION ON WORKERS. Ralston Paterson. Brit. J. Radiol. 16(181), 3-5(1943).

Author presents a summary of known information and a plea for an extensive and authoritative study of the subject. BA 18-1011

4887

ATOM TRANSFORMATION AND MEDICINE. A. Pickhan. Deut. med. Wochschr. 67(32), 871-3(1941). (In German).

Biologic results of exposure to fast neutrons, and physiologic applications of artificially radioactive elements are discussed. BA 18-2156

4888

THE INFLUENCE OF X-RAYS ON THE MATURATION OF GRANULOCYTES. Von Norbert Piechl. Folia Haematol. 66(1), 41-7(1942). (In German).

Abnormalities in maturation of granular leucocytes were observed following a 3000 r x-ray dose. Sternal puncture demonstrates early segmentation of myelocytes following irradiation of sternum. The effect is local. BA 18-2157.

4889

THERAPEUTIC USES OF THORIUM X. J. Plesch. Lancet 2, 653(1943).

Note is made of research from 1909-1912. BA 18-10551

4890

RADIATION THERAPY IN CARCINOMA OF THE RECTUM AND SIGMOID. AN EXPERIMENTAL STUDY OF THE "DANGER" DOSE OF ROENTGEN RAYS FOR THE INTESTINAL MUCOSA IN DOGS AND AN ANALYSIS OF 195 CASES TREATED IN THE STATE OF WISCONSIN GENERAL HOSPITAL DURING 1928-38. E. A. Pohle, J. B. McAneny, and B. K. Lovell. Radiology 41(3), 225-32(1943).

Single dose of 900 r (175 kv, 15 ma, 0.5 mm Cu + 1.0 mm Al, 50 cm, 40 r/min) (effective in normal intestinal mucosa of dogs) can be tolerated without serious damage; 1300 r (effective in intestinal wall) caused obstruction, perforation, generalized peritonitis, and death. BA 18-4598

4891

EFFECT OF X-RAYS ON THE RATE OF EGG-LAYING IN *DROSOPHILA MELANOGASTER* RACE KALYAN. S. S. Prabhu and M. S. Dalal. J. Univ Bombay 12(3), 33-46(1943).

Closely inbred flies, maintained under optimal conditions, were treated with either 800 or 2400 r. In the majority of treated flies no significant effect on rate of egg-laying was observed. A few flies were obtained that either laid no eggs or eggs of abnormal appearance, due to defects produced in flies by x-ray treatment. BA 18-9859

4892

CHANGES IN THE DISTRIBUTION OF POTASSIUM AND CALCIUM IN THE HISTOLOGICAL PICTURE OF THE LIVER AND KIDNEY IN TOTALLY IRRADIATED DOGS. Norbert Preminger. Berne. Dissertation. 1940, 15p. (In German). BA 18-21150

4893

EFFECT OF ROENTGEN IRRADIATION ON THE HORMONE CONTENT AND SECRETION OF THE ADRENAL MEDULLA. W. Raab and A. B. Soule, Jr. Radiology 41(1), 56-60(1943).

Rats, anesthetized with Nembutal, were x irradiated with single doses of 100 r or 1000 r (200 kv, 20 ma, 0.5 mm Cu, and 2.0 mm Al filtration) on the back over the adrenal area. Hormone content, determined by a modification of Shaw's colorimetric determination of "adrenalin," showed no significant change in glands within 68 hr postexposure. After 68 days there was an indication of diminished secretory activity following a dose of 100 r; similar decrease with slightly diminished hormone production after irradiation with 1000 r. BA 18-558

4894

THE EFFECT OF X-RAYS ON THE MITOTIC ACTIVITY OF EXPLANTED BONE MARROW. M. Rachmilewitz, A. Rosin, G. Goldhaber, and L. Doljanski. Proc. Soc. Exptl. Biol. Med. 59(2), 129-31(1945).

X-irradiation (250, 500, 1000, 2500, 5000 r) of rabbit bone marrow cultures produced at first a profound decrease in number of mitoses. With doses of 1000 r and less, mitotic decrease was followed by complete recovery of mitotic activity. With doses of 2500 r or more, recovery of mitosis was incomplete and irradiation resulted in aplasia of the bone marrow. BA 19-21129

4895

MOVEMENT, AGGLUTINATION, BRIDGES AND DISTENTION OF THE CHROMOSOMES IN MITOSIS. Flavio Resende. Bol. soc. Broteriana 15(2A ser.), 163-200(1941).

In *Aloe striata* X *saponaria* treated with x rays, a limited area in one plant was found to have completely asymmetric anaphases, lagging chromosomes, and the chromosomes were longer than in untreated tissues. BA 18-15355

4896

EFFECT OF ROENTGEN IRRADIATION ON CAPILLARY PERMEABILITY AND INFLAMMATION IN THE SKIN OF THE RABBIT. R. H. Rigdon and Howard Curl. Am. J. Roentgenol. Radium Therapy 49(2), 250-7(1943).

Small shaven areas on sides and back of adult rabbits were irradiated with 680-2720 r of 86 kv unfiltered x rays. Areas irradiated 1 hr or less prior to intravenous administration of trypan blue became blue; areas irradiated 3 hr or more before injection showed no dye accumulation. Effect is attributed to irradiation-induced changes in cell permeability. BA 18-227

4897

METABOLIC CHANGES OCCURRING AS THE RESULT OF DEEP ROENTGEN THERAPY. II. THE EFFECT OF 1,000 KILOVOLT ROENTGEN THERAPY. J. E. Robertson. Am. J. Roentgenol. Radium Therapy 50(3), 392-9(1943).

Seven patients were subjected to study of N and chloride metabolism before, during and after 1000 kv x-ray therapy. N studies show increase in total and uric acid N excretion resulting from x raying, followed by period of retention or diminished excretion after cessation of treatments. Negative chloride balance was seen less frequently in cases given 1000 kv than in those given 200 kv therapy. Chloride change is believed to be a secondary effect, due to disturbed water balance. BA 18-4189

4898

ACCEPTED STANDARDS IN RADIOLOGICAL PROTECTION. S. Russ. Brit. J. Radiol. 16(181), 6-7(1943).

Great need is expressed for investigation of blood changes as warning to x-ray dangers. Author proposes 10^{-10} curies/liter as allowable Rn content in Ra workshops and luminous material factories. BA 18-228

4899

BOTANY: PROGRESS OF BOTANY WITH SPECIAL REFERENCE TO ECONOMIC PLANTS. T. S. Sabnis. Science and Culture (India) 9(8), 358(1944).

Progress in improvement of economically important plants has been made by use of irradiation with controlled dosages of visible, infra-red, x rays, and ultraviolet rays. BA 18-15381

4900

MALIGNANCY SUBSEQUENT TO IRRADIATION OF THE UTERUS FOR BENIGN CONDITIONS. Lewis C. Scheffey. Am. J. Obstet. Gynecol. 44(6), 925-51(1942).

Author reports 20 new cases of uterine malignancy occurring after irradiation for supposedly benign conditions. Time between radiation and discovery of malignancy was 2-11 yr, carcinoma was squamous cell in type. BA 19-2745

4901

FURTHER RADIOBIOLOGICAL STUDY WITH DROSOPHILA PUPAE. Maximilian Schweigert. Berne, Dissertation. 1939. 16p. (In German).

With x rays (time ratio 1:4), time factor (rate of administering a given dose) is 0.67, for unfiltered ultraviolet, considering experimental errors, no time factor exists. Hard β rays, when relating to the same ionization and considering the time factor, present the same lesion rates as respective amounts of x or γ rays. BA 18-21004

4902

MYELOMALACIA OF THE CERVICAL PORTION OF THE SPINAL CORD, PROBABLY THE RESULT OF ROENTGEN THERAPY. Lewis D. Stevenson and Robt. E. Eckhardt. Arch. Pathol. 39(2), 109-12(1945).

Signs of transverse myelitis developed in region of fourth cervical segment about 2 years after intensive radiation therapy in the cervical region. Myelitis progressed and terminated fatally in this patient. BA 19-21130

4903

X-RAY AND ULTRAVIOLET STUDIES ON POLLEN TUBE CHROMOSOMES. I. THE EFFECT OF ULTRAVIOLET (2537 Å) ON X-RAY INDUCED CHROMOSOMAL ABBERATIONS. C. P. Swanson. Genetics 29(1), 61-8 (1944).

Treatment of pollen tube chromosomes with ultraviolet tends to increase resistance of chromosomes to x-ray breakage. Effect is most pronounced if ultraviolet is given prior to x rays. Degree of inhibition increases with dose of ultraviolet. Post-x-ray treatment with ultraviolet does not alter x-ray production of double deletions, may effect single deletions and translocations depending on time of treatment. Ultraviolet is believed to facilitate restitution of broken ends. BA 18-9842

4904

EXPERIMENTS WITH X-RAY TREATMENTS ON THE SEEDS OF CERTAIN CROP PLANTS. Wendell Russel Tascher. Univ. of Michigan, Thesis. 1929. (Microfilm available from University Microfilms, Ann Arbor, Michigan.)

Dormant and germinating seeds were x rayed with different intensities of continuous and intermittent doses and at different temperatures. LD_{50} for 24 field crops (8 botanical families) varied from 4000-85,000 r. Effect of stage of germination and of temperature and species differences on radiosensitivity were studied.

Morphological and some physiological effects of irradiation are described. BA19-3676

4905

X-RAY INDUCED MUTANT STRAINS OF ESCHERICHIA COLI. E. L. Tatum. Proc. Natl. Acad. Sci. U. S. 31(8), 215-19(1945).

Following a second x-ray treatment with 180,000 r of two mutant strains of E. coli, 16 new mutant strains were obtained from 1741 single colony isolations. Only one mutant was obtained from 1902 isolations from unirradiated material. (Mutants had altered growth-factor requirements.) BA 19-22054

4906

THE HISTOPATHOLOGY OF RADIATION LESIONS. Shields Warren. Physiol. Rev. 24(2), 225-38(1944).

A review (35 references), dealing with therapeutic types of radiation, electromagnetic, corpuscular (including radioisotopes), and neutron. Uses described and mode of action of radiation on cells, tissues and entire organism is analyzed. BA 18-18746

4907

TREATMENT OF THE SO-CALLED ROENTGEN SICKNESS WITH DESOXYCORTICOSTERONE. Ursula Weichert. Strahlentherapie 71, 127(1942).

Treatment of patients with desoxycorticosterone resulted in immediate improvement in almost all cases. Roentgen sickness, which resembles Addison's disease in many ways, is considered to be due to adrenal insufficiency and to result from increased protein destruction by radiation. BA 18-560

4908

RADIATION AND PLANT RESPIRATION. Robert L. Weintraub. Botan. Rev. 10(7), 384-459(1944).

Author reviews and discusses: effects of visible radiation on respiration, effects of nonvisible radiation, mechanism of radiation effects on respiration. Experiments with many types and parts of plants are described and evidence arising from numerous methods of approach is summarized. BA 18-22899

4909

DOMINANT LETHALITY AND CORRELATED CHROMOSOME EFFECTS IN HABROBRACON EGGS X-RAYED IN DIPTOTENE AND IN LATE METAPHASE. I. Anna R. Whiting. Biol. Bull. 89(1), 61-71(1945).

Unlaid eggs x rayed in diptotene (LD_{100} 45,000 r) and allowed to develop parthenogenetically show fragments, bridges, or both in division I, either or both in division II. Bridges in division I may be permanent. Unlaid eggs x rayed in late metaphase I (LD_{100} 1400 r) show fragments but no bridges in division I, bridges, fragments, or both in division II. BA 19-20974

4910

THE QUESTION OF THE INFLUENCE OF HEAVY MAGNETIC FIELDS ON THE BIOLOGICAL EFFECT OF ROENTGEN RAYS AND ULTRA-VIOLET LIGHT. Renate Wilbrandt. Radiol. Clin. 9(3), 143-51(1940). (In German).

Naked eye and microscopic examination after 1-2 days reveal that arrested growth produced by x rays and ultraviolet rays on bacteria (Bacillus prodigiosus) is not influenced by a magnet applied at right angles to the rays during radiation. Any marked effect of the magnetic field can, therefore, be excluded. BA 18-18747

4911

THE RADIOSENSITIVITY OF EGGS OF ARBACIA PUNCTULATA IN VARIOUS SALT SOLUTIONS. Karl M. Wilbur and Richard O. Recknagel. Biol. Bull. 85(3), 193-200(1943).

Treatment of A. punctulata eggs with 0.35 M K citrate reduced x-ray-induced inhibition of cell division slightly, mainly at high doses (30,400 and 53,200 r).

Radiosensitivity was unaffected by increasing Ca or Mg content of seawater medium. X-ray doses which markedly altered rate and normal course of cell division produced no detectable change in viscosity of unfertilized egg. BA 18-6642

4912

THE FREQUENCY OF X-RAY-INDUCED CHROMATID BREAKS IN TRADESCANTIA AS MODIFIED BY NEAR INFRARED RADIATION. C. P. Swanson and Alexander Hollaender. Biol. Bull. 91(2), 242(1946).

Abstract. BA 21-5115

4913

X-RAY INDUCTION OF CHROMOSOME MUTATIONS IN D. MELANOGASTER. II. THE FREQUENCY OF PRIMARY BREAKS ACCORDING TO STUDIES ON THE RING-X-CHROMOSOME. Hans Bauer. Z. Zellforsch. u. mikroskop. Anat. Abt. B. Chromosoma; Z. Zellkern-u. Chromosomenforsch. 2(4), 407-58(1942). (In German). NSA 10-7401

4914

THE BEHAVIOR OF CHROMOSOMES OF A. MEGALOCEPHALA AFTER X-IRRADIATION. Hans Bauer and Jean Le Calvez. Z. Zellforsch. u. mikroskop. Anat., Abt. B. Chromosoma; Z. Zellkern-u. Chromosomenforsch. 2(6), 593-617(1944). (In German).

Chromosomes of A. megalcephala eggs fragment after x irradiation. Fragments show no tendency to rejoin, but exhibit same behavior as natural ends of normal chromosomes. Chromosomes become irregularly shaped and are crowded together during meta- and anaphases after strong irradiation. BA 21-5123

4915

INDUCTION OF ZYGOTIC-LETHAL MUTATIONS IN P. FENESTRALIS BY X-RADIATION OF SPERM. Hans Bauer and Witta Lerche. Z. Zellforsch. u. Mikrosk. Anat., Abt. B. Chromosoma; Z. Zellkern-u. Chromosomenforsch. 2(5), 482-92(1943). (In German).

P. fenestralis females were fertilized by irradiated males. Death rate depends on dose; lethality curve indicates 25% mortality due to induced dominant lethal gene mutations or to single chromosome breaks, 75% due to multiple chromosome breaks. Mutation rate in Phyryne is much higher than that in Drosophila. BA 21-5124

4916

THE EFFECT OF ROENTGEN RADIATION ON PROTOPLASMIC VISCOSITY DURING MITOSIS. Walter L. Wilson. Biol. Bull. 91(2), 229(1946).

Viscosity of irradiated Arbacia punctulata ova fertilized with irradiated sperm, or of irradiated ova fertilized with un-irradiated sperm, remains high two-three times longer than in normal ova fertilized with normal sperm. BA 21-5143

4917

THE BEARING OF RADIATION EXPERIMENTS ON THE SIZE OF THE GENE. D. E. Lea and D. G. Catcheside. J. Genetics 47(1), 41-50(1945).

Authors dismiss objections to target theory. Gene size of Drosophila is estimated at 4-8 μ diameter, length of euchromatic region of X chromosome in sperms is deduced to be 10-20 μ . BA 21-5145

4918

THE INFLUENCE OF NUTRITION ON THE PRODUCTION OF MUTATIONS. H. Stubbe. Scientia Genet. (Torino) 1(4), 370-84(1940). (In Italian).

Plants grown in absence of P, when x-irradiated (600 r), exhibited a higher mutation rate than plants which had received normal nutrition and same x-ray dose. BA 21-5163

4919

CONTRASTS BETWEEN VISIBLE AND DOMINANT LETHAL MUTATION RATES IN X-RAYED HABROBRACON

EGGS. Anna R. Whiting and H. C. George. Biol. Bull. 91(2), 214(1946).

Abstract. BA 21-5188

4920

INCREASE IN INCIDENCE OF PULMONARY TUMORS IN STRAIN A MICE FOLLOWING LONG-CONTINUED IRRADIATION WITH γ -RAYS. Egon Lorenz, Walter E. Heston, Margaret Deringer, and Allan B. Eshenbrenner. Cancer Research 6(9), 485-6(1946).

Abstract. BA 21-5925

4921

ON SOME QUESTIONS OF THE ORIGIN OF SPECIES. E. Heitz. Arch. Julius Klaus-Stift. Vererbungsforsch. Sozialanthropol. u. Rassenhy. 19(3/4), 510-28(1944). (In German).

Numerous mutations were obtained by x-raying Pellia neesiana. Most of the clones with chromosome translocations showed no morphological change from normal even after long cultivation, indicating that gene changes are generally not position effects. BA 21-7945

4922

CHROMOSOME BREAKAGES AND REARRANGEMENTS INDUCED BY X-RAYING. A. Camara. Scientia Genet. (Torino) 1(4), 339-53(1940). (In Spanish).

Chromosome mutations in Aloe arborescens, produced by x-ray dosages ranging from 100-700 r, reveal that there are weak points in the chromosomes where breakage is more likely. As a rule breakage takes place first and is followed by reunion of broken ends. Translocations may occur as consequence of chromatic bridges. BA 21-7957

4923

PRODUCTION OF BIOCHEMICAL MUTATIONS IN PENICILLIUM. David Bonner. Am. J. Botany 33(10), 788-91(1946).

Each of 398 mutant strains of P. notatum-chrysogenum produced by ultraviolet or x rays differed from the parent strain by having one additional nutritional requirement. Individual requirements include vitamins, biotin, choline, inositol, nicotinic acid, p-amino-benzoic acid, pyridoxine, thiamine, and several amino acids. BA 21-7991

4924

FREQUENCY OF RECESSIVE LETHALS INDUCED IN DROSOPHILA BY NEAR INFRA-RED RAYS AND X-RAYS. Berwind P. Kaufmann and Helen Gray. Anat. Record 96(4), 530(1946).

An abstract. BA 21-8020

4925

DOMINANT LETHALS INDUCED BY X-RAYS IN SPERM OF THE WASP MELITTobia SP. (C). Jean Kerschner. Anat. Record 96(4), 60(1946).

An abstract. BA 21-8021

4926

X-RAY MUTATIONS IN THE GIANT MULTINUCLEAR AMEBA, CHAOS CHAOS LINN. A. A. Schaeffer. Anat. Record 96(4), 531(1946).

An abstract. BA 21-8029

4927

ANDROGENETIC MALES FROM EGGS X-RAYED WITH DOSE MANY TIMES LETHAL. Anna R. Whiting. Anat. Record. 96(4), 11-12(1946).

An abstract. BA 21-8032

4928

A STRONGLY INTERSEXUAL FEMALE IN HABROBRACON. P. W. Whiting. Biol. Bull. 91(3), 243-6(1946).

This specimen, more strongly intersexual than a group previously reported, lacks gonads and has defective poison apparatus. It is the third type of Habrobracon intersex reported. X-radiation may have modified a sexallele, resulting in an intersexual heterozygote rather than a normal male. BA 21-8033

4929

ACTION OF VARIOUS IONIZING RADIATIONS ON THE YEAST *SACCHAROMYCES ELLIPSOIDEUS*. M. Frilly and R. Latarjet. *Compt. rend.* 218, 480-1(1944). (In French).

4930

PHYSIOLOGICAL ABERRATIONS FOLLOWING TOTAL BODY IRRADIATION OF DOMESTIC ANIMALS WITH LARGE DOSES OF GAMMA RAYS. J. H. Rust, B. F. Trum, and U. S. G. Kuhn III. *Vet. Med.* 49, 318(1954).

Physiological changes in mules exposed to whole body irradiation are described and include: brain edema, gliosis, prolonged blood clotting time, leukopenia, abnormal cardiac rhythm, interference with oestrus cycle and marked changes in respiratory quotient.

4931

PROTECTIVE ACTION OF DESOXYCORTICOSTERONE ACETATE AGAINST X-RAY-INDUCED LIVER CHANGES. Friedrich Ellinger. *Science* 104(2709), 502-3(1946).

Mice were exposed to total-body x irradiation (200 kv, 10 ma, 0.25 mm, Cu plus 1.0 mm Al filters, 50 cm distance, 20 x 20 cm field, 23.4/min, HVL 0.75 mm Cu) of 500 and 1000 r/air in 1 exposure or in daily doses of 100 r. Daily doses of 0.25 or 0.5 mg DOCA were given subcutaneously 6 times weekly, total doses of 2.5-8.0 mg given in 10-19 days. Striking reduction in amount of fat was observed in livers of animals x rayed and DOCA-treated when compared with those x rayed only. BA 21-8492

4932

TREATMENT OF RADIATION SICKNESS WITH TRASENTINE AND TRASENTINE-PHENOBARBITAL: PRELIMINARY REPORT. J. C. Glenn Jr. and R. J. Reeves. *Radiology* 47(4), 392-6(1946).

Of 65 patients 39 were completely relieved of symptoms, 6 showed no relief after administration of trasentine-phenobarbital (three 75 mg tablets 4 times a day up to totals of 1000 mg). BA 21-8696

4933

PERORAL ADMINISTRATION OF VITAMIN B₆ (PYRIDOXINE HYDROCHLORIDE) IN THE TREATMENT OF RADIATION SICKNESS. A. Oppenheim and Bjorn Lih. *Radiology* 47(4), 381-5(1946).

Fifty patients received 75-100 mg of pyridoxine $\frac{1}{2}$ hr before meals, 3-4 times/day. In 30 cases (60%) results were excellent, in 6 cases (12%), good, in 8 cases (16%), fair, and no results in 6 cases (12%) Symptoms were aggravated in one instance, dermatitis was produced in one instance. BA 21-8719

4934

THE USE OF PYRIDOXINE IN RADIATION SICKNESS. H. I. Van Haltem. *Radiology* 47(4), 377-80(1946).

A total of 81 patients received 25-50 mg pyridoxine intravenously. Excellent results were obtained in 44 cases (54%), good results in 28 cases (35%), and in 9 cases (11%), vomiting was not entirely relieved and a troublesome degree of nausea remained. BA 21-8746

4935

STUDIES IN VITRO ON THE PHYSIOLOGY OF CELLS. FACTORS AFFECTING THE DELAYED CYTOTOXIC ACTION OF X-RAYS. Robert Schrek. *J. Cellular Comp Physiol* 28(3), 277-304(1946).

Cell suspensions were studied after in vitro exposure to x rays and incubation under varying conditions. Cells studied included thymic cells of rabbit and kitten, lymphocytes, granulocytes. Effect of altered temperature and pH on radiosensitivity is described. BA 21-8995

4936

THE REPLACEMENT OF *p*-AMINO BENZOIC ACID IN THE GROWTH OF A MUTANT STRAIN OF *ESCHERICHIA*

COLL. J. O. Lampen, R. R. Roepke, and M. J. Jones. *J. Biol. Chem.* 164(2), 789-90(1946).

For growth of x-ray mutant strain of *E. coli*, *p*-aminobenzoic acid can be replaced by a combination of thymine, the purines and an amino acid mixture of which methionine is the most important component. Data indicate that at least with this organism, *p*-aminobenzoic acid functions in the synthesis of thymine, the purines, and one or more of the amino acids. BA 21-9127

4937

TEMPERATURE EFFECTS ON X-RAY-INDUCED CHROMOSOME ABERRATIONS. Karl Sax. *Genetics* 32(1), 75-8(1947).

Frequency of ring and dicentric chromosomes was more than double when *Tradescantia* microspores were irradiated at 3°C, compared with the same x-ray dosage at 36°C. Temperature differences had little or no effect on frequency of rod deletions. Subjection of microspores to high and low temperatures before or after irradiation produced no consistent differences in x-ray-induced aberrations. BA 21-10990

4938

AN "INVISIBLE" CHROMOSOME. M. Kodani and Curt Stern. *Science* 104(2713), 620-1(1946).

Chromosomal rearrangements in offspring from males of *D. melanogaster* which were x irradiated with doses of 4000 r are described. BA 21-10998

4939

EFFECTS OF TEMPERATURE DURING X-RADIATION ON *DROSOPHILA*. Edward D. King. *Genetics* 32(1), 93-4(1947).

An abstract. BA 21-11065

4940

DOSE-ACTION CURVES FOR X-RAY-INDUCED DOMINANT LETHAL AND VISIBLE MUTATIONS IN *HABROBRACON* EGGS. Anna R. Whiting and Bernice Goldis. *Genetics* 32(1), 112(1947).

An abstract. BA 21-11083

4941

X-RAY INDUCED PARATHIOTROPHY IN *OPHIOSTOMA*. Nils Fries. *Svensk Botan. Tidskr.* 40(2), 127-40(1946).

Of 94 x-ray induced physiological mutations in *O. multiannulatum*, 13 were parathiotrophic (unable to assimilate 6-valent S). BA 21-11019

4942

RADIATION SENSITIVITY OF BONE MARROW. Torfinn Denstad. *Acta Radiol. (Stockholm)* 22(3), 347-59(1941).

Response of bone marrow in patients treated with 125-3000 r and large amounts of radium was studied. Erythropoietic cells of bone marrow were found to be more radiosensitive than myelopoietic cells. X-ray effects are believed to be indirect. Total-body irradiation with small doses is believed to be the best therapy in blood dyscrasias (leukemia and polycythemia). An extensive review of the literature is included. BA 21-11293

4943

PITUITARY-ADRENAL CORTICAL CONTROL OF LYMPHOCYTE STRUCTURE AND FUNCTIONS AS REVEALED BY EXPERIMENTAL X-RADIATION. Thomas F. Dougherty and Abraham White. *Endocrinology* 39(6), 370-85(1946).

Authors suggest that x rays exert both direct and indirect effect on lymphocytes. Indirect effect is mediated via pituitary-adrenal cortical mechanism. BA 21-11299

4944

QUANTITATIVE HISTOLOGIC ANALYSIS OF THE EFFECT OF X-RADIATION ON THE INTERSTITIAL TISSUE OF THE TESTES OF LA₁ MICE. Allen B. Eschenbrenner and Eliza Miller. *J. Natl. Cancer Inst.* 6(6), 343-8(1946).

Exposure of mice to x rays sufficient to produce severe damage of spermatogenic elements resulted in a relative, not an absolute increase of interstitial tissue in testes. Chalkley's method for quantitative morphologic analysis was used. BA 21-11300

4945

ACTION OF RADIATIONS ON THE MALIGN TRANSFORMATIONS OF INFECTIOUS PAPILLOMA OF THE RABBIT. A. Lacassagne and G. Rudali. Bull. assoc. franc. etude cancer 30(2), 74-89(1942). (In French).

Rabbits x irradiated either before or after inoculation with Shope papilloma virus showed partial regression of papilloma but malignant changes occurred in the growths. Other rabbits given implantations of radon tubes in an already formed papilloma also showed induced malignant transformation. Authors do not favor the hypothesis that malignant change in infectious papilloma of the rabbit is due to direct action of the infectious agent.

4946

CLINICAL INVESTIGATION OF A COMPLICATION, FISTULA RECTO-VAGINALIS, AFTER RADIUM THERAPY OF CERVICAL CARCINOMA. A. M. Ritala. Acta Obstet. Gynecol. Scand. 26(2), 193-224(1946).

Of 160 cases of cervical carcinoma treated with Ra (standard doses 3000 mg hr intracervically plus 5000 mg hr intravaginally), 42% had slight to severe rectal symptoms. Following Ra therapy patients characteristically lost weight, developed hypochromic anemia, and often had ascending genital infections. BA 21-11678

4947

OCULAR EFFECTS OF RADIANT ENERGY. Charles F. Kutscher. Trans. Am. Acad. Ophthalmol. Otolaryngol. 1946, 230-40(1946). BA 21-11732

4948

THE BLOOD PLATELETS. THE RATE OF THEIR UTILIZATION IN THE CAT. John S. Lawrence and William N. Valentine. Blood. 2(1), 40-9(1947).

Radiated, thrombopenic cats were cross-circulated with normal cats to deliver normal platelets to the thrombopenic animal. Platelets disappeared from recipient's circulation at rate of 1600-28,000/ mm^3 /hr. Platelets from splenectomized donors disappeared twice as fast as the average for the group. BA 21-11764

4949

STUDIES ON DEFECTIVE DEVELOPMENT FOLLOWING X-RAY-RADIATION. I. APPLICATION OF SUBLETHAL DOSES. H. A. L. Trampusch. Acta Neerl. Morphol. 6(1/2), 43-58(1948).

X-ray dose of 100 r was lethal to decapsulated blastulae of *Amblystoma mexicanum*. Embryos with capsules were less sensitive and in them, the x ray effect was primarily inhibition of invagination of entoderm and mesoderm, the degree of inhibition being proportional to dose. A later effect is reduction in size of special sense organs and the head. This effect was also proportional to dose. BA 23-23987

4950

ORGANIZATION OF THE CHROMOSOME. I. BREAK DISTRIBUTION AND CHROMOSOME RECOMBINATION IN *DROSOPHILA MELANOGASTER*. Berwind P. Kaufmann. J. Exptl. Zool. 102(3), 293-320(1946).

Chromosome rearrangements obtained following x radiation of mature spermatozoa of *D. melanogaster* are described. BA 21-63

4951

RADIOACTIVATION OF COLLOIDAL GAMMA FERRIC OXIDE. M. Blau, H. Sinason, and O. Baudisch. Science 103(2687), 744-8(1946).

Reticulo-endothelial cells can be influenced and their antibody actions stimulated if colloidal γ iron oxide particles are combined with some therapeutically acting

material, such as certain radioactive substances. Method is described. BA 21-352

4952

ACTION OF INCREASING DOSES OF X-RAYS ON THE SEEDS OF *LYCOPERSICON ESCULENTUM* MILL. M. LeFort. Compt. rend 239, 1401-4(1954). (In French).

4953

A CLINICAL SYNDROME FOLLOWING EXPOSURE TO ATOMIC BOMB EXPLOSIONS. Paul D. Keller. J. Am. Med. Assoc. 131(6), 504-6(1946).

Signs of delayed illness in 21 patients exposed to atomic bomb explosions included: destruction or suppression of hemopoietic system, disturbed liver function, and increased erythrocyte sedimentation rate. There was evidence of extensive tissue destruction within body. BA 21-354

4954

ACTION OF RADIATIONS ON THE NORMAL CELL. Jacques Lavedan. Paris. Gauthier-Villars. 1945. 128p. (In French).

Author emphasizes the importance of effects of ionizing radiation (x rays, α , β , and γ rays). BA 21-355

4955

THE PROBABILISTIC APPROACH TO THE EFFECTS OF RADIATIONS AND VARIABILITY OF SENSITIVITY. I. Opatowski. Bull. Math. Biophys. 8(3), 101-19(1946).

Calculation of size of the sensitive volume in irradiated biological systems is discussed from the viewpoint of the probabilistic theory of these phenomena, based on concept of random "effective events". "Mean life" (a measure of radioresistance) under radiation of 1r/min is calculated for processes with and without recovery. The case of variable sensitivity is also discussed. BA 21-356

4956

ON THE PARTIAL INHIBITION OF NUCLEIC ACID FORMATION PRODUCED BY ROENTGEN RAYS. L. Ahlstrom, H. v. Euler, and G. V. Hevesy. Arkiv Kemi 18B(13), 1-5(1945). (In German).

Jensen rat sarcoma was x irradiated and radioactive P as Na_3PO_4 was injected. Two hours later, radioactive nucleic acid P was determined as a measure of new nucleic acids formed during this time and indicated that nucleic acid formation was decreased about two-thirds. BA 21-821

4957

RESERPIN FACTOR IN CANCER IN RELATION TO THE RETICULO-ENDOTHELIAL SYSTEM. H. C. Connel. L. A. Munro, and A. Medley. Can. Med. Assoc. J. 54(2), 161-4(1946).

X-ray therapy has an effect on reticulo-endothelial system. Weak doses stimulate and high doses damage the system as indicated by congo red index. BA 21-839

4958

EXPERIMENTS ON RAY SENSITIVITY AND RAY TREATMENT OF SYMPATHOGONIOMA (*NEUROBLASTOMA SYMPATHICUM*). Abdul Rahman Patschadj. Strahlentherapie 70, 26(1941). (In German). BA 21-885

4959

COMPARISON OF THE PRIMARY ACTIONS OF X-RAYS AND U.-V. ON THE PARADYSENTERY BACILLUS Y6R. Raymond Lataret. Ann. inst. Pasteur 69(7/8), 205-14(1943). (In French).

No difference was detected in survival of bacteria following exposure to x or ultraviolet rays. Dose allowing 50% survival is 225 ergs/ mm^2 (200 ergs for *E. coli*). Theoretical deductions on action of both radiations are presented. BA 21-1187

4960

EVALUATION OF THE SIZE OF THE VIRUS OF HOOF AND MOUTH DISEASE BY ALPHA RADIATION. P. Bonet-Maury. Ann. Inst. Pasteur 69(1/2), 22-6(1943). (In French).

Using α irradiation methods, the virus of foot-and-mouth disease was shown to have diameter of 20-40 μ , contrasted to the 10-20 μ dimension shown by classical ultra-filtration studies. Results indicate relation between virulence of virus and size of particles after irradiation. BA 21-1312

4961

ACTION OF ALPHA RADIATION OF RADON ON THE VIRULENCE AND ANTIGENIC POTENTIAL OF VACCINIA VIRUS. C. Levaditi and R. Perault. Am. Inst. Pasteur 69(5/6), 139-45(1943). (In French).

Under influence of large α -ray doses, vaccinia virus loses its activity and its antigenic properties. Smaller doses do not wholly destroy immunizing properties. BA 21-1325

4962

THE RATE OF INDUCTION OF DOMINANT LETHALS IN *DROSOPHILA MELANOGASTER* SPERM BY X-RAYS. D. G. Catcheside and D. E. Lea. J. Genetics 47(1), 1-9(1945).

Dominant lethals were induced in Oregon-R wild type and in w mutant flies by 5 x-ray doses ranging from 1124-11,420 r. Found: at low doses 12% per 1000 r for death in embryo stage and 20% per 1000 r for death at stages between zygote and adult. At higher doses both rates increased. The dose-action curve fits (approximately) the single-hit type of action only at low doses. Ratio of females to males declines 2.5% per 1000 r. BA 21-2553

4963

DOMINANT LETHALS AND CHROMOSOME BREAKS IN RING X-CHROMOSOMES OF *DROSOPHILA MELANOGASTER*. D. G. Catcheside and D. E. Lea. J. Genetics 47(1)25-40(1945).

Ring X-chromosomes were treated with 4000 r of x rays and results of cytological analysis are presented. BA 21-2554

4964

THE RELATION BETWEEN RECESSIVE LETHALS, DOMINANT LETHALS, AND CHROMOSOME ABERRATIONS IN *DROSOPHILA*. D. E. Lea and D. G. Catcheside. J. Genetics 47(1), 10-24(1945).

Authors develop the theory that radiation-induced recessive lethals are all, or in very large part, due to chromosome breaks. About 1/3 of primary breaks are lethal. Quantitative theory of dominant lethals is also developed. BA 21-2558

4965

RADIATION EFFECTS OF THE ATOMIC BOMB AMONG THE NATIVES OF NAGASAKI, KYUSHU. James S. P. Beck and William A. Meissner. Am. J. Clin. Pathol. 16(9), 586-92(1946).

Clinical observations made 6-7th wk after bombing showed anemia, neutropenia and thrombocytopenia due to depression of marrow. In 7 postmortem examinations, there was confirmatory evidence of bone marrow damage. Evidence of recovery of bone marrow was found both clinically and at post mortem examination. Histologic evidence of lipid depletion of cells of adrenal cortex was found. Aspermatogenesis was noted in some instances. BA 21-2788

4966

ACTION OF X-RAYS ON THE TRANSFORMATION OF NUCLEIC ACID IN JENSEN'S SARCOMA. H. v. Euler and G. v. Hevesy. K. Danska Videnskab. Selskab Biol. Medd. 17(8), 1-38(1942). (In German).

Studies using radioactive P showed that the amount of thymus nucleic acid synthesized in 2 hr corresponded to 2-3% of total nucleic acid in the tumor. Exposure of rat sarcomas to 1000 I. U. of x rays or to 450 r decreased RNA synthesis during experimental period from 1/2 to 1/3 only 5 of 45 sarcomas showed normal

nucleic acid metabolism after x irradiation. Irradiation had no influence on regeneration of acid-soluble P fractions. BA 21-2789

4967

FACTORS AFFECTING THE CYTOCIDAL ACTION OF X-RAYS IN VITRO. Robert Schrek. Cancer Research 6(9), 498(1946).

The 50% survival time of hemic cells in suspension, irradiated with 1000 r at various temperatures, was compared for that of unirradiated cells. BA 21-2790

4968

MUTATION BREEDING IN POLYPLOID CEREALS. J. MacKey. Acta Agr. Scand. 4, 549-557(1954).

In general, the frequency of mutants in the X_2 is higher at the polyploid level than the diploid chiefly on account of the tolerance of chromosome rearrangement at the former level.

4969

THE PATHOLOGIC EFFECTS OF AN INSTANTANEOUS DOSE OF RADIATION. Shields Warren. Cancer Research 6(9), 449-53(1946).

Chief physiologic and pathologic effects of radiation from atomic bomb; (1) effects of heat, producing primary thermal injury of flash burn type, and secondary thermal injuries due to induced fires; (2) effects of short-wave radiation and neutrons, paralleling closely the effects noted in studies of biologic effects of x rays. Immediate and delayed effects are described in detail. BA 21-2792

4970

THE PATTERN OF INJURIES PRODUCED BY THE ATOMIC BOMBS AT HIROSHIMA AND NAGASAKI. S. Warren and R. H. Draeger. U. S. Naval Med. Bull. 46(9), 1349-53(1946).

Individuals exposed to ionizing rays only (not to thermal effects), exhibited: subjective malaise and nausea, lymphocytopenia, injury to gonadal tissue and bone marrow, leukopenia, thrombocytopenia with hemorrhage and anemia. BA 21-3882

4971

COMPARISON OF THE PRIMARY EFFECTS OF X-RAYS AND ULTRAVIOLET ON THE GROWTH OF YEAST. Raymond Latarjet. Ann. Inst. Pasteur 70(9/10), 277-85(1944). (In French).

For both radiations the energy sufficient to stop division of the yeast was measured, and the amounts of energy proved comparable. Minimum volume to be hit, in order to stop reproduction, proved to be 1.32×10^{-16} ml, being a sphere of 64 μ diameter. BA 21-4425

4972

THE BIOCHEMISTRY OF THE MALARIA PARASITE. IV. THE IN VITRO EFFECTS OF X-RAYS UPON *PLASMODIUM GALLINACEUM*. Joseph Ceithaml and E. A. Evans, Jr. J. Infectious Disease 78(3), 190-7(1946).

Exposure of washed parasitized chicken erythrocytes to: 30,000 r in vitro destroyed infectivity and increased oxygen and glucose consumption appreciably, 10,000 r reduced infectivity with no apparent influence on respiration and glucose metabolism; 1000 r, no effect. Injection of irradiated parasitized erythrocytes (30,000 or 10,000r) conferred some degree of immunity to malaria. BA 21-4641

4973

CHANGES IN SENSITIVITY OF CHROMOSOMES TO X-RAY BREAKAGE DURING MICROSPOROGENESIS. A. H. Sparrow. Genetics 32(1), 106-7(1947).

Radiosensitivity curves for Trillium chromosomes show a gradual increase of sensitivity from early meiotic prophase up to metaphase I. Range of sensitivities is large (1-27) and high and low sensitivity stages, respectively, correspond to stages of high and low concentrations of DNA in the chromosomes. BA 21-13302

4974

THE FREQUENCY OF X-RAY-INDUCED CHROMATID BREAKS IN TRADESCANTIA AS MODIFIED BY NEAR INFRARED RADIATION. C. P. Swanson and Alexander Hollaender. Proc. Natl. Acad. Sci. U. S. 32(12), 295-302(1946).

Experiments are reported in which near infrared radiation combined with x rays significantly increased frequency of x-ray induced breaks and rearrangements in microspore chromosomes of Tradescantia. BA 21-13306

4975

CONSTITUTION OF THE SECOND CHROMOSOME OF DROSOPHILA MELANOGASTER AS INDICATED BY X-RAY ANALYSIS. John W. Gowen and Marie S. Gowen. Genetics 32(1), 89(1947).

An abstract. BA 21-13314

4976

CYTOLOGICAL AND EXPERIMENTAL STUDIES ON THE OOCYTES OF FRESH WATER PULMONATES. Ernest W. Hartung, Jr. Biol. Bull. 92(1), 10-22(1947).

Cytoplasmic pattern or ground substance inherent in oocyte was unaffected by x-ray doses below killing intensity. As dosage increased there was a decrease in number of eggs completing embryonic development, no decrease in number of eggs able to initiate development. BA 21-13315

4977

MODIFICATION OF THE FREQUENCY OF CHROMOSOMAL REARRANGEMENTS INDUCED BY X-RAYS IN DROSOPHILA. I. USE OF NEAR INFRARED RADIATION. Berwind P. Kaufmann, Alexander Hollaender, and Helen Gay. Genetics 31(4), 349-67(1946).

Frequency of x-ray-induced chromosomal rearrangements was detected by analysis of salivary gland chromosomes of *D. melanogaster* and was found to be affected by use of near infrared radiation (10,000 Å). BA 21-13316

4978

MODIFICATION OF THE FREQUENCY OF CHROMOSOMAL REARRANGEMENTS INDUCED BY X-RAYS IN DROSOPHILA. II. USE OF ULTRAVIOLET RADIATION. Berwind P. Kaufmann and Alexander Hollaender. Genetics 31(4), 368-76(1946).

Ultraviolet radiation (2537 Å) used subsequent to x rays in treatment of *D. melanogaster* spermatozoa effected a decrease (as compared with controls receiving equivalent x-ray dose) in frequency of chromosomal rearrangements. BA 21-13317

4979

MODIFICATION OF THE FREQUENCY OF CHROMOSOMAL REARRANGEMENTS INDUCED BY X-RAYS IN DROSOPHILA. III. EFFECT OF SUPPLEMENTARY TREATMENT AT THE TIME OF CHROMOSOME RECOMBINATION. Berwin P. Kaufmann. Genetics 31(5), 449-53(1946).

Near infrared radiation is reported to facilitate recombination among breaks induced by x rays. This effect is attributed to selective action on certain cellular components rather than to an extension of the range of temperature within which fertility and viability may be maintained. BA 21-13318

4980

MODIFICATION OF THE X-RAY INDUCED MUTATION RATE IN FUNGI BY PRETREATMENT WITH NEAR INFRARED. Alexander Hollaender and C. P. Swanson. Genetics 32(1), 90(1947).

A significant increase in x ray produced mutations in *Aspergillus terreus* and *Trichophyton mentagrophytes* was observed if spores were previously irradiated with infrared radiation with 7000-18,000 Å, with maximum effect at 10,000 Å. Infrared alone did not produce mutation. BA 21-13338

4981

THE PROBLEM OF HAPLOIDY. (CYTOGENETIC STUDIES ON NICOTIANA HAPLOIDS AND THEIR BEARING ON SOME OTHER CYTOGENETIC PROBLEMS.) Dontcho Kostoff. Bibliographic Genetica (Gravenhage) 13(1), 1-48(1941).

Author mentions increased frequency of haploids induced by x irradiation. BA 21-13340

4982

AFTER THE FIFTEENTH YEAR OF X-RAY TREATMENT OF TULIPS FOR PROMOTING MUTATIONS. W. E. de Mol. Landbouwk. Tijdschr. 1944(687), 173-90(1944).

Among 98 mutations observed in tulips treated with 100-200 r were: 32 of paler color than original, 18 darker, 5 mutating from violet to pink, 4 from pink to violet, 5 producing yellow plastids, 1 yellow producing anthocyan, 12 mutating leaf color, and 20 showing differently shaped flowers or combining different shape and color mutation. Five showed mosaic-like symptoms but it could not be determined whether this is really a virus disease. BA 21-13343

4983

A QUANTITATIVE STUDY OF PHENOCOPY PRODUCTION WITH MONOCHROMATIC ULTRAVIOLET IRRADIATION. Claude A. Villee. Biol. Bull. 92(1), 1-9(1947).

Effect of x rays and ultraviolet rays were compared with respect to phenocopy production in *Drosophila*. BA 21-13375

4984

MEDICAL EXPERIMENTS ON HUMAN BEINGS IN CONCENTRATION CAMPS IN NAZI GERMANY. Kenneth Mellanby. Brit. Med. J. 1947(4490), 148-50(1947).

Among experiments performed on humans in Nazi concentration camps was the sterilization of individuals with x rays. BA 21-13475

4985

PYRIDOXINE HYDROCHLORIDE (VITAMIN B₆) IN THE CONTROL OF RADIATION SICKNESS: PRELIMINARY REPORT. L. D. Scott and G. J. Tarleton. Radiology 47(4), 386-91(1946).

None of 20 patients, irradiated for therapy of various malignant tumors and who also received 25 mg of pyridoxine intravenously, developed nausea or vomiting. BA 21-14334

4986

OBSERVATIONS ON THE EFFECT OF IRRADIATION IN CHRONIC ACQUIRED HEMOLYTIC ANEMIA EXHIBITING HEMOLYTIC ACTIVITY FOR TRANSFUSED ERYTHROCYTES. Robert S. Evans and Rose T. Duane. Blood 2(1), 72-84(1947).

Splenectomy in a 58 yr old woman with chronic, acquired hemolytic anemia was followed by a temporary remission for 18 mo. Irradiation of mediastinal and periaortic nodes was followed by a fall in leucocyte and lymphocyte counts and lessened hemolysis after blood transfusion. BA 21-14359

4987

THE COMBINED EFFECT OF COLCHICINE AND X-RAYS ON THE GROWTH OF ALLIUM CEPA SEEDS. A. Back. Growth 10(4), 375-80(1946).

X-ray doses of 2000 r applied to seeds previously treated with colchicine inhibits linear growth of onion seedlings by 20%. Either treatment alone has no effect on growth. Inhibition is explained on the assumption that colchicine provokes nuclear changes (e.g., polyploidy), thus sensitizing a considerable number of cells to x irradiation. BA 21-15573

4988

THE ABSORPTION OF BETA-RAYS IN PLANT LEAVES AND IN WOOD. S. Prat. Vestník Kralov. Ceske Spolecnosti Nauk, Trida Mat. -prirod 1940(9), 22(1940).

Penetrability of plant tissues by β rays was studied. Plants used: Tradescantia, Aucuba japonica, Abutilon thompsoni, Oplismenes, Adiantum capillus veneris, and Allium cepa. BA 21-15576

4989

INVESTIGATION ON THE BIOLOGIC EFFECT OF SHORT WAVE RADIATION OF ELEMENTS. II-V. INVESTIGATION OF THE BIOLOGIC EFFECT OF PENETRATING RADIATION OF THE ELEMENTS. Daniel Feher. Erdeszeti Kiserletek 45(1/4), 341-60, 162-8(1945). (In German).

Author describes chemical elements known at that time which develop biologically effective, penetrating radiation. From results of radiation experiments with plants, author postulates that living cells of roots absorb radiation and transmit it to tissues and organs that influence growth. BA 21-15530

4990

INCREASE IN INCIDENCE OF LUNG TUMORS IN STRAIN A MICE FOLLOWING LONG-CONTINUED IRRADIATION WITH GAMMA RAYS. Egon Lorenz, Walter E. Heston, Margaret K. Deringer, and Allen B. Eschenbrenner. J. Natl. Cancer Inst. 6(6), 349-53(1946).

Strain A mice of both sexes were exposed daily for 8 hr to radiation (8.8 r of γ) and were killed after 9½ mo of daily exposure (total dose 2500 r $\pm$ 10%). Incidence of pulmonary tumors was approximately 50% higher in experimental mice than in controls. BA 21-16583

4991

ROENTGEN IRRADIATION OF TULIPS AND HYACINTHS FOR THE PRODUCTION OF SOMATIC MUTATIONS. Willem Eduard de Mol. Z. Pflanzenzucht. 26(3/4), 353-403(1944). (In German).

Many somatic mutations produced in tulips and hyacinths are first manifested as sectors and after some years of propagation may be isolated as new clones. X-ray-induced mutations are apparently same as those arising spontaneously. Exposure may activate mosaic virus. BA 21-16315

4992

THE ACTION OF ULTRA-HARD ROENTGEN RAYS ON DROSOPHILA EGGS. D. den Hoed and A. G. Stoel. Acta Radiol. 21, 591-6(1940).

Ultra-hard x rays generated at 825 kv have smaller lethal action than the commonly used 180 kv x rays. No explanation for the observation was found. BA 21-16334

4993

EXPERIMENTS WITH X-RAYS ON COCK SPERMS IN REGARD TO MOTILITY AND FERTILITY. K. J. Johansson. Acta Agr. Suecana. 1(3), 335-43(1946).

Cock sperm were x irradiated with doses of 305-24,000 r (1220 r/min). Less than 610 r had no effect on motility. Higher doses did not reduce motility immediately, but effect was evident after 1 hr. There was no effect on fertilizing capacity of sperm nor on hatchability of egg. BA 21-16336

4994

APPLICATIONS OF β RADIATION OF RADIOACTIVE SUBSTANCES ON THE CEREBRAL CORTEX OF THE CAT. S. de Carvalho. Portugallae Acta Biol. 1A(3), 175-84(1946). (In French)

Cerebral cortices of 17 normal cats were exposed to filtered β rays of Ra E. Only the more penetrating rays, which passed Al filters of 0.10-0.15 mm, gave rise to evident histologic lesions. BA 21-16581

4995

ACTIONS OF RADIATIONS ON LIVING CELLS. D. E. Lea. New York, Macmillan Co. 1947.

Biologic effects produced by x rays, γ rays, electrons, neutrons, and ultraviolet rays on Drosophila, maize, Tradescantia, viruses, bacteria, and Arabacia are described.

Target theory is discussed extensively. Extensive tabular and graphical data are presented. BA 21-16582

4996

THYROID IRRADIATION AND ITS EFFECT ON THE OVARIES. L. Gabbianelli. Pathologica 32(587), 350-63 (1940). (In Italian).

Small x-ray doses applied to thyroid gland of rabbits stimulated development of ovaries; large doses brought on rapid evolution of folliculi followed by immediate involution tending toward cystic degeneration. Results are discussed with reference to the practical field of gynecology. BA 21-16991

4997

THE EFFECTS OF X-RAYS ON A STRAIN OF EBERTHELLA TYPHOSA. Thomas H. Grainger, Jr. J. Bacteriol. 53(2), 165-72(1947).

A strain of Eberthella typhosa isolated from blood of typhoid patient was exposed to x rays of maximum characteristic radiation of 0.712 Å. Loss of motility and change in colony formation from smooth to intermediate form was observed. No organism survived longer than 4½ hr. BA 21-17520

4998

EFFECT OF RADIOACTIVE ELEMENTS UPON DEVELOPMENT OF THE ROOT-NODULE BACTERIA AND UPON THE ASSIMILATION BY THEM OF THE MOLECULAR NITROGEN OF THE ATMOSPHERE. A. A. Drobkov. Compt. rend. acad. sci. URSS 49, 224-6(1945).

Following elimination of Ra and other radioactive elements from nutrient medium, no root nodules are formed on peas. Addition of Ra is followed by development of root-nodule bacteria which assimilated nearly twice as much N as control. Weight of leaves, seeds, and roots increased; plants did not mature earlier than controls. BA 21-17817

4999

PRODUCTION OF STRUCTURAL CHANGES IN SOMATIC CHROMOSOMES OF DROSOPHILA MELANOGASTER. B. M. Slizynski. Nature 159(4028), 66-7(1947).

Either a 5-12 hr exposure to 400 r or exposure to vapor of allyl isothiocyanate produced structural changes in chromosomes of fully grown larval salivary gland. BA 21-18815

5000

THE IMPORTANCE OF THE TIME FACTOR IN THE PRODUCTION OF MUTATIONS BY RADIATION. Karl Eberhardt and Karl G. Zimmer. Fortschr. Gebiete Rontgenstrahlen 61, 176-80(1940). (In German).

Rate of x-ray-induced lethal sex-linked mutations does not depend on dose, while that of ray-induced chromosomal mutations does. Importance of these results for study of mechanism of "release" of mutations and for questions of hereditary lesions and for ray protection is discussed. BA 21-18816

5001

INFLUENCE OF X-RAYS ON RESPIRATION OF NUCLEI OF FOWL ERYTHROCYTES. A. Back and L. Bloch-Frankenthal. Proc. Soc. Exptl. Biol. Med. 66(2), 366-8(1947).

X-ray dose of 1 million r stimulates O₂ uptake of both whole fowl erythrocytes and their isolated nuclei. This dose increased O₂ uptake by nuclei to four times that of whole erythrocyte. Effect was masked when nuclei were suspended in fluids containing albumen or hemolyzed blood. BA 22-15740

5002

EARLY EFFECT OF X-RAYS ON OVARIES OF NORMAL AND ADRENALECTOMIZED RATS. M. Ickowicz. Proc. Soc. Exptl. Biol. Med. 66(3), 646-9(1947).

Adrenalectomy before x irradiation prevented the appearance of pycnotic lesions of cells in the granular layer of the ovarian follicles of rats. Lesions otherwise appeared 4 hr post-exposure. BA 22-15742

5003

STRUCTURAL CHANGES PRODUCED IN MICROSPORES OF *TRADESCANTIA* BY α -RADIATION. J. P. Kotval and L. H. Gray. *Genetics* 48(2), 135-54(1947).

Structural changes observed in chromosomes of *Tradescantia* after immersion of anthers in radon solution resemble those seen after x and γ irradiation; number increases linearly with dose. Changes involving incomplete fusion of broken ends were more numerous than had been observed after comparable exposures to other kinds of radiation. BA 22-15515

5004

EFFECT OF OXYGEN ON THE FREQUENCY OF CHROMOSOME ABERRATIONS PRODUCED BY X-RAYS. J. M. Thoday and John Read. *Nature* 160(4070), 608(1947).

Vicia faba roots were exposed on second day to 175-320 r, while either N_2 or air was bubbled through the medium. Inhibition of subsequent growth was much greater when radiation was delivered in presence of available O_2 . Microscopic study of root tip anaphases 8-12 hr. after irradiation showed more (90% vs 30%) aberrations (bridges or fragments) when irradiation had occurred in the presence of O_2 . BA 22-15524

5005

THE INFLUENCE OF X-RAYS AND NEAR INFRA-RED RAYS ON RECESSIVE LETHALS IN *DROSOPHILA MELANOGASTER*. Berwind P. Kaufmann and Helen Gay. *Proc. Natl. Acad. Sci. U. S.* 33(12), 366-72(1947).

Supplementary treatment of *D. melanogaster* spermatozoa with near infrared radiation does not increase frequency of x ray-induced recessive, sex-linked lethal mutations. Infrared rays are believed to facilitate recombination, at expense of restitution, among ends of chromosomes broken by ionizing radiation. BA 22-15531

5006

INDUCED REVERSIONS OF BIOCHEMICAL MUTANTS IN *NEUROSPORA CRASSA*. Norman H. Giles, Jr. and Esther Zimmer Lederberg. *Am. J. Botany* 35(3), 150-7 (1948).

Effects of various mutagenic agents in inducing adaptations of a number of biochemical mutants in *N. crassa* were studied. X-rays, radiophosphorus, and nitrogen-mustard have proved effective in inducing reversions of inositolless mutant. Genetic and physiological tests, particularly with inositolless mutant, indicate that these adaptations represent reverse mutations to the original wild type allele. BA 22-15545

5007

SPERMATOGONIAL CROSSING OVER BETWEEN THE THIRD CHROMOSOMES IN THE PRESENCE OF THE CURLY INVERSIONS OF *DROSOPHILA MELANOGASTER*. Maurice Whittinghill. *Genetics* 32(6), 608-14(1947).

Author studied the possibility of interchromosomal effects of several inversions upon x-ray induced (± 1000 or less) crossing over in male flies. Offspring of normal males were compared with those of males bearing inversions in 2nd or 3rd chromosome. BA 22-15587

5008

HEPARINEMIA (?) AN ANTICOAGULANT IN THE BLOOD OF DOGS WITH HEMORRHAGIC TENDENCY AFTER TOTAL BODY EXPOSURE TO ROENTGEN RAYS. J. Garrott Allen, Margaret Sanderson, Mary Milham, Alice Kirschon, and L. O. Jacobson. *J. Exptl. Med.* 87(1), 71-86(1948).

After lethal x-ray dose, blood of dogs may prolong clotting time of normal dog blood. Inhibitor substance behaves like heparin, and anti-heparin substances protect

against hemorrhage despite severe thrombocytopenia. BA 22-15739

5009

LOCAL INJURIES OF THE SKIN FROM THE ACTION OF DEUTERONS. Gerhard Schubert and Wolfgang Riezler. *Naturwissenschaften* 33(9), 285-6(1947). (In German).

Irradiation of a 0.5 cm² skin area in guinea pigs for 4-90 sec with deuterons (3.6 mev, tissue penetration -0.12 mm) caused no immediate gross morphologic alteration. Swelling, scabbing, and superficial ulceration were noted on following days, however. After healing, irradiated skin had irregular papillae, elastic fibers were absent. BA 22-15743

5010

MANAGEMENT AND TREATMENT OF EXPOSED PERSONNEL. J. E. Wirth. p. 264-275 of *Industrial Medicine on the Plutonium Project*. (NNEs IV-20). Robert S. Stone, ed. New York, McGraw Hill Book Co., Inc. 1951. (ch. 3761)

Maximum permissible level of exposure to radiation was 100 mr in any 24 hours. If washing failed to cleanse contaminated skin, then potassium permanganate solution followed by a solution of sodium acid sulfite sufficed. (Also used for open skin lesions). Recommendations for treatment of wounds and contamination through inhalation or ingestion are included.

5011

RADIOACTIVITY UNITS AND STANDARDS. R. D. Evans. *Nucleonics* 1(2), 32-43(1947).

Definitions and numerical equivalent values of: electron volt, curie, rutherford, roentgen, roentgen-equivalent-physical, and roentgen-equivalent-man are presented. Discussions, examples, and sample calculations should be useful to biologists concerned with health physics and exposure to radiation during isotope studies. BA 22-15745

5012

THE USE OF ISOTOPES IN SURGICAL RESEARCH. F. D. Moore. *Surg. Gynecol. Obstet.* 86(2), 129-47(1948).

Some practical problems relative to the biologic use of isotopes are discussed briefly. BA 22-15749

5013

THE INHIBITION OF RIBO- AND THYMO-NUCLEIC ACID SYNTHESIS IN TUMOUR TISSUE BY IRRADIATION WITH X-RAYS. Barbara E. Holmes. *Brit. J. Radiol.* 20(239), 450-3(1947).

Uptake of P^{32} in thymo-nucleic acid fraction in Jensen rat sarcoma markedly was inhibited by x rays, ribonucleic acid fraction was inhibited to a lesser extent. Nembutal inhibited uptake of P^{32} in both fractions and should not be used. Hevesy's observation that irradiation of one tumor can affect nucleic acid metabolism of another tumor in the same animal is confirmed. BA 22-16388

5014

PROTOPORPHYRIN 9 AS A PRECURSOR OF CHLOROPHYLL. S. Granick. *J. Biol. Chem.* 172(2), 717-27(1948).

A brown mutant of *Chlorella vulgaris*, containing no green or yellow pigments, was induced by x irradiation for 10-20 min at a rate of 2050 r/min. The brown pigment was isolated and identified as protoporphyrin 9. This porphyrin is identical with porphyrin of blood heme, and is postulated to be a normal metabolic precursor in the synthesis of chlorophyll by *Chlorella*. BA 22-17179

5015

MUTATIONS IN *A. THALIANA* PRODUCED BY X-RAYS. Erna Reinholz. *Naturwissenschaften* 34(1), 26-8(1947).

X-rayed seeds of *A. thaliana* produce chiefly normal plants, a few with fasciations, cleaving of leaves, and other deformations and a single mutant with larger leaves and stronger growth. Second x-rayed generation had variation rate of 62.5%. New leaf characters persisted through eight generations. BA 22-17663

5016

THE GENETICS OF CANCER IN MICE. C. C. Little. Biol. Rev. Cambridge Phil. Soc. 22(4), 315-43(1947).

Genetic implications in transplantability of tumors are discussed. Mechanical factors, x rays, and parabiosis increase probability of growth of implants. Carcinogenic effects of x rays, ultraviolet light, and various chemical substances are mentioned. BA 22-17673

5017

THE DIFFERENCE IN HISTOLOGICAL LESIONS PRODUCED IN THE SKIN OF MICE BY ULTRAVIOLET RAYS AND ROENTGEN RAYS. A. Lacassagne. Acta Radiol. 28(56), 461-7(1947). (In French). BA 22-17822

5018

PTEROYLGLUTAMIC ACID AND RELATED COMPOUNDS. T. H. Jukes and E. L. R. Stokstad. Physiol. Rev. 28(1), 51-106(1948).

Relationship between pteroylglutamic acid and radiation sickness is considered in the course of the review. BA 22-17987

5019

INFLUENCE OF PHARMACOLOGICAL AGENTS ON THE EFFECTS OF IRRADIATION. F. Billinger. Radiology 50(2), 234-43(1948).

Desoxycorticosterone acetate markedly decreased the lethal effect of various x-ray doses in mice and prevented x-ray induced fatty changes in liver; pregnenolone did not show these effects. Vitamin B-complex reduced fatty changes in liver. Vitamin C and B-complex did not produce significant changes in x-ray effects on spleen. BA 22-18335

5020

FURTHER STUDIES ON THE RELATION BETWEEN RADIATION EFFECTS, CELL VIABILITY, AND INDUCED RESISTANCE TO MALIGNANT GROWTH. IV. COMPARISON OF EFFECTS OF ROENTGEN RAYS ON MAMMARY TUMORS AUTOGENOUS TO INBRED STRAINS OF MICE (DBA AND C3H). A. Goldfeder. Radiology 49(6), 724-32(1947).

Dose of 5000 r/air (200 kv, 20 ma, 0.5 mm Cu and 1.0 mm Al filter, HVL 0.9 mm Cu) to adenocarcinoma in vitro was required to prevent implant from producing tumor in dba mice, 2700 r/air required to produce same result in C3H strain. BA 22-18408

5021

RELATIVE EFFECTIVENESS OF DIFFERENT INTENSITIES OF GAMMA RADIATION IN RETARDING MITOSIS IN THE GRASSHOPPER NEUROBLAST. J. Gordon Carlson, Mary Louise Snyder, and Alexander Hollaender. Anat. Record 99(4), Abstract no. 54. p581(1947).

Eggs of *Chortophaga viridifasciata* containing embryos at age of 14 days at 26°C were exposed to x ray doses of (1) 8 r (2) 32 r or (3) 128 r at 32 r per min and 2 r/min. Dose rate (intensity) affected response only in (3) where 32 r/min proved more effective in retarding mitosis. BA 22-19722

5022

EFFECTS OF HEAT ON BREAKAGE OF CHROMOSOMES BY X-RADIATION. Mary Esther Gaulden. Anat. Record 99(4), Abstract no. 53. 581(1947).

Chortophaga viridifasciata embryo neuroblasts were heat-treated by immersing eggs in hot water under various conditions, prior to x irradiation and the number of chromosome fragments was determined. BA 22-19725

5023

CHROMOSOME SENSITIVITY TO X-RADIATION IN OOCYTES OF SCIARA. C. W. Metz. Anat. Record 99(4), 26(1947).

An abstract. BA 22-19730

5024

THE INHERITANCE OF THE GIANT CELL FORMATION IN YEAST, INDUCED BY RADIUM IRRADIATION. R.

Bauch. Arch. Mikrobiol. 13, 352-64(1942/43). (In German). BA 22-19742

5025

MUTATION AND ISOLATION EXPERIMENTS INFLUENCING THE SEX OF *S. FIRNICOLA*. (A CONTRIBUTION TO THE PROBLEM OF THE STABILITY AND LABILITY OF THE SEXUAL REACTIONS IN MONOECIOUS AND DIOECIOUS PLANTS.) Hans Greis. Z. Botan. 37(1/3), 1-116(1941/42). (In German).

Single-spore cultures were x irradiated during ascal meiosis. More than 50,000 single spores isolated from these cultures gave 73 sexual mutations. BA 22-19765

5026

MUTATION INVESTIGATION AND BREEDING. A. Gustafsson. Zuchter 14, 57(1942). (In German).

Author describes x-ray-induced mutations in barley. BA 22-19766

5027

X-RAY TREATMENT OF HEMP. W. Hoffman and E. Knapp. Zuchter 12, 1-9(1940). (In German).

With increased x ray dosage to seeds, plant damage of hemp increased, survivors decreased, sex ratio changed in favor of the females, and percentage of tendrilled plants increased. Authors conclude that it is possible by x irradiation to change sexuality of hemp and to get from the normal dioecious hemp a constant monoecious strain. BA 22-19775

5028

BACK-MUTATION AND ADAPTATION OF NUTRITIONAL MUTANT. F. J. Ryan. Cold Spring Harbor Symposia Quant. Biol. 11, 215-27(1946).

Biochemical deficiencies similar to those inducible in *Neurospora* may be induced in *E. coli* by irradiation and chemical means. Back mutations of these mutants occur in one step and are spontaneous in that they are not induced by absence of nutritional factors from the medium. BA 22-19824

5029

THEORIES OF THE BIOLOGICAL ACTIONS OF IONIZING RADIATIONS. C. B. Allropp. Brit. J. Radiol. 21(242), 72-4(1948).

Author discusses "poison" and "target" hypotheses. BA 22-20114

5030

EFFECTS OF ROENTGEN-RAY IRRADIATION ON THE TESTES OF RABBITS. POSSIBLE HARMFUL EFFECTS ON HUMAN TESTES FROM LOW VOLTAGE ROENTGEN-RAY THERAPY. J. Lamar Callaway and Sherwood W. Barefoot. Arch. Dermatol. and Syphilol. 56(4), 471-9(1947).

In rabbits, doses of 300-400 r suppress spermatogenesis; 600-650 temporarily arrests it; 950-1500 r produces permanent arrest; doses over 1200 r produced sterility. No arrest of spermatogenesis is apparent following 300, 600, or 900 r of x rays directed to human testes. BA 22-20115

5031

AGENTS INFLUENCING EXPERIMENTAL RADIATION INJURY. EFFECT OF FOLIC ACID AND PYRIDOXINE. Anna Goldfeder, Lionel Cohen, Charlotte Miller, and Margaret Singer. Proc. Soc. Exptl. Biol. Med. 67(3), 272-8(1948).

Treatment of mice with folic acid or pyridoxine hydrochloride for a period before and after exposure to 350 r significantly prolonged survival. No appreciable effect of these drugs on hemopoietic system was noted. BA 22-20116

5032

STUDIES ON RADIOSENSITIVITY OF CELLS. L. O. Jacobson, E. K. Marks, E. O. Gaston, E. L. Simmons, and M. H. Block. Science 107(2775), 248-50(1948).

Effect of whole body exposure of animals with previously induced regenerative anemia to an 800 r x ray dose was compared with effect of same dose on normal similarly irradiated animals. Normal irradiated animals developed anemia that reached its maximum in 14 days; animals with previous anemia developed no further anemia. Data (including marrow studies) indicate that increased mitotic activity and erythropoiesis does not increase radiosensitivity. BA 22-20117

5033

STUDIES ON THE EFFECTS OF RADIATION UPON THE MOBILE VISIBLE LIPIDS IN HUMAN BLOOD. K. Setälä. Ann. Med. Exptl. et Biol. Fenniae (Helsinki) 25 (Suppl. 1), 1-58(1947).

Data are presented to show that Ra and x rays regularly cause changes in amount and in metabolism of mobile visible blood lipids in both healthy and tumor-bearing individuals. Greatest effects were produced when radiation was applied to lower abdomen, liver, chest, and body organs harboring necrotic tumors. BA 22-20118

5034

SOME BIOLOGICAL EFFECTS DUE TO NUCLEAR FISSION. C. A. Tobias, P. P. Weymouth, L. R. Wassermann, and G. E. Stapleton. Science 107(2770), 115-8(1948). MDDC-1239

Colloidal U oxide, enriched with radioactive U^{235} , was injected into mice; 3 days later they were bombarded with sublethal dose of slow neutrons. All these mice died within 3 wk, some within 8 days. Neutron bombardment without U killed no control mice; neither did U that had not been subjected to fission by neutron bombardment. Mice also lived when x rays were substituted for neutrons. BA 22-20126

5035

VALUE OF INDUSTRIAL RESEARCH INSTITUTES TO FOOD TECHNOLOGY. W. L. Campbell. Food Technol. 1(4), 497-502(1947).

Comments are made on use of sonic, supersonic, and radar frequencies in food sterilization; use of x rays and cathode rays in this work and some limitations of the ionizing radiations are mentioned. BA 22-20358

5036

CONTROL OF HEMORRHAGIC SYNDROME AND REDUCTION IN X-IRRADIATION MORTALITY WITH A FLAVANONE. Paul E. Rekers and John B. Field. Science 107(2766), 16-17(1948).

Twenty-five dogs received 50 mg of rutin 3 times/day orally for 1 wk before irradiation and continuing throughout the test, while 25 others were irradiated and served as controls receiving no rutin. Following single 350 r dose, 16 control dogs died in 13-30 days, while 3 of 25 treated dogs died in 16, 28, and 31 days later. BA 22-20912

5037

INDUCTION OF LEUKEMIA IN EIGHT INBRED STOCKS OF MICE VARYING IN SUSCEPTIBILITY TO THE SPONTANEOUS DISEASE. Arthur Kirschbaum and Harry W. Mixer. J. Lab. Clin. Med. 32(6), 720-31(1947).

Of several agents capable of inducing leukemia in mice, x rays are probably the only one effective in all strains and are less dependent upon genetic constitution of stock involved than are most other agents. BA 22-20977

5038

IRRADIATION OF EXPERIMENTAL CEREBRAL TUMORS. I. EXPERIMENTAL PRODUCTION OF BRAIN TUMORS IN MICE II. SOME OBSERVATIONS ON THE EFFECT OF X-RADIATION ON EXPERIMENTAL GLIOMATA IN MICE K. Tansley and C. W. Wilson. Radiology 49, 62-71(1947).

Implanted tumors in mice were irradiated (180 kv, 0.5 mm Cu and 1.0 mm Al, HVL 0.93 mm Cu, distance 25 cm, intensity 154 r/min) with doses of 1623, 2434,

2850, and 3247 r/air. Arrest of growth increased with increasing dose, in no case was tumor entirely destroyed. Histological effects of irradiation are described. BA 22-20104

5039

DESTRUCTION OF THE GENITAL GLANDS OF THE THIRTEEN DAY OLD MOUSE EMBRYO BY IRRADIATION WITH X-RAYS. Albert Raynaud and Marcel Frilley. Ann. endocrinol. (Paris) 8(5), 400-19(1947). (In French).

Local x irradiation of genital primordia region of 3 male and 3 female 13-day mouse embryos in utero was followed by histologic examination at term. Except for complete destruction of gonads, genital organs and mammary glands of the females were normal. In the males, primordia of accessory sexual glands were undeveloped; external genitalia were feminized. BA 22-21170

5040

MUTATIONS IN BACTERIA INDUCED BY RADIATIONS. M. Demerec and R. Latarjet. Cold Spring Harbor Symposia Quant. Biol. 11, 38-50(1946).

X-irradiation (0.35 A) induces mutations in *E. coli* causing them to be resistant to bacterial viruses (T-1). Sterilization rate is higher with x rays than with ultraviolet, but mutation rate is higher with ultraviolet. BA 22-21268

5041

RADIATIONS AND CELL DIVISIONS. Arthur C. Giese. Quart. Rev. Biol. 22(4), 253-82(1947).

Ionization by x rays and γ rays, neutrons, and particulate radioactive emanations lowers rate of cell division mainly by increasing the interval between divisions. Author discusses "target" and "poison" theories. BA 22-22896

5042

THE EFFECTS OF X-RAYS ON THE MITOTIC ACTIVITY OF MOUSE EPIDERMIS. Norman P. Knowlton, Jr., Louis H. Hempelmann, and Joseph G. Hoffman. Science 107(2789), 625-6(1948).

CF_1 mice, 6-8 wk old, were exposed to 250 kvp x rays, 50 r/min. Change in mitotic index was studied for doses of 5-325 r. In animals receiving 35-325 r, minimum mitotic activity is < 1 mitosis/100,000 cells, which is reached less than 2 hr postexposure. Return to normal varies from 5 hr at 35 r to 6 days at 325 r. Overcompensation is evident at 325 r, with mitotic activity more than double that of normal on the 8th day postirradiation. BA 22-22961

5043

CROPS AND PLANT BREEDING. G. D. H. Bell. J. Roy. Agr. Soc. Engl. 108, 1-14(1947).

The use of x rays and cholechicine in the production of new lines of crop plants in Britain is reviewed. BA 22-22980

5044

Naval Radiological Defense Lab., San Francisco. THE EFFECTS OF COMBINED ADMINISTRATION OF STRONTIUM-90 AND EXTERNAL RADIATION. S. H. Cohn and W. L. Milne. May 21, 1956. 24p. Project NM 006-015. 04. (USNRDL-TR-89).

Platelet levels, body weight, mortality, bone alkaline phosphates and thymine and spleen weights were studied following administration of Sr^{90} and total body x irradiation alone and in combination. Platelet level was the most sensitive index of injury. It (1) fell faster, recovered more slowly after simultaneous Sr^{90} and x irradiation; (2) fell in proportion to Sr^{90} dose, alone or with x rays, (3) indicated residual damage proportional to Sr^{90} body burden when marrow was stressed (625 r x rays) 30 days after Sr^{90} . Acute effects and additivity of Sr^{90} and x ray effects are described also. NSA 10-7400

5045

THE EFFECT OF ROENTGEN IRRADIATION ON EPIPHYSEAL GROWTH. II. EXPERIMENTAL STUDIES UPON THE DOG. John A. Reidy, James R. Lingley, Edward A. Gall, and

Joseph S. Barr. J. Bone and Joint Surg. 29(4), 853-73 (1947).

Twelve puppies of both sexes were x rayed (300-1200 r) over selected joints the treated areas including joint, epiphysis, and adjacent metaphysis. Weight and torso size were unaffected, longitudinal growth of treated **extremities was retarded in all cases. There was less retardation of growth after 800 r than after 1000r, no difference in effect on radius and ulna between 1000 and 1200 r.** BA 22-23202

5046

INFLUENCE OF X-RAYS ON PITUITARY BODY CHANGED THROUGH TREATMENT WITH ESTRONE OR CASTRATION. A. Baidins, L. Claesson, and A. Westman. Gynaecologia 125(1/2), 9-20(1948). (In German).

Rats treated with estrone and x rays, compared with those treated only with estrone, showed increase in weight and strong luteinization, but no difference in the histologic picture of pituitary bodies. X-rays have no effect on pituitary bodies of castrated female rats. BA 22-23827

5047

THE TRANSMISSION OF RADIO-STRONTIUM AND PLUTONIUM FROM MOTHER TO OFFSPRING IN LABORATORY ANIMALS. Miriam F. Finkel. Physiol. Zool. 20(4), 405-21(1947).

Radio-Sr and Pu decreased the incidence of pregnancy in mice and rats and increased number of stillbirths. Offspring of Sr treated (when pregnant) mothers show retarded growth, long bone malformation, anemia, and osteogenic sarcoma. BA 22-23848

5048

SERUM CALCIUM FOLLOWING ROENTGEN-INHIBITION OF THE HYPOPHYSIS OF PREGNANT WOMEN. T. Paladino. Boll. soc. ital. biol. sper. 22(4), 299-301 (1946). (In Italian).

Twelve pregnant females were given x-ray treatment of hypophysis for 10-30 days during third trimester of pregnancy. Serum Ca in milligrams percent diminished from an average of 11.03-9.62. BA 22-23882

5049

PHYTOPHARMACOLOGICAL EXPERIMENTS WITH URETHANE. David I. Macht. Proc. Soc. Exptl. Biol. Med. 67(2), 237-40(1948).

Root growth of normal seedlings of *Lupinus albus* were only slightly affected by solutions of ethyl carbamate or urethane. Seedlings irradiated with short x rays, 500 r, and vernalized seedlings were very readily poisoned by these drugs. BA 22-25403

5050

CYTOTOXICOLOGICAL STUDY OF THE EFFECT OF DIVERSE PHYSICAL AND CHEMICAL AGENTS ON WHEAT SEEDLINGS. Henri Ollivier. Rev. can. biol. 7(1), 35-160(1948). (In French).

An account of x ray and Ra emanation effects on germination of wheat is included. BA 22-25404

5051

COMPARISON BETWEEN THE ACTION OF HEAT AND OF α -IRRADIATION ON THE ANTIGENIC POWER AND THE PROPERTIES OF TYPHOID BACILLI. H. R. Olivier and P. Bonet-Maury. Ann. inst. Pasteur 72(3/4), 222-9 (1946). (In French).

Typhoid and paratyphoid bacilli after exposure to α rays become avirulent but remain motile and show normal respiration and are more antigenic than bacilli killed by heat. Thus α irradiation separates the virulence and antigenic power and offers general method of obtaining vaccines which have most of the properties of bacteria but have lost virulence. BA 22-24598

5052

A MATHEMATICAL THEORY OF CHROMOSOMAL

REARRANGEMENTS. J. B. S. Haldane and D. E. Lea. J. Genetics 48(1), 1-10(1947).

A theory covering the process of structural rearrangement of chromosomes following irradiation is given. BA 22-10558

5053

DIFFERENTIAL REJOINING AS A FACTOR IN APPARENT SENSITIVITY OF CHROMOSOMES TO X-RAY BREAKAGE. Arnold H. Sparrow. Am. J. Botany 34(10), 589(1947).

An abstract. BA 22-10571

5054

THE PRODUCTION OF MUTATIONS. H. J. Muller. J. Heredity 38(9), 259-70(1947).

This review includes a discussion of chromosomes analysis, radiation effects, somatic radiation effects, and frequency of mutations. Induced and natural mutations are compared. Author emphasizes responsibility of radiologists in protecting human germ plasma against radiation injury. (Paper is in text of Nobel Prize lecture). BA 22-10627

5055

THE METABOLISM OF THE FISSION PRODUCTS AND THE HEAVIEST ELEMENTS. J. G. Hamilton. Radiology 49(3), 325-43(1947). BA 22-10789

5056

THE BIOLOGIC EFFECTS OF PILE RADIATIONS. P. S. Henshaw, E. F. Riley, and G. E. Stapelton. Radiology 49(3), 349-60(1947).

Studies made with CF₁, ABC, A, and C58 mice to determine early and late effects of periodic and single exposures to fast neutrons, slow neutrons, γ rays, and β rays are reported. Late effects of all types of exposure were: generalized atrophy and neoplasia in the hemopoietic organs, weight loss, histological changes and shortened life span. Survival time was one of the most sensitive responses. BA 22-10790

5057

HEMATOLOGICAL EFFECTS OF IONIZING RADIATIONS IN THE TOLERANCE RANGE. L. O. Jacobson and E. K. Marks. Radiology 49(3), 286-96(1947).

Possibility of detecting blood changes in chronic exposure to ionizing radiations was studied in mice, rabbits, guinea pigs, dogs and human beings. Lymphocyte reduction in peripheral blood is most sensitive indicator of acute or subacute exposure to externally originating ionizing radiation or internally deposited radioisotopes. BA 22-10791

5058

CARCINOGENIC PROPERTIES OF RADIOACTIVE FISSION PRODUCTS AND OF PLUTONIUM. H. Lisco, M. Finkel, and A. Brues. Radiology 49(3), 361-2(1947).

Late effects of various modes of treatment with radiostrontium, Y, Ce, Ra, and Pu were studied in mice, rats, and rabbits. BA 22-10792

5059

BIOLOGICAL STUDIES IN THE TOLERANCE RANGE. E. Lorenz, W. L. Heston, A. B. Eschenbrenner, and M. K. Deringer. Radiology 49(3), 274-85(1947)

Mice, guinea pigs, and rabbits were exposed (whole body) to irradiation at dose rates of 8.8, 4.4, 2.2, 1.1, and 0.11 r given in 8 hr or 24 hr/day during their entire life span or for limited periods. Effects on: ovaries, weight, life span, hematopoietic system, and induction of tumors are described. BA 22-10793

5060

THE CLINICAL SEQUENCE OF PHYSIOLOGICAL EFFECTS OF IONIZING RADIATION IN ANIMALS. C. L. Prosser, et al. Radiology 49(3), 299-312(1947).

Clinical picture and conditions resulting in death vary with dose rate and duration of exposure for both external and internal irradiation. Six patterns of reaction to exposure

are described (patterns determined by magnitude of dose).
BA 22-10794

5061

COMPONENTS OF THE ACUTE LETHAL ACTION OF SLOW NEUTRONS. R. E. Zirkle. *Radiology* 49(3), 271-3(1947)

Author discusses the two principal components of lethal action of slow neutrons. One acts through recoil protons and carbon nuclei produced in the transmutation of nitrogen, $N^{14}(n,p)C^{14}$, another acts through γ radiation emitted when hydrogen captures neutrons, $H^1(n,\gamma)D^2$. Induced radioactivity accounts for only 1% of total lethal action. BA 22-10796

5062

EFFECTS OF RADIOTOXIC DOSAGES OF I^{131} UPON THYROID AND CONTIGUOUS TISSUES IN MICE. Aubrey Gorbman. *Proc. Soc. Exptl. Biol. Med.* 66(1), 212-3(1947).

Single intracutaneous doses of I^{131} ranging from 3-50 mc/kg were given to mice. Histological changes in thyroid are described. Lesions were noted in tracheal epithelium with all doses and in recurrent laryngeal nerve with higher dosages. BA 22-10798

5063

INDUCTION OF OVARIAN TUMORS IN MICE BY X-RAYS. J. Furth and M. C. Boon. *Cancer Research* 7(4), 241-5(1947).

Following irradiation of 4-6 wk old mice with 87, 175, or 350 r, ovarian tumors began to appear when mice were about 11 mo of age. Frequency of these neoplasms increased with time and almost every mouse that lived 17 mo developed either unilateral or bilateral ovarian growth, irrespective of dose. BA 22-11295

5064

MORPHOLOGIC CHANGES IN THE LYMPHOCYTES OF PERSONS EXPOSED TO IONIZING RADIATION. A. Dickie and L. H. Hempelmann. *J. Lab. Clin. Med.* 32(9), 1045-59(1947).

In individuals chronically exposed to ionizing radiation, the total leucocyte count is statistically decreased. Absolute number of percentage of lymphocytes is without significant change, but there is a striking increase in cytoplasmic bodies. These appear in supravital stained preparations but not in fixed specimens. BA 22-11351

5065

LETHAL AND SUBLETHAL EFFECTS OF X-RAYS ON *ESCHERICHIA COLI* AS RELATED TO THE YIELD OF BIOCHEMICAL MUTANTS. Raymond R. Roepke and Florence E. Mercer. *J. Bacteriol* 54(6), 731-43(1947).

Authors present an equation showing that the greater the percentage of cells killed by x rays, the greater will be the percentage of mutant cells among survivors. The ratio does not hold, however, with very high doses. BA 22-11475

5066

THE INFLUENCE OF THE IRRADIATION EFFECT ON THE OXYGEN UTILIZATION. H. Kubo. *Strahlentherapie* 33, 70-88(1929). (In German).

Urinary C:N in rabbits was lower after x ray exposure of various parts of body, returned to normal in approximately two weeks. Effects differed from those following exposure to ultraviolet, Ra, and Th.

5067

X-RAY SENSITIVITY OF THE STAGES OF MITOSIS. Alan D. Conger. *Am. J. Botany* 34(10), 582(1947).

An abstract. BA 22-13028

5068

GENETIC AND GENERAL BIOLOGICAL EFFECTS OF RADIATION AS FUNDAMENTALS OF OUR VIEWS ON

HEREDITARY LESIONS. Gerhard Schubert. *Roentgen-Praxis* 13(1), 1-14(1941). (In German). BA 22-13048

5069

GENETICS OF PEARS. HYBRIDS PRODUCED WITH POLLEN TREATED EITHER WITH ELECTROMAGNETIC CURRENTS OR WITH ULTRA-VIOLET OR X-RAYS. M. R. Celestre. *Italia agric.* 83(8), 455-60(1946).

Pollen used in crossing highly fertile pear varieties was exposed to either electromagnetic fields, ultraviolet, or to x rays. Trees grown from seed developed slowly and resembled wild trees with thorny branches in early years; only in later years did they resemble cultivated plants. Some of the progeny were disease resistant (especially to *Fusicladium*) others showed increased drought resistance. BA 22-13055

5070

HISTOLOGICAL CHANGES FOLLOWING RADIATION EXPOSURES. W. Bloom. *Radiology* 49(3), 344-7(1947).

Effects of x rays, fast and slow neutrons, γ rays from Ra, β rays of P, Ra, Pu, Na^{24} , P^{32} , Ba^{140} - La^{140} , Sr^{89} , radio Zr, Y^{91} , and radio Ce; on mice, rats, rabbits, guinea pigs, and chickens are summarized. LD_{50-30} and fractions thereof were used in most studies. BA 22-13280

5071

SENSITIZATION TO HEAT BY X-RAYS. Arthur C. Glese and H. Duane Heath. *J. Gen. Physiol.* 31(3), 249-58(1948).

Soft x rays (20 kv, Ag target) at dosage rate of 56,000 r/min killed *Paramecium caudatum* after dose of 600,000 r if protozoans were kept in irradiated medium, but only after double this dose when immediately transferred to fresh medium. Dosages of 56,000-280,000 r sensitized the cells to heat, 1/8 the lethal heat exposure was required to kill. BA 22-13281

5072

EFFECTS OF X-RAY IRRADIATION ON VISCOSITY OF SYNOVIAL FLUID. C. Ragan, C. P. Donlan, J. A. Coss, Jr., and A. F. Grubm. *Proc. Soc. Exptl. Biol. Med.* 66(1), 170-2(1947).

In vitro reduction of synovial fluid viscosity after exposure to x rays varies directly with dose. Reduction in viscosity of pure Na hyaluronate solutions was also noted but to lesser degree. Hyaluronic acid content was stable and still susceptible to enzymatic hydrolysis after exposure to x rays. It is suggested that x rays may cause breaking of secondary valences present in synovial fluid hyaluronic acid without change in hyaluronic acid molecule. BA 22-13284

5073

PRIMARY AND SECONDARY VACUOLES IN THYMIC CELLS EXPOSED IN VITRO TO X-RAYS. Robert Schrek. *J. Cellular comp. Physiol.* 30(3), 203-24(1947).

Rabbit thymus cell suspensions were irradiated with 1000 r and incubated aerobically at 37°C. After 3 hr incubation, cells were viable, but many had primary, intra-nuclear, acidophilic vacuoles, after 24 hr, secondary "vacuoles" were seen which were shown in stained sections to be pyknotic nuclei. BA 22-13283

5074

ON THE EFFECT OF X-RAYS ON FEATHER GROWTH. J. Steinbacher. *Zool. Anz.* 142(7/8), 151-9(1943). (In German)

Results of irradiating plucked areas of doves with various doses at various intervals indicate that differentiating feathers are more radiosensitive than the undifferentiated feather germ. Doses ranged from 200-1000 r. BA 22-13285

5075

THE MUTATIONS FOR REDUCED PRODUCTION OF PENICILLIN. P. de Somer. *Bull. soc. chim. biol.* 29, 364-6(1947). (In French).

Irradiation by ultraviolet light or x rays results in diminution of penicillin produced by four types of Penicillium (designated as 2000, NRRL 1951B25, St63638, 1984A). Rare cultures may show marked increase in yield of penicillin but diminished or suppressed pigment formation. BA 22-14314

5076
THE DISTRIBUTION OF ROENTGEN-INDUCED ALTERATIONS IN THE CHROMOSOMES OF BELLEVALIA ROMANA. Hans Marquardt. Bern. deut. botan. Ges. 60(2), 94-124(1942). (In German).

Study of 2700 mitoses in Roman hyacinth pollen x-rayed prior to division showed all chromosomes to be equally liable to alteration by x rays, frequency of breaks and translocations was proportional to chromosome lengths. Breaks occurred more often in commissure-to-subterminal end than in subterminal end than in subterminal-to-median region. Translocations increased in frequency from subterminal end to commissure in all four chromosomes BA 19-52

5077
RESEARCHES WITH X- AND GRENZ-RAYS ON THE PUPAE OF DROSOPHILA MELANOGASTER. Ruth Ehrmanova-Friedlander. Berne, Dissertation. 1941. 16p. BA 19-61

5078
THE EFFECT OF TOTAL-BODY IRRADIATION ON BLOOD VOLUME IN SPLENECTOMIZED DOGS. Lukin L. Skvortsov. Thesis. Columbia University, Faculty of Pure Science. 1955.

5079
ROENTGEN RADIATION DISINTEGRATION OF MNEMIOPSIS (COMB JELLY). T. C. Evans Anat. Record 87(4), 13(1943).
An abstract. BA 19-214

5080
LEUKEMIA IN MICE FOLLOWING EXPOSURE TO X-RAYS. P. S. Henshaw. Radiology 43, 279-85(1944)

C57 mice were x irradiated with single doses of 200 r/air (200 kv, 20 ma, 0.5 mm Cu and 1.0 mm Al filter, distance 38 cm) over whole body at four-week intervals as long as there was no apparent effect on health of animals. Continuous blood records showed general depression of leucocyte level during treatment, followed by slow return to normal after treatment was discontinued. Some animals developed marked leukocytosis during phase and at death had leucemic infections. Hyperplasia of hematopoietic was organs seen in all these cases. BA 19-215

5081
SOME ASPECTS OF THE BIOLOGICAL ACTION OF X-RAYS ON COCK SPERMATOOZOA. Igor L. Kosin. Physiol. Zool. 17(3), 289-319(1944).

Fertilizing capacity of cock spermatozoa was destroyed by soft x-ray dose of 5544-6488 r in vitro. No effect was seen for 10 days after exposure, but total functional life span has shortened. X-irradiation of male gametes resulted in preponderance of male chicks hatching from zygotes fathered by such gametes. Lethality of embryos fathered by irradiated spermatozoa was associated with increased frequency of abnormal development. BA 19-216

5082
EFFECT OF ROENTGEN RAYS ON THE MINUTE VESSELS OF THE SKIN IN MAN. E. P. Pendergrass, P. J. Hodes, and J. Q. Griffith. Am. J. Roentgenol. Radium Therapy 52(2), 123-7(1944).

Changes in relative count of cutaneous capillaries (number visible/total number present) following administration of 300 r, 200 kv x rays in 3/4 min, 7.2 min, and 30.8 min were the same, an increase after 6 hr was almost gone after 24 hr. Same dose of 50 kv x rays resulted in a mild effect at 6 hr, was much more pronounced at

24 hr. (Total number capillaries was determined after local administration of histamine.) BA 19-217

5083
ACTION OF RADIOACTIVE SUBSTANCES ON THE SPEED OF GROWTH OF PENICILLIUM NOTATUM AND THE PRODUCTION OF A POTENT PENICILLIN. Richard Jähnel, Ethel Guberman, and Rafael Kazdan. Science 100(2596), 298(1944).

Experiments are described which demonstrate possibility of decreasing time required for growth of P. notatum and obtaining active penicillin in presence of radon and its deposits. Addition of a fluorescent substance to medium in which radioactive substances are present improves effects of radioactive elements. BA 19-1267

5084
RADIOBIOLOGICAL STUDIES ON THE LYSOGENIC SYSTEM IN E. COLI K₁₂. I. X-RAYS. H. Marcovich. Ann. Inst. Pasteur 90, 303-19(1956).

Author presents an analysis of dose-response relationship in studies in which the criterion of effect was the number of phage centers observed in cultures of a lysogenic bacterium. As dose increased, number of induced colonies increased to a maximum and then decreased with further increases in dose. Possible explanations (1) x rays induced conversion of prophage to vegetative phage and simultaneously damaged ability of bacteria to synthesize phage or (2) a system that was merely inactivated by a single event may have been destroyed by two such events.

5085
THE EFFECT OF IONIZING RADIATION ON THE BROAD BEAN ROOT. IV. SUMMATION OF THE EFFECT OF RADIATION OF DIFFERENT ION DENSITY. A NEUTRON PLUS GAMMA RADIATION. B. ALPHA PLUS X RADIATION L. H. Gray and John Read. Brit. J. Radiol. 17(201), 265-71(1944).

Bean roots were exposed in succession to either (1) γ plus neutron rays or (2) x plus alpha rays. Data from (1) were inconclusive. For (2) to kill $\frac{1}{2}$ the roots, it was necessary to administer slightly more than half a mean lethal dose of each. Primary cell injury responsible for death of root was apparently the same for whichever radiation was used. Differences in mean lethal doses are ascribed to difference in radiation efficiency. BA 19-1619

5086
A NOTE ON THE PRELIMINARY STUDIES ON THE EFFECTS OF X-IRRADIATION UPON GROWTH AND DEVELOPMENT OF JUTE PLANT. B. C. Kundu. Science and Culture (India) 9(12), 559(1944).

Vitality of plants from irradiated seedlings was first depressed, then enhanced in later growth stages. X-ray effects included: bifurcation at tips, bushiness, number of leaves at single internode different from control, increase in amount of xylem. Moist seeds were more radiosensitive than dry ones. BA 19-1620

5087
ON THE COMPARISON OF α -RADIATION SENSITIVITY OF NUCLEUS AND CYTOPLASM. J. Petrova. Ber. deut. botan. Ges. 60(2), 148-51(1942). (In German).

Zygnema cells were irradiated with α rays of Po with depth of penetration limited by filters, radiation concentrated on either the nucleus or cytoplasm of the algal cell. Dosage required to kill cell by irradiation of cytoplasm was 700 times that required to kill cell by exposure of nucleus. BA 19-1622

5088
EFFECT OF X-IRRADIATION OF RATS UPON THEIR RESISTANCE TO TRYPANOSOMA LEWISI. Dorothy Neuhoof Naiman. J. Parasitol. 30(4), 209-28(1944).

Infection ranged from 2 to 8 times as high in irradiated rats as in controls. Ability to produce antibody against *T. lewisi* was diminished by exposure. Sharp reduction in circulating leucocytes following x irradiation was considered not to be the major factor in decreased resistance since leucocyte level had returned to normal at peak of infection. BA 19-1806

5089
EFFECT OF X-RAYS UPON FLECKING IN THE DOMESTIC PIGEON. Leon J. Cole. *Physiol. Zool.* 18(2), 167-75 (1945).

Number and extent of flecks in feathers of pigeons heterozygous for two colors is definitely increased by exposure of follicles to 750 and 1000 r x-ray doses. Author concludes that x rays increase frequency of change which is the same type as that occurring spontaneously in feather germs of pigeons of genotypes concerned BA 19-15284

5090
THE INEFFECTIVENESS OF TEMPERATURE IN INFLUENCING THE PRODUCTION OF MUTATIONS BY X-RAYS. J. K. Makhiani. *J. Univ. Bombay* 13(16), 1-13(1944).

Cy D D. melanogaster males were x rayed (50 kv, 10 ma, 1 mm Al filter, 17 cm target distance, for 20 min, dose of 2000 r) at 4-6°C and 36-38°C. Males were crossed with C1 B/scar virgin females. No significant difference in lethal mutations and translocations was observed in F₁ and F₂ of the two groups. Temperature coefficient for lethal mutations and translocations during exposure was very nearly 1. BA 19-15302

5091
EFFECTS OF X-RAYS ON HATCHABILITY AND ON CHROMOSOMES OF HABROBRACON EGGS TREATED IN FIRST MEIOTIC PROPHASE AND METAPHASE. Anna R. Whiting. *Am. Naturalist* 79(782), 193-227 (1945). BA 19-15318

5092
CELLULAR DYNAMICS IN THE INTESTINAL MUCOSA: THE EFFECT OF IRRADIATION ON EPITHELIAL MATURATION AND MIGRATION. Nathan B. Friedman. *J. Exptl. Med.* 81(6), 553-8(1945).

Although irradiation of the duodenum of rats inhibits mitosis in crypts and halts normal passage of cells up the villi, maturation of goblet cells is unaffected. BA 19-15862

5093
A CONTRIBUTION TO THE TREATMENT OF POST IRRADIATION NECROSIS. J. E. Moseley. *Radiology* 44(3), 262-5(1945).

Author reports two cases of postirradiation necrosis in which application of estrogenic ointment brought about complete healing of ulcers. BA 19-15948

5094
FURTHER STUDIES ON THE RELATION BETWEEN RADIATION EFFECTS, CELL VIABILITY AND INDUCED RESISTANCE TO MALIGNANT GROWTH. II. EFFECTS OF ROENTGEN RAYS ON BAGG-JACKSON MOUSE CARCINOMA 755 IRRADIATED IN VITRO AND IN SITU. A. Goldfeder. *Radiology* 44(3), 283-92(1945).

X-ray dose necessary to prevent an implant from producing a tumor does not differ widely from that required to destroy a tumor in situ, provided an inbred strain of mice is used. BA 19-16207

5095
EXPERIMENTAL ROENTGEN INJURY. V. EFFECTS ON HEMATOPOIETIC RESERVES AND REGENERATIVE CAPACITY. Paul S. Henshaw, Jean W. Thompson, and Henry L. Myer. *J. Natl. Cancer Inst.* 5(4), 233-47(1945).

C₃H mice were exposed to 0, 12½, 25, 50, 100, 200, or 400 r. Mild injury in hematopoietic organs was seen after repeated small exposures, acute extensive destruction after large doses. Guinea pigs exposed to 25, 50, or 100 r showed same effects, but exhibited greater general susceptibility. BA 19-16215

5096
CHANGES IN THE UTERUS AFTER ERADICATION OF ENDOMETRIAL ADENOCARCINOMA BY RADIOTHERAPY. John F. Sheehan, Herbert E. Schmitz, and Janet Towne. *Arch. Pathol.* 39(4), 237-56(1945). BA 19-16247

5097
INFLUENCE OF THE ALKALINE CHLORIDES (LITHIUM, CALCIUM, AMMONIUM, CESIUM, RUBIDIUM) AND THE THORIUM-URANIUM RAYS ON COLD-SENSITIVITY AND SPORES FORMATION OF MEGATHERIUM AND MESENTERICUS ON AGAR SLANTS. M. Cicconi. *Zentr. Bakteriöl., Parasitenk. Abt. I. Orig.* 150(5), 263-7 (1943). (In German).

Radiation with Th-U appeared to stimulate viability and spore formation, spores remaining viable at ice box temperature. BA 19-16580

5098
THE RELATIVE SUSCEPTIBILITY OF NORMAL AND X-RAYED MICE OF DIFFERENT STOCKS TO PNEUMOTROPIC VIRUSES. P. F. DeGara and J. Furth. *J. Immunol.* 50(5), 255-64(1945).

Total irradiation with 300 r given 24-48 hr before intranasal infection significantly increased susceptibility of mice of all stocks studied to small infecting doses of pneumotropic viruses. BA 19-16777

5099
THE RADIOACTIVITY OF THE MINERAL WATERS OF CACHEUTA. Natalia M. Sales de Cogorno. *Rev. asoc. med. argentina* 58(539), 649-51(1944). (In Spanish).

Therapeutic effects of thermal springs at Cacheuta are attributed to Ra emanation in water. Average radioactivity of the different springs in 56.7 Mache U/1. (Equivalent to 206.4 emans.) BA 19 18110

5100
RADIOSENSITIVITY OF LYMPHOCYTES AND GRANULOCYTES IN VITRO ACCORDING TO THE METHOD OF UNSTAINED CELL COUNTS. Robert Schrek. *Proc. Soc. Exptl. Biol. Med.* 58(4), 285-6(1945).

Suspensions of lymphocytes from thymus and spleen (rabbits) and from normal and lymphocytic leukemic blood of patients were irradiated and then incubated at 37°C. Dose of 1000 r caused death of lymphocytes after latent period of 3 hr, 50 r had minimal cytotoxic effect on thymic lymphocytes; granulocytes were resistant to 1000 r. Cytotoxic effect on lymphocytes was noted only when exposure and incubation were carried out aerobically. BA 19-18111

5101
STUDIES ON THE NUCLEAR AND NUCLEOLAR CYCLES OF DEVELOPMENT IN PLANTS, ANIMALS AND MAN, PARTICULARLY WITH REFERENCE TO THE AGING OF CHROMATIN AND OTHER CYTOGENIC PHENOMENA. Doncho Kostoff. *Bull. chambre culture natl. (Sofia), Ser. biol., Agr. et silvicult.* 1(1), 1-86(1946).

New interpretation of chromosome breakage and rearrangement as related to aging, X rays and other irradiation and to temperature changes is included. BA 22-77

5102
ARTIFICIAL EVOLUTION. J. B. S. Haldane. *Neue Auslese* 2(3), 97-9(1947).

Experiments with x-ray induced mutations in agricultural plants and their economical significance are discussed, with special regard to Gustafsson's results on barley. BA 22-96

5103

NOTE ON THE THEORY OF RADIATION-INDUCED LETHALS IN *DROSOPHILA*. U. Fano. Science 106(2743), 87-8(1947).

Author contradicts previous theory of induced lethals (Lea and Catsheside, 1945), stating that in radiation-induced lethals in *Drosophila* it is difficult to ascertain the dependence of mutation frequency on dose. There is a nonlinear effect, leading to a significant discrepancy between the previous theory and experimental data. BA 22-103

5104

THE RELATIONSHIP OF X-RAY INDUCED RECESSIVE LETHALS TO CHROMOSOMAL BREAKAGE. I. H. Herskowitz. Am. Naturalist 80(795), 588-92(1946).

Employing the C1B technique, recessive lethal changes were obtained in Canton S stock of *D. melanogaster* after x irradiation of 1000 and 5000 r. Analysis of data suggest that x ray induced lethals are produced primarily at breakage points. Position effects and nonbreakage mutation appear to be much less important as sources of recessive lethals. BA 22-105

5105

TOLERANCE CONCENTRATIONS OF RADIOACTIVE SUBSTANCES. Karl Z. Morgan. J. Phys. Colloid Chem. 51(4), 984-1003(1947).

Elementary equations and procedures involved in determining tolerance concentrations of radioactive substances when taken into the human system are reviewed. BA 22-296

5106

THE RADIOSENSITIVITY OF THE TESTIS IN COMPARISON TO THE OVARY IN THE HERMAPHRODITE GLAND OF *ARION EMPIRICORUM* FER. H. R. Schinz and U. Cocchi. Radiol. Clin. 13(6), 301-10(1944). (In German).

Dose of 600 r had no effect on sex cells of the snails, female sex cells were damaged only by a dose four times that necessary to damage male sex cells. BA 22-297

5107

FURTHER DEVELOPMENT OF THE THEORY OF BIOLOGICAL REACTIONS CAUSED BY ROENTGEN-RAYS. J. Th Van der Werff. Acta Radiol. 28(2), 168-84(1947).

Author applies his "equation of metabolism" to A. Forssberg's studies on x ray effect upon growth rate of *Phycomyces blakesleeanae*. Theory can also be applied to phenomena of nerve excitation. BA 22-299

5108

THE USE OF ARTIFICIALLY RADIOACTIVE ISOTOPES FOR THE PRODUCTION OF LOCALIZED BIOLOGICAL RADIATION. II. DIRECT INJECTION INTO BIOLOGICAL TISSUE, ESPECIALLY TUMORS. J. H. Muller. Experientia 2, 372-4(1946).

Following subcutaneous and intramuscular injection of Zn^{63} (suspended in pectin) into rabbits, no diffusion of radioactive substances into blood or other tissue was observed. In two cases of human cancer of uterine cervix, injection of Zn^{63} into tumor caused almost no radioactivity in blood or urine. BA 22-306

5109

PLASMA AND RED CELL RADIO-IRON FOLLOWING INTRAVENOUS INJECTION. STERILE ABSCESES IN NORMAL AND ANEMIC DOGS. Charles L. Yuile, Chauncey G. Bly, and John C. Wells. Federation Proc 6(1), 400(1947).

An abstract. BA 22-308

5110

MITOTIC NON-DISJUNCTION IN THE CASE OF INTER-CHANGES INVOLVING THE B-TYPE CHROMOSOME IN MAIZE. Herschel Roman. Genetics 32(4), 391-409(1947).

Eight interchanges between B-type chromosomes and various members of the basic set obtained by x irradiation are described. BA 22-2707

5111

THE EFFECTS OF TOTAL BODY X-IRRADIATION ON THE PERIPHERAL BLOOD AND BLOOD FORMING TISSUES OF THE RAT. S. P. Stearner, E. L. Simmons and L. O. Jacobson. MDDC-1319, ANL-4001, 42p. (April 7, 1947).

Effects of single large and small daily doses of x rays on certain blood constituents are described. Effects of x-rays on rabbits and rats are compared.

5112

LETHAL EFFECT OF X-RAYS ON MARINE MICROPLANKTON ORGANISMS. Kelshaw Bonham, Allyn H. Seymour, Lauren R. Donaldson, and Arthur D. Welander. Science 106(2750), 245-6(1947).

Chlorella, *Nitzschia closterium*, and unidentified green carteriid mastigophoran with four flagella and an unidentified brown mastigophoran with two flagella were irradiated (200 kv, 20 ma, 1 mm of Al and 0.5 mm of Cu, at 132 r/min, target distance of 13 or 6.5 in.) with total doses of 1000, 10,000, 25,000, 50,000, and 100,000 r. Dose of 50,000 r immobilized 50% of organisms in 24 hr; 100,000 r was nearly 100% effective. BA 22-2868

5113

COSMIC RADIOCARBON AND NATURAL RADIOACTIVITY OF LIVING MATTER. A. V. Grosse and W. F. Libby. Science 106(2743), 88-9(1947).

Effect of radiocarbon in man is compared to that due to Ra and its decay products, or K, and to action of cosmic rays. Results show that radiocarbon occupies second place in biological importance. Based on number of disintegrations, it is a little below half of K, much above Ra and other natural radio-elements. BA 22-2958

5114

A CONSTANT CURVE OF BLOOD PROTEINS IN RADIUM THE RAPY OF UTERINE CARCINOMAS. C. Fua. Boll. soc. ital. biol. sper. 22, 171(1946). (In Italian).

No changes were noted during 5-6 days of application of Ra. After its removal, usually on second day, there was a sharp drop of protein level ranging from 1-2g per cent. After several days, curve returned to normal. BA 22-3019

5115

EFFECTS OF INHALATION OF AN AIR RENDERED RADIOACTIVE BY PASSAGE OVER THORIUM OXIDE. J. Cluzet. Compt. rend. soc. biol. 135, 949-51(1941). (In French).

Author compares the biological effects of inhalation of air made radioactive by exposure to thorium oxide with effects of inhalation of thorium *per se* (i.e. exposure to gaseous vs. particulate activity). Weight and appetite of guinea pigs chronically exposed to the radioactive gas remained normal. Red cell counts did not change, leukocyte counts increased transiently and then returned to normal. BA 22-3241

5116

RADIUM DIAL PAINTING-MEDICAL STATUS OF WORKERS. Irving Tabershaw. J. Ind. Hyg. Toxicol. 28(5), 212-6(1946).

Fifty-two Ra painters employed for a minimum of 18 mo and maximum of 4 yr failed to show any deleterious effects when amount of Ra in body was kept below 0.1 μ . Determination of breath radon in practical control measure in determining Ra retention, 10-12 curies of radon/l. considered safe standard. BA 22-3830

5117

THE HEMATOLOGY OF THE BIKINI ANIMALS. Eugene P. Cronkite. Am. J. Pathol. 23(5), 801-2(1947). BA 22-3857

- 5118**
RELATIONS BETWEEN METABOLISM AND MORPHO-
GENESIS DURING REGENERATION IN TUBIFEX TUBIFEX
I. Jane G. Collier. Biol. Bull. 92(3), 167-77(1947).
Worms in which regeneration had been inhibited by
x rays showed no increase in O₂ consumption. BA 22-3941
- 5119**
X-RAY-INDUCED MUTATION OF ACTINOMYCES FLAVEOLUS
Albert Kelner. J. Bacteriol. 54(1), 31(1947).
Lethality and mutation induction in conidia exposed
to x ray doses ranging from 25,000 - 300,000 r are described.
BA 22-4038
- 5120**
MUTATION FREQUENCY AS CONDITIONED BY THE
MANNER OF APPLICATION OF RADIATION. J. K.
Makhijani. Indian J. Genet. and Plant Breeding 5(1),
15-31(1945).
Studies with D. melanogaster indicate that differences
in timing of treatment and fertilization caused no significant
difference in frequencies of sex-linked lethals in
spermatozoa. Radiation apparently produces gross
rearrangements by breaking chromosomes, ends later
undergo recombination. Broken ends cannot rejoin
within free spermatozoon, but after fertilization some
changes in conditions makes union of pieces possible.
BA 22-5436
- 5121**
INFLUENCE OF DOSE FRACTIONATION ON THE LETHAL
X-RAY EFFECT PRODUCED BY TOTAL BODY IRRADIATION
IN MICE. F. Ellinger. Radiology 49(2), 238-41(1947)
It was demonstrated that simple dose fractionation of
1000, 500, and 400 r/air into equal fractions of 100 r/air
on consecutive days decreased mortality rate as compared to
that caused by same doses when given in one exposure
(x rays, HVL 0.75 mm Cu). Decrease in mortality rate
was most pronounced with dose of 400 r/air which produced
lowest mortality rate in single exposure. BA 22-5668
- 5122**
COMPARATIVE ACTION OF MASSIVE DOSES AND
FRACTIONATED DOSES OF X-RAYS ON DORMANT
PLANT CELLS. H. Guillemot. Compt. rend. soc. biol.
biol 64, 951-2(1908). (In French).
- 5123**
SOME OBSERVATIONS ON RADIATION SICKNESS AND
ITS TREATMENT. Stig Kullander. Acta Radiol. 28(3),
221-4(1947).
Injection of histamine and administration of HCl
reportedly alleviate symptoms of radiation sickness.
BA 22-5922
- 5124**
ACTION OF RADON Rn-222 ON THE VACCINIA VIRUS:
EVOLUTION OF THE DIAMETER OF CORPUSCLES.
P. Bonet-Maury and R. Perault. Compt. rend. soc. biol.
135, 1117-9(1941). (In French). BA 22-6900
- 5125**
GROSS AUTOPSY OBSERVATION IN THE ANIMALS
EXPOSED AT BIKINI. A PRELIMINARY REPORT.
John L. Tullis and Shields Warren. J. Am. Med. Assoc.
134(14), 1155-8(1947).
Air blast injury was not common cause of death,
fur or anti-flash-burn cream protected animals from thermal
effect. Cause of death was ionizing radiation, guinea
pigs, pigs, goats, and rats being sensitive in that order.
Pathological observations: depression of hemopoiesis,
increased capillary permeability, capillary dilation,
extravasation, ulceration of digestive tract and anemia.
Peak death rate: 2 wk postexposure. BA 22-6995
- 5126**
THE REACTION OF LEUCOLEJEUNEA CLYPEATA
TO VARIATIONS IN DOSAGE OF SOFT X-RAYS. M.
Fulford and H. Kersten. Bryologist 50(2), 147-56
(1947).
Plants of L. clypeata were irradiated with soft x rays
operated at 30 peak kv and 30 ma at varying distances.
500 r/min. for 2-3 min. was maximum nonlethal dosage
producing positive effects. Growth usually slowed or
ceased after exposure. A lethal exposure of part of a
plant always resulted in death of whole plant. BA 22-7469
- 5127**
DEPENDENCE OF THE RATE OF RADIATION-INDUCED
REARRANGEMENTS IN D. MELANOGASTER ON TEMPERATURE
DURING IRRADIATION. A. Kanellis. Naturwissenschaften
33(1), 27(1946). (In German).
Frequency of translocation obtained between 2nd
and 3rd chromosomes of spermatozoa and D. melanogaster
after x-ray dose of 4000 r (70 kv, 66.7 r/min) was 17.1%
at 2°C and 12.33% at 32°. Presumably at low temperatures,
probability of regeneration of fractures of chromosomes
is less than at high. Thus at low temperatures more
fragments will be available to form new combinations.
BA 22-8099
- 5128**
THE DEPENDENCE OF X-RAY-INDUCED MINUTE
REARRANGEMENTS IN D. MELANOGASTER UPON DOSE.
I. B. Pansch, N. Panschina, and P. P. Peyrou.
Naturwissenschaften 33(1), 27-8(1946). (In German)
In contradiction to Muller's and Belgovsky's results,
authors found a relation between x-ray dose and induced
minute rearrangements in D. melanogaster which is
similar to the "two hit" curve of big rearrangements and
not to a linear function. Doses of 2000 r caused 0.094%,
4000 r caused 0.318%, and 8000 r caused 1.219%
deficiencies of N, bb, wN, wbb, and wNbb. BA 22-8104
- 5129**
PILGRIM TRUST LECTURE. THE GENE. H. J. Muller.
Proc. Roy. Soc. (London) 134B(874), 1-37(1947).
Lecture includes discussion of x-ray-induced mutations.
BA 22-8107
- 5130**
GENETIC EFFECTS OF THE ATOMIC BOMBS IN HIROSHIMA
AND NAGASAKI. COMMITTEE ON ATOMIC CASUALTIES,
NATIONAL RESEARCH COUNCIL. Science 106(2754),
331-3(1947).
At present there is no reliable evidence on which to
base opinion concerning absolute or relative frequency of
congenital abnormalities among children born in
Hiroshima or Nagasaki. Material is too much influenced
by extraneous variables and too little adapted to disclosing
genetic effects. BA 22-8145
- 5131**
THE DYSGENIC EFFECT OF INDUCED RECESSIVE
MUTATIONS. J. B. S. Haldane. Ann. Eugenics 14(1),
35-43(1947)
A statistical study showing that total number of deaths
from recessive mutations to be expected as the result
of an atomic bomb explosion is a small fraction of the
number killed immediately and is spread over thousands
of generations. BA 22-8149
- 5132**
THE RADIOSENSITIVITY OF ERYTHROBLASTS. Margaret
A. Bloom and William Bloom. J. Lab. Clin. Med. 32(6),
654-9(1947).
Mammalian bone marrow exposed to total body x
irradiation and fast and slow neurons revealed depressed
hematopoiesis. Injury varies with dose. Radioactive
isotope injections produce much the same effect
Erythropoietic cells are more sensitive than the myelocyto-
poietic and these in turn more sensitive than megakaryocytes.
Findings in chickens were similar. Degenerating erythroblasts

are not to be confused with degenerating lymphocytes.
BA 22-8314

5133

HAEMOLYSIS AND FIXATION OF ERYTHROCYTES BY X-RAYS. L. Halberstaedter and J. Leibowitz. *Biochem J.* (London) **41**(2), 235-9(1947).

Suspensions of erythrocytes down to concentration of 0.5% respond to irradiation with an effective x-ray dose by hemolysis independently of nature of medium in which they are suspended, at concentrations below 0.5% response does depend on medium. In isotonic NaCl, KCl, CaCl₂, NaNO₃, (NH₄)₂SO₄, MgSO₄, and glycerol, effective x-ray dose causes cell fixations and loss of ability to hemolyze, in isotonic glucose, KH₂PO₄, Na₂NHPO₄, NaHCO₃, and glycine, the effect is hemolysis. BA 22-8316

5134

THEORIES AS TO THE BIOLOGICAL ACTION OF RADIATION. N. Koyenuma. *Physik. Z.* **42**, 213-7(1941). (In German).

Author includes mathematical speculations as to effects of radiation upon biological systems with regard to mutations, etc. BA 22-8318

5135

THROMBOCYTES OBSERVED IN DARK FIELD ILLUMINATION UNDER THE INFLUENCE OF RADIUM RAYS. Luis Maissen. *Radiol. Clin.* **15**(4), 237-57(1946) (In German).

In contrast to effects of x rays, change of the active form into the inactive resting state is upset by Ra radiation. Deformed cells are observed, number increasing with dose. Thrombocyte holding power is reduced; thromboplastic fixation to carrier takes longer than in x irradiated or unexposed thrombocytes. BA 22-8319

5136

AN ATTEMPT TO INTERPRET THE BIOLOGICAL ACTION OF RADIATION IN KINETIC TERMS. W. Minder. *Radiol. Clin.* **15**(1), 30-5(1946). (In German).

X-ray induced changes within the cell occur in conformity to a rigid pattern of the type in which substance A is activated, converted into an intermediate product B which, in turn, is converted into final product X, conversion being quantitatively determined by radiation dose. Activation of water may play an important part. BA 22-8321

5137

PLASMA PROTEINS AND PLASMA VOLUME IN RATS FOLLOWING TOTAL-BODY X-IRRADIATION. H. Supplee, J. D. Hauschildt, and C. Entenman. *Am. J. Physiol.* **169**, 483-90(1952).

In rats given 750 r, the plasma volume, expressed as milliliters/100 gm final body weight, decreased to values 20 per cent below the controls by the third post-exposure day. No decrease was observed in animals given 400 or 600 r. Plasma volumes then increased in all irradiated rats. Plasma protein concentration of rats exposed to 600 and 750 r decreased to 20 per cent below control values.

5138

ON THE THEORETICAL-MATHEMATICAL TREATMENT OF PROBLEMS ON RADIOBIOLOGICAL EFFECTS. R. M. Sievert. *Acta Radiol.* **22**, 237(1941). (In German). BA 22-8323

5139

THE PATHOLOGIC CHANGES INDUCED BY IONIZING RADIATIONS IN THE BIKINI ANIMALS. John L. Tullis. *Am. J. Pathol.* **23**(5), 891(1947).

An abstract. BA 22-8324

5140

THE MATHEMATICAL THEORY OF BIOLOGICAL REACTION PHENOMENA ESPECIALLY TO ROENTGEN RADIATION. J. Th. van der Werff. *Acta Radiol.* **23**, 603(1942). (In German).

Author discusses Sievert's theoretical considerations. Reactions after irradiation are subordinated to general

biological reactions. Many experimental observations are cited in support of the thesis, especially Forssberg's studies on rate of growth of *Phycomyces Blakesleeanus* after roentgen irradiation. Author applies his theory in explaining phasic nature of reactions (as did Sievert). BA 22-8325

5141

BLOOD VOLUME AND OTHER STUDIES IN HAMSTERS X-IRRADIATED WITH UPPER BODY SHIELDED. M. N. Swift and S. T. Taketa. *Federation Proc.* **16**, 126(1957).

Circulating blood volume began to decline about the third post-exposure day. The weight of the small intestine contents was moderately increased from the third day on, owing to the fluid increase

5142

THE UTILIZATION OF ARTIFICIALLY RADIOACTIVE ISOTOPES FOR THE PRODUCTION OF LOCALIZED BIOLOGICAL EFFECTS. J. H. Muller and P. H. Rossier. *Experientia* **3**, 75-6(1947).

Localized radiation in lungs was obtained by intravenous injection of radioisotope Zn⁶⁸, suspended in a solution of pectin. BA 22-8335

5143

ADRENAL RESPONSE TO TOTAL BODY X-RADIATION. H. M. Patt, M. N. Swift, E. B. Tyree, and E. S. John. *Am. J. Physiol.* **150**(3), 480-7(1947)

Adrenal cholesterol decreased 40-50% 3 hr after irradiation of white male rats with either 650 r or 900 r. Decrease was followed by gradual rise toward or above normal after which (terminally) a precipitous falling off was observed. Adrenal weight changed little initially but increased (50-100%) in intermediate and terminal periods after treatment with either dose. After 200 r there was little change in adrenal activity. BA 22-8748

5144

THE EFFECT OF ROENTGEN RAYS AND EXPOSURE TO RADIUM ON FERTILITY. Charles E. Dunlap. *Human Fertility* **12**(2), 33-9(1947).

Ra and x-ray treatment during pregnancy should be restricted to very clear and urgent indications, and diagnostic x-ray examinations should not be repeated frequently. Author feels that any pregnancy which has been subjected to therapeutic radiation should be interrupted because of the high percentage of defective children born after such treatment. BA 22-8812

5145

EFFECTS ON EMBRYONIC DEVELOPMENT OF X-IRRADIATION OF RABBIT SPERMATOZOA IN VITRO. E. C. Amoroso and A. S. Parkes. *Proc. Roy. Soc. (London)* **134B**(874), 57-72(1947).

Rabbits in which ovulation was induced artificially were inseminated with spermatozoa x rayed in vitro with 50-100,000 r. After 250-1000 r, normal divisions dropped progressively below normal (80-90%) to 2% independent of intensity or type or irradiation and time between exposure and insemination (5-17 hr). Cytological damage to spermatozoa nuclei appeared after 10,000 r, polyspermy after 1000 r. Following doses of 50-250 r fertile young were born, no living young following 1000 r. BA 22-9148

5146

INVESTIGATIONS OF THE BIOLOGICAL EFFECTS OF SOFT X-RAYS. V. Hardung. *Helv. Phys. Acta* **18**(1), 45-71(1945).

Large variations were found in the mean dose of 20 kv and of Al K x rays necessary to stop division in *E. coli*. Curves obtained with *Bacillus pyocyaneus* and Al K x rays showed "multiple hit" type of effect, those with 4000 V x rays, "one hit" effect. An attempt was made using *B. pyocyaneus* to prove the hit theory by comparing effects of equal doses of radiation at several x-ray wave lengths. BA 22-9241

5147

THE EFFECT OF ROENTGEN RAYS AND UV RADIATION ON THE PERMEABILITY OF YEAST. G. Hevesy and K. Zerahn. *Acta Radiol.* 27(3/4), 316-27(1946).

Dose of 30,000 r was sufficient to kill about 10% of yeast cells and to influence amount of free radio-phosphorus (P^{32}) and radio-potassium (K^{42}) migrating daily from yeast cells into nutrient solutions, but only to very slight extent. BA 22-9982

5148

A QUANTITATIVE ANALYSIS OF THE EFFECT OF GAMMA RADIATION ON MALIGNANT CELLS IN VITRO AND IN VIVO. I. Lasnitzki. *Brit. J. Radiol.* 18, 214-20 (1945).

Effect of 198 r of gamma rays was qualitatively and quantitatively similar on mouse adenocarcinoma 63 in vitro and in vivo. Recovery was more rapid in vivo. BA 19-18659

5149

TWENTIETH ANNUAL REPORT OF THE BRITISH EMPIRE CANCER CAMPAIGN 1943. J. B. Lockhart-Mummery, ed. London, British Empire Cancer Campaign. 1943.

Description of effect on ovary of rabbits of varying doses of Ra and Rn is included. BA 19-18663

5150

THE EFFECTS OF ROENTGEN RADIATION ON THE THYMONUCLEIC ACID CONTENT OF TRANSPLANTABLE MAMMARY CARCINOMAS. Robert E. Stowell. *Cancer Research* 5(3), 169-78(1945).

In 6 rat tumors given 4000 r, thymonucleic acid/unit volume was decreased by statistically significant amounts and 2 tumors showed significant decrease in amount/cell. In 9 of 16 irradiated mouse tumors, decrease in thymonucleic acid/unit volume was significant; and in four of these decrease/cell was significant. BA 19-18686

5151

EFFECT OF RADIATION ON MALARIA. AN EXPERIMENTAL STUDY IN THE CHICK AND DUCK. R. H. Rigdon and Hillyer Rudisell, Jr. *Proc. Soc. Exptl. Biol. Med.* 59(2), 167-70 (1945).

Plasmodium lophurae was injured by x rays in vivo and in vitro (studied development of parasitemia in chick). Dose necessary to produce significant effect in vivo is near lethal dose for chick, Ra bromide had no effect on *P. lophurae*, but produced severe degenerative changes in treated birds. BA 19-20372

5152

SUPPLEMENT TO THE WORK "ON THE PHYSICAL OCCURRENCE OF ELICITATION OF GENE MUTATIONS BY RADIATION." K. G. Zimmer and N. W. Timofeeff-Ressovsky. *Z. indukt. Abstamm.-u. Vererb.* 80(4), 619 (1942). (In German).

A few points regarding the comparison of "pairs of ions per cm^3 tissue" produced by x rays and neutron radiation, as used in the original paper are explained. BA 19-4215

5153

INFLUENCE ON MUTATION PRODUCTION AND OTHER EFFECTS OF X-RAYS ON *ANTIRRHINUM MAJUS* OF VARIATION IN SWELLING OF IRRADIATED SEEDS. E. Knapp and R. Kaplan. *Z. indukt. Abstamm.-u. Vererb.* 30(4), 501-50(1942). (In German).

Results indicate that gas exchange as well as water content affect physiological processes which alter radiosensitivity of seeds. BA 19-4224

5154

THE VALIDITY OF THE BUNSEN-ROSCOE LAW IN THE PRODUCTION OF MUTATIONS BY RADIATION OF EXTREMELY LOW INTENSITY. S. P. Ray-Choudhuri.

Proc. Roy. Soc. Edinburgh 62B(pt. 1 paper no. 9), 66-72 (1944).

Drosophila sperm were irradiated in body of impregnated females (70 mg of Ra for 720 hr, 2 dosages of 2000 r and 400 r, at 0.556 r and 2.78 r/hr). Frequency of sex-linked lethals was directly proportional to dosage; independent of irradiation intensity. Mutation rate was independent of duration of treatment when flies were given 29 r/hr and a (maximal) total dose of 1300 r. BA 19-4250

5155

X-RAYS AND THE REPRODUCTIVE CYCLE OF RING-NECKED PHEASANTS. Leonard B. Clark and Gardiner Bump. *Biol. Bull.* 87(2), 134-7(1944).

Ring-necked pheasants given 50, 75, 225, and 425 r of x rays applied to head region show disturbances in reproductive cycle by decreased egg production, decreased length of laying period, and possibly decreased viability of eggs laid. Decrease is related to amount of radiation. Rate of egg laying is decreased in experimental animals but is not correlated with x-ray dose over range studied. BA 19-4364

5156

RADIUM METABOLISM IN RATS AND THE PRODUCTION OF OSTEOGENIC SARCOMA BY EXPERIMENTAL RADIUM POISONING. R. D. Evans, Robert S. Harris, and J. W. M. Bunker. *Am. J. Roentgenol. Radium Therapy* 52(4), 353-73(1944).

Oral or intradermal administration of 25-100 γ of Ra in young male rats always resulted in chronic Ra poisoning and, in a high percentage of cases, in development of primary osteogenic sarcoma. Rats are of no use in obtaining estimate of toxic Ra dose for humans, as its tolerance/kg of body weight is much higher. BA 19-4365

5157

THE EFFECTS OF REPEATED IRRADIATION OF THE GASTRIC REGION WITH SMALL DOSES OF ROENTGEN RAYS UPON THE STOMACH AND BLOOD OF DOGS. W. C. Hueper and J. de Carvajal-Forero. *Am. J. Roentgenol. Radium Therapy* 52(5), 529-34(1944).

Seven dogs were x irradiated over gastroduodenal region, rest of abdomen lead-shielded. Minor changes in gastric mucosa with moderate and transitory anemia were caused by total of 4875 r in small individual doses, administered within 25 wk. Total of 6000 r, within 4 wk (single doses of 300 r) produced marked loss in body wt, moderate to severe secondary anemia and perforating gastric ulcers. BA 19-4366

5158

ALPHA RAYS IN THE TREATMENT OF WOUNDS. E. M. Uhlmann. *Surg. Gynecol. Obstet.* 79(4), 412-18(1944).

Author reports his observation on lesions in 8 patients treated with α rays incorporated in neutral fat and administered as ointment in strength of 1000 electrostatic units/10 ml of final preparation. Histological study showed formation of new capillaries, ulceration with impaired local blood supply healed better than with other surgical therapy. Rate of wound healing was accelerated, resulting scars were soft, smooth, nonadherent, and promoted good function. BA 19-4367

5159

DIRECT AND INDIRECT ACTIONS OF RADIATION ON VIRUSES AND ENZYMES. D. Lea, K. M. Smith, Barbara Holm, and Roy Markham. *Parasitology* 36(1/2), 110-18 (1944).

Inactivation of tobacco mosaic virus at various concentrations by x rays is described. Inactivation dose is independent of concentration at high concentrations, at low concentrations it is also constant but lower in value. Mechanism of direct and indirect inactivation

are compared. There appears to be no difference in x-ray inactivation of viruses and enzymes. BA 19-5398

5160
PISUM SATIVUM MUTATIONS INDUCED BY X-RAYS. G. von Rosen. Hereditas 28, 313-38(1942).

Three lines of P. sativum were x irradiated. In two lines several types of chlorophyll-deficient plants and an albaviridis-chimaera type appeared; in 22 mutations no pure albino forms were produced. Mutations also appeared in third line which was tall and had thick shells. All mutations found were concerned with chlorophyll content of plants. BA 19-5977

5161
A COMPARISON OF X-RAY INDUCED MUTATIONS AND MUTATIONS OCCURRING SPONTANEOUSLY IN RING CHROMOSOMES IN MAIZE. Edward Allan Weaver. University of Missouri, Thesis. 1942. BA 19-5981

5162
THE PRODUCTION OF CHROMOSOME MUTATIONS BY ROENTGEN IRRADIATION. A CRITICISM OF THE WORKS OF H. MARQUARDT. Hans Bauer. Z. Botan. 38(1), 26-41(1942). (In German).

The authors criticism of Marquardt's new hypothesis of origin of chromosome mutations is based on lack of agreement between observed and expected frequencies of complete and incomplete recombinations. Author claims that if calculations are corrected, data do not contradict prevailing hypothesis. BA 19-7821

5163
ANALYSIS OF ROENTGEN-INDUCED CHROMOSOME VARIATIONS AND CHROMOSOME MUTATIONS. A REPLY. Hans Marquardt. Z. Botan. 38(1), 42-63(1942). (In German).

This report is an answer by the author to criticisms of his theory by Bauer. Marquardt maintains that Bauer's calculations do not take into account the impossibility of precise localization of break- and contact-points, nor the fact that experimental material on which ratios are based necessarily includes only viable eggs. BA 19-7822

5164
X-RAY INDUCED GROWTH FACTOR REQUIREMENTS IN BACTERIA. C. H. Gray and E. L. Tatum. Proc. Natl. Acad. Sci. U. S. 30(12), 404-10(1944).

E. coli and A. melanogenum were x rayed until 99.99% cells were killed. From 800 isolations of survivors of E. coli, 2 strains differed from parent, of 575 from A. melanogenum, 4 strains differed with respect to growth factor requirements. X-irradiation apparently modified ability of bacteria to carry out specific biochemical reactions, growth of each mutant being a function of concentration of the required supplement. BA 19-7830

5165
GROWTH RATES OF THE PRIMARY FLIGHT FEATHERS OF THE PIGEON AND THE EFFECTS OF IRRADIATION. Rose E. Frisch. J. Exptl. Zool. 97(3), 199-229(1944).

Squabs were irradiated with 1000, 1500, or 2000 r at varying interval after hatching. Data suggest that axial growth of feather was reduced by constant factor after exposure. BA 19-7851

5166
A GROWTH-DELAYING EFFECT OF ULTRAVIOLET RADIATION ON BACTERIAL VIRUSES. S. E. Luria. Proc. Natl. Acad. Sci. U. S. 30(12), 393-7(1944).

Growth-delaying effect induced by ultraviolet-irradiation was apparently brought about by action of quanta which did not act lethally, and since effect was progressive, it is reasoned that it results from cumulative effect of ultraviolet quanta absorbed by virus particles. No similar effect was found on virus particles surviving x irradiation,

hence surviving particles probably had not absorbed any radiation at all. BA 19-8914

5167
INACTIVATION OF MALARIAL PARASITES BY X-RAYS. B. E. Bennison and G. Robert Coatney. Public Health Repts. U. S. 60(5), 127-32(1945).

Sporozoite and trophozoite suspensions of Plasmodium gallinaceum were exposed to graded x-ray doses. Trophozoites were inactivated by 20,000 r, but not by 10,000 r; sporozoites, by 8000 r but not by 6000 r. Trophozoite suspensions exposed to 2000 and 8000 r produced infections characterized by lengthened prepatent periods and lengthened survival times. Sample of human blood parasitized by P. malariae and exposed to 5000 r failed to produce an infection in susceptible patient. BA 19-9556

5168
IS THE ESTABLISHMENT OF COLONIES OF TRYCHOPHYTON ON THE SKIN INFLUENCED BY RADIATION? ROENTGEN RAYS AND U.-V). K. von Berde. Dermatologica 84, 320-9(1941). (In German).

Experiments on 75 persons with healthy skin showed that neither an epilation dose of x rays nor an erythema dose of quartz lamp rays is sufficient to cause biological, physical, or physico-chemical changes of skin in which the epidermis of a hairless patch would be in a condition to prevent establishment and especially the development of Trychophyton gypseum asteroides. BA 19-8928

5169
REDUCED CHROMONEMA ELONGATION AND ABNORMAL SPIRALIZATION FOLLOWING X-RAY TREATMENT OF MEIOTIC CHROMOSOMES. A. H. Sparrow. Genetics 30(1), 23(1945).

Author describes observations on pollen mother cells of Trillium. BA 19-9837

5170
X-RAY INHIBITION OF MITOSIS IN RELATION TO CHROMOSOME NUMBER. A. Marshak and Muriel Bradley. Proc. Natl. Acad. Sci. U. S. 30(9), 231-7(1944).

Root tips of Triticum (T. monococcum, T. dicoccum, T. vulgare) and of Bromus (B. carinatus, B. arizonicus) with chromosome numbers 14, 28, 42, 56, and 84 respectively were irradiated and after 3 hr incubation fixed and stained with acetocarmine. Counts of metaphases and anaphases show that inhibition varies inversely as the chromosome number but is neither directly nor inversely proportional to chromosome length. Inhibition by x rays occurs through action on centromeres. BA 19-9843

5171
THE EFFECT OF ULTRAVIOLET RADIATION AND X-RAYS ON MUTATION PRODUCTION IN PENICILLIUM NOTATUM. Alexander Hollaender and E. M. Zimmer. Genetics 30(1), 8(1945).

An abstract. BA 19-9869

5172
QUANTITATIVE EFFECTS OF RADIATION ON MUTATION PRODUCTION IN NEUROSPORA CRASSA. E. R. Sansome, A. Hollaender, E. Zimmer and M. Demerec. Genetics 30(1), 19-20(1945).

An abstract. BA 19-9884

5173
THE EFFECT OF X-RAYS UPON DOMINANT MUTATION IN MAIZE. L. J. Stadler. Proc. Natl. Acad. Sci. U. S. 30(6), 123-8(1944).

Gene "a" (colorless aleurone) rarely shows spontaneous mutation, but mutates frequently in presence of factor "Dt". X-rays failed to induce mutation of "a" to "A" (or to any other aleurone allele) in populations large enough to yield approximately 400,000 mutations to "A" under influence of homozygous "Dt" or 900,000 losses of "A" by deficiency or by mutation to a colorless allele. BA 19-9886

E OCCURRENCE OF X-RAY INDUCED DOMINANT LETHAL MUTATIONS IN HABROBRACON. Gertrude Idenhalt. *Genetics* 30(2), 197-205(1945).

Haploid males were x rayed with 500-10,000 r. In 3-allele crosses all F_1 males were haploid, all males diploid. Number of F_1 males remained constant, males decreased with increasing x-ray dose. Dominant lethal mortality curves were similar to those of *Drosophila*. Doses of 152,000 and 168,000 r caused at least one dominant lethal in each sperm and inactivated %. BA 19-9907

75

RELATIVE SENSITIVITY OF CHROMOSOMES TO ULTRAVIOLET RAYS. III. COMPARISON OF CARCINOMA AND LYMPHOSARCOMA IN THE RAT.

Marshak and Muriel Bradley. *Proc. Natl. Acad. Sci. U. S.* 31(2), 84-90(1945).

Chromosomes of Walker 256 carcinoma were more radiosensitive than those of a lymphosarcoma. Ratio of mutation to x-ray efficiency (n/x) was approximately 6 at all time intervals in lymphosarcoma, while carcinoma increased from 6 at 3 hr to 10.8 at 24 hr. BA 19-9918

76

POST-IRRADIATION BONE CHANGES. F. R. Gratzek, G. Holmstrom, and L. G. Rigler. *Am. J. Roentgenol. and Radium Therapy* 53(1), 62-76(1945).

X-ray therapy in infancy or childhood may result in retardation of bone growth. In adults it may be followed by spontaneous fracture or aseptic necrosis. BA 19-10093

77

METHOD OF DISTRIBUTING BETA-RADIATION TO THE VASCULO-ENDOTHELIAL SYSTEM AND ADJACENT TISSUES. Hardin B. Jones, Charles J. Wrobel, and William R. Lyons. *J. Clin. Invest.* 23(5), 783-8(1944)

Method is given for preparation of $CrP^{32}O_4$ which, in suspension, has average particle size of 1μ . In mice, radiation doses which deplete the spleen do not affect the liver. Doses of 80,000 r in liver may induce hepatoma. BA 19-10094

78

CUPATION OF HEALTH, ENCYCLOPAEDIA OF HYGIENE, TECHNOLOGY AND SOCIAL WELFARE, STUDIES FROM THE POINT OF VIEW OF LABOUR, INDUSTRY AND TRADES SPECIAL SUPPLEMENT. INDUSTRIAL HEALTH IN WARTIME. Montreal International Labour Office. 1944

This review of developments in industrial toxicology includes a section on radioactive materials. BA 19-10604

79

EFFECT OF X-RAYS ON THE FREQUENCY OF A BACTERIAL MUTATION. Raymond Croland. *Compt. rend.* 216(13/22), 13-8(1943). (In French).

In *Moraxella lwoffii* var. *brevis* radiation acts directly on S^- bacteria and increases rate of their transformation into S^+ bacteria. Mutation frequency is a function of increasing doses of radiation absorbed. BA 19-10784

80

METHOD FOR STUDYING THE BIOLOGICAL EFFECT OF COSMIC RAYS. J. Eugster. *Schweiz. Z. allgem. med. u. Bakteriolog.* 2, 109-10(1939). (In German).

Special photographic plates were exposed under Pb cosmic rays for some months together with soil spores homogeneously distributed on sterile Petri dishes. Growth-inhibiting influence of cosmic rays on soil bacteria is apparent after period of exposure of 8-10 months. BA 19-11129

81

INFLUENCE OF X-RAYS ON THE DEVELOPMENT OF THE ENDOTHELIAL STAGE OF AVIAN MALARIA (*PLASMODIUM*

GALLINACEUM). H. Zain. *Deut. Tropenmed. Z.* 47(3), 68-71(1943). (In German)

X-rays do not suppress exoerythrocytic stages of *P. gallinaceum*, instead the parasites are increased in number. Effect may be due to x-ray induced activation of reticulo-endothelial system. BA 19-11685

5182

X-RAY SENSITIVITY CHANGES IN MEIOTIC CHROMOSOMES AND THE NUCLEIC ACID CYCLE. A. H. Sparrow. *Proc. Natl. Acad. Sci. U. S.* 30(7), 147-55(1944).

Relative effects of x-rays on stages of meiosis and on microspore resting nuclei studied in *Trillium erectum* are described. Ratio of chromosome aberrations was 1:2:6:9:1 for early meiotic prophase, pachytene, metaphase, anaphase, and post meiotic resting nuclei, respectively. High radiosensitivity is believed to be related to high content of DNA. BA 19-12054

5183

ALTERATION OF THE FREQUENCY OF X-RAY-INDUCED CHROMOSOMAL BREAKS BY USE OF ULTRAVIOLET AND NEAR INFRARED RADIATION. Berwind Kaufmann and Alexander Hollaender. *Genetics* 30(1), 11-12(1945).

Authors present observations on the number of altered sperm and the number of chromosome breaks in *Drosophila*. BA 19-12081

5184

LETHAL DOSE STUDIES WITH X-RAYS. F. P. Ellinger. *Radiology* 44(2), 125-42(1945)

Minimal lethal dose for mice was 200 r/air, absolute lethal dose, 1000 r/air for mice, 500 r/air for guinea pigs. Lethal effect of x-rays was correlated with destruction of Malpighian bodies of spleen. Relationship between dose and lethal effect followed S-shaped curve in both species. BA 19-12367

5185

EFFICACY OF HEMATOPOIETIC PROCEDURES IN RATS X-IRRADIATED WITH INTENSIVELY SHIELDED. N. M. Swift, T. Taketa, and V. P. Bond. *Radiation Research* 4, 186-92(1956).

A postirradiation dose of 60 mg of bone marrow per 100 gm of body weight was slightly more effective than 30 mg per 100 gm in reducing mortality in rats given 1200 r with the gastrointestinal tract shielded.

5186

PERSISTENCE OF THE EFFECT OF X-RAYS AND OF RADIUM RAYS ON DORMANT SEEDS. H. Guillemot. *Compt. rend. soc. biol.* 68, 309-11(1910).

5187

ARTIFICIAL AND RADIOACTIVE BODIES IN PHYSIOLOGY AND MEDICINE. N. N. Das Gupta. *Science and Culture (India)* 10(6), 221-7(1944).

Author describes experiments using radioisotopes of As, Br, C, Ca, Cl, Fe, I, K, N, Na, P, S, Si, and Y. BA 19-12504

5188

RESPONSE OF THE LIVER TO IRRADIATION. F. P. Ellinger. *Radiology* 44(3), 241-54(1945).

Threshold dose producing liver injury produced 70-80% mortality rate. Small daily x-ray doses produced liver damage only when accumulated dose equaled lethal single dose. Irradiation effects are ascribed to combined influence of direct x-ray action plus those accounted for by histamine theory. BA 19-12626

5189

RESPONSE OF THE RETINA TO THE DIRECT ROENTGEN BEAM. A METHOD OF ASSESSING THE CONDITION OF THE RETINA AND AN AID IN LOCALIZING INTRAOCULAR FOREIGN BODIES. E. W. Godfrey, H. P. Schenck, and L. E. Silcox. *Radiology* 44(3), 229-36(1945). BA 19-12743

5190

NEW STRAINS OF PENICILLIUM NOTATUM INDUCED BY BOMBARDMENT WITH NEUTRONS. W. G. Myers and Hazel Jean Hanson. Science 101(2623) 357-8(1945).

About 100 mutations were produced in P. notatum by neutron bombardment from cyclotron. Antibiotic activity of many of the new strains was qualitatively similar to parent strain. Number of new strains was fairly proportional to amount of bombardment. BA 19-13618

5191

PHYSIOLOGICAL INFLUENCE OF METALS AT A DISTANCE. THE BUCKWHEAT TEST, A NEW BIOLOGIC TRACE INDICATOR OF EXCEPTIONAL SENSITIVITY FOR RADIOACTIVE ELEMENTS. Werner Schmidt. Ber. deut. botan. Ges. 61(3), 75-80(1943). (In German).

Tropism in buckwheat seedlings was positive at 240-290 cm from a 10^{-8} g Ra source. Response was negative in immediate vicinity of Ra. Tropism is ascribed to β rays. BA 19-14461

5192

COLCHICINE AND X-RAYS IN THE TREATMENT OF PLANT AND ANIMAL OVERGROWTHS. Michael Levine. Botan. Rev. 11(3), 145-80(1945).

Topics discussed are: effect of colchicine on animals and on plants, colchicine and x rays, colchicine and bacterial filtrates acenaphthene and other chemicals, colchicine in genetics, colchicine in cytology, effects of colchicine on the endocrines, and irradiation with x rays. BA 19-15190

5193

THE EFFECT OF COLCHICINE AND X-RAYS ON ONION ROOT TIPS. Michael Levine. Cancer Research 5(2), 107-19(1945).

Author reports on combined effect of 0.01% aqueous solution of colchicine and x rays on Allium cepa var. Yellow Globe and A. cepa var. Brigham Yellow Globe. Effects on root and leaf growth are described. BA 19-15249

5194

THE BIOLOGICAL EFFECTS OF X-RAYS AS A FUNCTION OF INTENSITY. A. A. Bless. Proc. Natl. Acad. Sci. U. S. 30(5), 118-21(1944).

Various x-ray intensities (from 25 r/min to 5000 r/min) produced no significant differences in length of stems of Big Club var. wheat sprouts from irradiated seeds when dosage was constant. BA 19-15229

5195

QUANTITATIVE IRRADIATION EXPERIMENTS WITH NEUROSPORA CRASSA. II. ULTRAVIOLET IRRADIATION. Alexander Hollaender, Eva R. Sansome, E. Zimmer, and M. Demerec. Am. J. Botan. 32(4), 226-35(1945).

Occurrence of sterility in association with mutants in microconidia was less frequent in ultraviolet mutants than in x-ray mutants. Authors suggest that ultraviolet effects are localized, while x-ray effects are more diversified, including chromosome breaks and rearrangements. BA 19-15243

5196

GENETIC PROOF OF HETEROKARYOSIS IN PENICILLIUM NOTATUM. G. Pontecorvo and A. R. Gemmell. Nature 154(3912), 514-15(1944).

Four of the 5 x-ray mutations tested behaved as if they were recessive, involving 4 different loci. BA 19-15262

5197

QUANTITATIVE IRRADIATION EXPERIMENTS WITH NEUROSPORA CRASSA. I. EXPERIMENTS WITH X-RAYS. Eva R. Sansome, M. Demerec, and Alexander Hollaender. Am. J. Botan. 32(4), 218-26(1945).

In x-irradiated microconidia, increase in mutation rate with increase in energy followed straight line relationship at low dosages and reached 78.5% at 126,000 r. Increased intensity led to increased mutation rate. Partial

sterility was often observed in phenotypic mutants from irradiated spores and is believed to be the result of chromosomal aberration. Two types of mutants are described. BA 19-15268

5198

ON THE DEPENDENCE OF ROENTGEN INDUCED TRANSLOCATION RATES ON THE RIPENESS OF IRRADIATED GAMETES IN MALE DROSOPHILA MELANOGASTER. A. Catsch and G. Radu. Naturwissenschaften 31(31/32), 368-9(1943). (In German).

Wild type males were x rayed (1 hr, 70 kv, 0.5 mm Al filter, dose of 4000 r). Progressive decline of translocation rate, from 12% to 0, was noted with aging of original males. Authors suggest that spermatogonial cells either react differently from sperms to x rays, or some selective elimination occurs in former. BA 19-15282

5199

DOSE PROPORTIONALITY AS DETERMINED BY ROENTGEN-INDUCED TRANSLOCATIONS BETWEEN CHROMOSOMES II AND III IN DROSOPHILA MELANOGASTER. A. Catsch, G. Radu, and A. Kanellis. Naturwissenschaften 31, (31/32), 368(1943). (In German).

Wild type males were x rayed (300 min, 70 kv, 0.5 mm Al filter, doses of 1000, 2000, or 4000 r). Translocation rate was approximately 1.5 power of dosage times a constant. Multiple hits and lethal eliminations are suggested to account for exponent value of < 2. BA 19-15283

5200

GENERAL BIOLOGICAL REACTIONS ON RADIATION INFLUENCE. F. E. Lehmann. Radiol. Chn. 10, 130-46(1941). (In German).

Includes discussion of: mutations, chromosome deficiencies, "quantum-hit" theory, suppression of mitosis by x rays in amphibia, and viability of those tissues devoid of mitosis. BA 21-18817

5201

EFFECTS OF HYDROGEN PEROXIDE PRODUCED IN THE MEDIUM BY RADIATION ON SPERMATOZOA OF ARBACIA PUNCTULATA. Titus C. Evans. Biol. Bull. 92(2), 99-109(1947).

Sperm of A. punctulata, suspended in heavily irradiated water (over 100,000 r), caused reduction of survival time and delay in first cleavage when such sperm were used to inseminate fertile eggs. Agent in water responsible for effects is considered to be H_2O_2 . BA 21-19065

5202

SOME EXPERIMENTS IN IRRADIATING DROSOPHILA EGGS WITH ROENTGEN-RAYS AND γ -RAYS IN A MAGNETIC FIELD. A. Forssberg. Acta Radiol. 21, 213-219(1940).

Drosophila eggs that were irradiated with x and γ rays during simultaneous application of magnetic field of 6,000 Gauss exhibited a small increase in irradiation effect. BA 21-19066

5203

PRODUCTION OF INCREASED CAPILLARY FRAGILITY IN RATS FOLLOWING IRRADIATION. J. Q. Griffith, Jr., Eleanor Anthony, E. P. Pendergrass, and R. Perryman. Proc. Soc. Exptl. Biol. Med 64(3), 331-2(1947).

Rn ointment, 500 E. S. U. in 1 ml, was introduced into peritoneal cavity of normal rats. One - 8 wk later, increase in capillary fragility was demonstrable in peritoneal vessels. BA 21-19067

5204

EFFECT OF RUTIN ON RECOVERY TIME FROM RADIATION INJURY IN RATS. J. Q. Griffith, Jr., Eleanor Anthony, E. P. Pendergrass, and R. Perryman. Proc. Soc. Exptl. Biol. Med. 64(3), 332-3(1947).

All animals in the experiment were given 2385 r to one leg (single dose, 200 kv, 15 ma, $\frac{1}{2}$ mm Cu plus 1 mm Al filter, 26 cm skin target distance). Half were used as

controls; other half given rutin, 20 mg every third day, implanted subcutaneously as pellet. Time of onset of reaction and height of reaction were essentially the same for the two groups, but rutin-treated rats recovered more rapidly. BA 21-19068

5205

THE EARLY EFFECTS OF X-RAYS ON THE OVARIES OF THE RAT. L. Halberstaedter and M. Ickowicz. *Radiology* 48, 369-73(1947).

In ovaries of normal rats, pyknosis in granular layer is generally restricted to follicles whose ovule contains nucleus in state of division. Four hr postirradiation with at least 400 r/air (150 kv, 4 ma, 0.5 mm Cu filter, 30 cm distance, 100 r/min), pyknoses are evident in follicles whose ovule contains a resting nucleus as well as in primary follicles. BA 21-19069

5206

ATTEMPTS TO FIND PRODUCTS BLOCKING NUCLEIC ACID FORMATION IN THE CIRCULATION OF AN IRRADIATED ORGANISM. L. Ahlstrom, H. v. Euler, G. Hevesy, and K. Zerahn. *Arkiv. Kemi, Mineral. Geol.* 23A(10), 1-6(1947).

Blood (9-23 ml), of 4 wk-old rabbits irradiated with 7500-10,000 r was transfused to nonirradiated paired litter-mates. Radioactive phosphate (20 μ c) was administered subcutaneously to nonirradiated rabbits and after 2 hr, activity of DNA and P extracted from liver, kidneys, and intestinal mucosa was compared with free P extracted from corresponding organisms and plasma. Results indicate slower formation of DNA in kidney and liver, no effect in labeled intestinal mucosa in transfused animals. BA 21-19070

5207

THE OVARY OF THE MOUSE AFTER X-RAY TREATMENT. G. J. van Eck-Vermande. *Acta Brevia Neerl. Physiol., Pharmacol., Microbiol.* 14(1/3), 40-2(1946).

Detectable changes in mouse ovary one day after x-ray treatment are: damaged egg cells of large follicles with disorganized and destroyed granulosa, enlargement, vacuolation and more fat deposition of interstitial cells, in some follicles an atretic appearance and cells joining surrounding interstitial tissue, sporadic estrus, production of estrogenic substances by interstitial cells. Young primary follicles and primordial egg cells show no symptoms of degeneration. BA 21-19504

5208

MECHANISM OF RADIATION EFFECTS AGAINST MALIGNANT TUMORS. Shields Warren. *J. Am. Med. Assoc.* 133(7), 462-3(1947).

A brief discussion of current theories of effect of x rays and radioactive radiations upon normal and diseased tissues is presented. BA 21-19815

5209

THE ATOMIC BOMB EXPERIMENTS IN THE PACIFIC WITH A CONSIDERATION OF THE RELATIONSHIP OF ATOMIC ENERGY TO THE FUTURE OF MEDICINE. E. P. Pendergrass. *Trans. Studies Coll. Physicians Phila.* 14(3), 107-12(1946). BA 21-19076

5210

PROTECTIVE METHODS IN RADIOLOGY. W. Binks. *Brit. Med. Bull.* 4(1), 58-64(1946).

Author describes safeguards for protection of operators of x-ray equipment, and considers factors importance in establishing tolerance doses. BA 21-19877

5211

MEASUREMENTS OF RADIOACTIVITY IN AN INDUSTRIAL PAINTING ROOM. C. J. Braudo and J. D. Craggs. *Brit. J. Ind. Med.* 3(1), 15-9(1946).

Industrial hazards arising from use of radioactive luminous compound are reviewed; tolerance limits set

by British and American authorities summarized. Simple calculation of ventilation requirements are given for certain idealized conditions. BA 21-19878

5212

MEDICOLEGAL ASPECTS OF INJURIES FROM EXPOSURE TO ROENTGEN RAYS AND RADIOACTIVE SUBSTANCES. (SYMPOSIUM ON SCIENTIFIC PROOF AND THE RELATIONS OF LAW AND MEDICINE.) Charles E. Dunlap. *Occupational Med.* 1(3), 237-301(1946).

Radiation injuries include: dermatitis, skin cancer, bone necrosis, gastroenteritis, sterility, damage to blood forming tissue, and damage to fetus in utero. It is recommended that use of Ra and x rays be limited by law to properly qualified persons. BA 21-19879

5213

THE ROLE OF ADRENAL CORTICAL INJURY IN THE TOXIC EFFECTS OF X-RAY EXPOSURE. Bradford N. Craver. *Federation Proc.* 6(1), 319(1947).

Two series of Wistar male rats were x irradiated with 660 r whole body exposure and 29 days later exposed to 880 r. Protected series (lead strip 1 inch wide placed over adrenal region) showed significantly lower mortality and morbidity up to the time of their disposal (30 days) after second exposure than did control series (lead strip $\frac{1}{2}$ inch wide placed above and below adrenal area). BA 21-21501

5214

QUANTITATIVE HISTOLOGIC STUDY OF THE EFFECT OF CHRONIC WHOLE-BODY GAMMA IRRADIATION ON MOUSE TESTES. Allen B. Eschenbrenner, Egon Lorenz, and Eliza Miller. *Federation Proc.* 6(1), 391(1947).

An abstract. BA 21-21502

5215

THE ROLE OF INTENSITY IN CHRONIC IRRADIATION WITH GAMMA AND X-RAYS. Egon Lorenz. *Federation Proc.* 6(1), 395-6(1947).

An abstract. BA 21-21503

5216

NONSPECIFICITY OF THE PATHOPHYSIOLOGY OF THE RADIATION SYNDROME. E. E. Panter. *Federation Proc.* 6(1), 175(1947).

An abstract. BA 21-21504

5217

THE CLINICAL SEQUENCE OF RADIATION DAMAGE. C. L. Prosser, E. E. Panter, and M. N. Swift. *Federation Proc.* 6(1), 182-3(1947).

An abstract. BA 21-21505

5218

EXPERIMENTAL PRODUCTION OF NEW FORMS OF CULTIVATED PLANTS. POSSIBILITIES OF THE ACTUAL METHODS. Francesco Crescini. *Italia agr.* 78(1), 13-20(1941).

Author reviews publications on the creation of polyploids through exposure to low and high temperatures, to x rays, or to action of electromagnetic currents. BA 21-21286

5219

MEDICINE AT THE CROSSROADS. R. H. Draeger and S. Warren. *U. S. Naval Med. Bull.* 47(2), 219-25(1947).

Biologic experiments conducted during operation Crossroads are described. Test objects included: goats, pigs, rats, mice, guinea pigs, insects, bacteria, seeds, sera, hormones, and other materials such as soil and drugs. BA 21-21511

5220

REMARKS ABOUT THE APPLICATION OF THE BETATRON IN CANCER THERAPY. Henry Quastler. *Illinois Med. J.* 91(3), 119-21(1947).

Author describes production of beta rays and x rays by betatron, and biological applications in treatment of

tumors without damaging tissues outside the tumor area.
BA 21-21518

5221
ARTIFICIAL RADIOACTIVE TRACERS: APPLICATIONS TO CHEMISTRY AND MEDICINE. Glenn T. Seaborg. Science 105(2727), 349-54(1947).

Availability of large quantities of radioactivity has opened the possibility of its wide use in industry, biology, medicine, etc. Several of the present uses of the induced radioactivities are described. BA 21-21520

5222
HYPERHEPARINEMIA; CAUSE OF THE HEMORRHAGIC SYNDROME ASSOCIATED WITH TOTAL BODY EXPOSURE TO IONIZING RADIATION. J. Garrett Allen and L. O. Jacobson. Science 105(2728), 388-9(1947).

Authors describe experimental observations that indicate the presence of an anticoagulant in the peripheral blood of heavily irradiated experimental animals. BA 21-21634

5223
CANCEROGENIC EFFECT OF RADIATIONS. B. Bugyi. Orvosok Lapja 2, 305(1946).

General review. BA 21-22290

5224
COSMIC RADIATION AND CANCER. Frank H. J. Figge. Science 105(2726), 323-5(1947). BA 21-22304

5225
REACTIONS OF CONNECTIVE TISSUES AFTER PROTRACTED FRACTIONATED IRRADIATION OF LARYNGEAL CARCINOMA. Frank Windholz. Radiology 48(2), 148-56(1947).

Three stages of injury are described following protracted, fractionated irradiation of larynx in patients with malignant tumors. BA 21-22343

5226
PROBLEMS OF ACQUIRED RADIORESISTANCE OF CANCER: ADAPTATION OF TUMOR CELLS. F. Windholz. Radiology 48, 398-404(1947). BA 21-22344

5227
THE EFFECTS OF EXPOSURE TO BETA RAYS ON THE CEREBRAL CORTEX OF THE CAT. Rosalind Novick. Anat. Record 97(3), 359-60(1947).

An abstract. BA 21-22485

5228
EFFECT OF X-RAYS IN VIVO ON THE AGGLUTINATION OF BRUCELLA. M. Azzariti. Pathologica 32(582), 157-8(1940).

A group of rabbits which were immunized by antigens of Brucella without flagella, were irradiated. Sera from such rabbits gave higher titer of "floccular" agglutinins than "granular" agglutinins, in contrast to controls. This behavior appears to depend on x-ray doses. Floccular character, if present, remains for several days after stimulus has ceased. BA 21-22639

5229
EFFECT OF X-RAY IN VITRO UPON THE CONTRACTILITY OF THE ISOLATED INTESTINE OF THE CAT. Bradford N. Craver. Federation Proc. 6(1), 319(1947).

An abstract. BA 21-21500

5230
DARK-FIELD OBSERVATIONS ON LYMPHOCYTES EXPOSED TO X-RAYS AND OTHER INJURIOUS AGENTS. Robert Schrek. Proc. Soc. Exptl. Biol. Med. 64(3), 381-4(1947). BA 21-21986

5231
HISTOPATHOLOGICAL EFFECTS OF PLUTONIUM, FISSION PRODUCTS, FAST AND SLOW NEUTRONS, AND X-RAYS ON THE THYMUS. Raymond G. Murray. Anat. Record 97(3), 358(1947).

An abstract. BA 21-21991

5232
EXPERIMENTS WITH DIFFERENT METHODS OF ISOLATING PHYSIOLOGICAL MUTATIONS OF FILAMENTOUS FUNGI. Nils Fries. Nature 159(4032), 199(1947).

Author classifies 463 of 600 mutants of *Ophiostoma multiannulatum*, some were from irradiated ascospores, but most were from irradiated conidia. Exposure of conidia impregnated with uranyl nitrate gave higher incidence of mutants but no obvious shift in proportions of types. BA 21-23987

5233
PLUM-PEACH HYBRIDS. Alberto Pirovano. Italia agric. 78(10), 681-5(1941). (In Italian).

Plum (*Prunus domestica*) flowers were pollinated with peach (*P. persica*) pollen exposed to β and γ Ra rays, 6 seeds were obtained. Trees from these seeds, observed 18 years later, exhibited characters of plum trees with white, fertile flowers. Fruits were small and deep fissures appeared causing desiccation of pulp before fruits ripened. Stones resembled plum stones. BA 21-23993

5234
PRELIMINARY NOTE ON SOME STUDIES OF GEOGRAPHICAL PHENOMENA IN MEXICO AND GUATEMALA. A. Sharp. Rev. soc. mex. hist. nat. 7(1/4), 35-9(1946). (In Spanish).

Natural radiation from rocks and soils in volcanic region in Guatemala and Mexico are suggested as a probable and important factor in evolution of plants. BA 21-24085

5235
ORGANIC AND FUNCTIONAL CHANGES IN PLANTS EXPOSED TO RADIUM. G. Fabre. Compt. rend. soc. biol. 69, 523-4(1910). (In French).

5236
INFRARED ABSORPTION AND TEMPERATURE STUDIES ON THE BUDS AND CHROMOSOMES OF *TRADESCANTIA PALUDOSA*. C. P. Swanson, C. S. Rupert and H. T. Yost, Jr. Am. J. Botany 40, 557-565(1953).

Infrared radiation, when combined with x-rays, increases the frequency of chromatid breaks, although infrared is without effect itself. Use of over-lapping filters localized the effective region of infrared around 9600A, but absorption studies of anthers, sepals, and petals revealed no striking lines in this region. (from abstract). BA 28-10153

5237
INDUCED BIOCHEMICAL MUTATIONS IN *BACILLUS SUBTILIS*. Paul R. Burkholder and Norman H. Giles, Jr. Am. J. Botany 34(6), 345-8(1947).

Irradiation of spores or vegetative cells of *B. subtilis* with either ultraviolet or x rays resulted in production of numerous biochemical mutant strains differing from parent strain in their inability to synthesize specific growth factors. BA 21-25268

5238
GENETICS OF RESISTANCE TO RADIATION IN *ESCHERICHIA COLI*. Evelyn M. Witkin. Genetics 32(3), 221-48(1947).

Strain B of *E. coli* gives rise to a radio-resistant (to ultraviolet and x rays) variant which originates as a spontaneous mutation at a rate of 10^{-5} mutations/bacterium/generation, but can be induced by ultraviolet. X-ray survival curves are linear for both strains. Technique for absolute selection of mutants is described and applied in experiments to prove their spontaneous origin. BA 21-25295

5239
PRELIMINARY STUDY OF THE UTILIZATION OF X-RAY INDUCED MUTATIONS FOR BREEDING. I. THE EVIDENT EFFECTS OF IRRADIATION ON THE FIRST GENERATION OF SUMMER BARLEY. R. Freisleben and A. Lein. Z. Pflanzenzucht. 25(3/4), 325-54(1943). (In German).

Germination apparently was not influenced by 4000-25,000 r, but sprouting ability showed definite dose-dependent effect. Genetic nature of changes in survival after exposure are considered. BA 23-66

5240

PRELIMINARY STUDY OF THE UTILIZATION OF X-RAY INDUCED MUTATIONS FOR BREEDING. II. MUTATIONS OF THE CHLOROPHYLL APPARATUS AS TEST MUTATIONS FOR SELECTING X-RAY INDUCED MUTATIONS IN BARLEY. R. Freisleben and A. Lein. Z. Pflanzenzucht. 25(3/4), 255-83(1943). (In German).

5241

ARTIFICIAL VARIEGATION IN IRRADIATED MICE. N. Dobrovolskaja-Zavadskaia and M. Rodzevitch. Compt. rend. soc. biol. 135(15/16), 1303-5(1941).

Two strains of mice (black, strain XLI and silver gray, strain XLII) were irradiated with 600-650 r in 8-12 min (anticathode 40 cm from skin, 155 kv, 5 ma, 1 mm Al filter). Two weeks later the coats began to lose color, after 3-5 mo decolorization was complete. Strain XLII became entirely white, but black eyes were retained. Strain XLI showed decolorized zones in fur completely distinct from colored parts. Authors conclude that strain XLII is predisposed to regional coloring which becomes manifest through influence of external agent. BA 23-325

5242

PROCESSES OF THE FIXATION OF OXYGEN IN RADIO-BIOLOGY. R. Latarjet and J. Loiseleur. Compt. rend. soc. biol. 136, 60-3(1942).

One of first and most important effects of x rays upon a solution containing dissolved free O₂ (as in biologic solutions) is ionization of the O₂. This is considered to be one of primary radiobiologic effects. BA 23-326

5243

SOME HEMATOLOGIC EFFECTS OF IRRADIATION. W. Bloom and L. O. Jacobson. Blood. 3(5), 586-92(1948).

Studies utilizing acute and chronic application of externally originating ionizing radiations and internally deposited radioisotopes failed to demonstrate primary stimulation of hematopoiesis. Leukocytosis during first 24 hr after acute exposure is considered to be a reaction to injury. BA 23-331

5244

THE THERAPEUTIC USE OF RADIOACTIVE ELEMENT IN MALIGNANCY. P. F. Hahn and C. W. Sheppard. Ann. Internal Med. 28(3), 598-606(1948).

Of 450 radioactive isotopes only 6 or 8 were found to be useful in therapy of malignant diseases, some of these having more than one isotope. These include Na²⁴, Cu⁶⁴, As⁷⁶, Y⁹⁰, Ag¹¹¹, I¹³¹, I¹³³, Au¹⁹⁸, Au¹⁹⁹, and Br²⁰⁷. Others were found unsuitable because of objectionable half-lives, radiation spectra, biological behavior, poorly understood chemistry, or expensive production. Various means of utilizing isotopes are discussed. BA 23-333

5245

THE EFFECT OF RADIATION THERAPY ON THE NOCTURNAL GASTRIC SECRETION IN PATIENTS WITH DUODENAL ULCER. Erwin M. Levin, Anna Hamann, and Walter Lincoln Palmer. Gastroenterologia 8(5), 565-74(1948).

In 9 patients studied during period of x-ray therapy directed at the fundus of the stomach, a reduction in volume and free acidity of night secretion was noted during first week of therapy in 7, an increase occurred in 2. Comparable results were obtained in gastric secretory response to histamine. BA 23-662

5246

EFFECTS OF X-RAY IRRADIATION ON THE DEVELOPMENT OF OVARIAN TUMORS IN INTRA-SPLENIC GRAFTS IN

CASTRATED MICE. Min Hsin Li, W. U. Gardner, and Henry S. Kaplan. J. Natl. Cancer Inst. 8(3), 91-8(1947).

Granulosa-cell tumors, luteomas, or mixed tumors developed in irradiated (400 r), intrasplenic ovarian grafts in 7 of 9 castrated female mice and in all of 8 castrated male mice. Irradiation of hypophysis and adjacent tissues (400 r) did not inhibit formation of intrasplenic ovarian tumors (developed in 9 of 12 mice). Ovaries irradiated in vitro and subsequently grafted into spleens of castrated hosts gave rise to tumors, but the incidence was lower than with grafts exposed in vivo. BA 23-979

5247

MAGNESIUM PROTOPORPHYRIN AS A PRECURSOR OF CHLOROPHYLL IN CHLORELLA. S. Granick. J. Biol. Chem. 175(1), 333-42(1948).

Author describes x-ray mutant of *C. vulgaris*. BA 23-1968

5248

INHIBITION OF PLANT GROWTH BY IRRADIATION. I. DISCRETE STEPS OF GROWTH INHIBITION AND PATTERN OF DOSE-RESPONSE-RELATION. Henry Quastler and Marianne Baer. J. Cellular. Comp. Physiol. 31(2), 213-34(1948).

Irradiated seeds of mung beans show growth inhibition when allowed to develop. Four qualitative different reactions are distinguished: (1) beans completely developed through sometimes stunted, (2) beans developing only primary root and hypocotyl, (3) beans with abortive growth of primary root only, and (4) complete abolition of growth. BA 23-1992

5249

LETHAL MUTATIONS PRODUCED BY ULTRA-VIOLET AND X-RAY IRRADIATION OF FUNGAL SPORES. Joan Munro Ford. Australian J. Exptl. Biol. Med. Sci. 26(3), 245-51(1948).

Irradiation of spores of *Chaetomium globosum* with ultraviolet and x rays produces many new, small lethal colonies. These spores stop growing when less than 1 mm in diameter. From 7053 germinated spores, 3860 lethal microscopic mutants were obtained. The small lethal colonies were also found in association with macroscopic mutants of known characteristics, and appeared in their progeny through many generations. BA 23-2585

5250

EXPERIMENTS WITH DROSOPHILA ON THE DEPENDENCE OF RAY INDUCED CHROMOSOME MUTATIONS UPON DOSAGE. Alexander Catsch. Z. Indukt. Abstamm.-u. Vererb. 82(2), 155-63(1948). (In German).

X-ray induced translocations between chromosomes II and III of *D. melanogaster* were studied in hybrids where certain deficiencies and duplications are lethal. Rates of observed translocations (1.33% at 1000 r, 3.79% at 2000 r, 11.09% at 4000 r in spermatozoa used for fertilization on the first day postirradiation) lie between those expected for 1-hit curve and 2-hit curve. BA 22-2633

5251

FURTHER INVESTIGATIONS ON THE STERILIZATION OF CHICKEN EMBRYOS BY GAMMA RAYS. CONSTANCY OF DETERMINATION OF THE FEMALE SEX IN IRRADIATED EMBRYOS. R. Dulbecco. Atti accad. nazl. Lincei Rend., Classe sci. fis., mat. e nat. Ser. 8A 2(5), 659-62(1947).

Author's previous results (that chicken embryos sterilized by gamma rays are invariably female) are confirmed on a larger scale and discussed. BA 23-2637

5252

LEG-LIKE ANTENNAE IN HABROBRACON. P. W. Whiting. J. Heredity 39(5), 153-4(1948).

A single sterile female with leg-like antennae, probably a mutant resulting from an x-rayed egg, is reported. The

proximal rather than the distal region of antennae is modified. BA 23-2652

5253
RADIOACTIVE EMANATIONS: THEIR NATURE, MECHANISM OF ACTION, BIOLOGICAL EFFECTS AND TOLERANCE LIMITS. B. N. Craver. J. Ind. Hyg. Toxicol. 29, 196-200 (1947).

This is a review including a brief discussion of nature, measurement, and biological effects of radiations, cyclotron, betatron, and mechanism of radiation effects. Accepted limits of tolerance for radiation exposure are given. Leukemia, osteogenic sarcoma, and pulmonary neoplasm are briefly mentioned. BA 23-2945

5254
Naval Radiological Defense Lab., San Francisco.
INCREASED URINARY EXCRETION OF TAURINE AND UREA BY RATS FOLLOWING X IRRADIATION. R. E. Jay, J. C. Early, and C. Entenman. July 10, 1956, 20p. (USNRDL-TR-98).

Whole body exposure to x ray doses of 175-2500 r caused increased urinary excretion (per 24 hours) of urea, taurine and sulfate in fasting rats. Increase was greater with greater doses between 75-2500 r. Larger doses caused no further increase. Sequence of changes in excretion rates of the three compounds is described, as is the effect of adrenalectomy on the rats. NSA 10-9924

5255
HYPERTHYROIDISM OF ACROMEGALY. Saint-Milco. Ann. endocrinol. (Paris) 8, 503-9(1947). (In French).

Seven patients suffering from acromegaly with signs of hyperthyroidism were treated with x irradiation of hypophysis. Urinary excretion of thyrotropic hormone was increased before treatment and fell to normal values at same time as clinical signs of hyperthyroidism diminished. Thyrotropin excretion was normal in four cases of acromegaly without hyperthyroidism. BA 23-3576

5256
THE TOXICITY OF SOME ZIRCONIUM AND THORIUM SALTS IN RATS. L. T. McClinton and Jack Schubert. J. Pharmacol. Exptl. Therap. 94(1), 1-6(1948).

Solutions of citrate and gluconate salts of Zr and citrate salt of Th were administered to rats intraperitoneally and acute LD₅₀s determined. Rats which survived for 36 hr invariably recovered and exhibited no toxic symptoms as long as 6 mo later. No hematologic or histologic signs of Zr toxicity were found. 3600 mg/kg of Zr citrate was tolerated by rats when given in daily doses of 450 mg/kg. BA 23-3863

5257
EFFECT OF X-RAYS ON PHOSPHOLIPID TURNOVER. G. Hevesy. Arkiv Kemi 24A(26), 1-21(1947).

Evidence is presented indicating that x rays probably do not influence penetration of labeled P to sites of phospholipid synthesis. Irradiation causes a decrease in phospholipid turnover rate in cytoplasm and nuclei of sarcoma cells. Even greater effect (60% decrease) on liver nuclei. BA 23-3975

5258
COMPARATIVE SUSCEPTIBILITY OF THE LYMPHOID TISSUES OF STRAIN C57 BLACK MICE TO THE INDUCTION OF LYMPHOID TISSUES BY IRRADIATION. Henry S. Kaplan. J. Natl. Cancer Inst. 8(4), 191-7(1948).

Young mice were killed at successive intervals after fractional whole-body irradiation, and lymph nodes, spleens, and thymus glands subjected to gross and histologic examinations and to bio-assay. Fifteen of 28 mice (54%) developed lymphoid tumors 57 to 135 days after the beginning of irradiation. BA 23-3981

5259
EFFECTS OF URETHANE, X-RAYS, POTASSIUM

ARSENITE, BENZOL, ON SURVIVAL TIME IN TRANS PLANTED MOUSE LEUKEMIA. Arthur Kirschbaum, Sister Teresita Judd, Chen San Lu, Ruby M. Engstrom, and Harry Mixer. Proc. Soc. Exptl. Biol. Med. 168(2), 377-80(1948)

Survival time was lengthened significantly in three transfer lines of mouse myeloid leukemia by treatment with either potassium arsenite, urethane, x rays or benzol, in decreasing order of effectiveness. Two transfer lines of lymphoid leukemia grown in genetically identical hosts did not respond favorably to the same treatment. BA 23-3984

5260
ADDITIVE EFFECTS OF X-RAYS AND METHYLCHOLANTHRENE IN INDUCING MOUSE LEUKEMIA. H. W. Mixer and A. Kirschbaum. Radiology 50(4), 476-80(1948).

Total dose of 1100 r/air of x rays (140 kv, 2 mm Al filter, HVL 4.2 mm al) in 11 weekly treatments of 100 r was applied (total body) to 34 mice. Equal number received 18 skin applications of methylcholanthrene, 48 mice received both. Leukemogenic agents acted in an additive fashion except in CBA mice which were susceptible only to x rays. BA 23-3993

5261
LUMINOUS RADIO-ACTIVE SUBSTANCES. N. S. Wales. Govt. Gaz. 1945, 173(1945).

A girl employed on operations requiring use of radioactive substances developed sore lips. Substance causing condition was removed by solvent and recovery followed. (The girl had had respiratory infection and used handkerchief repeatedly while working without removing gloves.) BA 23-4088

5262
FURTHER OBSERVATIONS ON THE USE OF THREE-MILLION-VOLT ROENTGEN THERAPY. R. Dresser. Radiology 50(5), 645-8(1948).

With this type of super-voltage x rays it is possible to deliver upwards of 5000 r to a single portal in daily doses of 300-400 r without visible skin erythema or epilation. Systemic reaction of patients to supervoltage x-ray therapy is also less, possibly because scattering is reduced and relatively smaller volume of tissue is irradiated. BA 23-4107

5263
PHYSICAL BASIS FOR THE HIGH SKIN TOLERANCE OF SUPER-VOLTAGE ROENTGEN RAYS. J. G. Trump. Radiology 50(5), 649-56(1948). BA 23-4114

5264
MUTATION IN STREPTOMYCES FLAVEOLUS INDUCED BY X-RAYS AND ULTRAVIOLET LIGHT. Albert Kelner. J. Bacteriol. 56(4), 457-65(1948).

In *S. flaveolus* ATCC 3319 irradiated with ultraviolet and x rays, the most common mutants were "yellow," "asporogenous," and "restricted." Doses of x rays up to 300,000 r were used. Mutation frequency rose with dosage up to 200,000 r, above which rate of increase leveled off. Results were more uniform with x rays than with ultraviolet rays. BA 23-4315

5265
PRODUCTION OF PENICILLIN. Milislav Demerec. U. S. Patent 2,445,748. 1946. Issued July 27, 1948.

P. chrysogenum treated with 50,000-100,000 r (suitable 75,000 r) of x rays gave rise to a mutant capable of increased penicillin production under submerged conditions of growth. BA 23-4710

5266
FILARIASIS IN THE DOG DUE TO *DIROFILARIA IMMITIS* LEIDY PERIODICITY. ACTION OF PHYSICAL FACTORS, PARTICULARLY X-RAYS. Henri Galliard. Ann. parasitol. humaine et comparee 22(3/4), 148-57(1947). (In French)

Application of x rays to cardiac region of dog was followed by immediate reduction of number of microfilariae. Over a period of more than five months, decline in microfilarial number was progressive, but periodicity persisted. X-ray treatment did not affect development of microfilariae in *Aedes*. BA 23-5371

5267
INFLUENCE OF THE BETA-RAYS ON THE PUPAL WING OF BUTTERFLY. (PRELIMINARY NOTE.) Sanji Kishi, Mituo Miwa, and Kazuo Mori. Zool. Mag. (Tokyo) 54(12), 502-5(1942).

Pupae of *Papilio xuthus*, *P. demetrius*, and *P. sarpedon nipponus* had a limited area of pupal wing on one side irradiated with β rays. Wing of imago when it emerged from treated pupa was deformed, showing wrinkling, scalelessness, formation of bubbles containing green fluid, intense wrinkling like a burn, and asymmetry. Younger pupae were more sensitive than older ones. Transparent spot often appeared at middle of scaleless area of irradiated wing of young pupa. BA 23-5626

5268
THE USE OF RADIOACTIVE TRACERS IN PLANT NUTRITION STUDIES. P. R. Stout, Roy Overstreet, Louis Jacobson, and Albert Ulrich. Soil Sci. Soc. Amer., Proc. 12, 91-7(1947, 1948).

When radioactivity concentration of principal long-lived fission products was 0.1 μ c/g soil, pronounced injury to plants was observed. BA 23-19650

5269
THE EFFECT OF RADIUM ON PLANTS. G. Fabre, Compt. rend. soc. biol. 70, 419-20(1911). (In French).

Author had previously irradiated lily blossoms and found effects (atrophy of flowers) were manifest in neighboring blossoms of the same stem. Additional studies are reported here on the growth and development of plants subsequently (7 stalks surviving previous irradiation). All had sterile or decayed rhizomes. Radiation effects on plant reproductive organs are considered to be the result of effects of decay secondary to atrophy of the vascular (conductive) system.

5270
THE EFFECT OF ADRENAL CORTICAL INJURY ON THE TOXICITY OF ROENTGEN RAYS. Bradford N. Craver. Am. J. Roentgenol. Radium Therapy 59(3), 404-7(1948).

X-ray effects from single doses of 660 r were diminished in white rats which had adrenal area protected by lead during exposure as compared to rats which had adrenal area exposed and surrounding tissue protected. Possibility that radiation sickness may be due to adrenal cortical injury is discussed. BA 23-6165

5271
DEVELOPMENT OF GONADS IN THE ABSENCE OF GERMINAL CELLS IN CHICKEN EMBRYO. TOTAL STERILIZATION THROUGH TREATMENT WITH GAMMA-RAYS ON THE PRIMITIVE-STREAK STAGE. R. Dulbecco. Atti accad. nazl. Lincei, Rend., Classe sci. fis. mat. e nat. Ser. 8A 1(11), 1211-19(1946).

After irradiation of primitive streak stages with Ra needles for 24 hr, only 3 embryos survived up to 7th, 8th, and 12th days. They were normally developed but gonocytes were entirely lacking. BA 23-6166

5272
PHYSIOBIOLOGY AND GENERAL MANAGEMENT OF CHRONIC ULCERATION OCCURRING AFTER IRRADIATION. H. B. Hunt and D. H. Breit. Am. J. Roentgenol. Radium Therapy 59(1), 9-18(1948).

Radiobiology of cellular necrosis and tissue repair were discussed at length along with various types of treatment for radiodermatitis. BA 23-6167

5273
INJURIOUS EFFECTS OF WHOLE BODY NEUTRON

IRRADIATION IN ANIMALS. T. Leucutia. Am. J. Roentgenol. Radium Therapy 59(1), 133-6(1948).

It is established that pure neutron source can produce systematic effect which is much more harmful than that produced by equivalent doses of x or γ rays when whole body is irradiated. Small doses given over prolonged periods of time are dangerous, for malignant tumor formation may occur. Adequate protection against neutron radiation is important in medicine and industry. BA 23-6168

5274
THE TIME FACTOR IN RADIATION THERAPY. Charles L. Martin. Am. J. Roentgenol. Radium Therapy 59(1), 1-8(1948). BA 23-6169

5275
OXYGEN UPTAKE FROM AMPHIBIAN EMBRYOS TREATED WITH LETHAL DOSES OF X-RAYS. E. Urbani-Mistruzzi. Atti. accad. nazl. Lincei Rend., Classe sci. fis. mat. e nat. Ser. 8A 1(10), 1097-1102(1946). (In Italian)

Embryos of *Rana esculenta* at tail-bud stage were x irradiated for 60 min. Five hours after treatment there was no difference in O_2 uptake, as compared with controls. Later, a marked decrease in O_2 uptake was observed. BA 23-6172

5276
USE OF ARTIFICIAL RADIOACTIVE ISOTOPES FOR PRODUCTION OF LOCALIZED BIOLOGIC IRRADIATION EFFECTS. I. H. Mueller. Gynaecologia 121, 129-31(1946). (In German).

Radioactive Zn, suspended in purified and buffered pectin to prevent diffusion, was applied intraperitoneally to animals. A very strong localized irradiation effect was observed. Results of therapeutic attempts in man (two cases of advanced peritoneal carcinomatosis) are also described. BA 23-6178

5277
PROBLEM OF RADIOACTIVE WASTE DISPOSAL. Forrest Western. Nucleonics 3(2), 43-9(1948).

Radiobiologic characteristics and tolerance levels of a number of reactor and fission produced isotopes are considered with reference to possible contamination of immediate environment of a population. Table of tolerance concentrations of certain isotopes in drinking water is included. Radiobiological limitations determine the levels which are tolerable. BA 23-6181

5278
STUDIES ON THE GENETICS OF ANTIBIOTIC FORMATION; THE INDUCTION OF ANTIBIOTIC-FORMING MUTANTS IN ACTINOMYCETES. Albert Kelner. J. Bacteriol. 57(1), 73-92(1949).

After *Streptomyces albosporus*, *S. albus*, *S. cellulosa*, *S. fleveolus*, *S. griseus*, *S. violaceus*, and *S. viridochromogenus* were treated with x or ultraviolet rays, active mutants found in all but two cultures, indicating that probably most actinomycetes can be induced to form antibiotically-active mutants. BA 23-19223

5279
EFFECT OF LARGE DOSAGES OF IRRADIATION ON GASTRIC ACIDITY. I. B. Brick. New Engl. J. Med. 237, 48-51(1947).

No definite pattern of effect on gastric acidity is seen after radiation injury, there was no effect after two months. Author discourages radiation treatment for peptic ulcers, since it may produce perforation and hemorrhage or no change. BA 23-6542

5280
CONTRIBUTION TO THE STUDY OF MECHANISM OF FOLLICULAR DEVELOPMENT AND INVOLUTION IN THE OVARY OF THE ADULT RABBIT. P. Desave. Arch. biol. (Leige) 59(1), 31-146(1948). (In French).

X-ray sterilization limits the stimulative effect of prolactin on follicular development to two waves. Sub-

sterilizing x-ray doses, particularly when divided, temporarily inhibits the follicular cycle. Effects of pregnancy, pseudo-pregnancy, hypophysectomy, and thyroidectomy on follicular cycle in the rabbit are discussed. BA 23-6838

5281
THE USE OF HIGH VOLTAGE ROENTGEN THERAPY IN THE TREATMENT OF AMENORRHEA AND STERILITY IN WOMEN. Ira I. Kaplan. Am. J. Roentgenol. Radium Therapy 59(3), 370-1(1948).

X-ray therapy of amenorrhea and sterility may also produce: direct stimulating effect on ovaries; stimulation of an undeveloped uterus; hyperemia with subsequent swelling of tissues and rupture of ovarian cysts, and rupture of a persistent corpus luteum which prevents menstruation. Specific x-ray action is undetermined. BA 23-6857

5282
GASTRIC ULCER FOLLOWING RADIATION. F. E. Hamilton. Arch. Surg. 55, 394(1947).

Of 256 patients receiving massive high voltage x-ray therapy for malignant growths of the testis, 80% of seminoma cases, and 50% of teratocarcinoma cases exhibited an apparent clinical cure. Half of the patients treated experienced epigastric distress 2-3 mo post-irradiation, 35 of these developed gastric ulcer. Individual sensitivity to radiation is considered to be a factor. BA 23-7198

5283
EXPERIMENTAL CONTRIBUTION TO THE PROBLEM OF RADIOSENSITIZATION. E. Fischel. Rev. can. biol. 6(3), 436-8(1947). (In French).

In 4 of 5 patients, x ray produced more pronounced erythema on biceps region of arm when region had been previously treated with infrared rays. Visibility of skin reaction with Wood's light differed according to reaction: marked in infrared reaction, slight in x ray erythema. BA 23-7373

5284
TRANSPLANTATION OF THE EYE AMONG X-IRRADIATED AND NORMAL EMBRYOS AND LARVAE. N. Frontali. Atti. accad. nazl. Lincei, Rend., Classe sci. fis. mat. e nat. Ser. 8A 1(7/8), 865-9(1946). (In Italian).

Eyes of *Rana esculenta* embryos in tail-bud stage, x irradiated for 30 and 60 min and transplanted on normal larvae can survive, grow, and differentiate. A normal eye, transplanted on an irradiated larva and then retransplanted on a normal larva, is not influenced as to growth or differentiation. BA 23-7441

5285
CEPHALIC MALFORMATIONS IN AMPHIBIAN EMBRYOS WITH PARTICULAR RESPECT TO X-IRRADIATION EXPERIMENTS. T. Perri. Atti. accad. nazl. Lincei. Rend. Classe sci. fis. mat. e nat. Ser. 8A 2(2), 213-17 (1947). (In Italian) BA 23-7451

5286
INDUCED BIOCHEMICAL MUTANTS OF *AZOTOBACTER AGILIS*. J. L. Karlsson and H. A. Barker. J. Bacteriol. 56(5), 671-7(1948).

Among morphological and physiological x ray-induced variants of *A. agilis*, a stable mutant was discovered which, because of a complete genetic block, is unable to convert pyruvate to acetate. Due to necessity of acetate for growth this substrate is unable to develop on glucose and succinate substrates which are arrested at pyruvate stage. BA 23-7531

5287
BIOELECTRIC POTENTIALS AS AN INDEX OF X-RAY ACTION. A. A. Bless. Phys. Rev. 74(9), 1209(1948).

Functional relations between effects of x rays on vital activity of corn seeds and on bioelectric potential were found to be similar. The hypothesis that biological

effects of x rays may be traced through variations of electrical potentials of the material is suggested.

BA 23-8820

5288
POLYPLOIDY IN BACTERIA? A. Buzzati-Traverso, N. Visconti di Modrone, and L. L. Cavalli. Nature 162(4112), 295(1948).

Of three stocks of *E. coli*, stock Ida (both R and S) was more resistant to x irradiation than were stocks 76 or 111. Assuming that survival rate is a measure of target volume and that the target may be the "nucleus", cells were measured. Those with larger target volume were significantly larger. This analogy with nucleoplasmic ratio might imply polyploidy in some bacterial stocks. BA 23-9756

5289
POSTIRRADIATION TREATMENT OF MICE AND RATS. CIBA FOUNDATION SYMPOSIUM ON IONIZING RADIATIONS AND CELL METABOLISM. D. W. H. Barnes and J. F. Loutit. p. 140-153. Little, Brown and Co., Publishers 1956.

5290
EXPERIMENTAL X-IRRADIATION OF THE RAT THYROID. A. E. Bender. Brit. J. Radiol. 21, 244-8(1948).

Treatment of rat thyroid with 50-5000 r x-ray doses produces no change in the rats, O₂ consumption, nor in histological picture of the glands in mature males, young growing rats, and mature animals in which gland had been rendered hyperplastic by oral thiouracil. Dose greater than 5000 r invariably resulted in death of animal 9-10 days later, which could be delayed or prevented by subcutaneous injection of glucose-saline. Although death was due to insufficient intake of fluid, no cause for this was found. BA 23-10025

5291
HEALTH ASPECTS OF RADIOACTIVE WORK. D. F. Brown. Proc. Conf. Nuclear Chem., Hamilton, Ontario 1947, 205-11(1947).

Biological effects of radiation and health hazards connected with radiological work are discussed. Personnel monitoring and radiation protective devices are considered. BA 23-10028

5292
CURRENT AND FUTURE ENVIRONMENTAL CONTROL PROBLEMS ATTENDANT ON THE USE OF RADIOACTIVE ENERGY. L. F. Curtiss. Am. Ind. Hyg. Assoc. Quart. 8, 14-18(1948).

Consideration of medical aspects of the radiation problem connected with nuclear transformations is included in this discussion. BA 23-10029

5293
THE EFFECT OF BETA RAYS ON CELLS CULTIVATED IN VITRO. Ilse Lasnitzki. Brit. J. Radiol. 21, 265-9(1948).

Tissue cultures of avian fibroblasts were exposed to 1000 r of pure β rays from uranium UX-1. Steep fall in mitosis, appearance of abnormal mitotic figures and degenerate cells were observed shortly after exposure, followed by return of mitotic activity accompanied by more abnormal mitosis and cell degeneration. Mitotic recovery to half normal value had occurred at end of observation period. Changes produced by same dose of x rays was qualitatively similar, total damage is of same order, but time relation differs. BA 23-10030

5294
THE THEORY OF THE BIOLOGICAL EFFECT OF X-RAYS. L. Neu and V. Neu. Med. Woman's J. 54, 17-23(1947).

Permeability of cell membranes increased after x raying and unstable cell membranes were found to be more radiosensitive. Hypothesis advanced showing close connection between periodic behavior of permeability of

cell membranes and erythema (a recurring x-ray effect). Concentration of ions in cell increases with irradiation time, primary effect of x rays is described as irreversible poisoning of living cell. BA 23-10032

5295

GAMMA-RAY PROTECTION IN RADIUM THERAPY.

C. W. Wilson and J. R. Greening. Brit. J. Radiol. 21, 211-30(1948).

Calculations and measurements of local dosages and integral dose received by Ra mold technicians and Ra therapists were made. On basis of observations reported, implications of various proposed standards of protection are examined and evaluated with reference to actual working conditions. Protection is considered in relation to: local exposure of hands, local exposure of gene material, and integral dose throughout whole body. BA 23-10034

5296

CONFERENCE ON METABOLIC ASPECTS OF CONVALESCENCE. Edward C. Reifstein, Jr., ed. Transactions of the Fifteenth Meeting, March 31-April 1, 1947, New York, N. Y. Josiah Macy, Jr. Found., New York. 1947. 163p.

Topics include: use and hazards of isotopes in biological and clinical investigation, effects of Sr and Be on bone metabolism, relation of cell permeability to isotope studies. BA 23-10156

5297

LIVER INJURY. F. W. Hoffbauer. Transactions of the Seventh Conference, January 15 and 16, 1948, New York, N. Y. Josiah Macy, Jr. Foundation, New York. 1948. 95p.

Topics include: effects of Pu on the liver. BA 23-10552

5298

Texas Agricultural Experiment Station, College Station, Tex.

FINAL REPORT ON AEC PROJECT 815. July 2, 1956. 11p. (ORO-152).

Data are presented from a study of the effects of doses of whole-body x radiation ranging from 50 to 500 r administered at various ages on: the pituitary gland, thyroid gland, pancreas, and spleen of cockerels, egg production of the progeny of irradiated male chickens, the reproductive performance of progeny of irradiated males, and the sex ratio of chicks dying during the third week of incubation as related to irradiation dosage of the sire of both parents of these chicks. NSA 10-7396

5299

FANCY AND FACTS CONCERNING PROGRESS IN AGRICULTURAL RESEARCH WITH RADIOACTIVE MATERIALS. Malcolm H. McVickar. Fertilizer Rev. 23(6), 3-5(1948).

Recent experiments with radioactive materials are reviewed to show that radioactivity is not beneficial to crop growth, but is a valuable research tool in studying deposition of fertilizer nutrients in soils, plants, and animals. BA 23-12048

5300

THE INFLUENCE OF α IRRADIATION ON THE MOVEMENT OF THE PROTOPLASM IN THE ONION EPIDERMIS. J. Chury. Biol. Listy 28(2), 89-91(1947).

Pieces of epidermis of yellow onions irradiated for 15 min exhibited more rapid movement than cells not irradiated. Increased protoplasmic motility was also observed in cells adjacent to irradiated cells but protected from rays by Al. BA 23-12580

5301

EFFECT OF RADIATION ON PLANT PROTOPLASM. R. Biebl. Mikroskopie 2(9/12), 328-35(1947). (In German).

Author surveys present knowledge on influence of ultraviolet α , β , and γ rays on permeability and irritability of plant protoplasm. BA 23-12577

5302

INFLUENCE OF RADIOACTIVE MATERIALS ON CROP PLANT GROWTH TO BE STUDIED. Am. Fertilizer 108(7), 12-13(1948).

Proposed studies outlined are intended to: (1) measure effect of adding radioactive material to soil on growth, yield, and maturity and composition of crops; (2) determine influence of low activities of α , β , and γ radiation on seed germination and on seedlings, and (3) determine effect of radioactivity on soil microbiology. BA 23-12589

5303

CHROMOSOME ABERRATIONS IN TRADESCANTIA PRODUCED BY X-RAY TREATMENT AT LIQUID AIR TEMPERATURE. A. C. Faberge. Genetics 33(6), 609 (1948).

The number of chromosome aberrations (in Tradescantia pollen) produced by a given dose of x-rays is much smaller when pollen is exposed in liquid air than when exposure takes place at room temperature, but the types of aberration are not different under the two conditions. BA 23-13702

5304

CYTOLOGICAL EFFECTS OF X-RAYS ON COLCHICINIZED ROOT-TIPS OF ALLIUM CEPA. Michael Levine. Am. J. Botany 35(10), 795(1948).

An abstract. BA 23-13712

5305

THE CYTOGENETIC EFFECT OF SONIC ENERGY APPLIED SIMULTANEOUSLY WITH X-RAYS. Alan D. Conger. Genetics 33(6), 607(1948).

Combination of x irradiation (250 r, 78 r/min) and sonic treatment caused increase in frequency of all types of chromosome aberrations in inflorescences of *Tradescantia paludosa*. BA 23-13753

5306

EXPERIMENTS ON ANALYSIS OF GENE EFFECTS IN A. MAJUS. F. Mainx. Oesterr. bot. Z. 94(3), 355-84 (1948). (In German).

Correlations between morphological and physiological components of mutations were studied in x ray-induced mutants of Müncheberg strain "S 50", which was taken as control. BA 23-13770

5307

EXPERIMENTAL MODIFICATION OF THE BIOLOGICAL EFFECTS OF X-RAYS. Luther Smith, R. S. Caldecott, and Barbara Hayden. Genetics 33(6), 629(1945).

Tests with dormant and germinating seeds of barley and Einkorn have shown that the atmosphere surrounding seeds during x raying, or heat either before or after irradiation, profoundly modifies radiation effects. Three criteria used in making comparisons were: injury symptoms, frequency of chromatinic bridges in root-tip cells, and frequency of seedling mutants in F_2 . BA 23-13775

5308

GENETIC DIFFERENCES IN RADIATION EFFECTS ON RESISTANCE OF MICE TO TYPHOID, SALMONELLA TYPHIMURIUM. John W. Gowen. Genetics 33(6), 611 (1948).

An abstract. BA 23-13798

5309

EFFECTS OF BETA-RAYS ON HABROBRACON JUGLANDIS. A. Martin, Jr., J. N. Dent, and L. Joseph. Genetics 33(6), 619-20(1948).

Wild type females exposed to dried P^{32} produced progeny about 25% of which were abnormal. BA 23-13814

5310

LETHAL CHANGES INDUCED BY X-RAYS IN PARAMECIUM AURELIA. E. L. Powers, Jr. and Deborah Shefner.

Genetics 33(6), 624-5(1948).
An abstract. BA 23-13819

5311
THE PRODUCTION OF PHENOCOPIES IN THE MOUSE
BY MEANS OF X-RAY TREATMENT OF EMBRYOS. Liane
Brauch Russell and W. L. Russel. Genetics 33(6), 627
(1948).

Mouse embryos of various developmental stages were
x irradiated by (250 kvp, total body exposure) by exposing
pregnant females, 2-17 days gravid. Total doses of 200-
500 r at 72 and 84 r/min produced characteristic and consistent
results for various stages. Treatment on 9th, 10th,
11th, and 12th days produced abnormalities resembling
known gene mutations. BA 23-13824

5312
FAILURE OF RUTIN TO DECREASE THE MORTALITY
OF ACUTE IONIZING RADIATION ILLNESS IN MICE
E. P. Cronkite, D. C. Eltzholtz, C. R. Sipe, W. H.
Chapman, and F. W. Chambers, Jr. Proc. Soc. Exptl.
Biol. Med. 70(1), 125-8(1949).

Mortality and weights of rutin-treated white Swiss
mice, irradiated with mid-lethal doses of 1000 kv x rays,
were compared with values for untreated irradiated mice.
Rutin increased rate at which mice died BA 23-14167

5313
THE EFFECT OF X-RAYS ON ASCORBIC ACID CONCEN-
TRATION IN PLASMA AND IN TISSUES. C. H. Kretzsch-
mar and F. Ellis. Brit. J. Radiol. 20(231), 94-9(1947).

Observation made of 35 patients during course of
x ray treatment (31 with malignant disease) revealed, in
most cases, that the ascorbic acid content of plasma was
below the pre-exposure level. In one case this fall paralleled
x ray leukopenia. Using normal rabbit blood and in vivo
muscle and kidney tissue from rats, it was found that x
rayed tissues had lower ascorbic acid content than did
nonirradiated tissues. BA 23-14169

5314
HEALTH HAZARDS IN THE USE OF RADIOACTIVE
ISOTOPES. William F. Bale. Madison, Univ. Wisconsin
Press. 1948. 445p. A Symposium on the Use of Isotopes
in Biology and Medicine (Edgar S. Gordon, Chairman).
BA 23-14175

5315
NEUTRON EFFECTS ON ANIMALS. Ellice McDonald.
Baltimore, Williams and Wilkins Co. 1947 198p.

Opening chapter briefly reviews general problems of
radiation effects on cells, balance of book deals directly
with problems of neutron irradiation, its theory, methodology,
and biological effects. Experimental material includes:
rats, microorganisms, mice, Zea mays, rabbits, chickens,
and dogs. BA 23-14180

5316
DOSAGE DETERMINATION WITH RADIOACTIVE ISOTOPES.
I. FUNDAMENTAL DOSAGE FORMULAE. II. BIOLOGICAL
CONSIDERATIONS AND PRACTICAL APPLICATIONS L.
D. Marinelli, Edith H. Quimby, and G. J. Hine Nucleonics
2(4), 56-66, (5), 44-9(1948).

Authors present formulae and numerical values by
which it is possible to calculate dosage of energy originating
from isotopes absorbed by living tissue. Concept of effective
half-life of isotope in the body is emphasized (biological
half-life). BA 23-14181

5317
SARCOMA ARISING IN IRRADIATED BONE. William G.
Cahan, Helen Q. Woodard, Norman L. Higinbotham, Fred
W. Stewart, and Bradley L. Coley Cancer 1(1), 3-29
(1948).

Histories of 11 patients in whom osteogenic sarcoma
developed 6-22 yr after x- or γ -ray therapy are presented.
Authors feel that such therapy is inadvisable for benign

tumors of bone and associated bone conditions. Radio-
resistance of benign bone lesions and potential disturbance of
epiphyseal growth centers in children are contra-
indications to wide use of irradiation. BA 23-15221

5318
EFFECT OF ATOMIC RADIATION ON THE ORAL STRUCTURES.
Joseph L. Bernier. J. Dental Research 27(6), 731(1948).

Changes in the oral mucosa and gingival of patients
who received lethal or sublethal radiation exposure at
Hiroshima and Nagasaki are described. BA 23-15321

5319
THE EFFECT OF X-RAYS ON EPITHELIAL CELLS.
W. Jadassohn, E. Bujard, R. Paillard, and P. Gaudin.
Dermatologica 97(Suppl.), 36-43(1948). (In French).

Male guinea pig nipples were rubbed with estrogens
to produce acanthosis. Before excision, colchicine was
injected intradermally to make mitosis visible. After
33 hr, many pycnotic mitoses were observed. In animals
irradiated before treatment with 2400 r no such histological
changes were found, although acanthosis was produced.
BA 23 15362

5320
EYE TRANSPLANTATION BETWEEN NORMAL AND
X-IRRADIATED LARVAE OF B. VULGARIS AND B.
VIRIDIS. F. Chelli. Atti accad. nazl. Lincei, Rend.,
Classe sci. fis. mat. e nat. Ser. 8A 4(1), 140-5(1948).

Eye of larvae of B. vulgaris irradiated with strong
x-ray doses undergoes degeneration when transplanted
on normal larva. With weaker doses the eye can metamorphose
and have well preserved retina but degenerating lens. Eyes
from normal larvae, transplanted to irradiated larvae, grow
and differentiate well. BA 23-15455

5321
PRELIMINARY STUDY OF ROENTGEN CASTRATION OF
DOGS. Joachim Fontaine. Deutsche tierarztl. Wochschr.-
Deut. tierarztl. Rundschau 51(9/10), 94-6(1943). (In
German).

Destroying all cells of testes in dogs by x rays is
impossible. Germ cells degenerate but Sertoli and interstitial
cells remain unchanged.
BA 23-16149

5322
EFFECT OF RADON ON THE YEAST SACCHAROMYCES
ELLIPSOIDEUS. P. Bonet-Maury and A. Husson. Compt.
rend. soc. bio. 136, 475-7(1942). (In French).

Survival of an important fraction of irradiated cells
was observed. Diameter of target corresponding to immediate
death was equal to the cell diameter (for α -radiation of Po).
Biologic effect of total Rn irradiation appears to be due to
 α rays. BA 23-16843

5323
ON THE FREQUENCY AND TRANSMITTED CHROMOSOME
ALTERATIONS AND GENE MUTATIONS INDUCED BY
ATOMIC BOMB RADIATIONS IN MAIZE. E. G. Anderson.
Proc. Natl. Acad. Sci. U. S. 34(8), 387-90(1948).

Maize seed was exposed to atomic bomb radiation on
ships (Bikini). In one lot, partial pollen sterility indicated
chromosomal alterations in 4.5-5% of progenies in outcrosses
with nonexposed seed or pollen. More than 50% of gametes
of the exposed generation are believed to carry one or
more gene mutations. Aberrant characters are described.
BA 23-17801

5324
THE INFLUENCE OF X-RAYS AND CHEMICAL SUBSTANCES
ON MITOSIS. Karl Hohl. Radiol. Clin. 17, 302-9(1948).
(In German).

First modification of Vicia faba and Allium cepa were
observed after x ray treatment with 25 r. These included
pycnosis of metaphase chromosomes (accumulation of

thymonucleic acid), chromosome fragmentation, and injury to centromere. BA 23-17809

5325

SYMPOSIUM ON MEDICOLEGAL PROBLEMS. SERIES II. Samuel A. Levinson. Philadelphia, J. B. Lippincott Co 1949. 276p.

The symposium includes a section on radiation hazards and health protection in radioactive research. BA 23-17881

5326

THE BEHAVIOR OF SOME ENZYMES IN IRRADIATED SKIN I. INTRODUCTION. PROTEASES. II. AMYLASES. III. ESTERASES. IV. CHOLINESTERASES. T. Baglioni and M. Piemonte. Boll. soc. ital. biol. sper. 23(7), 727-33(1947). (In Italian) BA 23-18035

5327

ABERRANT TISSUE DEVELOPMENT IN RATS EXPOSED TO BETA RAYS. P. S. Henshaw, R. S. Snider, and E. F. Riley. Radiology 52(3), 401-15(1949).

All types of skin and connective tissue tumors appeared in Sprague-Dawley rats 10 months to 1 year after exposure to β rays of P^{32} . Results show: greater response in males than females, high degree of tumor differentiation with tendency of epithelium to form squamous and basal cell carcinomas and adenomas, tendon, cartilage, and bone formation from connective tissues. Nonmalignant abnormalities (extra parts on toes, soft tissue extensions, and chitinous projections from feet and nose) were also observed. BA 23-18039

5328

OXIDATIVE PHOSPHORYLATION IN SOME RADIOSENSITIVE TISSUES AFTER IRRADIATION. D. W. Van Bekkum. p. 77-89 Ciba Foundation Symposium on Ionizing Radiations and Cell Metabolism Little, Brown and Co. Publishers 1956.

5329

A REPORT OF HYGIENIC INVESTIGATIONS ON CASUALTIES AND THE RESIDUAL EFFECTS BY THE ATOMIC BOMB DROPPED ON NAGASAKI-SHI Kiyomi Otsubo and Masaichi Ishizawa. Japan J. Clin. Exptl. Med. 24. 27-9(1947).

Authors report results of their examination of 384 inhabitants (161 males, 223 females) in afflicted areas within 2 km from center of explosion, 42 days after the bombing. BA 23-18042

5330

WHAT EVERY MEDICAL OFFICER SHOULD KNOW ABOUT THE ATOMIC BOMB. IV. EVALUATION OF THE FIVE ATOMIC EXPLOSIONS. V. FUNDAMENTALS OF RADIATION PATHOLOGY. Bull. U. S. Army Med. Dept. 8(5), 350-62(1948).

Authors present a brief review of general destructive effects of ionizing radiation with a tabulation of relative radiosensitivities of the main body tissues and cells. BA 23-19205

5331

Argonne National Lab. QUARTERLY REPORT OF BIOLOGICAL AND MEDICAL RESEARCH DIVISION. Oct. 1954 100p. (ANL-5332)

Includes reports on: cytological effects of continuous irradiation of tumors (implanted Sr^{90} beads), effects of 80- and 250-kv x rays on mice, pyrophosphatase and ATP-ase activity of rat spleen and thymus postirradiation, radiosensitivity of renal function in chicks, induction of cataracts in mice by fast neutrons and Co^{60} γ radiation, x ray effect on synthesis of egg yolks, protection of mice against radiation injury by heterologous serum and plasma proteins. NSA 9-3

5332

Texas Univ. A STUDY OF DISCRIMINATION LEARNING IN MONKEYS WITH IMPLICATIONS FOR THE INVESTIGATION OF THE PSYCHOBIOLOGICAL EFFECTS OF IONIZING RADIATION.

PROJECT NO. 21-3501-0003, REPORT No. 6. J. M. Warren. Univ. of Texas and Sylvan J. Kaplan, School of Aviation Medicine. July 1954. 7p. (NP-5371)

In this study of effect of stimulus variables on discrimination learning in monkeys, it was found that the difficulty of discrimination problems is an inverse function of number of relevant stimulus cues present. Authors suggest that intelligence test may be a useful aid in analyzing radiation effect on psychobiological efficiency. NSA 9-4

5333

Columbia Univ. PROGRESS REPORT FOR JUNE 15, 1951-MARCH 14, 1952. Theodosius Dobzhansky. 16p. (NYO-4005) Contract AT(30-1)-1151.

Author describes genetic variants in natural populations of *Drosophila* that resemble variants induced in living organism by ionizing radiations. NSA 9-5

5334

Michigan State Coll. THE ABSORPTION AND DISTRIBUTION OF RADIOACTIVITY IN PLANTS GROWN UPON SOILS CONTAMINATED WITH FISSION PRODUCTS. PRELIMINARY REPORT. W. G. Long, F. G. Teubner, S. H. Wittwer, and H. B. Tukey. Sept. 1954. 15p. (AECU-2945)

Corn, bean, and radishes grown on soil contaminated with fission products exhibited injury symptoms resembling strontium toxicity after 10-14 days' growth. Little visible growth occurred after symptoms became severe NSA 9-9

5335

American Meat Inst. Foundation, Chicago UTILIZATION OF GROSS FISSION PRODUCTS SUMMARY REPORT FOR PERIOD FEBRUARY 1, 1952-JUNE 30, 1954. 54p. (AECU-2951)

Includes reports on: γ -ray sterilization of fresh beef, chemical changes occurring in meat during irradiation, factors affecting radiosensitivity of *Pseudomonas* (meat spoilage microorganism of fresh beef). NSA 9-10

5336

Washington Research Labs., National Canners Association, D. C.

INVESTIGATION OF GAMMA STERILIZATION FINAL REPORT FOR THE PERIOD JULY 1, 1953 THROUGH JUNE 30, 1954. C. B. Denny, C. W. Bohrer, and J. M. Reed. Oct. 1954. 39p. (AECU-2952).

Authors report on γ ray effects on *Clostridium botulinum* and factors (temperature, medium, density, pH) modifying these effects. NSA 9-11

5337

Hanford Works

EFFECT OF BODY DISTRIBUTION AND RETENTION OF TRITIUM ON THE HAZARD OF EXPOSURE TO TRITIUM OXIDE. Roy C. Thompson. Jan. 1, 1954. 31p. (HW-30340) Contract W-31-109-Eng52.

Results from rat studies indicate that nonuniform distribution of body water may increase radiation dosage rates to certain tissues by as much as 25% over that which would be calculated on the assumption of uniform distribution. NSA 9-12

5338

Air Force Radiation Lab. Univ. of Chicago BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION. THE EFFECT OF X-IRRADIATION ON THE ACTION OF ANALGESIC DRUGS. School of Aviation Medicine, Project No. 21-3501-0005-Report No. 14. John C. Ballin and James L. Wilding. Air Force Radiation Lab. and Dept. of Pharmacology, Univ. of Chicago. Apr 1954. Contract AF(038)27353 (NP-5329)

Whole-body x irradiation with doses of 250, 500, and 750 r did not affect sensitivity of rats to painful thermal stimuli, nor did these doses affect analgesic response of

rats to morphine sulfate, codeine phosphate, meperidine hydrochloride, and methadone hydrochloride. Large doses of the last three agents did not influence ultimate lethality of whole-body x irradiation in mice. NSA 9-13

5339

Air Force Radiation Lab., Univ. of Chicago
BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION. THE ADENOSINE TRIPHOSPHATASE AND 5-NUCLEOTIDASE ACTIVITY OF HEMATOPOIETIC TISSUES OF IRRADIATED ANIMALS. School of Aviation Medicine Project No. 21-3501-0005, Report No. 13. Kenneth P. DuBois and Donald F. Petersen. Air Force Radiation Lab. and Dept. of Pharmacology, Univ. of Chicago. [May 1954]. 8p. (NP-5333).

Measurements of ATP-ase and 5-nucleotidase activity in spleens and thymus glands of rats and mice exposed to sublethal x ray doses indicates an increase ability of these tissues to hydrolyze ATP and 5-adenylic acid. Increase was detectable 3 hr postexposure and was maximal within 72 hr. Alteration is reversible, rate depends on dose. Effects of larger doses are described. NSA 9-14

5340

Naval Medical Research Inst., Bethesda
THE METABOLISM OF INJECTED RADIOACTIVE GLUTATHIONE (S^{35}) IN X-IRRADIATED AND NONIRRADIATED MICE. Memo Report 54-1. William H. Chapman and J. W. Duckworth. Mar. 22, 1954. 4p. (NP-5366).

Background, experimental design, and results to date are presented. NSA 9-15

5341

School of Aviation Medicine
LOCUS OF EMLTIC ACTION OF IRRADIATION. Project No. 21-3501-0001 Report No. 3. Herman I. Chim, School of Aviation Medicine and S. C. Wang. Columbia Univ., Coll. of Physicians and Surgeons. May 1954. 5p. (NP-5411)

Incidence of vomiting among dogs given 300-800 r was determined. All those exposed to 800 r vomited within 2 hr postirradiation. The 50% vomiting dose was 340 r. No dog subjected to bilateral destruction of the emetic chemoreceptor zone vomited after 800 r. Significance of the findings is discussed. NSA 9-16

5342

Atomic Energy Medical Research Project, Western Reserve Univ.
WHOLE BODY RADIATION AS A CARCINOGENIC AGENT. Simon Koletsky, Gordon E. Gustafson, Phyllis Goldston, and Vera Milanich. Sept. 1, 1954. 24p. Cancer Research 15, 100-104(1955). (NYO-4964).

Authors describe neoplasms developing in group of rats which survived single total body dose of 660 r. Of 69 tumor-bearing animals, 43 had one or more malignant tumors. Of these, 14 had fibrosarcoma, 8 carcinoma of the skin, 8 carcinoma of the kidney, 5 osteogenic sarcoma, 5 neuroblastoma. Such tumors occur rarely as spontaneous lesions, especially in the Wistar strain. Both frequency of neoplasm and number of tumors/rat increased with ageing. NSA 9-17

5343

Atomic Energy Medical Research Project, Western Reserve Univ.
QUARTERLY PROGRESS REPORT, APRIL-JUNE 1954. Hymer L. Fridell. 8p. (NYO-4968).

Includes reports on: x ray effects on ascites tumor growth in mice, carcinogenic effects of radioactive colloidal Au on liver, mechanism of death in rats after massive whole-body irradiation, therapeutic effects of injected bone marrow against radiation injury. NSA 9-18

5344

Atomic Energy Project, Univ. of Rochester
THE EFFECTS OF IRRADIATION WITH PHOSPHORUS-32

ON THE VIABILITY AND GROWTH OF RAT EMBRYOS.

M. R. Sikov and T. R. Noonan. Oct. 8, 1954. 27p. (UR-327). Contract W-7401-eng-49.

Effects of β radiation on rat embryos of 6, 8, 9, and 10 days of gestational age were studied after intraperitoneal administration of P^{32} to pregnant females. Values for LD_{50} were found in terms of doses of P^{32} which, when administered to the mother, would be expected to kill 50% of the fetuses by 14th day of gestation. Uptake was found to be proportional to injected dose. All doses produced depression of embryo weight. NSA 9-19

5345

LATE EFFECTS OF THERMAL NEUTRON IRRADIATION IN MICE. A. C. Upton, J. Furth, and K. W. Christenberry. Cancer Research 14, 682-90(1954).

Pathological effects produced in mice by irradiation in the thermal column (thermal neutrons and gamma rays) were indistinguishable from those of x rays. Relative biological effectiveness of thermal neutron radiation was essentially the same for most late effects, and several times higher for cataract induction than for acute lethality. The RF mouse, like man, is susceptible to induction of myeloid leukemia by relatively low doses of ionizing radiation. NSA 9-20

5346

SOME LATE EFFECTS IN MICE OF IONIZING RADIATION FROM AN EXPERIMENTAL NUCLEAR DETONATION. Jacob Furth, Arthur C. Upton, Kenneth W. Christenberry, Walter H. Benedict, and Jack Moshman. Radiology 63, 562-9(1954).

Authors summarize late effects of ionizing radiations on mice 30 months after exposure to nuclear detonation (high energy γ rays, small component of fast, and a still smaller component of slow neutrons). Topics discussed include: mortality, cataracts, iris defects, graying, leukemia, ovarian tumors, pituitary tumors, harderian gland tumors, mammary gland tumors, other tumors, and nephrosclerosis. NSA 9-21

5347

THE EFFECT OF X-IRRADIATION ON THE GROWTH AND HISTOCHEMISTRY OF ADRENAL AUTOTRANSPLANTS IN THE RAT. Leland C. Wyman, Rae Whitney, Patricia L. Griffin, and Donald L. Patt. J. Cellular Comp. Physiol. 44, 33-47(1954).

Effects of direct x irradiation (2000 r) of adrenal glands of rats or of local irradiation of site of implantation on subsequent growth of intramuscular, autoplasic, adrenocortical transplants were studied. Site irradiation was more effective in preventing establishment of implants, but once established, implants were affected more by direct exposure than by irradiation of site. Other differences between gland and site irradiation were also noted. NSA 9-22

5348

THE EFFECT OF IONIZING RADIATION ON DEOXYRIBONUCLEASE ACTIVITIES OF BODY FLUIDS. I. THE EFFECT OF TOTAL BODY EXPOSURE ON THE URINARY EXCRETION OF DEOXYRIBONUCLEASES. O. D. Kowlessar, Kurt I. Altman, and Louis H. Hempelmann. Arch. Biochem. and Biophys. 52, 362-72(1954)

Some properties of urinary DNases of the rat are described. It has been shown that there is increased acid and neutral DNase activity in the urine of rats exposed to total-body x rays. NSA 9-23

5349

THE 'OXYGEN-EFFECT' IN IONIZING IRRADIATION. H. Laser. Nature 174, 753(1954).

Bacteria representing strict and facultative aerobes and anaerobes and some yeasts, were exposed to 190-kv x rays to study (1) whether "oxygen effect" requires maintenance of normal respiration during irradiation,

and (2) possible relation of "oxygen effect" to a particular type of cellular metabolism. No washed, nongrowing cells (except yeast) were affected by x rays but all cells showed "oxygen effect" when transferred into growth-promoting media. NSA 9-24

5350
RELATIONSHIP BETWEEN BLOOD LIPIDS AND RADIATION INJURY IN RABBITS. Lawrence J. Milch, Richard A. Yarnell, James V. Stinson, John G. Collins, Lesly G. Robinson, Beulah L. Croye, and Sherman S. M. Chang. Science 120, 713-14(1954).

Groups of rabbits were subjected to varying doses of local x rays up to 30,000 r. Plasma lipid and lipoprotein components showed changes over this dose range corresponding to increasing continuum of muscle injury. NSA 9-25

5351
BIOLOGICAL EFFECTS OF THE PERIODICALLY INTERRUPTED X RADIATION. Andre Denner. J. radiol. et electrol. 35, No. 7-8, 578-81(1954). (In French).

Periodic x radiation is reported to have same biological effect as dose of continuous radiation twice as large. When distance between source and target is varied, there is summation effect for periodic radiations between 5 and 10 cm. (Rabbits and grains studied.) NSA 9-26

5352
EFFECT OF RADIATIONS ON PLANT CELLS AND THEIR METABOLISM. E. De Bernardi and E. Macciotta. J. Radiol. et electrol. 35, No. 7-8, 569-71(1954). (In French).

Narcissi and onions placed in $U(NO_3)_4$ solution exhibited more robust development than those in KNO_3 , $Ca(NO_3)_2$, $Ca_3(PO_4)_2$, $MgSO_4$, or KCl . Plants receiving a medium dose developed best. Some preliminary measurements of effect of radiation on salt uptake are reported. NSA 9-27

5353
THE EFFECT OF CHRONIC GAMMA RADIATION ON ENDOSPERM MUTATIONS IN MAIZE. W. Ralph Singleton. Genetics 39, 587-603(1954).

Data from studies of effects of chronic γ radiation from a Co^{60} source on mutation rates in the male gametophyte in maize are tabulated. NSA 9-28

5354
DOSE-RESPONSE RELATIONSHIPS IN RADIATION INDUCED MUTATION. H. B. Newcombe and J. F. McGregor. Genetics 39, 619-27(1954).

In most organisms, x-ray-induced mutations increase linearly with dose while corresponding ultraviolet-induced changes rise to a plateau or peak followed by decline. Response of streptomyces spores, however, is similar to both radiations and varies nonlinearly with dose. NSA 9-29

5355
A NONLINEAR RELATION BETWEEN X-RAY DOSE AND RECOVERED LETHAL MUTATIONS IN DROSOPHILA. H. J. Muller, I. H. Herskowitz, S. Abrahamson, and I. I. Oster. Genetics 39, 741-9(1954).

X rays dose of 1000 r was delivered to adult male *D. melanogaster* that had hatched not more than 24 hr previously. Offspring derived from sperm of these males ejaculated 7-9.5 days after exposure exhibited induced recessive lethal mutation rate in exposed X chromosomes of $6.5\% \pm 0.3\%$, a value twice the normal rate. NSA 9-30

5356
EFFECT OF IRRADIATION ON THE SERUM PROTEIN IN RATS HAVING A BENZOPYRENE-INDUCED TUMOR. V. Verga and G. Giordano. Boll. soc. ital. biol. sper. 30, 614-15(1954). (In Italian). NSA 9-31

5357
RADIATION CANCER. REPORT OF 21 CASES. Olaf Petersen. Acta Radiol. 42, 221-36(1954). NSA 9-32

5358
RESISTANCE OF BACTERIAL SPORES TO GAMMA IRRADIATION. Bruch H. Morgan and James M. Reed. Food Research 19, No. 4, 357-66(1954).

Importance, in γ ray studies, of thoroughly investigating effect of culture conditions during spore production and spore irradiation is stressed, since different conditions can increase or decrease sterilization requirement for a particular type of organism. (*Cl. botulinum* mentioned.) NSA 9-33

5359
LABORATORY STUDIES FOR EVALUATING THE BIOLOGICAL EFFECTS OF PRIMARY COSMIC RADIATION. Ann C. Birge. J. Aviation Med. 25, 326-30(1954).

Biological effects of primary cosmic radiation are discussed with reference to laboratory studies on effects of ionizing radiations. Possible radiation hazards to aviators from this source are postulated. NSA 9-34

5360
Atomic Weapons Research Establishment, Aldermaston, Berks, England.
AGRICULTURAL AND BIOLOGICAL INVESTIGATIONS PERTAINING TO CONTAMINATION BY FISSION PRODUCTS. (MISCELLANEOUS PAPERS). July 16, 1954. 26p. (FWE-10)

Brief summaries are presented from studies of the uptake of fission products by both plants and animals following exposure in the environs of Operations Hurricane and Totem. NSA 9-35

5361
California. Univ. Los Angeles. Atomic Energy Project.
EFFECT OF BEEF EMBRYO EXTRACT ON SURVIVAL TIME IN IRRADIATED MICE. Thomas J. Haley, W. G. McCormick, and Eve F. McCulloh. Oct. 19, 1954. 13p. Contract AT-04-1-Gen-12. (UCLA-311).

Injections of beef embryo extract into mice on either days one and two or three and four gave slight increase in ST_{50} but had no effect on total mortality. Daily injections were not beneficial. Results appeared to be related to presence of a beneficial and a detrimental factor in the extract. Separation of these factors from one another was not possible with fractionation procedures used. NSA 9-37

5362
SPLEEN ADENOSINE TRIPHOSPHATASE ACTIVITY IN IRRADIATED MICE TREATED WITH SPLEEN HOMOGENATE. Willie W. Smith, William Anderson, Jr., and Gilbert Ashwell. Am. J. Physiol. 178, 471-3(1954).

Changes in ATPase activity, spleen weight, and leucocyte count were studied in LAf_1 mice treated with spleen homogenate after 650 r. Duration of spleen involution and high ATPase activity was less marked in homogenate-treated than in irradiated controls. Total spleen ATPase showed little change in treated mice. In irradiated mice, spleen ATPase was decreased for 3 wks; increased in 4th week after exposure. NSA 9-38

5363
EFFECT OF GRANULOCYTE COUNT AND LITTER ON SURVIVAL OF IRRADIATED MICE. Willie W. Smith, Leon Gonschery, Ilo Alderman, and Jerome Cornfield. Am. J. Physiol. 178, 474-6(1954).

Survival of mid-lethally irradiated mice was found not to be associated with granulocyte count taken either 4 or 7 days after irradiation. Clustering of survival in litters was highly significant in contrast to clustering of relatively high granulocyte counts. Occurrence of *Pseudomonas*, *Proteus*, α -streptococcus and negative cultures, but not of *E. coli*, in postmortem blood was significantly influenced by litter. NSA 9-39

5364
THE INITIAL MEDICAL AND INDUSTRIAL USE OF

RADIOACTIVE MATERIALS. William B. Looney. Am. J. Roentgenol. Radium Therapy Nuclear Med. 72, 838-48 (1954).

Author presents a historical account of first administration of radioactive materials as therapeutic agents and the changes subsequently observed in persons with such exposure histories. Importance of locating as many of these individuals as possible and referring them for careful follow-up studies is stressed. NSA 9-40

5365

A PROTECTIVE EFFECT OF INORGANIC MAGNESIUM AGAINST ROENTGEN RADIATION DAMAGE TO HYDRA. George E. Daniel and Helen D. Park. Am. J. Roentgenol. Radium Therapy Nuclear Med. 72, 857-66(1954).

Magnesium given in proper amount postirradiation markedly alleviated and prevented damage caused in Hydra by 15,000 r of x rays. Preirradiation treatment was ineffective and no synergistic action was seen between pre- and postirradiation treatment. Fe, Mn, Be, Ba, Ca, and K did not protect. Mg/Ca ratio may be varied over wide range without destroying magnesium's beneficial effect. Physiological implications and biological mechanism are discussed. NSA 9-41

5366

INFLUENCE OF POTENTIAL ANESTHESIA ON THE MORTALITY RATE OF IRRADIATED GUINEA PIGS. Charles M. Gros and Jean Comsa. Compt. rend. 239, 832-4(1954).

Very satisfactory radiation protection was obtained by injecting 3-chloro-10-(3'-dimethylaminopropyl) phenothiazine and the ethyl ester chlorohydrate of 1-methyl-4-phenyl-4-piperidinecarboxylic acid. Maximum resistance to radiation injury was obtained when animals were irradiated 10 hr after injection. Beneficial effects disappeared after 24 hr. NSA 9-43

5367

Radiation Lab., Univ. of Calif., Berkeley
CHEMISTRY DIVISION QUARTERLY REPORT [FOR]
JUNE, JULY, AUGUST 1954. Sept. 30, 1954. 47p.
Contract W-7405-eng-48 (UCRL-2709)

Effects of Co^{60} irradiation (total body dose of 1300 rep) on respiratory metabolism of glucose, glycine, and DL-leucine in mice was studied. There was consistent indication that amino acid utilization in the irradiated animal may be decreased, more in the case of glycine than DL-leucine. NSA 9-61

5368

THE IMPACT OF NUCLEAR ENERGY ON SAFETY AND THE CITIZEN. Robert J. Hansen. Nuclear Engineering Part III. Chem. Eng. Progr. Symposium Ser. No. 13, 210-15(1954). NSA 9-469

5369

Food Research Inst.

A. STUDY OF THE EFFECT OF RADIATION ON STAPHYLOCOCCUS ENTEROTOXIN. B. RADIATION STUDIES ON SURFACE RIPPENED CHEESE. REPORT NO. 4 (TERMINATION) COVERING PERIOD JUNE 18, 1952-SEPTEMBER 30, 1954. M. J. Sargalla and R. O. Wagenaar. 26p. (AECU-2957).

Dosage of 800,000 rep Co^{60} γ radiation inactivated staphylococcus enterotoxin. Smaller doses were ineffective. Data are presented from studies on soft surface-ripened cheese samples inoculated with *Cl. botulinum* spores irradiated with various doses of Co^{60} γ rays. Toxin-producing ability of spores was unaltered by sub-lethal dosages. Effects of medium, atmosphere, and temperature on radionactivation of *Cl. botulinum* toxin and spores in cheese are described. NSA 9-474

5370

Brookhaven National Lab.

GENETIC AND NON-GENETIC EFFECTS OF RADIATIONS IN NEUROSPORA. V. W. Woodward and C. M. Clark. Brookhaven National Lab. and Univ. of Delaware. [1954]. 9p. (BNL-2052).

Effects of x rays on Neurospora indicate that changes are instigated in both genetic and nongenetic components of conidia. From relationship between mutation rate and conidial survival it is concluded that the survival curve is a composite of at least two independent events, conidial stimulation and inactivation. Implications of the findings are discussed briefly. NSA 9-475

5371

Brookhaven National Lab.

THE RELATIONSHIP BETWEEN CHROMOSOME FRAGMENTATION AND REJOINING IN TRILLIUM ERECTUM FOLLOWING THERMAL NEUTRON AND X-IRRADIATION. Eleanor E. Deschner. [1954?]. 4p. (BNL-2063).

No consistent relationship was found between rejoining capacity and degrees of sensitivity exhibited by chromosomes of *T. erectum* exposed to irradiation at various stages of microsporogenesis. Data seem to indicate that processes of breakage and reunion may be controlled by two independent mechanisms. Large differences were observed in radiosensitivity of chromosome breakage and rejoining in various stages. NSA 9-476

5372

Naval Medical Research Inst., Bethesda

AN ANALYSIS OF THE EFFECTS OF TOTAL-BODY X-IRRADIATION ON THE BODY WEIGHT OF WHITE SWISS MICE. 1. THE WEIGHT AND MORTALITY OF MALE AND FEMALE MICE IN THE LETHAL X-RAY DOSE RANGE. William H. Chapman. Aug. 14, 1954. 15p. (NM-006 012.04.67).

In studies on 60-80 day old mice it was found that male mice gained proportionately more weight than females after 740 r or less of x rays, lost proportionately more weight after higher doses. Male 28-day survivors of mid-lethal and high-lethal doses showed greatest weight loss 2 wk postexposure, females, 4 days postexposure. The 28-day mortality of males was greater than that of females for same doses in LD₀₋₁₀₀ range. NSA 9-477

5373

Radiobiological Lab., Univ. of Texas

SOME EFFECTS OF A LETHAL DOSE OF X-RADIATION UPON RETENTION. STUDIES OF SHOCK AVOIDANCE MOTIVATION. Project No. 21-3501-0003, Report No. 9. William H. Melching. Radiobiological Lab., Univ. of Texas and School of Aviation Medicine and Sylvan J. Kaplan, School of Aviation Medicine. Aug. 1954. 9p. (NP-5412).

Eight *Macaca rhesus* monkeys, trained to give an instrumental response under shock motivation, exhibited no deleterious effects on performance following exposure to 1500 r of x rays. NSA 9-478

5374

School of Aviation Medicine

SOME EFFECTS OF A LETHAL DOSE OF X-RADIATION UPON RETENTION IN MONKEYS. Project No. 21-3501-003, Report No. 8. Sylvan J. Kaplan, Maurice Delit, School of Aviation Medicine and George Gentry and William H. Melching. Radiobiological Lab., Univ. of Texas and School of Aviation Medicine. Aug. 1954. 10p. (NP-5413).

Performance of rhesus monkeys on a multiple discrimination task involving two orders and two groupings of stimuli was studied before and after exposure to lethal x ray dose. Principal behavioral deficits noted were increases in reaction times and failures to respond in the testing situation. NSA 9-479

5375

Air Force Radiation Lab., Univ. of Chicago

QUARTERLY PROGRESS REPORT NO. 13. Oct. 15, 1954. 136p. Contract AF33(038)-27353 (NP-5419).

Includes reports on: effects of partial shielding on 5-nucleotidase and ATP-ase activity of hematopoietic tissues of irradiated rats, alteration of the ATP-ase activity of hematopoietic tissues by implanting exogenous hematopoietic tissue after exposure, x ray effect on metabolism of hematopoietic tissues of rats, biochemical and histopathological effects of large doses of total-body x rays on rat tissues, and their modification by increased temperature, effects of thiourea derivatives and 2,4-dinitrophenol on mortality of irradiated mice, effects of total-body x rays on metabolism of sulfanilamide and phenolic compounds by guinea pigs and rats. NSA 9-480

5376

Naval Radiological Defense Lab.

EFFECT OF REPETITIVE EXPOSURE TO GAMMA RAYS ON THE HEMATOPOIETIC SYSTEM OF THE RAT.

S. J. Baum, D. J. Kimeldorf, and E. M. Jacobsen.

Aug. 27, 1954. 22p. (USNRDL-TR-12).

Male rats were exposed one or more times to 75 r of γ rays at 7-day intervals. Hematological examinations after last exposure indicated that maximum changes were largely independent of number of exposures and reflected mostly effects of last irradiation. Observed results are attributed to capacity of hematopoietic system to recover during 7-day intervals. NSA 9-482

5377

INVERSE RELATIONSHIP BETWEEN THE WATER CONTENT OF SEEDS AND THEIR SENSITIVITY TO X-RAYS. Richard

S. Caldecott. Science 120, 809-10(1954).

Seeds with water contents of 7, 9, 13, 16, and 24% were subjected to x-ray doses of 10,000, 20,000, 30,000, 40,000, and 50,000 r. An inverse relationship was found between water content and radiosensitivity as determined by seedling heights at 7 days. NSA 9-483

5378

ORAL MANIFESTATIONS OF IONIZING RADIATION. II. EFFECT OF 200 KV. X-RAY ON RAT INCISOR TEETH WHEN ADMINISTERED LOCALLY TO THE HEAD

IN THE 1500 R DOSE RANGE. James A. English, Carl A. Schlack, and Friedrich Ellinger. J. Dental Research 33, 377-88(1954).

Three littermate groups of 21-day-old white rats were given single dose of localized head x radiation, maximum dose of 1500 r. Striking changes were observed in developing incisor teeth of irradiated animals sacrificed 100 days postexposure. NSA 9-484

5379

METABOLISM OF BENZOIC ACID IN NORMAL AND IRRADIATED RATS. Kurt Schreier, Kurt I. Altman, and Louis H.

Hempelmann. Proc. Soc. Exptl. Biol. Med. 87, 61-3 (1954).

Evidence is presented to show that benzoic acid is a normally-occurring metabolite in rats. When x-ray effect on ability of starved rats to conjugate benzoic acidcarboxyl- C^{14} was tested, no defect was detected under experimental conditions used. NSA 9-486

5380

WOUND HEALING AND MORTALITY AFTER TOTAL BODY EXPOSURE TO IONIZING RADIATION.

Antolin Raventos. Proc. Soc. Exptl. Biol. Med. 87, 165-7(1954).

Standardized laparotomy wound was produced in mice after whole-body x-ray dose of 500 r and tensile strength of healing wounds was compared to that of wounds in unirradiated mice. The 30-day mortality was determined for mice subjected to wounding, irradiation and to wounding plus irradiation. Irradiated mice showed significant retardation of wound healing from 6th-11th

day after wounding, not thereafter. Wounding did not alter postirradiation mortality. NSA 9-487

5381

EFFECT OF TOTAL BODY X-IRRADIATION ON DESOXYRIBONUCLEASE ACTIVITY OF RAT SPLEEN.

Vias M. Fellas, I. Meschan, Paul L. Day, and Carl D. Douglas. Proc. Soc. Exptl. Biol. Med. 87, 231-3 (1954).

Acid-active DNAase of rat spleen was found to increase markedly after 500 r of total-body x rays. Such change was not apparent in neutral enzyme of liver or spleen. Maximum elevation of DNAase activity occurred 24-48 hrs postirradiation, and maximal response was elicited by a dose of 200 r. NSA 9-488

5382

EFFECT OF TOTAL BODY X-IRRADIATION ON SERUM ELECTROLYTE LEVELS AND ELECTROCARDIOGRAMS OF THE GOLDEN HAMSTER. George P. Fulton and Frederick N. Sudak. Am. J. Physiol. 179, 135-8(1954).

Disturbances in serum potassium and sodium concentration, electrocardiogram and circulation in the cheek pouch were demonstrated in moribund hamsters following total body exposure to 1000 r of x irradiation. NSA 9-489

5383

IONIZING RADIATIONS AND MUTATIONS. Juan De Dios Leal Luna. Bol. radiactividad (Madrid) 25, 66-78(1952-53). (In Spanish).

Author discusses effects of ionizing radiation in producing mutations and the influence of such processes on evolution. NSA 9-490

5384

EFFECT OF IONIZING RADIATIONS ON THE VIRUS POLIOMYELITIS SK. G. Comba Ezquerria. Bol. radiactividad (Madrid) 25, 79-92(1952-53). (In Spanish). NSA 9-491

5385

PHYSIOLOGIC AND HISTOCHEMICAL CHANGES IN CONNECTIVE TISSUE OF RAT INDUCED BY TOTAL BODY IRRADIATION. A. C. Upton and W. D. Gude. Arch. Pathol. 58, 258-64(1954).

Evans blue injected intradermally in rats after whole-body x irradiation spreads faster and more widely than in nonirradiated controls. Radiation-induced permeability of dermal connective tissues appears 4-7 days postirradiation and persists for 2-3 wk, coinciding with increased vascular permeability and purpura. Heightened permeability is associated with increased stainable acid polysaccharide in ground substance of dermis and panniculus, and decreased number of mast cells in dermis. NSA 9-492

5386

IONIZING RADIATION CATARACTS. David Shoch and Irving Puntenney. Quart. Bull. Northwestern Univ. Med. School 28, 359-63(1954).

Investigations to date have shown that the ciliary body is injured only temporarily by ionizing radiation and although this temporary damage may play a part in development of the radiation cataract, it is at best a minor factor. Authors conclude that the site of injury in radiation cataract is the lens itself. NSA 9-494

5387

THE EFFECT OF X-RAYS ON THE RESPIRATORY METABOLISM OF EGGS AND EMBRYOS OF THE GRASSHOPPER CHORTOPHAGA VIRIDIFASCIA 1A. S. R. Tipton and G. S. St. Amand. Physiol. Zool. 27, 311-17(1954).

X ray doses of 10,000 r and above significantly reduced oxygen consumption of 14-day Chortophaga eggs in first hour after treatment. Doses of 3500 r and above significantly reduced respiration of embryos in the hour following irradiation. Reduction in respiration was greater with larger doses of x rays. NSA 9-495

5388

Hanford Works

GASTRO-INTESTINAL ABSORPTION OF PLUTONIUM

2. EFFECT OF PLUTONIUM CONCENTRATION IN SOLUTION
FED. Joseph Katz, Maurice H. Weeks, and Roy C. Thompson.
Jan. 4, 1954. 9p. (HW-30220).

Concentration of plutonium in solution fed had no effect on gastrointestinal absorption of plutonium over range of 10^{-5} $\mu\text{g/ml}$ to $1 \mu\text{g/ml}$. Average absorption was 0.0028% of amount fed, with 0.0025% of amount fed being deposited in skeleton. NSA 9-501

5389

THE EFFECT OF THE ROENTGEN RAYS ON THE AUTONOMIC NERVOUS SYSTEM OF THE RABBIT.

T. Toyoma. Tohoku J. Exptl. Med. 22, 335-47(1933).

Roentgen rays acting on the ganglion cells of the heart's autonomic nervous system have an agitating effect that is similar in rabbits and frogs.

5390

Radiological Research Lab., Columbia Univ.

X-IRRADIATION OF THE FROG EMBRYO; GROSS EFFECTS.

Roberts Rugh. Sept. 1, 1954. 26p. (NYO-474).

Uterine egg and early stages of development of frog from fertilization through neurulation were exposed in toto to 180-2880 r of x rays, and studied for developmental effects. At any exposure level there was wide range of variation in response. In embryonic development, it appears that the differentiating rather than the merely dividing cell is more radiosensitive. NSA 9-820

5391

BIOLOGICAL LEVELS OF THE RADIOSENSITIVITY OF SOMATIC CELLS. A. Glucksmann. Brit. J. Radiol.

27, 660-9(1954).

Factors affecting radiosensitivity of somatic cells are reviewed, concept linking radiosensitivity and hormonal factors is discussed. NSA 9-821

5392

THE LETHAL EFFECTS OF X RAYS ON THE CHICK EMBRYO. THE MODE AND TIME OF DEATH AND THEIR BEARING ON THE DETERMINATION OF THE LD_{50}

John Boland. Brit. J. Radiol. 27, 680-7(1954).

Lethal effects of x rays on chick embryo are re-examined, method for estimating LD_{50} is described. NSA 9-822

5393

RADIOBIOLOGICAL STUDIES WITH TRADESCANTIA AT NUCLEAR TEST DETONATIONS. Alan D. Conger. Am. Naturalist 88, 215-24(1954).

Yield of chromosome aberrations in *Tradescantia* as a function of dose was used to determine the radiobiological effects of mixed radiations from a nuclear test detonation. Correlation between instrumentally measured dose and biologically estimated dose is discussed. NSA 9-823

5394

VISIBLE AND LETHAL MUTATIONS IN DROSOPHILA.

George H. Mickey. Am. Naturalist 88, 241-55(1954).

Author compares effectiveness of cyclotron fast neutrons (1 Mev) and 250 kvp x rays in producing specific loci mutations at res markers in 3rd chromosome of *D. melanogaster*, dominant visible mutations, sex-linked recessive lethal mutations. It appears, with all biological criteria used to measure genetic damages of radiations in *Drosophila*, that fast neutrons cause a much greater effect than do x rays. NSA 9-824

5395

THE RELATIVE EFFECTIVENESS OF NEUTRONS FROM A NUCLEAR DETONATION AND FROM A CYCLOTRON IN INDUCING DOMINANT LETHALS IN THE MOUSE W. L. Russell, Liane B. Russell, and A. W. Kimball. Am. Naturalist 88, 269-86(1954).

Dominant lethality in offspring of male mice exposed in lead hemispheres to neutron radiation from nuclear detonation was determined for 10 doses by mating males to unexposed females, dissecting females at late stage of pregnancy and recording number of living and dead embryos, resorption sites, and corpora lutea. Data from early and late matings are tabulated separately and compared with results from similar experiments with cyclotron fast neutrons. NSA 9-825

5396

SURVIVAL AND MUTATIONS IN NEUROSPORA EXPOSED AT NUCLEAR DETONATIONS. K. C. Atwood and Frank Mukai. Am. Naturalist 88, 295-314(1954).

Conidia of *Neurospora* were exposed to mixed radiations from nuclear devices at several stations, both inside and outside the seven-inch-thick lead neutron-shielding hemispheres. Data are presented on survival of conidia under conditions of forced heterokaryosis, when supplied with supplemented medium, and on frequency of nuclei carrying recessive lethal mutations. NSA 9-826

5397

HEMANGIOMA. AN EXPERIMENTAL AND MORPHOLOGICAL STUDY. T. Balı and J. Furth. Oncologia 7, No. 3, 231-44(1954).

Three hemangioendotheliomas occurring in x rayed mice were studied in serial passages. One mimicked chorionepithelioma, then assumed angiomatous features, second was benign, did not change in 7 yr except for increase in growth rate and third was malignant. Evidence indicates these can be induced by x rays as well as by other agents. NSA 9-827

5398

ELECTROPHORESIS OF PLASMA PROTEINS AND ASCITIC FLUID OF DOGS WITH RADIATION CIRRHOSIS.

Doris H. Clouet, Con O. T. Ball, George R. Meneely, and Paul F. Hahn. Proc. Soc. Exptl. Biol. Med. 87, 362-5(1954).

Electrophoretic patterns for plasma of dogs with livers irradiated (intravenous injection of Au^{198}) showed significantly lower serum albumins and significantly higher gamma globulin components than did patterns for controls. NSA 9-829

5399

INHIBITION OF INFLAMMATORY RESPONSES IN BETA-IRRADIATED SKIN. Georges Ungar and Evelyn Damgaard. Proc. Soc. Exptl. Biol. Med. 87, 383-6(1954).

Beta radiation depresses local reaction of rat skin to certain inflammatory stimuli. Response to histamine is not inhibited but histamine liberator 48-80 fails to elicit response within a few hours after irradiation. Histamine content is not diminished after β irradiation. Results suggest that β rays interfere with a tissue protease system which is important in mechanism of inflammation. This inflammation-inhibiting action may be applied to early detection of radiation injury. NSA 9-830

5400

ALTERATIONS IN THE GLIAL CELLS FOLLOWING IRRADIATION OF THE BRAIN IN PRIMATES. Arthur Arnold and Percival Bailey. Arch. Pathol. 57, 383-91(1954).

Normal adult glial cell of primate brain may be adversely affected by irradiations. Alterations in function and structure of the cells can be correlated with total radiation dose, intensity, uniformity of dose distribution, and time after exposure. NSA 9-831

5401

INTOLERANCE OF THE PRIMATE BRAINS TO HIGH ENERGY RADIATIONS. Arthur Arnold, Percival Bailey, and Roger A. Harvey. Neurology 4, 575-85(1954).

Studies indicate brainstem and hypothalamus of man and monkey are intolerant to large x ray dose from conventional x ray equipment and to biologically equivalent doses of radiations from the betatron, due to the fact that these areas subserve many functions essential for survival, and that these areas are much more radio-responsive than cortical areas. Moderate x ray doses also are effective. NSA 9-832

5402
EFFECTS OF X-IRRADIATION ON THE HYPOTHALAMUS: A POSSIBLE EXPLANATION FOR THE THERAPEUTIC BENEFITS FOLLOWING X-IRRADIATION OF THE HYPOPHYSIAL REGION FOR PITUITARY DYSFUNCTION. Arthur Arnold. *J. Clin. Endocrinol. and Metabolism* 14, 859-68(1954).

Author suggest that therapeutic benefits reported following x irradiation of the hypophyseal region for pituitary dysfunction are due to effects of x ray on the hypothalamus, especially the paraventricular and supraoptic nuclei, since these have considerable influence on pituitary. NSA 833

5403
ON THE CHANGES PRODUCED IN THE LIVER OF RATS IRRADIATED WITH GAMMA RAYS. INCREASE OF LIVER WEIGHT AND THE AUGMENTATION OF P^{32} INCORPORATED IN THE PHOSPHOLIPIDS AND NUCLEOPROTEINS. Aleksander D. Becarevic, Katica L. Kacanski and Desanka D. Mancic. *Bull. Inst. Nuclear Sci. "Boris Kidrich" (Belgrade)* 4, 105-9(1954).

Author describes effects on rats of daily doses of 38.4 r of γ radiation. There is first a fall, then an increase in body weight, increase in liver weight, increase in fat metabolism. NSA 9 834

5404
EFFECT OF LINEAR ENERGY TRANSFER ON RADIATION-INDUCED CHROMOSOME ABERRATIONS IN TRADESCANTIA MICROSPORES. Norman H. Giles and C. A. Tobias. *Science* 120, 993-4(1954).

Yields of isochromatid and chromatid aberrations were compared for microspores exposed to (1) 190 MEV deuterons and (2) 380 MEV α particles. Yields of both types of aberration were increased with increased energy loss. Relative effectiveness of the radiations are given in terms of RBE. NSA 9-835

5405
ERYTHEMA EFFECTS OF A PURE BETA EMITTER (STRONTIUM 90) ON HUMAN SKIN. Victor H. Witten, Earle W. Brauer, Vera Holmstrom, and Robert Loevinger. *J. Invest. Dermatol.* 23, 271-85(1954).

Clinical biologic effects produced by strontium-90 β rays in 19 subjects indicate: (1) the greater the source-skin distance, the greater the reactions for any given dose and (2) the greater the dose, the greater the biologic effects (erythema). NSA 9-836

5406
PROTECTION AGAINST IONIZING RADIATION. THE "RECOVERY FACTOR" IN SPLEEN AND BONE MARROW. J. F. Loutit. *J. Nuclear Energy* 1, 87-91(1954) Atomic Energy Research Establishment Harwell Berks, England. Mice have been shown to survive a "normally" lethal x ray dose when treated with spleen and bone marrow preparations. Author concludes that the mechanism involved may be explained as well by the cellular hypothesis as by the humoral theory. NSA 9-837

5407
INFLUENCE OF CORTISONE ON THE MORTALITY OF X-IRRADIATED ADRENALECTOMIZED MICE. George A. Santisteban, J. Z. Bowers, and T. F. Dougherty. *Endocrinology* 55, 794-807(1954).

Influence of cortisone in acute x irradiation syndrome was studied by making statistical comparisons of cumulative mortality curves of groups of x irradiated (650 r whole-body) adrenalectomized CBA mice, some nontreated and others treated with intraperitoneal injections of graded doses of the hormone. Data are presented graphically and discussed. NSA 9-838

5408
BIO-FLAVONOIDS IN RADIATION INJURY. III. CLINICAL STUDIES. Isidore Arons, John Freeman, and Solomon Weintraub. *Brit. J. Radiol.* 27, 696-8(1954).

Bio-flavonoids were administered (600 mg daily) for 5-7 days prior to initial x irradiation and during whole course of x ray therapy to 403 patients with malignant growths. Marked increase in tolerance to radiation occurred in this group as compared with 613 control cases receiving no bio-flavonoids. NSA 9-839

5409
PROTECTIVE EFFECT OF BREPHOPLASTIC GRAFTS OF BONE MARROW AGAINST THE ACTION OF X-RADIATION IN MICE. Raoul-Michel May and Noubar Arpiarian. *Compt. rend.* 239, 1151-3(1954). (In French).

Favorable results (radiation protection of mice) were obtained by grafting bone marrow from new-born mice into the irradiated adult animal. NSA 9-841

5410
THE EFFECTS OF PRE- AND POSTIRRADIATION CENTRIFUGATION ON THE CHROMOSOMES OF TRADESCANTIA AND VICIA. Sheldon Wolff and R. C. von Borstel. *Proc. Natl. Acad. Sci. U S A* 40, 1138-41(1954).

In *Tradescantia* microspores and *Vicia* seed, pre-irradiation centrifugation decreases aberrations as compared with noncentrifuged controls. Postirradiation centrifugation increases aberrations (if done before chromosome breaks rejoin). *Tradescantia* cells irradiated in nitrogen show no increase of aberration yield caused by centrifugation. Explanations of these phenomena are offered. NSA 9-842

5411
THE EFFECT OF THE HOST ON THE PROPERTIES AND SENSITIVITY OF A BACTERIAL VIRUS. Murray Friedman. *J. Bacteriol.* 68, 274-8(1954).

Three strains of *Bacillus megaterium* served as hosts for one virus, M-5. Hosts react similarly with respect to the virus's latent period, thermal, x ray, and deuteron inactivation. NSA 9-1153

5412
Brookhaven National Lab. CHROMOSOME REJOINING CAPACITY WITH RESPECT TO BREAKAGE SENSITIVITY TO X-RAYS AND THERMAL NEUTRONS. Eleanor Deschner and A. H. Sparrow. [1954]. 35p. (BNL-2045).

Experiments were carried out to determine the relative biological effectiveness of x rays and thermal neutrons on induction of breakage and degree of rejoining during various stages of microsporogenesis in *Trillium*. NSA 9-1154

5413
Brookhaven National Lab. DECREASE IN UPTAKE OF IRON BY DUCK ERYTHROCYTES IN VITRO FOLLOWING WHOLE-BODY X-IRRADIATION. J. Raymond Klein. [1954] 6p. (BNL-2071).

Whole-body x irradiation of ducks is followed by a decrease in uptake of iron by blood cells *in vitro*. Since uptake by leucocytes and decrease in leucocyte level of blood postirradiation does not account for decrease, a diminished ability of erythrocytes to take up iron *in vitro* is suggested. NSA 9-1155

5414
Tennessee Univ. AGRICULTURAL RESEARCH PROGRAM. SEMI-ANNUAL

PROGRESS REPORT FOR JANUARY 1, 1954 TO JUNE 30, 1954. Dec. 1954. 91p. (ORO-133).

Includes report on: toxicity of Ra and Sr⁹⁰ for lambs, radiotoxicology of Ni⁶³ for rats, and of Cr⁵¹ and Zn⁶⁵ for cattle; physiological effects on burros of chronic γ ray exposure, initial signs, gross pathology, degree of healing, and chronic histopathologic changes in skin of burros, horses, cattle and sheep following exposure to β rays applied in activated amorphous red phosphorous plaques, bacterial transfer in burros after lethal total-body irradiation, toxicity of irradiated flesh. NSA 9-1156

5415

X-RADIATION, TEST OF GROWTH AND MUTATIONS.

A. Moes. J. belge radiol. 37, No. 4, 572-87(1954).

(In French).

Physiological action of x rays can be demonstrated by growth test on *Hordeum sativum* Jess., using conventional methods. Data obtained are compared to results in terms of survival rate, fertility of surviving plants and to mutation rates. Growth test may be applied to such questions as relation between radiosensitivity and corn development, wavelength effect, and differences in radiosensitivity among different tissues and species. NSA 9-1159

5416

CHANGES IN THE LATENT PERIOD OF A BACTERIAL

VIRUS. Ernest Pollard, W. R. Adams, and Shirley Robbins. Radiation Research 1, 514-22(1954).

Latent period of T1 bacteriophage which has been dried and either treated or irradiated by ionizing radiation has been observed to increase. Data are given for: deuteron and α -particle bombardment, x irradiation, and wet x irradiation. Author suggests presence of about 100 long, thin units, some of which are vital to survival and others of which are rate increases, inside the virus, and that these are the units inactivated by ionizing radiation. NSA 9-1160

5417

EFFECT OF WHOLE-BODY X-IRRADIATION ON LIPIDS IN THE LIVER, KIDNEY, AND SPLEEN OF FASTED RATS.

W. E. Cornatzer, J. P. Davidson, O. D. Engelstad, and Carol Simonson. Radiation Research 1, 546-50(1954).

Phospholipid synthesis was somewhat reduced in spleen. No significant changes were observed in lipid P in the kidney, or in the concentration of cholesterol in the spleen, liver, and kidney due to irradiation. NSA 9-1161

5418

RELATIONSHIP BETWEEN *BARTONELLA MURIS* INFECTION AND ACUTE RADIATION EFFECTS IN THE RAT. J. K.

Scott and J. N. Stannard. J. Infectious Diseases 95, 302-8(1954).

Latent *Bartonella muris* infection in the rat can be activated by injecting polonium²¹⁰, or by whole-body exposure to 600 r of 250 kv x rays. Anemia develops less rapidly and is not as severe as when infection is activated by splenectomy. Authors conclude that presence of active bartonella infection does not exacerbate lethal effects of an acute radiation dose, although hematological response may be markedly altered. NSA 9-1164

5419

IRRADIATION AND ADRENAL STEROIDOGENESIS. STEROID TRANSFORMATION BY IRRADIATED ISOLATED PERFUSED CALF ADRENALS. George Rosenfeld, Frank Ungar, Ralph L. Dorfman, and Gregory Pincus. Endocrinology 56, 24-9(1955).

Exposure of isolated calf adrenal to moderate doses of γ rays (Co⁶⁰) during perfusion of various steroid substrates caused significant reduction in ability of the gland to carry out 11 β -, 17 α -, and 21-hydroxylations as well as the oxidation of the Δ^5 -3 β -hydroxyl group to the Δ^4 -3-ketone group. NSA 9-1165

5420

IRRADIATION AND ADRENAL STEROIDOGENESIS. INFLUENCE OF IRRADIATION OF ISOLATED ACTH-STIMULATED CALF ADRENALS ON THEIR CORTICAL OUTPUT. Frank Ungar, George Rosenfeld, Ralph L. Dorfman, and Gregory Pincus. Endocrinology 56, 30-6 (1955)

Exposure of the isolated, ACTH-stimulated calf adrenal to moderate γ ray (Co⁶⁰) doses during perfusion resulted in a significantly decreased secretion of hydrocortisone, corticosterone, and unidentified Porter-Silber chromogens. No marked morphological alterations were seen in cortex, but it is still considered a radioresponsive tissue. NSA 9-1166

5421

SEARCH FOR AN EFFECT OF HYDROSTATIC PRESSURE ON X-RAY INACTIVATION OF YEAST. Victor W. Burns. Arch. Biochem. Biophys. 53, 450-6(1954).

Evidence has been presented to show that lethal inactivation of haploid *S. cerevisiae* by x rays is not altered by hydrostatic pressures reaching 10,000 lb/in.² applied during and after irradiation. From these results it is inferred that the lethal mutation process probably does not initially involve macromolecular unfolding. NSA 9-1167

5422

EARLY RADIATION DEATH IN GUINEA PIGS. K. C. Brace, H. L. Andrews, and E. C. Thompson. Am. J. Physiol. 179, 386-9(1954).

Guinea pigs were exposed to whole-body x rays of 1000-25,000 r at constant dose rate of 50 r/min. Doses of: 1000 and 5000 r caused death in 4-6 days, progressive depression with few other neurological symptoms, brief, transient granulocytosis, 7500 r proved lethal in less than 24 hr, elicited state of hypersensitivity with convulsive seizures, and marked granulocytosis, 6000 r caused equal numbers of the two types of death. Irradiation of the head alone produced similar effects. NSA 9-1168

5423

LARGE DOSES OF I¹³¹ IN DOGS. RADIATION DOSAGE CORRELATED WITH HISTOLOGIC AND AUTORADIOGRAPHIC CHANGES. Martin B. Levene, Gould A. Andrews, and Ralph M. Kniseley. Am. J. Roentgenol. Radium Therapy Nuclear Med. 73, 88-97(1955).

Normal dogs were given 1.5 millicuries/kilograms of I¹³¹. Inflammation and necrosis of thyroid developed after 3rd day. Destruction of the gland was correlated with release of I¹³¹ from the thyroid into the blood stream. A patchy rim of preserved follicles was seen in the thyroids of dogs sacrificed on 6th and 9th days. At later intervals necrosis was complete, and autoradiographs showed focal zones of radioactivity. NSA 9-1169

5424

MODIFICATION IN STEROL METABOLISM OF YEAST ORGANISMS UNDER THE INFLUENCE OF X-RAYS. R. D. Gal'tsova, M. N. Metsel, and L. A. Seliverstova. Doklady Akad. Nauk. S. S. S. R. 98, 1013-16(1954). (In Russian).

Data on ergosterol content, respiration, and fermentative power of *Saccharomyces cerevisiae* cultures following exposure to 2000-100,000 r of 160 kv x rays are tabulated and discussed. NSA 9-1170

5425

BLOOD RADIATION DOSE DURING RADIOIODINE THERAPY OF METASTATIC THYROID CARCINOMA. S. M. Seidlin, A. Aaron Yalow, and Edward Siegel. Radiology 63, 797-813(1954).

Blood radioiodine concentration was determined for 1-35 days after ingestion of therapeutic doses of I¹³¹ by 26 patients with thyroid carcinoma, and specific radiation dose to the blood was computed. NSA 9-1173

- 5426**
THE EFFECT OF BONE-MARROW INJECTION ON THE INCORPORATION OF FORMATE-CARBON-14 INTO DESOXYRIBONUCLEIC ACID PURINES OF X-IRRADIATED RATS. C. A. Erikson, R. K. Main, and L. J. Cole. Oct. 15, 1954. (USNRDL-TR-14).
Injection of bone-marrow causes an over-recovery of previously inhibited incorporation in the DNA purines of bone-marrow and spleen on 8th postirradiation day. Results for small intestine and liver were inconclusive. NSA 9-1176
- 5427**
SERUM LIPOPROTEINS AS AN INDICATION OF SURVIVAL TIME IN THE X-IRRADIATED RABBIT. Thomas Hayes and John E. Hewitt. (Radiation Lab. U. of California, Berkeley). 1954. (UCRL-2790).
Detailed analysis of hyperlipoproteinemia of the x-irradiated rabbit is presented. Increases of certain classes of lipoproteins at 24 hrs. postirradiation was correlated with subsequent time of death. NSA 9-1446
- 5428**
ENLARGEMENT OF THE LIVER IN SPRAGUE-DAWLEY RATS FOLLOWING WHOLE-BODY X-IRRADIATION. Helen Supplee, E. O. Weinman, and Cecil Entenman. (1954). (USNRDL-TR-18).
A significant increase in liver mass of rats may occur as early as 6 hrs postirradiation with dose as low as 200 r. Water, lipid and glycogen contribute to increase in mass. Most striking change is in glycogen content. NSA 9-1447
- 5429**
INFLUENCE OF ANOXIA UPON HEMATOPOIETIC CELLS OF TADPOLES EXPOSED TO X-IRRADIATION OF COLCHICINE. Bennet M. Allen, Ole Arne Schjeide, and Ronald Piccirillo. J. Cellular Comp. Physiol. 44, 318-22 (1954).
Anoxia was found to suppress cell division and thereby retard x-irradiation damage to hematopoietic tissues of *Rana catesbeiana* tadpoles. Results indicate that mitosis is slowed in rough proportion of duration of partial anoxia in the tadpole. Data on x-ray inhibition and colchicine arrest are compared. NSA 9-1448
- 5430**
THE EFFECTS OF TUMOR GROWTH, X-RADIATION, AND 8-AZAGUANINE ON THE INCORPORATION OF ADENINE INTO NUCLEIC ACIDS OF MICE. James Leong Way, H. George Mandel, and Paul K. Smith. Cancer Research 14, 812-16(1954).
X-radiation produced decreased incorporation of the labeled precursors into liver DNA purines and a slightly increased incorporation into PNA purines of livers of normal as well as tumor-bearing mice. X-radiation produced slightly increased incorporation into tumor PNA but no appreciable change in tumor DNA purines of tumor-bearing mice. NSA 9-1449
- 5431**
THE MECHANISM OF INDUCTION AND THE CHARACTERISTICS OF PITUITARY TUMORS INDUCED BY THYROIDECTOMY. Jacob Furth, James Norman Dent, William T. Burnett, Jr., and Evelyn L. Gadsden. J. Clin. Endocrinol. and Metabolism 15, 81-97(1955).
Studies on mice led to conclusion that sustained deficiency of thyroid hormone gives rise to thyrotropic pituitary tumors, whether the thyroid deficiency be brought about by ionizing radiation or by other agents. NSA 9-1450
- 5432**
COMPARATIVE EFFECTS OF X-RAY AND ULTRAVIOLET RADIATION ON THE DIFFERENTIATED CHROMOSOMES OF THE TOMATO. Donald W. Barton. Cytologia (Tokyo) 19, Nos. 2-3, 157-75(1954).
Cytological analysis, at pachytene stage, of F_1 tomato plants following x ray and ultraviolet pollen treatment has established that there is a higher proportion of deficiencies to translocations after ultraviolet treatment than after x irradiation. Both radiations produced both terminal and interstitial deficiencies in tomato chromosomes. Chromosome breakage was highly localized in chromatic regions of chromosomes after both x ray and ultraviolet treatment. NSA 9-1451
- 5433**
PROTECTIVE EFFECT OF d, 1- α -OCTADECYLGLYCEROL-ETHER IN MICE GIVEN TOTAL BODY X-IRRADIATION. T. Edlund. Nature 174, 1102(1954).
Batyl alcohol was found to have beneficial therapeutic effect on irradiation injuries in mice. NSA 9-1454
- 5434**
ALKOXYGLYCEROLS IN THE TREATMENT OF LEUKOPAENIA CAUSED BY IRRADIATION. Astrid Broholt. Nature 174, 1102-3(1954).
Treatment with alkoxyglycerols administered by mouth proved effective in raising white blood count of patients suffering from radioinduced leukopenia. NSA 9-1455
- 5435**
ROENTGEN, RADIUM AND RADIOISOTOPE THERAPY. A. J. Delario. Philadelphia, Lea and Febiger. 1953. 371p.
This book includes a discussion of biological reactions to radiation. NSA 9-1458
- 5436**
Engineering Research Inst., Univ. of Michigan
UTILIZATION OF THE GROSS FISSION PRODUCTS. PROGRESS REPORT NO. 7. L. E. Brownell, L. C. Anderson, H. J. Gombert, L. L. Kempe, J. J. Martin, J. V. Nehemias, and R. A. Wolfe. Dec. 1954. 249p. (AECU-2981).
Low doses of γ rays increased refrigerator storage life of raw, ground pork and beef and prepackaged coleslaw. Irradiation sufficient to prevent insect infestation of flour or wheat had no undesirable effects on taste and baking qualities of wheat flour. Low γ ray doses prevented sprouting of stored potatoes and onions. Also studied: effect of irradiated diet on animals, effect of radiation on plants, and on tissue transplants for dogs. NSA 9-1550
- 5437**
THE ACTION OF X-RAYS ON THE NUCLEIC ACID METABOLISM IN PROLIFERATIVE AND SECRETORY CELLS. M. de Nicola. Experimentia 6(11), 432-3(1950).
X rays inhibit DNA-synthesis and conversion of DNA into RNA in *Asellus aquaticus*. Effects on germ cells and follicular secretory cells are described. Author concludes that x ray action is essentially specific for nucleic acids and not for some intermediate substance for their metabolism, and that stickiness, metaphasic block, and chromosome abnormalities are probably a secondary effect. BA 25-16073
- 5438**
RADIOACTIVE WASTES AND THEIR SIGNIFICANCE IN STREAM ECOLOGY. Elmer Higgins. Trans. Am. Fisheries Soc. 79, 217-32(1949). BA 25-16191
- 5439**
CLINICAL THERAPEUTIC RADIOLOGY. U. V. Portmann. New York, Thomas Nelson and Sons. 1950. 748p.
Author describes use of x rays and Ra in medicine, and includes section on biological effects of radiation. BA 25-16297
- 5440**
THE ELECTROPHORESIS OF LECITHIN- AND CHOLESTEROL-TREATED OIL EMULSIONS. Suzanne Bazin and Gaston Meynel. Compt. rend. soc. biol. 144(1/2), 9-11(1950).

Paramecia were protected by lecithin and cholesterol in suspensions of oils from lethal effects of x rays. BA 25-16313

5441
THE EFFECT OF IRRADIATION ON THE DEVELOPING DENTAL SYSTEM OF THE SYRIAN HAMSTER. K. W. Bruce. J. Oral Surg. Oral Med. and Oral Path. 3(11), 1468-77 (1950).

Effects on rats of 3 hr of exposure of the head to radon emanation in variable doses included: greying of hair, retardation of skull development, retarded dental growth and development in younger animals, dwarfing of teeth roots, diminution in tooth size, and anodontia. BA 25-174021

5442
EFFECT OF SENSITIZATION AND IRRADIATION ON THE FATE OF I^{131} -LABELLED BOVINE GAMMA GLOBULIN IN RABBITS AND MICE. F. J. Dixon, G. J. Dammin, and S. C. Bukantz. Federation Proc. 9(1), 380(1950).

An abstract. BA 25-17606

5443
IRRADIATION OF VIRUSES WITH SOFT X-RAYS. W. R. Guild. Bull. Am. Phys. Soc. 26(1), 15(1951).

T-1 bacteriophage of *Escherichia coli* is inactivated easily by x rays (500-3500 volts). BA 25-17784

5444
EFFECT OF SUPERVOLTAGE CATHODE RAYS ON BACTERIAL FLORA OF SPECIES AND OTHER DRY FOOD MATERIALS. Bernard E. Proctor, Samuel A. Goldblith, and Harvest Fram. Food Research 15(6), 490-3(1950).

Cathode ray dosage of 1.33×10^6 rep was found to result either in complete destruction or, in a few instances, in survival of only a few of aerobic mesophilic and thermophilic bacteria in sugar, flour starches, egg and milk powders. BA 25-17879

5445
X-RAYS IN THE CENTROMERE PROBLEM OF *LUZULA PURPUREA* LINK (1). D. de Castro, A. Camara, and Nydia Malheiros. Gent. Iberica 1(1), 49-54(1949).

Seeds of *L. purpurea* were x irradiated with 20,000 r, seedlings with 10,000, 5000, and 1000 r. All doses produced: chromosome breakage, fragments, rings, chains, and lateral attachments. In mitotic anaphase, fragments all moved to poles as if they were independent units. This behavior persisted in subsequent cell-generations until onset of meiosis. Author believes data show clearly that chromosomes of *L. purpurea* lack localized centromeres. BA 25-19220

5446
DIFFERENCES BETWEEN EFFECTS OF CHEMICAL AND PHYSICAL MUTAGENS. C. Auerback. Pubbl. staz. zool. Napoli Suppl. 22, 1-21(1950).

Compares effects of mustard gas and x rays on *Drosophila melanogaster*. BA 25-19292

5447
HISTAMINE CONCENTRATION AFTER IRRADIATION WITH X-RAYS. H. Baur and M. Ludin. Radiol. Clin. 19(5), 268-76(1950).

X rays reportedly cause increased blood histamine concentration in man and animals amounting to 5-6 times normal values. In vitro irradiation of blood gives no increase. Author feels experiments indicate that histamine production is caused by radiation effect on the reticuloendothelial system or the bone marrow. BA 25-19536

5448
EFFECT OF ADRENALECTOMY AND GLUTATHIONE ON X-RAY-INDUCED MORTALITY IN MICE. E. P. Cronkite and W. H. Chapman. Federation Proc. 9(1), 329(1950).

An abstract. BA 25-19984

5449
HORMONAL CHANGES FOLLOWING LOW DOSAGE IRRADIATION OF PITUITARY AND OVARIES IN ANOVULATORY WOMEN.

A. E. Rakoff. Fertility and Sterility 1(6), 504-16(1950).

Endocrine studies were made before, during and after low dosage irradiation to the pituitary and ovaries of 12 women with persistent anovulatory sterility. Improvement in hormonal pattern occurred in all 3 types of endocrine dysfunction, but was most consistent in patients with gonadotropic deficiency. Results indicate primary beneficial effect was upon ovaries, possibility of a primary effect upon pituitary in some instances not eliminated. BA 25-20085

5450
ADAPTATION AND X-RAY IRRADIATION. A. Lenoir. Radiol. Clin. 13(5), 264-76(1944).

Since vitamin A deficiency parallels decrease in faculty of adaptation, and patients exhibit decreased faculty of adaptation after x irradiation, author postulates a reduction of vitamin A content postirradiation. (Considers three components of adaptation: accommodation of pupil, adaptation of cones, adaptation of rods). BA 22-3414

5451
DEPOSITION OF METHYLCHOLANTHRENE IN SOME ORGANS OF THE RAT. Ole Esmarch. Acta. Path. Microbiol. Scand. 19(1), 79-99(1942).

Groups of 10 animals were injected with methylcholanthrene, half of each group x rayed (160 kv, 4 ma; 4 mm Al; half layer value, 0.55 Cu, 60 cm dist., at 11.9 r/min, total body dose of 330 r). Tumor formation was studied in mammary glands, striated muscle, thyroid, peritoneum, liver, spleen, lung, uterus, testes, and brain. Radiation had no effect on character of tumors, tendency to metastasis, length of latent period before appearance or proportion of growths obtained. BA 18-889

5452
THEORETIC CONSIDERATIONS AND CLINICAL USE OF GRENZ RAYS IN DERMATOLOGY. Frederick Kalz. Arch. Dermatol. and Syphilol. 43(3), 447-72(1941).

This is a review article. BA 16-15898

5453
ROENTGEN TREATMENT OF ASTHMA. Charles K. Maytum and Eugene T. Leddy. J. Allergy 10(2), 135-45(1938-39).

Reasons for beneficial effects of x-ray therapy are not definitely known. One conclusion is that x rays decrease secretory power of mucous glands in trachea, liberate antibodies by destruction of leucocytes, and may stimulate production of eosinophils. BA 13-17172

5454
ON THE PRODUCTION OF HEREDITARY PHYTOCARCINOMA BY RADIUM IRRADIATION IN *ANTIRRHINUM MAJUS*. Emmy Stein. Phytopathol. Z. 4(5), 523-38(1932). (In German).

Author describes a heritable disease (capable of being transmitted through at least 4 generations) which was produced by irradiating *A. majus* embryo for 6 hr β rays of Ra. BA 7-7726

5455
INDUCTION OF DOMINANT LETHAL EFFECTS BY X-RADIATION IN HABROBRACON. D. W. Bishop. Genetics 22(4), 452-6(1937). BA 11-17887

5456
THE EFFECTS OF X-RAYS ON THE DISSOCIATIVE RATES OF CERTAIN BACTERIA. Sol Haberman and Louis D. Ellsworth. J. Bacteriol. 38(2), 237-8(1939).

No abstract. BA 13-17456

5457
AN INTERNATIONAL BIBLIOGRAPHY ON ATOMIC ENERGY. VOL. II. SCIENTIFIC ASPECTS. United Nations Atomic Energy Groups, Dept. of Security Council Affairs. New York, Columbia University Press. 1951. 880p.

Scientific aspects of atomic energy as described in books and articles from all parts of the world between 1925 and 1949 are included. Subjects include: basic nuclear science; biological and medical effects of high-energy radiations; isotopes in biology and medicine, radioactive tracers. NSA 5-5240

5458
X-RAY FRACTIONATION AND CHROMOSOME BREAKAGE. George Roy Lane. *Heredity* 5(1), 1-35(1951).

Results of experiments with *Tradescantia bracteata* show following effects of separating an x ray dose of 360 r into 2 equal fractions: (1) as time period between fractions increases, breakage frequency decreases, then recovers, until at 8 hr separation it is little below that from full continuous dose; (2) frequency of breakage and reunion is reduced, at 4 hr separation, to less than twice the breakage frequency which would be expected from the half dose. BA 25-22445

5459
STUDIES OF THE EFFECTS PRODUCED BY X-RAYS, POLONIUM, AND SOME CHEMICAL REAGENTS ON THE MERISTEMATIC CELLS OF HIGHER PLANTS. R. Villars. *Rev. gen. botan* 56, 205-31, 258-81, 318-32, 364-80, 404-23(1949). (In French).

Author describes x ray effects on mitosis in root tips of *Pisum sativum*, *Vicia faba*, *Helianthus uniflorus*, *Allium cepa*, *Hyacinthus orientalis*, and *Pinus pinea*; and effect of solutions of polonium on *V. faba*, *P. sativum*, and *P. pinea*. BA 25-22455

5460
TWENTY-FIVE YEARS OF TULIP IMPROVEMENT BY X-RAYS. Willem Eduard DeMol. *Papers Mich. Acad. Sci.* 35, 9-14(1949).

Microscopic study of x-irradiated tulips show (1) number of chromosomes varied owing to arrest of nuclear divisions, (2) separated **chromomeres stretched into** filaments, (3) chromosomes remained in cytoplasm after nuclear reconstruction, (4) pollen became sterile, (5) somatic mutations occurred. Visible changes are described. Treatment in August or September with dosages not in excess of 800 r were most successful. BA 25-22492

5461
PROTECTIVE ACTION OF SOME SULFUR-CONTAINING AND SULFUR-FREE COMPOUNDS AGAINST X-RAY DAMAGE IN BACTERIA. W. T. Burnett, G. E. Stapleton, and A. Hollaender. *Federation Proc.* 10(1), 22(1951).
An abstract. BA 25-22782

5462
RESPONSE OF *CHILOMONAS PARAMECIUM* TO IONIZING RADIATION. Howard S. Ducoff and John O. Hutchens. *Federation Proc.* 10(1), 37(1951).
An abstract. BA 25-22785

5463
SURVIVAL OF RATS ADRENALECTOMIZED AFTER X-IRRADIATION. Abraham Edelmann and Seymour Katsh. *Federation Proc.* 10(1), 38(1951).

Life span was reduced when time between radiation and adrenalectomy was reduced. Thus, need for adrenal hormones is most acute immediately after irradiation and rapidly diminishes after 3-5 days. BA 25-22786

5464
PROTECTION OF MICE FROM LETHAL EFFECTS OF X-RADIATION WITH INTRAVENOUS INJECTION OF METHYLENE BLUE. B. Vincent Hall. *Federation Proc.* 10(1), 58-9(1951).
An abstract. BA 25-22790

5465
DESOXYRIBONUCLEIC ACID CONTENT PER NUCLEUS IN RAT THYMUS DAMAGED BY β -RADIATION. Helen

Harrington and Paul S. Lavik. *Federation Proc.* 10(1), 194-5(1951).

An abstract. BA 25-22792

5466
PREVENTION OF INJURY FROM X-RADIATION. Francis R. Holden, Eugene Tochilin, Charles H. Hine and Leon Lewis. *Calif. Med.* 74(3), 188-92(1951).

Authors discuss **occupational radiation injuries** from the point of view of preventive medicine. BA 25-22793

5467
EFFECT OF TERRAMYCIN ON ACUTE RADIATION SYNDROME IN DOGS. J. W. Howland, F. W. Furth, and M. P. Coulter. *Federation Proc.* 10(1), 67(1951).
An abstract. BA 25-22794

5468
EFFECTS OF DIBENAMINE AND CORTIN UPON COMPOSITION OF BLOOD PLASMA DURING ACUTE RADIATION SYNDROME. Henry I. Kohn. *Federation Proc.* 10(1), 74(1951).
An abstract. BA 25-22797

5469
EFFECT OF X-IRRADIATION ON IRON OF SERUM AND TISSUE OF RATS. Stephan Ludewig and Alfred Chanutin. *Federation Proc.* 10(1), 218(1951).
An abstract. BA 25-22800

5470
ON THE EFFECTS OF RADIOACTIVE IODINE ON THE HYPOPHYSIS AND OVARIES OF MAMMALS. L. A. Kashchenko. *Med. Radiol. No. 2*, 70-5(1956). (In Russian). NSA 10-11017

5471
FLUID BALANCE STUDIES IN GUT, MUSCLE, AND SKIN OF RATS AFTER TOTAL BODY X-RADIATION. E. E. Painter and M. A. Cooley. *Federation Proc.* 10(1), 100-1(1951).
An abstract. BA 25-22801

5472
ACUTE INTESTINAL RADIATION DEATH. Henry Quastler. *Federation Proc.* 10(1), 106(1951).
An abstract. BA 25-22802

5473
SEVERE RADIATION INJURY OBSERVED IN THE ERYTHROCYTE SEDIMENTATION OF DOGS. G. A. Sacher, M. N. Swift, and J. Gurian. *Federation Proc.* 10(1), 116(1951).
An abstract. BA 25-22804

5474
THERMAL FRAGILITY OF RAT ERYTHROCYTES FOLLOWING WHOLE-BODY X-IRRADIATION. Falconer Smith and Marie M. Grenan. *Federation Proc.* 10(1), 128(1951).
An abstract. BA 25-22806

5475
POTASSIUM TOLERANCE FOLLOWING IRRADIATION. Willie W. Smith. *Federation Proc.* 10(1), 129(1951).
An abstract. BA 25-22807

5476
THE EFFECT OF OVER-ALL TIME OF EXPOSURE UPON SURVIVAL OF YOUNG CHICKS FOLLOWING ROENTGEN IRRADIATION. Phyllis Stearner and Emily J. B. Christian. *Am. J. Roentgenol. Radium Therapy* 65(2), 272-6(1951).

Survival following exposure to fractionated x ray dosages indicates that over-all time is of **greater importance** than dosage rate in determining lethal effect of given dosage for newly hatched chicks. Additional results indicate that recovery does not occur at linear rate. BA 25-22810

5477
BODY RADIUM CONTENT OF INDIVIDUALS WITH NO

KNOWN OCCUPATIONAL EXPOSURE. John B. Hursh and Allan A. Gates. *Nucleonics* **7**(1), 46-59(1950).

Radium content of bodies of 25 adults and 6 stillborn infants or fetuses was determined. Average value for adults was found to be 0.50×10^{-13} g of Ra per g of ash, for stillborns, 0.32×10^{-13} g Ra/g ash. Daily dose to bone is estimated as 1.13×10^{-2} millirep. BA 25-22851

5478

RADIATION SICKNESS IN MICE DURING REDUCED BAROMETRIC PRESSURE. L. B. Bychkovskaya, G. S. Strelin, and I. V. Shiffer. *Central Research Inst. of Roentgen Radiology*, No. 3, 85-92(1956). (Russian). NSA 10-11007

5479

THE HISTOGENESIS OF RADIATION-INDUCED AND OF BENZOPYRENE-INDUCED EPIDERMAL TUMORS IN THE MOUSE. A. Glucksmann. *J. Pathol. Bacteriol.* **63**(1), 176-7(1951).

Tumors induced by β rays appear following destruction of directly irradiated skin and production of severe vascular damage and arise in regenerating epidermis after about 14 months. Weekly paintings with benzpyrene leads to formation of epidermal tumors in 3 months by direct stimulation of treated epidermis. BA 25-23979

5480

COMBINED THERMAL AND PRIMARY IONIZATION EFFECTS ON A BACTERIAL VIRUS. W. R. Adams and Ernest Pollard. *Bull. Am. Phys. Soc.* **26**(3), 39(1951).

Inactivation of dry T-1 bacteriophage proceeds definitely faster when virus is bombarded by deuterons or x rays at temperatures above room temperature. BA 25-24427

5481

PHYSICAL CATALYSTS IN THE PLANT WORLD. Vincenzo Rivera. *Italia agric.* **87**(7), 415-8(1950). (In Italian).

Discusses: effect of naturally occurring ultragamma radiations on bacteria and yeast, effect of exposing *Vicia faba* seeds to 400 mg of Ra for 24 hr at 3 cm, effect of x rays on growing points or on pathological tissues such as tumors due to *Pseudomonas tumefaciens*. BA 25-25403

5482

THE EFFECT OF X-RADIATION ON INDOLEACETIC ACID AND AUXIN LEVELS IN THE PLANT. S. A. Gordon and R. P. Weber. *Am. J. Botan.* **37**(8), 679(1950).

An abstract. BA 25-25418

5483

Naval Radiological Defense Lab.
COMBINED EFFECTS OF TOTAL BODY X IRRADIATION AND RADIANT ENERGY THERMAL BURNS. 3. OSMOTIC AND MECHANICAL FRAGILITY OF THE ERYTHROCYTE. E. L. Alpen, J. A. Alexander, A. K. Davis, and W. M. Davis. Nov. 23, 1953. 28p. (USNRDL-419, AFSWP-474)

Osmotic and mechanical fragility of rat erythrocytes were measured during the 30-day interval following severe and moderately severe burns, 100 and 500 r of whole-body ionizing radiation, and combinations of the two traumata. NSA 8-2095

5484

Naval Radiological Defense Lab.
COMBINED EFFECTS OF TOTAL BODY X IRRADIATION AND RADIANT ENERGY THERMAL BURNS. 2. ANEMIA. A. K. Davis, E. L. Alpen, G. E. Sheline, and W. M. Davis. Nov. 23, 1953. 28p. (USNRDL-423, AFSWP-732)

Effects of 25% and 15% body area burns, and 100, 475, and 500 r of total-body x irradiation were compared with the effects of three combinations of these on blood volume, red cell volume, hematocrit, red cell count, hemoglobin, and reticulocyte population in rats. NSA 8-2096

5485

Radiological Lab., Univ. Calif., San Francisco, School of Medicine Physics and Biology Sections
ANNUAL REPORT FOR 1953. 26p. Contract AT-11-1-GEN-10. (UCSF-8).

Includes reports on: tests of relative biological efficiency of x radiation and response of various mouse organs and tissues to x radiation as a function of dose rate and fractionation. NSA 8-2098

5486

Los Alamos Scientific Lab.
BIOLOGICAL EFFECTIVENESS OF THERMAL NEUTRONS IN PRODUCING TESTICULAR ATROPHY IN MICE. John B. Storer, Wright Langham, Phyllis Sanders, and William Schweitzer. May 1953. 14p. Contract W-7405-eng-36 (LA-1630).

Using testicular atrophy in mice 4 wk postexposure as the biological indicator of radiation effect, a comparison was made of relative effectiveness of the thermal column and 250 kvp x radiation. Results showed approximately 8×10^3 thermal n/cm² produced an effect equivalent to 1 r of 250 kvp x rays. NSA 8-2282

5487

National Bureau of Standards
THE RELATIVE BIOLOGICAL EFFICIENCY OF DIFFERENT IONIZING RADIATIONS. John W. Boag. Dec. 30, 1953. 147p. (NBS-2946).

Author discusses general aspects of biological effect of different radiations and defines terms used. Several experiments are reviewed, including those on whole animals or organs, and those on microorganisms and other simple materials. Relative RBE values are tabulated. Appendices give linear energy transfer distribution in water or tissues irradiated by fast neutrons and by x ray beams. NSA 8-2283

5488

Air Force Radiation Lab., Univ. of Chicago
QUARTERLY PROGRESS REPORT NO. 10. Jan. 15, 1954. 126p. Contract AF-33(038)27353 (NP-5055).

Includes reports on: application of 5-nucleotidase measurements on hematopoietic tissues for evaluating protective efficacy of chemical agents against radiation injury, x ray effect on sulfanilamide metabolism *in vivo*, x ray effects on O consumption by spleen and thymus, on respiration in rat tissue slices, on neurohumoral mechanisms of gastrointestinal, hematopoietic and other tissues of rats, on O consumption and production of CO₂ and acetone by rats, on survival of amoeba, effects of antihistaminic agents and mouse liver catalase on lethality of x irradiation in rats. NSA 8-2284

5489

Atomic Energy Project, Univ. of Calif., Los Angeles
SOME FACTORS INFLUENCING THE METABOLISM OF RADIO-STRONTIUM BY ANIMALS. Warren J. Gross, Janice F. Taylor, and James C. Watson. Jan. 6, 1954. 20p. (UCLA-274).

Metabolism of ingested strontium in rats was studied. Attainment of published value for maximum Sr⁹⁰ + Y⁹⁰ body burden in man is discussed. NSA 8-2285

5490

Atomic Energy Project, Univ. of Rochester
PRENATAL MORTALITY RATES OF SEVENTEEN RADIATION INDUCED TRANSLOCATIONS IN MICE. Eileen M. Otis. Nov. 23, 1953. 60p. Contract W-7405-eng-49 (UR-291).

Seventeen chromosome translocations (semi-sterile lines) in the mouse were investigated to determine prenatal mortality rates of lethally affected zygotes. Seven translocations were obtained from exposure to low chronic x ray doses, and ten from single exposures to 600 r at

34. 9 r/min and 48. 5 r/min. Data are tabulated.
NSA 8-2286

5491

Atomic Energy Project, Univ. of Rochester
QUARTERLY TECHNICAL REPORT [FOR] OCTOBER 1
THROUGH DECEMBER 31, 1953. Feb. 9, 1954. 31p. Contract
W-7401-eng-49. (UR-311).

Included are reports on (1) use of an immunizing agent (Bacterin), a blood coagulant (Koagamin), and an acetylation antagonist (Antabuse), which failed to alter post-irradiation course, morbidity, and mortality of dogs. (2) Aureomycin appeared to have some influence on maintenance of body weight of irradiated animals. Data are included from studies of toxicity of inhaled UO_2 fumes in rats. NSA 8-2287

5492

Atomic Energy Project, Univ. of Rochester
ANOTHER POSSIBLE CAUSE OF SPONTANEOUS MUTATIONS.
Robert L. Brent. Feb. 22, 1954. Contract W-7401-eng-49
(UR-313).

Author reports that naturally occurring C^{14} can account for between 0.1% and 6% of spontaneous mutations in nature. Proposes that effects of atomic transformation should be included in all estimates of maximum permissible dose of radioisotopes which might be incorporated into genes. NSA 8-2288

5493

Naval Radiological Defense Lab.
QUANTITATIVE SEROLOGICAL DETERMINATION OF
ANTIBODY FORMATION IN X-IRRADIATED RABBITS.
M. S. Silverman and P. H. Chin. Dec. 23, 1953. 18p.
(USNRDL-422).

Even though antigen was administered with adjuvant, presumably permitting a prolonged, slow antigenic stimulation, response of animals receiving 400 r total body x rays was lower than that of nonirradiated animals. NSA 8-2289

5494

INCORPORATION OF P^{32} INTO TRICHLOROACETIC ACID
FRACTIONS OF LIVER FROM IRRADIATED AND
NONIRRADIATED MICE. F. G. Sherman and A. Forssberg.
Arch. Biochem. and Biophys. 48, 293-9(1954).

Specific activity of ortho P and acid-labile P from livers of irradiated mice was markedly increased, but had decreased when determined 1 hr and 24 hr after exposure. Irradiation of excised livers *in vitro* had negligible effect. NSA 8-2290

5495

THE IRRADIATION OF BACTERIAL SPORES WITH LOW-
VOLTAGE ELECTRONS. Marguerite Davis. Arch. Biochem
and Biophys. 48, 469-81(1954).

Spores of *Bacillus subtilis* were found to have three radiosensitive regions, but no evidence of a single organized nucleus containing particles of maximum radiosensitivity was found. NSA 8-2291

5496

EFFECT OF TOTAL BODY X-IRRADIATION ON THE
TRYPTOPHAN PEROXIDASE ACTIVITY OF RAT LIVER.
John F. Thomson and Eleanor T. Mikuta. Proc. Soc.
Exptl. Biol. Med. 85, 29-32(1954).

Total body x irradiation produces a dose-dependent increase in tryptophan peroxidase-oxidase system of rat liver within a few hours after exposure. Increase does not occur in adrenalectomized rats hence cannot be construed as a direct irradiation effect. NSA 8-2292

5497

SUBLETHAL TOTAL BODY IRRADIATION AND I^{131}
METABOLISM IN THE RAT THYROID. Robert A. Monroe,
John H. Rust, and Bernard F. Trum. Science 119, 65-7
(1954).

Comparative values are presented for uptake and binding of I^{131} by thyroid of rats at various intervals after exposure to 665 r of γ or 500 r of x radiation. Comparison is made with observations on excited thyroids of irradiated burros. (Uptake increased after exposure in both species.) NSA 8-2293

5498

DEPIGMENTATION OF HAIR AS A BIOLOGICAL
RADIATION DOSIMETER. Jack Moshman and Arthur C.
Upton. Science 119, 186-7(1954).

Study of large numbers of mice exposed to graded doses of whole-body ionizing radiation led to conclusion that degree of depigmentation of mouse fur is correlated closely enough with radiation dose to constitute a convenient biological dosimeter. Correlation varied markedly with different regions of coat, and for mice studied, it was more constant for fur on top of the head. NSA 8-2294

5499

SKIN REACTION TO PROTRACTED BETA IRRADIATION.
H. D. Griffith, J. F. Philip, and G. E. Swindell. Brit.
J. Radiol. 27, 107-12(1954).

Skin reactions consequent upon handling glass-screened radioactive material were classified in parallel with dose of β radiation received, protraction being up to four years. NSA 8-2295

5500

THE CHEMISTRY OF BIOLOGICAL AFTER-EFFECTS OF
ULTRAVIOLET AND IONIZING RADIATIONS. (A
SYMPOSIUM). X. MODIFICATION OF RADIATION DAMAGE
AFTER EXPOSURE TO X RAYS. Alexander Hollaender and
George E. Stapleton. Brit. J. Radiol. 27, 117-21(1954).

Effects of temperature and nutrient substances on post-exposure recovery of *E. coli*; changes produced on x ray sensitivity of *E. coli*, *Drosophila*, and other tissues by various agents are described. NSA 8-2296

5501

THE CHEMISTRY OF BIOLOGICAL AFTER-EFFECTS
OF ULTRAVIOLET AND IONIZING RADIATIONS. (A
SYMPOSIUM). XI. AFTER-EFFECTS OF RADIATION
AND CHEMICALS ON CHROMOSOMES AND GENES.
C. Auerbach. Brit. J. Radiol. 27, 122-4(1954).

After-effects of nuclear changes in chromosomes and genes produced by exposure to ionizing radiations and chemical and physical mutagens are discussed. Modification of effects of various mutagens by various post-treatments are reviewed, and an attempt is made to explain some of mechanisms of mutation. NSA 8-2297

5502

THE CHEMISTRY OF BIOLOGICAL AFTER-EFFECTS OF
ULTRAVIOLET AND IONIZING RADIATIONS. (A
SYMPOSIUM). XII. DELAYED EFFECTS IN CHROMOSOME
BREAKAGE BY X-RAYS. K. C. Bora. Brit. J. Radiol.
27, 124-7(1954).

Theories of nature of delayed radioinduced chromosome breakage are reviewed. NSA 8-2298

5503

THE CHEMISTRY OF BIOLOGICAL AFTER-EFFECTS OF
ULTRAVIOLET AND IONIZING RADIATIONS. (A
SYMPOSIUM). XIII. THE OXIDATIVE PHOSPHORYLATION
BY MITOCHONDRIA ISOLATED FROM THE SPLEEN OF
RATS AFTER TOTAL BODY EXPOSURE TO X RAYS.
D. W. van Bekkum, H. J. Jongepier, H. T. M. Niswenderk,
and J. A. Cohen. Brit. J. Radiol. 27, 127-30(1954)

Four hours after 1100 r of x rays, phosphorylation, O uptake, and P/O ratio are significantly reduced. Effect is observed with succinate as well as with α -ketoglutarate as substrate. NSA 8-2299

5504

THE CHEMISTRY OF BIOLOGICAL AFTER-EFFECTS OF

ULTRAVIOLET AND IONIZING RADIATIONS. (A SYMPOSIUM). XIV. RADIATION PROTECTIVE COMPOUNDS: A COMPARISON OF THEIR EFFECTS IN IN VIVO AND IN VITRO SYSTEMS. P. Alexander, M. Fox, and S. F. Hitch. *Brit. J. Radiol.* 27, 130-1(1954).

In vivo and in vitro methods for evaluating protective effects of various compounds against radiation injuries are discussed. Results are summarized from comparative experiments using the two systems, mouse and polymer. Possible mechanisms in radiation protection are discussed. NSA 8-2300

5505

THE CHEMISTRY OF BIOLOGICAL AFTER-EFFECTS OF ULTRAVIOLET AND IONIZING RADIATIONS. (A SYMPOSIUM). XV. FREE RADICAL PRODUCTION IN OXIDATION-REDUCTION REACTIONS OF PEROXIDASE, CATALASE AND METMYOGLOBIN. Philip George and D. H. Irvine. *Brit. J. Radiol.* 27, 131-7(1954). NSA 8-2301

5506

THE EFFECT OF RADIATION DOSE FRACTIONATION ON CHROMOSOME ABERRATION FREQUENCIES IN TRADES-CANTIA MICROSPORES. II. STUDIES WITH FAST NEUTRONS. Norman H. Giles, Frederick J. De Serres, Alvin V. Beatty. *Genetics* 38, 416-20(1953).

Single or fractionated dose of 25 n produced the same aberration frequency. Results are compared with data from x-ray studies. NSA 8-2303

5507

COMPARATIVE EFFECTS OF COBALT 60 AND RADIUM WHEN UTILIZED IN IDENTICAL DOSES ON THE SKIN OF RABBITS. Isadore Meschan and Anderson Nettleship. *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 71, 306-19(1954).

Of 58 rabbits subjected to externally applied Ra^{226} and Co^{60} , 30 exhibited identical reactions to the two elements; 27 had more severe reactions to Co^{60} , while in one, the Ra^{226} reaction was more severe. Microscopic study indicated an earlier hyperplastic and greater ulcerative reaction due to Co^{60} . NSA 8-2304

5508

THE EFFECT OF X IRRADIATION AND LOWERED METABOLIC RATE ON THE MORPHOGENESIS OF DEVELOPING MELANOPLUS DIFFERENTIALIS EMBRYOS. Theodore N. Tahmisian, Janet V. Passonneau, and Dorothy M. Adamson. *J. Natl. Cancer Inst.* 14, 941-53(1954).

Sequence of biological susceptibility to x irradiation was found to be, in order of decreasing susceptibility, tissue differentiation, cell division, anabolism, catabolism, in developing grasshopper embryos. Anaerobic conditions during exposure increased radio-resistance tenfold. NSA 8-2305

5509

WEIGHT RESPONSE OF IRRADIATED ACCESSORY SEX ORGANS OF THE CASTRATE MALE RAT TO TESTOSTERONE PROPIONATE. Walter Fleischmann and John T. Brackin, Jr. *Endocrinology* 54, 227-8(1954).

Growth induced by testosterone propionate in accessory sex organs of castrated male rats was only partially inhibited by x rays. NSA 8-2306

5510

Naval Radiological Defense Lab. STUDIES ON THE TREATMENT OF INTERNAL RADIO-ACTIVE CONTAMINATION. 4. EFFECT OF ZIRCONIUM CITRATE AND EDTA ON THE DISTRIBUTION AND EXCRETION OF A MIXTURE OF LONG-LIVED FISSION PRODUCTS. J. K. Gong, W. L. Milne, and S. H. Cohn. *Dec. 24*, 1953. 16p. (USNRDL-426).

Zirconium citrate administered before the fission products afforded the most effective prevention of their deposition in the skeleton. NSA 8-2308

5511

MODIFICATION OF LETHAL IRRADIATION INJURY IN MICE BY INJECTION OF HOMOLOGOUS OR HETEROLOGOUS BONE. Egon Lorenz and Charles C. Congdon. *J. Natl. Cancer Inst.* 14, 955-61(1954).

Bone of mouse and rat transplanted intraperitoneally protected LAF₁ mice from lethal x ray dose. Homologous bone induced bonemarrow formation in the transplant. Heterologous rat bone marrow protected LAF₁ mice also, but bone marrow formation did not occur in transplant. NSA 8-2309

5512

PROTECTION OF IRRADIATED RATS BY PARABIOSIS WITH ADRENALECTOMIZED OR SPLENECTOMIZED PARTNERS. Martin Schneider, Robert C. Wybourn, Robert Binhammer, and John C. Finerty. *Radiology* 62, 234-40(1954).

Postexposure parabioses permanently protected a majority of rats from lethal effects of irradiation, but only if the non-irradiated partner had a spleen. NSA 8-2310

5513

Tennessee Univ. AGRICULTURAL RESEARCH PROGRAM. SEMI-ANNUAL PROGRESS REPORT FOR JULY 1 TO DECEMBER 31, 1953. Apr. 1954. 114p. Contract AT-40-1-GEN-242. (ORO-110).

Data are tabulated on clinical and pathological response of burros subjected to daily whole-body doses (until death) of γ radiation of: 400 r/day, 100 r/day, 50 r/day, and 25 r/day. Other work reported includes: suppression of gonadotropin principles by whole body x rays in rabbit, alteration of thyroid function and reduction of serum alkaline phosphatase in burro. NSA 8-2735

5514

Brookhaven National Lab. SEX-LINKED LETHAL MUTATIONS INDUCED BY THERMAL NEUTRONS IN MALE AND FEMALE DROSOPHILA MELANOGASTER. Robert C. King and Eunice M. Wood. (1953). BNL-1778

Authors describe recessive lethal mutations, loss and fragmentation of X-chromosomes in spermatozoa and oocytes of D. melanogaster produced by thermal neutrons. NSA 8-2737

5515

OBSERVATIONS ON EFFECTS OF X-IRRADIATION ON ACHROMOBACTER FISCHERII. R. D. Higginbotham and John Z. Bowers. *Proc. Soc. Exptl. Biol. Med.* 86, 303-5(1954).

Reproductive mechanism of A. fischerii is more sensitive to x radiation at all measured dosage levels than is the luminescent system of this organism. These findings indicate that cells sterilized by x rays are capable of metabolic activity for a measurable length of time after exposure. NSA 8-5476

5516

Los Alamos Scientific Lab. BIOLOGICAL EFFECTIVENESS OF 14 MEV NEUTRONS. SPLEEN AND THYMUS WEIGHT LOSS IN MICE AS THE BIOLOGICAL INDICATOR. Payne S. Harris, L. Edward Ellinwood, E. C. Anderson, Rowland W. Davis, William Schweitzer, and Phyllis Sanders. *Dec. 1953*. 16p. Contract W-7405-eng-36. (LA-1629).

Biological effectiveness study of 14 Mev neutrons and 250 kvp x rays indicates that a dosage of 1×10^8 n/cm² is equivalent to 1 r of x rays, and RBE of 7-Mev recoil protons is calculated to be between 1 and 2 for biological indicator used (spleen and thymus atrophy in female CF₁ mice). NSA 8-2738

5517

Atomic Energy Project, Univ. of Rochester

THE EFFECT OF SINGLE VS. DIVIDED DOSES OF X-IRRADIATION ON SURVIVAL OF RATS. John B. Hursh, Florence Van Slyke, and George Casarett. Mar. 16, 1954. 14p. Contract W-7401-eng-49. (UR-317).

Studies performed on male rats demonstrate that the average shortening of life of 60-day survivors of a single 600 r x ray dose (19%) is significantly greater than the average life shortening produced by a total dose of 600 r divided into either 10 daily doses of 60 r/day or 30 daily doses of 20 r/day. NSA 8-2739

5518

Atomic Energy Project, Univ. of Rochester
USE OF A TEST DOSE TO ESTIMATE LIFE SHORTENING PRODUCED IN RATS BY A SINGLE DOSE OF X-IRRADIATION. John B. Hursh, Florence Van Slyke, and George Casarett. Mar. 16, 1954. 15p. Contract W-7401-eng-49. (UR-318).

Male rats, 60-day survivors of single 650 r x ray dose, were tested by second dose and LD₅₀ was found to be 548 r. Reduction in LD₅₀ is believed to be caused by an irreparable injury produced by initial dose and to reflect reduction in survival established in earlier experiments as a consequence of high single dose irradiation. NSA 8-2740

5519

Atomic Energy Project, Univ. of Rochester
INFLUENCE OF DIET ON SURVIVAL OF RATS FOLLOWING WHOLE BODY X-IRRADIATION OR POLONIUM INJECTION. Thomas R. Noonan and J. N. Stannard. Mar. 23, 1954. 12p. Contract W-7401-eng-49. (UR-320).

The 30-day mortality of rats following either 625 r of whole-body x rays or the intravenous injection of 38 μ c of polonium per kilogram body weight is not significantly changed by feeding synthetic diets with either 25% casein and 32% fat or 10% casein and 5% fat as compared to a standard Fox Chow diet. NSA 8-2741

5520

Naval Radiological Defense Lab.
ALTERATIONS IN ORGAN AND BODY GROWTH OF RATS FOLLOWING DAILY EXHAUSTIVE EXERCISE, X IRRADIATION, AND POST-IRRADIATION EXERCISE. D. J. Kimeidorf and S. J. Baum. Dec. 23, 1953. 24p. (USNRDL-427).

Male rats were subjected to the stress of repeated exhaustive swimming exercise or to several doses of x rays or to various numbers of exhaustive swimming trials after irradiation. Data describing body weight and weights of 9 organs at various intervals after imposition of the experimental condition are analysed. NSA 8-2742

5521

PREVENTION OF TRICHINOSIS BY GAMMA IRRADIATION OF PORK AS A PUBLIC HEALTH MEASURE. S. E. Gould, H. J. Gomberg, and F. H. Bethell. Am. J. Public Health 43, 1550-7(1954).

Gamma irradiation of raw pork is considered as method for preventing Trichinosis and advantages of radiation treatment are summarized. NSA 8-2743

5522

THE EFFECT OF TUMOR GROWTH AND X-RADIATION ON THE INCORPORATION OF RADIOCARBON FROM 4-AMINO-5-IMIDAZOLECARBOXAMIDE-C¹⁴ INTO NUCLEIC ACIDS. Gaylord M. Conzelman, Jr., H. George Mandel, and Paul K. Smith. Cancer Research 14, 100-2 (1954).

Sarcoma-bearing mice showed greater incorporation of 4-amino-5-imidazole-carboxamide into nucleic acid purines isolated from liver than did control mice. After total body x radiation of 400 r, incorporation into PNA purines was higher, into DNA purines slightly lower than for control mice. NSA 8-2745

5523

THE PROBLEM OF THE MECHANISM OF THE ACTION OF PENETRATING RADIATION ON THE SYNTHESIS OF NUCLEOPROTEIDS IN THE SPLEEN. A. M. Kuzin and E. V. Budilova. Doklady Akad. Nauk S. S. R. 91, 1183-6(1953). (Russian).

Suppression of incorporation of P³² into the protein fraction of rat spleen by irradiation occurred 19-20 hrs after P³² injection when radiation was applied immediately before injection. Results following irradiation of spleen only are compared with results following irradiations of spleen-shielded rats. NSA 8-2746

5524

THE EFFECT OF X RAYS ON THE MACROMOLECULAR ORGANIZATION OF ESCHERICHIA COLI. Daniel Billen and Elliot Volkin. J. Bacteriol. 67, 191-7(1954).

Data are presented from studies of x-ray effects on structure of macromolecular components of E. coli, as determined with aid of analytical ultracentrifuge and by chemical analysis. NSA 8-2747

5525

EFFECT OF IONIZING IRRADIATION ON INFRARED SPECTRA OF THE BONE MARROW IN RATS. H. P. Schwarz, H. E. Riggs, C. Glick, J. McGrath, R. Childs, E. Bew, Jr., and F. Stone. J. Phila. Gen. Hosp. 4, 165-8(1953).

X-irradiation produces changes in the infrared absorption spectrum of the bone marrow as a result of a considerable decrease of nucleic acid content. NSA 8-2748

5526

RADIATION STERILIZATION. VI. RELATIVE MERITS OF CATHODE RAYS AND GAMMA RADIATIONS. Samuel A. Goldblith and Bernard E. Proctor. Nucleonics 12, No. 2, 32-5(1954).

Problems of ionization distribution and bactericidal effects are discussed for cathode rays and γ radiation. It is pointed out that while γ rays can provide more uniform distribution of energy, the efficiency of utilization is much lower than for β particles. NSA 8-2749

5527

MAXIMUM PERMISSIBLE CONCENTRATION OF RADIO-ISOTOPES IN FOOD, WATER AND AIR AND MAXIMUM PERMISSIBLE EQUILIBRIUM AMOUNTS IN THE BODY. Karl Z. Morgan. Acta Radiol. 41, 30-46(1954). NSA 8-2750

5528

SKIN EFFECTS OF COBALT 60 TELECURIE THERAPY. C. C. Burkell, T. A. Watson, H. E. Johns, and R. J. Horsley. Brit. J. Radiol. 27, 171-6(1954).

Skin effects, in general, have been much less with Co⁶⁰ therapy than with conventional x radiation, even though higher tumor doses and fewer fields were usually employed. (A report of clinical experiments.) NSA 8-2753

5529

THE ROLE OF ATOMIC ENERGY IN AGRICULTURAL RESEARCH. PROCEEDINGS OF THE FOURTH ANNUAL OAK RIDGE SUMMER SYMPOSIUM, AUGUST 25-30, 1952. C. L. Comar and S. L. Hood, comps. Oak Ridge National Lab. and Oak Ridge Inst. of Nuclear Studies. Jan. 1953. 492p. (TID-5115).

Topics include: agricultural radiobiology and the national welfare, nuclei and radioactivity, ecological effects of radioactive effluents. NSA 8-2757

5530

Chicago Univ., School of Medicine
THE TREATMENT OF POST-IRRADIATION INFECTION. Carolyn W. Hammond. [1953]. 23p. (AECU-2836).

Experimental studies on the use of antibiotics and tissue homogenate in treating postirradiation infection in dogs, rats, and mice are reviewed. NSA 8-3189

5531

Brookhaven National Lab.

STEM RUST RESISTANCE IN OATS INDUCED BY NUCLEAR RADIATION. Calvin F. Konzak. [1954]. 20p. (BNL-1792).

Rust-resistant mutants of oats produced after exposure of seeds to thermal neutrons. Resistance apparently is inherited as simple dominant factor and is believed to be radioinduced. Mutation frequency was greater for higher radiation dosages. Other mutations were also observed. Results indicate that radiations may be profitably used in plantbreeding programs. NSA 8-3190

5532

Field Research Lab., Fort Knox

A STUDY OF MITOTIC ACTIVITY IN THE INTESTINAL EPITHELIUM OF THE ALBINO RAT AND ITS ROLE IN THE RECOVERY PROCESS AFTER X-IRRADIATION.

O. Czerwonka, J. Gregg, W. Parr, W. Luther, and A. Krebs. Nov. 25, 1950. 15p. (NP-5116, MSFRL-6-64-12-06-(40)). NSA 8-3191

5533

School of Aviation Medicine

THE BIOCHEMISTRY OF TISSUE TRAUMA PART 7. LIPOPROTEIN CHANGES AFTER LOCAL ISCHEMIA AND LOCAL RADIATION INJURY. Lawrence J. Milch, Robert F. Redmond, and William W. Calhoun. Feb. 1954. 11p. (NP-5124).

Plasma lipoprotein levels were measured in rabbits subjected to two degrees of ischemia and in rabbits exposed to 30,000 r of x rays. Both (1) leg ischemia maintained for 3 hr and (2) irradiation of hind limbs induced hyperlipoproteinemia. NSA 8-3192

5534

Boston Univ. School of Medicine

THE EFFECTS OF X-IRRADIATION ON PHYSICAL EXERCISE AND BEHAVIOR IN THE DOG; RELATED HEMATOLOGICAL AND PATHOLOGICAL CONTROL STUDIES. Walter W. Jetter, Ogden R. Lindsley, and Frederick J. Wohlwill. [1953]. 365p. Contract AT(30-1)-1201. (NYO-4548).

Mortality was increased in dogs exhaustively exercised following exposure to 300 r total-body x irradiation when compared with unexercised dogs exposed to the same radiation dose. Data from clinical, histopathological, and hematological studies made on irradiated and control dogs are included. NSA 8-3193

5535

THE INFLUENCE OF PROLONGED EXPOSURE TO RADIUM GAMMA RADIATION ON ROOT-TIP MITOSIS IN THE BROAD BEAN PLANT. Karl Peters. *Strahlentherapie* 93, 263-73(1954).

Broad bean root tips were exposed to Ra (50 r, 5, or 0.5 r/min). Long-term irradiation was more effective with respect to inhibition of mitosis. Protracted irradiation did not influence phase distribution, appearance of pathologic ana- and telophases, nor the development of paranuclei as a result of fragmentations. NSA 8-3194

5536

THE EFFECTS OF IONIZING RADIATION ON NON-GERMINATING PLANT SEED. E. Zdansky, L. Drexler, and H. Werkgartner. *Strahlentherapie* 93, 289-94(1954).

Roentgen irradiation of dry wheat seeds with 100 r resulted in a temporary inhibition of growth in roots, extent of which varied with the seasons. NSA 8-3195

5537

THE BEHAVIOR OF MITOCHONDRIA IN THE MOUSE SPLEEN FOLLOWING TOTAL-BODY X IRRADIATION. E. Scherer and F. Stolle. *Strahlentherapie* 93, 317-20(1954).

After a single total irradiation there is a significant decrease in the number of granules vitally stained with

Janus green in the splenic cells of mice. The smallest number of granules is found between the 5th and 7th days after exposure. Changes are interpreted as a sign of damage to cell plasma, particularly to enzymes. NSA 8-3196

5538

MORTALITY IN SWINE EXPOSED TO GAMMA RADIATION FROM AN ATOMIC BOMB SOURCE. John L. Tullis, Baldwin G. Lamson, and Sidney C. Madden. *Radiology* 62, 409-15(1954).

Results are based on observations of swine exposed to radiation from an atomic bomb and indicate 100 per cent mortality after 390 r, 50 per cent mortality after 230 r, and 100 per cent survival after 130 r. These results agree closely with expected results and, when variables are taken into account, with previous 2000 kvp x irradiation control studies. NSA 8-3197

5539

THE RELATION OF RADIORESISTANCE TO BUDDING IN *SACCHAROMYCES CEREVISIAE*. C. A. Beam, R. K. Mortimer, R. G. Wolfe, and C. A. Tobias. *Arch. Biochem. Biophys.* 49, 110-22(1954).

Survival of haploid yeast after x irradiation is established as consisting typically of 2 components; an initial exponential of $LD_{50} = 3100$ r, which represents the survival of about 90% of a population of growing cells, and a complex multiple-hit component which represents that of the remainder ($LD_{50} \approx 60,000$ r). Effect of nitrogen starvation and budding on radioresistance was also studied. NSA 8-3198

5540

EFFECT OF CHLORPROMAZINE ON EMESIS AFTER RADIATION. Herman I. Chinn and George L. Sheldon. *Proc. Soc. Exptl. Biol. Med.* 86, 293-5(1954).

Chlorpromazine in doses of 10 mg/kg injected subcutaneously protected dogs against vomiting after 800 r x radiation. Injections of 5 mg/kg were ineffective as were 10 mg/kg prepared from solutions allowed to stand for 2 hrs at room temp before injection. No protection was conferred by cysteamine. Increased survival was noted with both chlorpromazine and cysteamine. Mechanisms of protection are discussed. NSA 8-5479

5541

Los Alamos Scientific Lab., N. Mex.

EXPERIMENTAL ADMINISTRATION OF ETHYLENE-DIAMINETETRAACETIC ACID IN PLUTONIUM POISONING. Harry Foreman, Los Alamos Scientific Lab. and Philip A. Fuqua and William D. Norwood, Hanford Works. [1954]. 13p. Contract [W-7405-eng-36]. (AECU-2923).

The metabolic fate and behavior of ingested Pu in experimental animals and the therapeutic effects of Ca ethylenediaminetetraacetic acid in Pu poisoning are discussed. NSA 8-5483

5542

Argonne Cancer Research Hospital
SEMIANNUAL REPORT TO THE ATOMIC ENERGY COMMISSION. Leon O. Jacobson., ed. (1954). 62p. (ACRH-1).

This report includes studies on: effect of injection of cell suspensions on survival following irradiation; effect of Pb-shielding of surgically exteriorized spleen or appendix of rabbits during total-body exposure to 800 r of x rays on bone marrow recovery, effect of inoculating irradiated *E. coli* into normal embryonated eggs. NSA 8-5767

5543

Argonne National Lab., Lemont, Ill.

REPORT ON BIOLOGICAL, MEDICAL, AND BIOPHYSICS PROGRAM. PART I. QUARTERLY REPORT OF BIOLOGICAL AND MEDICAL RESEARCH DIVISION. PART 2. SEMI-ANNUAL REPORT OF RADIOLOGICAL PHYSICS DIVISION. July 1954. 150p. Contract W-31-109-eng-38. (ANL-5288).

Includes reports on: radiation effects on mouse ascites tumor, effect of culture media temperature on radiosensitivity of Paramecium, role of hypotension in radiosensitivity of chick, radiation effects on mouse spleen, C^{14} effect on soy bean growth, bacteremia in irradiated mice, survival of chicks as influenced by variations in dosage rate, morphology of radiation-damaged leaves. NSA 8-5768

5544

California Univ. Berkeley. Radiation Lab.
MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT [FOR] JANUARY, FEBRUARY, MARCH 1954. May 16, 1954. 60p. Contract W-7405-eng-48. (UCRL-2605).

Studies on acute and chronic effects of lethal amounts of I^{131} and At^{211} in the rat are described. NSA 8-5770

5545

Air Force Radiation Lab., Univ. of Chicago
QUARTERLY PROGRESS REPORT NO. 12. July 15, 1954. 125p. Contract AF-33(038)-27353. (NP-5266).

Report includes studies on, protective effects of cysteine and mercaptoethylamine against radiation injury, effects of combinations of these drugs on enzymes in hematopoietic tissues of x rayed animals, effect of acute x irradiation on alkaline phosphatase hematopoietic activity in rats and mice, effect of sublethal x ray doses on biochemistry of rat tissues, relationship of age, sex, and species to radiosensitivity of liver catalase, possible role of Fe in radiation syndrome, effect of a naturally occurring inhibitor of hyaluronidase on response to whole body x radiation NSA 8-5775

5546

Atomic Energy Medical Research Project, Western Reserve Univ.
SYNERGISTIC EFFECT OF RADIOISOTOPES USED IN COMBINATION. Paul R. Salerno and Hymer L. Friedell. Aug. 6, 1954. 39p. (NYO-4965).

Authors conclude that marked capacity of uninjured spleen to stimulate proliferative activity of the bone marrow is rather unique in the mouse and that extrapolation of data to other species must be supported by specific experimentation. NSA 8-5776

5547

Naval Radiological Defense Lab.
STUDIES ON THE EFFECT OF RADIATION PROTECTION FACTOR ON INCORPORATION OF FORMATE- C^{14} INTO NUCLEIC ACID PURINES IN X-IRRADIATED MICE. R. K. Main, L. J. Cole, and V. P. Bond. June 3, 1954. 31p. (USNRDL-444)

The x ray induced inhibition *in vivo* of the incorporation of formate- C^{14} into the nucleic acid purines (adenine and guanine) of bone marrow, small intestine and spleen was investigated in LaF₁ mice. Effects of intraperitoneal injection of spleen homogenate are described. NSA 8-5777

5548

A STUDY ON THE EFFECT OF S^{35} -LABELLED SODIUM SULPHATE ON FERTILITY IN MICE. Erik Odebal and Harry Bostrom. Acta Radiol. 41, 525-8(1954)

Groups of adult female mice were given amounts of S^{35} (sulfate) varying from 0.5 to 60 μ c/g. Even at highest dosage levels studied, complete inhibition of fertility failed to occur, and histologic damage of ovaries was not observed with certainty. NSA 8-5778

5549

IMPROVED STORAGE QUALITY OF POTATO TUBERS AFTER EXPOSURE TO Co^{60} GAMMAS. A. H. Sparrow and E. Christensen. Nucleonics 12, No. 8, 16-17(1954)

Katahdin variety potato tubers were exposed to about 1250, 5000, 10,000, 20,000, 80,000, and 106,250 r and effects on taste, sprouting shrinkage, internal black spotting, and texture were observed over a period of months. NSA 8-5779

5550

X RADIATION TELANGIECTASIA AS A LATE SYMPTOM. G. Miescher, J. Pluss, and B. Weder. Strahlentherapie 94, No. 2, 223-33(1954). (In German).

Data reveal that it takes 5 years and more after irradiation for telangiectasia to develop completely, and no differences exist between soft and hard rays with respect to inducing its production. Predisposition of skin of trunk and extremities toward telangiectasia is considerably greater than that of skin of the face. NSA 8-5780

5551

LETHAL DOSE STUDIES WITH BURROS AND SWINE EXPOSED TO WHOLE BODY COBALT-60 IRRADIATION. John H. Rust, Bernard F. Trum, James L. Wilding, Charles S. Simons, and C. L. Comar. Radiology 82, 569-74(1954).

$LD_{50/30}$ of Co^{60} γ rays for burros and swine was found to be 784 r and 618 r respectively. Burros exposed to Co^{60} had significantly higher $LD_{50/30}$ than those exposed to Ta^{100} . NSA 8-5781

5552

Atomic Energy Medical Research Project, Western Reserve Univ.
A COMPARISON OF THE MAGNITUDE OF CYSTEINE ANTAGONISM TOWARD SMALL AND LARGE DOSES OF X-IRRADIATION. Paul R. Salerno and Hymer L. Friedell. June 28, 1954. 11p. Contract W31-109-eng-78. (NYO-4963).

Au^{198} and P^{32} in combination with x rays were used to compare the magnitude of prophylactic effect of cysteine against doses of 393-786 r in rats. Cysteine was shown to be more effective against large doses than against small doses. Approximately 1/3 to 1/2 of the biological effect of x irradiation, irrespective of dose in r, was antagonized by a given dose (800 mg/kg) of cysteine NSA 8-5782

5553

Atomic Energy Medical Research Project, Western Reserve Univ.
COMPARISON OF THE PROTECTIVE EFFECTS OF D AND L ISOMERS OF CYSTEINE AGAINST TOTAL BODY RADIATION AND NITROGEN MUSTARD IN RATS. J. P. Storaasli, S. Rosenberg, and A. Weisberger. Aug. 6, 1954. 12p. Contract W31-109-eng-78. (NYO-4967)

There appears to be more protection against the neutropenia produced by NH_2 with L-cysteine than with D-cysteine NSA 8-5783

5554

INVESTIGATIONS OF BIOLOGICAL RADIATION PROTECTION. VI. ON THE MORTALITY OF X-IRRADIATED MICE, THE DIFFERENCE BETWEEN SEXES AND THE INFLUENCE OF THE GONADS ON RADIOSENSITIVITY. H. Langendoiff and R. Koch. Strahlentherapie 94, No. 2, 250-7(1954). (German). NSA 8-5785

5555

THE EFFECT OF 1, 4-DIMETHYL-7-ISOPROPYL AZULENE AGAINST RADIATION DAMAGE FROM X-RAY THERAPY. K. L. Schmidt. Strahlentherapie 94, No. 2, 270-1(1954). (German).

Sufficiently large doses of this agent will often effectively combat the side effects of deep x-ray therapy and permit completion of the treatment NSA 8-5786

5556

SKIN DOSE FROM A COBALT 60 TELE THERAPY UNIT. Jasper E. Richardson, Herbert D. Kerman, and Marshall Bruce. Radiology 63, 25-36(1954). NSA 8-5789

5557

Quartermaster Food and Container Inst., Chicago
IONIZING RADIATIONS THEIR PRODUCTION, EFFECTS, AND UTILIZATION (WITH SPECIAL REFERENCE TO FOOD AND PACKAGING TECHNOLOGY) BIBLIOGRAPHIC SERIES NO. 4. [PART 2]. June 1954. 341 p. (NP-5297).

Over 2000 references are presented covering theoretical and practical aspects of the use of ionizing radiations for food sterilization. NSA 8-6048

5558
Quartermaster Food and Container Inst., Chicago
IONIZING RADIATIONS. THEIR PRODUCTION, EFFECTS, AND UTILIZATION (WITH SPECIAL REFERENCE TO FOOD AND PACKAGING TECHNOLOGY). SUBJECT INDEX. BIBLIOGRAPHIC SERIES NO. 4, [Part 3]. June 1954. 276p. (NP-5298).

Subject index to over 4500 references covering theoretical and practical aspects of use of ionizing radiations for food sterilization is presented. NSA 9-6049

5559
Massachusetts Inst. of Tech.
BACTERICIDAL EFFECTS OF IONIZING RADIATIONS ON *E. COLI*, *S. THERMOACIDURANS*, AND *CL. SPOROGENES* AS INFLUENCED BY DIFFERENT CONDITIONS OF ATMOSPHERE, MEDIUM, AND PHYSICAL STATE IN WHICH SAMPLES ARE IRRADIATED. FINAL REPORT FOR THE PERIOD JANUARY 1, 1954 THROUGH JUNE 30, 1954. Bernard E. Proctor and Samuel A. Goldblith. June 30, 1954. 44p. (NYO-3344).

This is a report on effects of atmosphere, medium, and freezing on radio-resistance of *E. coli* and spores of *B. thermoacidurans* and *Cl. sporogenes*. NSA 8-6050

5560
Radiological Research Lab., Columbia Univ
ANNUAL REPORT ON RESEARCH PROJECT. G. Failla and H. H. Rossi. Apr. 1, 1954. 149p. (NYO-4582).

Report includes studies on protection, tissue hydration, and fertility changes following total-body x irradiation of various animals, radiation-induced cataracts in rabbits, mechanism whereby an anemia is produced in animals by irradiation of the exteriorized spleen alone. NSA 8-6051

5561
Atomic Energy Project, Univ. of Calif., Los Angeles
GLUCOSE TRANSPORT ACROSS THE WALL OF THE INTESTINE OF IRRADIATED AND NON-IRRADIATED RATS. Lawrence E. Detrick, Harvey C. Upham, Dorothy Highby, Virginia Debley, and Thomas J. Haley. Sept 3, 1954. 17p. Contract AT-04-1-Gen-12. (UCLA-302).

Acute whole-body x irradiation inhibited glucose absorption in perfused, surviving intestinal segment of the rat, greatest degree of inhibition observed on 3rd to 6th day. Attempt to correlate histological picture with glucose absorption in intestine after whole-body irradiation revealed that histological evidence of recovery after injury gave no guarantee of functional recovery. NSA 8-6052

5562
Radiological Lab., Univ. of Calif., San Francisco. School of Medicine.
PROGRESS REPORT [FOR] JANUARY 1, 1954-JULY 31, 1954. Aug. 27, 1954. 25p. Contract AT-11-1-GEN-10. (UCSF-9).

Includes reports of studies on: relative biological effectiveness (RBE) of 22.5-Mv x rays in yeast test, nature of reaction of mouse thymus to x rays and its suitability for use in RBE tests, effect of dose fractionation upon reaction of mouse testes to x rays, effect of sodium menadiol diphosphate (Synkavite) upon survival curves of *E. coli* and *S. cerevisiae*. Progress made in determining recovery rates of mouse, hamster, and rat from sublethal doses of total-body x irradiation is also reported. NSA 8-6053

5563
Atomic Energy Project, Univ. of Rochester
STUDIES ON THE ACUTE EFFECTS OF X-IRRADIATION AND P-32 ON 21 AND 32 DAY OLD RATS. Melvin R. Sikov and Thomas R. Noonan. Aug. 4, 1954. 13p. Contract W-7401-eng-49. (UR-352).

LD-50/30 for rats at 21 days of age is 350 r, and at 32 days, 420 r, LD-50 does not differ from that of adult when irradiation is administered on 60th day of life. LD-50/30 for P^{32} does not differ significantly from adult value when isotope is administered on either 21st or 32nd day of life, being 4.54 and 4.05 $\mu\text{c/g}$, respectively. NSA 8-6054

5564
ON INCONSISTENCIES BETWEEN RADIOHEMATOLOGIC OBSERVATIONS. Matts Helde and T. Wahlberg. *Anta Radiol.* 42, 75-80(1954).

Relationship between direct and indirect effects of radiation on blood picture, and factors contributing to inconsistencies in data are discussed. The report is concerned with repeated low-level exposures in man (occupational exposures). NSA 8-6055

5565
MEASUREMENT AND CONTROL OF SOME DIRECT AND INDIRECT EFFECTS OF X-RADIATION. Felix L. Haas, Edna Dudgeon, Frances E. Clayton, and Wilson S. Stone. *Genetics* 39, 453-71(1954).

Studies to determine extent of x-ray damage due to indirect effects were carried out by varying physiological conditions during irradiation of the test organism, *Drosophila virilis*. Effects of temperature, oxygen, carbon monoxide, and carbon dioxide in various combinations were tested. NSA 8-6056

5566
GENETIC DRIFT IN IRRADIATED EXPERIMENTAL POPULATIONS OF *DROSOPHILA MELANOGASTER*. Timothy Prout. *Genetics* 39, 529-45(1954).

Effect of genetic drift was investigated in 3 experimental populations of *D. melanogaster*, 2 of which received treatment with γ rays. Data are reported from studies on allelism of lethals in second chromosomes, from which the conclusion is drawn that genetic drift operates in at least small populations. NSA 8-6057

5567
X-RAY-INDUCED DOMINANT LETHALS IN *DROSOPHILA ROBUSTA*. Armon F. Yanders. *Genetics* 39, 558-64(1954).

D. robusta males, 10 or 17 days old, were exposed to 0.2500 or 5000 r of x rays and mass mated. Values for induced dominant lethals in groups aged 10 days were similar to values for *D. melanogaster* at corresponding dosages. Sperm of males aged 17 days exhibit greater sensitivity. NSA 8-6058

5568
EFFECTS OF BETATRON RADIATION ON THE BRAIN OF PRIMATES. Arthur Arnold, Percival Bailey, and John S. Laughlin. *Neurology* 4, 165-78(1954).

Clinical and pathological effects of 375 to 14,000 r doses of 23-Mev x rays from betatron on brain of monkeys are described and compared with effects of 225 to 8400 r doses of 400-kev x rays. NSA 8-6059

5569
LITERATURE SURVEY OF THE PROPERTIES OF FISSION PRODUCT OXIDES, FLUORIDES AND OXYGLUCOSIDES. G. Tennenhouse and M. J. Steindler. 1959. 75p. (ANL-RCV-SL-1545). NSA 8-6061

5570
RADIATION EFFECTS ON PNEUMOCOCCAL INFECTION PRODUCED BY SUBCUTANEOUS INJECTIONS INTO WHITE MICE. William E. Clapper, James E. Roberts, and Grace H. Meade. *Proc. Soc. Exptl. Biol. Med.* 86, 420-2 (1954).

Mice with artificially produced pneumococcal infection showed little or no effect from 350 r (x rays) when inoculation and exposure were given at same time. Time from inoculation to death, and time required for bacteremia to develop were reduced when exposure was made 3 days prior to inoculation. Times from inoculation to death

and bacteremia to death were reduced when exposure antedated inoculation by 6 days. NSA 8-6062

5571
ACETYLATION OF P-AMINOBENZOIC ACID IN X-IRRADIATED RATS. John F. Thomson and Eleanor T. Mikuta. Proc. Soc. Exptl. Biol. Med. 86, 487-8(1954).

Rats exposed to 1000 r of x rays retained their capacity to acetylate p-aminobenzoic acid and sulfanilamide for at least 3 days after exposure, an indication that Coenzyme A is not indiscriminately destroyed by whole-body irradiation. NSA 8-6063

5572
GROWTH OF VACCINIA VIRUS IN X-IRRADIATED CHICK EMBRYO TISSUES AS STUDIED IN TISSUE CULTURE. N. J. Schneider and F. S. Cheever. Proc. Soc. Exptl. Biol. Med. 86, 591-4(1954).

Irradiation of chick embryonic tissue in ovo appeared to diminish its ability to support viral growth in tissue culture, *in vitro* irradiation had no such effect. Evidence suggesting that the differences noted are due chiefly to secondary radiation effects is discussed. NSA 8-6064

5573
AMPHOPHIL TUMORS OF THE HYPOPHYSIS INDUCED IN MICE BY I^{131} . Agnes S. Burt, Benjamin H. Landing, and Sheldon C. Sommers. Cancer Research 14, 497-502 (1954).

Histological studies of hypophyses of 38 C57 mice suggest that the hypophyseal adenomas induced by large doses of I^{131} are derived from cells morphologically similar to thyrotrophic basophils of rats and to sparsely granulated basophils or intermediate mucoid cells of man. Thyroidectomy cells found in the adenomas strongly resemble the hypertrophic amphophils previously found in some types of human adrenal hyperactivity and carcinoma of the breast. NSA 8-6065

5574
AN ABCOPAL EFFECT OF X-RAY UPON MOUSE SPLEEN WEIGHT. Antoin Raventos. Radiation Research 1, 381-7 (1954).

Irradiation of spleen plus remainder of body resulted in spleen weight losses showing marked dependence on x ray dosage over 300-750 r range, an effect not seen when only the spleen was irradiated. Author concludes that irradiation of remainder of body probably provokes splenic atrophy, perhaps through cortical action, and suggest that shielded spleen is able to respond to hematopoietic needs of the irradiated animal. NSA 8-6066

5575
ON THE QUESTION OF THE TOLERANCE DOSE OF HUMAN ORGANISMS ON INHALATION OF RADIUM EMANATION O. Henn. Strahlentherapie 94, No. 3, 441-54(1954). (In German).

Results obtained in examinations of human bone marrow suggest that tolerance dose for Ra emanation has to be estimated lower by 1 to 2 decimal powers, than that for x and γ rays. Apart from other factors, an essential causal importance is attributed to specific organotropy of Ra emanation. NSA 8-6067

5576
THE EFFECTS OF CORTISONE ON THE DEVELOPMENT OF SPONTANEOUS LEUKEMIA IN MICE AND ON ITS INDUCTION BY IRRADIATION. A. C. Upton and J. Furth. Blood 9, 686-95(1954)

Development of spontaneous lymphoma in a high-leukemia strain of mice was inhibited by administration of cortisone, although hormone-induced atrophy of thymus and other lymphoid tissues was only transient. High incidence of myeloid leukemia was induced in a low-leukemia strain of mice by single 350-r x ray dose and cortisone was without effect on the incidence. NSA 8-6068

5577
INDUCTION OF STERILITY IN MALE MICE BY CHRONIC GAMMA IRRADIATION. T. C. Carter, Mary F. Lyon, and Rita J. S. Phillips. Brit. J. Radiol. 27, 418-22(1954). NSA 8-6069

5578
HISTOPATHOLOGICAL EXAMINATION OF MICE IRRADIATED AFTER INJECTION WITH CYSTEINAMINE. M. A. Gerebtzoff and Z. M. Bacq. Experientia 10, 341-3(1954). (In French with English summary).

Injection of β -mercaptoethylamine to C-57 black mice before irradiation (700 r) effects partial protection of liver and spleen. It has a strong accelerating action on regeneration in spleen, intestine, and probably thymus. Experiments suggest that this action is related to a protection of glucidic metabolism NSA 8-6071

5579
DECREASE OF RADIOSENSITIVITY OF THE ADULT RAT IN DEEP HYPOTHERMY. S. Hajdukovic, A. Herve, and V. Vidovic. Experientia 10, 343-4(1954). (In French, with English Summary).

Rats irradiated in state of deep hypothermy (rectal temperature of 14-15°C) with lethal doses of 800 and 900 r of x rays, are partially protected, 50% of these survived more than 30 days, while all control animals died after 17 days. Same degree of protection is obtained if cooling is carried out in presence of oxygen or under an air pressure of 1.25 atmosphere. NSA 8-6072

5580
PROTECTIVE EFFECTS OF COMBINED HYPOXIA AND CYSTEINE TREATMENT ON WHOLE-BODY IRRADIATION OF MICE Finn Devik. Brit. J. Radiol. 27, 463-6(1954)

Mice were exposed to 200, 600, 800, and 1100 r of x rays at 170 to 190 kv. Frequency of irradiation-induced chromosome injuries in bone marrow and acute lethality were used as indicators of protective effects of buffered cysteine hydrochloride and hypoxia. Protective effect of α -cysteine was the same as that of β -cysteine, an observation which suggests that the protective effect is radiochemical rather than biochemical. NSA 8-6073

5581
INVESTIGATIONS ON A BIOLOGICAL RADIATION PROTECTION VII THE INFLUENCE OF NARCOTICS ON RADIATION INJURED MICE. H. Langendorff and R. Koch. Strahlentherapie 94, No. 3, 411-20(1954). (In German).

Results indicate that ether and urethane are apt to increase radiosensitivity of mice in the presence of ethyl alcohol or Megaphen + Dolantin, which tend to decrease the radiosensitivity. NSA 8-6074

5582
RADIATION SICKNESS. A STUDY OF ITS RELATION TO ADRENAL CORTICAL FUNCTION AND THE ABSOLUTE EOSINOPHIL COUNT. Elliott C. Lasser and K. Wilhelm Stenstrom. Am. J. Roentgenol. Radium Therapy Nuclear Med. 72, 474-87(1954).

Data suggest that the adrenal cortex undergoes definite changes in course of irradiation, but that these probably are not related to radiation sickness. Similarity of direction of change of the symptom indexes and the absolute eosinophil counts suggest an etiological factor common to both. Low estrogen level is believed to be related to high radiosensitivity. NSA 8-6075

5583
Mound Lab.
BIOLOGICAL RESEARCH QUARTERLY PROGRESS REPORT THROUGH JUNE 17, 1954. D. S. Anthony. July 13, 1954. 15p. Contract AT-33-1-GEN-53. (MLM-989).

There was no indication that maintenance of an average body concentration of 0.01 μ c Po/kg of body weight in rats for duration of their adult life has any effect on body weight,

tumor incidence or longevity. Studies of: gross effect of Ac on rats and mice, effects of Ac on rat reproduction, myelogenous leukemia induced by low doses of Ac and its transfer to young rats, chemical inhibition of cell division are described. NSA 8-6079

5584

Brookhaven National Lab.

QUARTERLY PROGRESS REPORT [FOR] APRIL 1 - JUNE 30, 1954. (UNCLASSIFIED SECTION). 58p. (BNL-299).

Results of several experiments on x-ray and neutron sensitivity of dormant barley seeds in relation to H₂O content showed increased radiosensitivity with increased H₂O content for fast neutrons, reverse relationship for thermal neutrons. Effects of x rays on germination of Neurospora, the x ray sensitivity of Trillium as a function of phase of cell division, and effects of x radiation on liver glycogen content of rats are described. NSA 8-6374

5585

ROENTGEN RAYS AND WOUND HEALING. W. Lawrence, Jr., J. J. Nickson and S. M. Warshaw. Surgery 33, 376-84 (1953).

5586

THE EFFECTS OF LOCALIZED CATHODE RAY PARTICLE IRRADIATION OF THE HYPOPHYSIS AND WHOLE BODY X-IRRADIATION ON ADRENOCORTICOTROPHIN, GONADOTROPHIN AND THYROTROPIN CONTENT OF THE RAT PITUITARY. G. M. Mateyko and Abraham Edelmann. New York Univ. and Brookhaven National Lab. [1954?]. 35p. (BNL-1939). NSA 8-6381

5587

SOME EFFECTS OF A LETHAL DOSE OF X-RADIATION UPON MEMORY. A CASE HISTORY STUDY. (Report No. 2, Project No. 21-3501-0003). Sylvan J. Kaplan, School of Aviation Medicine and George Gentry, Univ. of Texas and Air Force Radiobiology Lab. June 1954. 18p. (NP-5321).

Lethal x ray dose (1000 r) does not entirely destroy monkey's memory for a learned task. Manifestations of retention were obtained during the period between 8 hr postirradiation until 21 hr before death. Survival time for 4 monkeys studied ranged between 151 and 168 hr. NSA 8-6382

5588

THE EFFECT OF NEUTRONS ON THYMIC AND CIRCULATING LYMPHOCYTES IN THE MOUSE. R. E. Carter and V. P. Bond, Naval Radiological Defense Lab. and Eugene P. Cronkite, Naval Medical Research Inst., Bethesda. Nov. 19, 1953. 24p. (USNRDL-443).

Neutron radiation employed was less effective in decreasing lymphocyte count in peripheral blood (RBE of approximately 4) than it was in producing thymic weight loss (RBE of approximately 8), indicating that ratios for neutron effectiveness can differ for similar tissues in the small mammal as well as in lower organism used in previous experiments. NSA 8-6354

5589

Naval Radiological Defense Lab.

EFFECTS OF X IRRADIATION ON LIPID METABOLISM.

1. PLASMA PHOSPHOLIPID LEVELS IN SEVERAL SPECIES. C. Entenman, R. A. Neve, H. Supplee, and C. A. Olmsted. June 11, 1954. 28p. (USNRDL-TR-2).

Authors describe occurrence of opalescence of serum in irradiated rats, dogs, guinea pigs, and mice, and relation of this condition to level of plasma phospholipid phosphorus. NSA 8-6385

5590

Naval Radiological Defense Lab.

EFFECTS OF X IRRADIATION ON LIPID METABOLISM.

2. UPTAKE OF P³² INTO RAT LIVER PHOSPHOLIPIDS.

E. O. Weinman, S. R. Lerner, and C. Entenman. June 17, 1954. 26p. (USNRDL-TR-3).

Liver slices from rats 24 hr postexposure (2500 r) incorporated more P³² into phospholipids than did slices from unirradiated rats. No increase in P³² incorporation into phospholipids of whole liver or cell fractions was noted in rats injected with P³² 24 hr following exposure to 2500 r. NSA 8-6386

5591

ECONOMICS OF PORK IRRADIATION. H. J. Gomberg, S. E. Gould, J. V. Nehemias, and L. E. Brownell. Nucleonics 12, No. 9, 66-70 (1954).

Results are presented from a cost study of meat-processing plant designed to use γ radiation from a Cs¹³⁷ source to irradiate hog carcasses for the purpose of breaking the trichinosis cycle in pork. NSA 8-6388

5592

HUMAN FEEDING STUDIES OF IRRADIATED FOOD TO START: ARMY TEST WILL HASTEN COMMERCIAL APPLICATION. Nucleonics 12, No. 9, 78-9 (1954).

The start of a program in which 12 volunteers will include irradiated meat in their diets for one year is reported. NSA 8-6389

5593

PRESERVING FOOD IN THE ATOMIC AGE. L. E. Brownell. (Univ. of Michigan, Ann Arbor). In the Story of Our Time. New York, The Grolier Society, Inc. 1954.

Problems associated with the successful use of radiation in the sterilization of food are briefly reviewed. NSA 8-6390

5594

Naval Medical Research Inst., Bethesda

GLUTATHIONE IN RADIATION INJURY. (LECTURE AND REVIEW SERIES NO. 54-1). Eugene P. Cronkite, Robert A. Conrad, and W. H. Chapman, Naval Medical Research Inst., Bethesda and George Brecher, National Inst. of Arthritis and Metabolic Diseases, National Institutes of Health. Jan. 3, 1954. 16p. (NP-5328).

Mechanisms of protective action of anoxia and of sulfhydryl compounds against radiation injury are reviewed. Comparative histologic changes observed in unprotected mice and in mice protected with para-aminopropiophenone and with glutathione prior to irradiation are described. NSA 8-6392

5595

EFFECT OF RADIOACTIVE PHOSPHORUS ON TUMOR CELLS LABELED WITH THIS ELEMENT. Frederic Ludwig. Compt. rend. 239, 453-4 (1954). (In French).

After a 24-hr period, 100% more dead cells were found in the serum of mice treated with 15 to 50 μ c of Na₂HP³²O₄ than in serum of mice injected with nonradioactive Na₂HPO₄. NSA 8-6403

5596

Oak Ridge National Lab.

HEALTH AND PHYSICS DIVISION SEMIANNUAL PROGRESS REPORT FOR PERIOD ENDING JULY 31, 1954. Sept. 27, 1954. Contract W-7405-eng-26. (ORNL-1763).

Includes report of maximum-permissible concentration of γ radiation from Co⁶⁰ for mice. NSA 8-6609

5597

SUSCEPTIBILITY OF THE INTESTINAL TRACT TO INFECTION FOLLOWING TOTAL BODY IRRADIATION. David Ruml, Dorothy B. Cooper, Carolyn W. Hammond, and C. Philip Miller. [1954?]. 18p. (AECU-2931).

On 5th day postirradiation (550 r), standard dose of 10 million *Pseudomonas aeruginosa* was inoculated into

stomach of mice. More of irradiated mice retained larger numbers of inoculated bacteria than did unirradiated controls. Fasting was nearly as effective as irradiation in slowing down elimination of bacteria. NSA 8-6614

5598

ENDOGENOUS INFECTION IN MICE IRRADIATED WITH FAST NEUTRONS OR GAMMA RAYS. Howard H. Vogel, Jr., John W. Clark, Carolyn W. Hammond, Dorothy B. Cooper, and C. Phillip Miller. Argonne National Lab. and Univ. of Chicago [1954]. 27p. (AECU-2932).

Close correlation between bacteremia and time of death was observed following irradiation with either slow neutrons or γ rays. The bacteremia, as measured by colony counts on heart's blood culture, was less severe in the neutron-irradiated than in the γ irradiated mice. NSA 8-6615

5599

THE EFFECT OF STREPTOMYCIN THERAPY ON MICE IRRADIATED WITH FAST NEUTRONS. Carolyn W. Hammond, Howard H. Vogel, Jr., John W. Clark, Dorothy B. Cooper, and C. Phillip Miller. Univ. of Chicago and Argonne National Lab. [1954]. 19p. (AECU-2933).

Streptomycin significantly reduced mortality in female mice during the first 10 days following fast-neutron irradiation but failed to alter it during the remainder of the acute phase. Beneficial effect is attributed to its action in preventing occurrence of fatal bacterial infections. NSA 8-6616

5600

Chicago Univ.

EFFECT OF X RAYS ON HEMOLYSIN FORMATION FOLLOWING VARIOUS IMMUNIZATION AND IRRADIATION PROCEDURES. William H. Taliaferro and Lucy Graves Taliaferro. [1954]. 33p. (AECU-2934). NSA 8-6617

5601

Chicago Univ.

FURTHER STUDIES ON THE RADIOSENSITIVE STAGES IN HEMOLYSIN FORMATION. William H. Taliaferro and Lucy Graves Taliaferro. [1954]. 17p. (AECU-2935). NSA 8-6618

5602

EFFECTS OF IONIZING RADIATIONS ON SEEDS OF BARLEY. Richard S. Caldecott. [1954]. 26p. (BNL-1973).

Water content and/or physiological state of seeds of barley were modified by a variety of treatments prior to subjecting them to x radiation, thermal neutrons, or fast neutrons. After irradiation, seeds were germinated and grown for 7 days at which time heights were measured. NSA 8-6619

5603

Brookhaven National Lab.

STUDIES OF THE RADIATION SYNDROME IN *DROSOPHILA MELANOGASTER*. R. C. King and Louise P. Wilson. Brookhaven National Lab. and Wellesley Coll. [1954]. 24p. (BNL-1978).

Effects of 60,000 r on: mortality, phosphorus turnover, weight, growth, food intake, and oxygen consumption in *D. melanogaster* are described. NSA 8-6620

5604

RADIOSENSITIVITY OF SEVERAL MEIOTIC STAGES OF LILIUM. C. C. Bowen and A. H. Sparrow. Genetics 39, 960(1954).

5605

BACTERIAL VIRUS; RADIATION AND FUNCTION. D. J. Fluke and E. C. Pollard. Brookhaven National Lab. and Yale Univ. [1954]. 20p. (BNL-2012).

T-1 bacteriophage in dry state was subjected to cyclotron bombardment at 5 values of linear energy loss

and subsequently tested with respect to 3 virus functions. Results are discussed in relation to bacteriophage composition and function and target theory of radiation inactivation. NSA 8-6622

5606

THE RELATION OF GENOME NUMBER TO RADIO-SENSITIVITY IN *HABROBRACON*. A. M. Clark, Brookhaven National Lab. and Univ. of Delaware. [1954]. 14p. (BNL-2014).

No constant difference in radiosensitivity was found between haploids and diploids of *Habrobracon*. Relative radiosensitivities differed for different stages of development. Results indicate that no simple relation between genome number and radiosensitivity exists. NSA 8-6623

5607

Naval Medical Research Inst., Bethesda

REPRODUCIBILITY OF THE LETHAL EFFECT OF TOTAL BODY IRRADIATION IN MICE. (LECTURE AND REVIEW SERIES NO. 53-9). Friedrich Ellinger, Jasper E. Morgan, and Ellsworth S. Cook. Nov. 23, 1953. 16p. (NP-5340).

Under certain conditions, mortality caused in mice by a stated x ray dose given as total-body irradiation can be reproduced over several years. At certain points of the dose-response curve a high degree of accuracy in discriminating biologically between lethal effects of various x ray doses can be attained, permitting optimum discrimination of a dose difference of $\pm 2.5\%$. NSA 8-6624

5608

Radiation Lab., Univ. of Calif., Berkeley

MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT [FOR] APRIL, MAY, JUNE 1954. July 29, 1954. 83p. Contract W-7405-eng-48. (UCRL-2661).

Report includes studies on: effects of x rays and influence of nitrogen mustard and colchicine on incorporation of P^{32} into deoxyribose nucleic acid of mouse tissues, toxicology of Ra^{223} in rats, pathological effects of I^{131} and At^{211} in rats and monkeys. NSA 8-6625

5609

Naval Radiological Defense Lab.

DELAYED GASTRIC EMPTYING IN RATS AFTER WHOLE- AND PARTIAL-BODY X IRRADIATION. M. N. Swift, S. T. Taketa, and V. P. Bond. June 25, 1954. 36p. (USNRDL-TR-6).

Delayed gastric emptying was demonstrated in rats after whole- or partial-body x irradiation. Degree of inhibition obtained increased with whole-body dosage. Head and abdominal regions were found to be most radiosensitive with respect to producing delayed gastric emptying. NSA 8-6627

5610

INFLUENCE OF TEMPERATURE AND PHASE STATE ON X-RAY SENSITIVITY OF YEAST. Thomas H. Wood. Arch. Biochem. and Biophys. 52, 157-74(1954).

Radiosensitivity of haploid yeast increases slowly for increased irradiation temperatures in range from 0 to 40° with a temperature coefficient of 0.0034/deg. At 50° and above there is a greatly increased radiosensitivity. Additivity studies using heat and x rays are reported. There is no significant change in radiosensitivity from -10 to -0.5° , suggesting that inactivation below 10° is due to direct action of radiations. Studies of T2 bacteriophage are described. NSA 8-6628

5611

THE HEMATOLOGICAL EFFECTS RESULTING FROM INJECTION OF RADIOACTIVE PHOSPHORUS (P^{32}) INTO ALBINO RATS. John Stephen Latta and Ronald E. Waggener. Anat. Record 113, 357-85(1954).

Authors describe changes observed in blood picture of rats at intervals of 1-15 days following injection of a

single dose of 4.5 μ c of P^{32} /gm of body weight. NSA 8-6629

5612

EFFECT OF MULTIPLE LOW-DOSE IRRADIATION AND SPLENECTOMY ON THE STABILITY OF DOG ERYTHROCYTES.

Marguerite A. Constant and Paul H. Phillips. *Am. J. Physiol.* 178, 367-70(1954).

Erythrocytes of irradiated (100 r/wk for life) splenectomized dogs showed marked decrease in fragility as compared to normal non-irradiated dogs; those of nonsplenectomized irradiated dogs also became less fragile, but change was less and occurred later than in splenectomized animals. Rise in fragility was found in several dogs in terminal stages of x ray sickness. No correlations were apparent between degree of fragility and life expectancy, hemoglobin levels, platelet, or target cell counts. NSA 8-6630

5613

DOSE DEPENDENCE AND SEQUENTIAL CHANGES IN MOUSE SMALL INTESTINAL WEIGHT INDUCED BY IONIZING RADIATION.

Robert A. Conard. *Proc. Soc. Exptl. Biol. Med.* 86, 664-8(1954).

Data are presented to illustrate the biological effects of various doses of x and γ radiation on mice. Weight of the small intestine at various times post irradiation was used as the criterion of effect. NSA 8-6631

5614

RADIATION-INDUCED EXCHANGES IN DROSOPHILA FEMALES.

D. R. Parker. *Proc. Natl. Acad. Sci. U. S.* 40, 795-800(1954).

Author found that most radiation-induced detachments involved exchanges with chromosome 4 in attached-x females lacking a Y chromosome. The presence of a Y chromosome increased the frequency of induced detachments and when only Y's were present, detachment frequency was increased further. Author suggests that the long arm of the Y protects the short arm against induced exchanges with the X chromosome. NSA 8-6632

5615

BLOOD MODIFICATIONS CAUSED BY RADIOTHERAPY.

P. DePlaen, G. Lion, and R. van Male de Ghorain. *J. belge radiol.* 37, No. 1, 41-57(1954). (In French).

Describes effects of radiotherapy for malignant diseases on: red cells, hemoglobin, color index, eosinophilia, bilirubinemia, and plasmatic density. Found that a period of 3 months after completion of therapy was necessary for organism to restore hematologic status to normal. NSA 8-6633

5616

REPEAT DOSE X-IRRADIATION ON SINGLE-TYPE CELLS. TIME INTERVAL OF IRRADIATION EFFECT.

L. C. Fogg and R. F. Cowing. *Exptl. Cell Research* 6, 263-70 (1954).

Effects of irradiation on spermatogonia and prespermatogonia were studied in testes of 68 partially shielded C^{57} black mice and in testes of 144 animals that received a dose of 138 r followed by a second dose of 138 r. Results confirm clinical observations that recovery is delayed after a repeat dose. NSA 8-6634

5617

HISTOCHEMICAL AND HISTOMETRIC INVESTIGATIONS ON THE ADRENAL CORTEX OF WHITE RATS AFTER DIFFERENT DOSES OF TOTAL BODY X IRRADIATION. I. ON THE INDIRECT RADIATION EFFECTS AND THE PRESENT STATE OF RESEARCH ON THE ADRENAL CORTEX.

R. Birkner, G. Suchowsky, and J. Trautmann. *Strahlentherapie* 94, 497-505(1954). (In German).

Present stage of research with respect to the role of the adrenal cortex in radiation injury is surveyed. Authors stress importance currently attributed to the adrenal cortex in field of radiobiology and radiotherapy. NSA 8-6635

5618

HISTOCHEMICAL AND HISTOMETRIC INVESTIGATIONS ON THE ADRENAL CORTEX OF WHITE RATS AFTER DIFFERENT DOSES OF TOTAL-BODY X IRRADIATION.

II. HISTOCHEMICAL OBSERVATIONS. R. Birkner, G. Suchowsky, and J. Trautmann. *Strahlentherapie* 94, 506-26(1954). (In German).

Adrenal cortex of albinotic rats after various doses of total x irradiations (250, 500, 1000, 2000, and 3000 r) was studied histochemically. Four hours after exposure, a progressive increase in cortical activity began, the magnitude of the increase being proportional to dose. NSA 8-6636

5619

RADIATION INJURY BY IONIZING RADIATION.

Hermann Murth. *Strahlentherapie* 94, 527-38(1954). (In German).

Author discusses various types of ionizing radiations and differences in their biological effects. Survey of lesions due to single short-period total-body irradiation with x and γ rays is presented. Concept of time factor is explained, problems involved in establishing tolerance dose are discussed. Table of data pertinent to the evolution of cancer after incorporation of artificial radioactive isotopes is presented. NSA 8-6637

5620

EXPERIMENTAL INVESTIGATIONS ON THE BEHAVIOR OF BIOLOGICALLY PREFORMED THIOL COMPOUNDS AFTER TOTAL-BODY IRRADIATIONS.

Ludwig Rausch and E. Heinz Graul. *Strahlentherapie* 94, 539-46(1954). (In German).

Authors studied behavior of biologically pre-formed low-molecular thiol compounds in blood and liver of mice submitted to total-body irradiation with 700 r. Initial SH increase was followed by decrease beneath control level in liver, slow fall in the blood level was observed. NSA 8-6638

5621

INVESTIGATIONS ON THE RELIABILITY OF THE GENETIC METHOD FOR THE ESTABLISHMENT OF THE MUTATION FREQUENCY OF PLANTS.

Hans Marquardt. *Strahlentherapie* 94, 608-31(1954). (In German).

Effects of x raying pollen grains (1000, 2500, 4500, and 5000 r) of *O. Hookeri* were studied in F_1 and F_2 . Amount of pollen on stigmas, ripeness of seeds, and viability of plants used as female parent, greatly influenced germinating power of seed and number of aberrant F_1 plants. Percentage of mutation in F_2 depends on dose, coincidence of mutations involving lethal aberrations, and on environment. NSA 8-6639

5622

THE EFFECT OF CERTAIN GASES ON THE RADIO-SENSITIVITY OF HABROBRACON DURING DEVELOPMENT.

A. M. Clark and E. B. Herr, Jr., Marine Biological Lab., Woods Hole, Brookhaven National Lab., and Univ. of Delaware. [1954]. 21p. (BNL-1963).

Groups of *Habrobracon* during postembryonic development were exposed to x rays in presence of oxygen, carbon dioxide, nitrogen, and hydrogen. Effects on development to adulthood were observed. Results show radiosensitivity can be modified by presence of hydrogen. NSA 8-6640

5623

INVESTIGATIONS ON THE EFFECTIVENESS OF RADIATION PROTECTIVE SUBSTANCES IN PLANTS.

Erna Reinholz and Karl Aurand. *Strahlentherapie* 94, 646-56(1954). (In German).

Despite extensive experiments on plants it proved impossible in every case to reduce the radiation effects by preliminary treatment with the protective substances known from animal experiments. An irradiation in nitrogen atmosphere, however, remarkably decreased x ray injuries. NSA 8-6642

5624

GRANULOCYTE COUNT, RESISTANCE TO EXPERIMENTAL INFECTION AND SPLEEN HOMOGENATE TREATMENT IN IRRADIATED MICE. Willie W. Smith, Robert Q. Marston, H. Jeanette Ruth, and Jerome Cornfield. *Am J. Physiol.* 178, 288-92(1954).

Survival of sublethally irradiated mice that were challenged by a subcutaneous injection of *Pseudomonas* was related to leucocyte count as recovery from damaging effects of radiation progressed (with or without treatment with spleen homogenate). Similar relationship found among mice of each treatment group was shown to depend on granulocyte count, with no measurable lymphocyte contribution NSA 8-6643

5625

Atomic Energy Project, Univ. of Rochester
THE DISTRIBUTION AND EXCRETION OF ORALLY ADMINISTERED POLONIUM IN THE RAT. J. N. Stannard. Sept. 17, 1954. 17p. Contract W-7401-eng-49. (UR-299). NSA 8-6653

5626

STUDIES ON CELL DIVISION. NITROGEN COMPOUND CHANGES IN YEAST ACCOMPANYING AN INHIBITION OF CELL DIVISION. Edward Spoerl and Richard Carleton. *J Biol. Chem.* 210, 521-9(1954).

Growing yeast cells were treated with α particles, x rays, and triethylenemelamine to inhibit division of cells so that they enlarged in size. Major nitrogen fractions of division-inhibited cells were measured chemically, and the free amino acids, amides, and glutathione of cells were measured by paper chromatography. Patterns of change caused by the three agents were similar. NSA 8-6914

5627

INFLUENCE OF HYDROGEN ION CONCENTRATION ON RADIATION EFFECTS. Tikvah Alper and M. Ebert. *Science* 120, 608-9(1954).

Role of oxidation and reduction reactions in radiation injury of living cells and influence of pH on these reactions is discussed. NSA 8-6915

5628

X-RAY INACTIVATION OF SACCHAROMYCES DURING THE BUDDING CYCLE. A. Sarachek. *Experientia* 10, 377-8(1954). (In English).

The data presented provide additional evidence that inactivation of yeast cells by x radiation is in large part a consequence of induction of chromosomal aberrations. NSA 8-6916

5629

A GAMMA-RAY SOURCE FOR STERILIZING INSECTS. E. B. Darden, Jr., E. Maeyens, and R. C. Bushland. *Nucleonics* 12, No. 10, 60-2(1954).

A Co^{60} irradiation unit is described which was constructed for the purpose of sterilizing insects, insect larvae, and insect-infested material. Techniques are described for utilizing radiation in large-scale control of the screw worm, and preliminary results are reported. NSA 8-6917

5630

RADIOBIOLOGY OF THE C3H MOUSE MAMMARY CARCINOMA. EFFECT OF IMMUNOGENETIC FACTORS ON THE RADIOSENSITIVITY OF THE TUMOR TREATED IN SITU. A. Cohen and L. Cohen. *Brit. J. Cancer* 8, 303-12(1954).

Median effective dose for C₃H adenocarcinoma (1) growing in C₃H hosts was 5700 r, (2) growing in factor-harboring F₁ hybrids was 5100 r and (3) growing in factor free F₁ hybrids was 3950r. Radiosensitivity of a tumor appears to reflect, quantitatively, subliminal host-resistance resulting from immunogenetic differences in host-tumor relationship. NSA 8-6918

5631

RADIOBIOLOGY OF THE C3H MOUSE MAMMARY CARCINOMA INCREASED RADIOSENSITIVITY IN SITU OF HOMOPLASTS

ATTENUATED PRIOR TO IMPLANTATION. A. Cohen and L. Cohen. *Brit. J. Cancer* 8, 313-19(1954).

Mammary carcinoma of C₃H mice was attenuated by means of an x ray dose of 2000-2500 r and then transplanted to normal C₃H mice. Recipients of the tumor grafts then received local x ray therapy to the grafts. The LD₅₀ of the attenuated grafts was 4500 r, which is lower than the LD₅₀ (5700 r) for unattenuated grafts. Increased radiosensitivity of the graft was the same if it was transplanted to a second site on the original host (after it had become established following the initial transplantation) prior to irradiation. Authors suggest that implantation of the attenuated tumor fragment induces a state of subliminal resistance in the host and that this resistance enhances the radiosensitivity of the tumor. NSA 8-6919

5632

STUDIES ON RADIOSENSITIVITY AND "IMMUNIZING" ABILITY OF MAMMARY TUMOURS OF MICE. Anna Goldfeder. *Brit. J. Cancer* 8, 320-35(1954). NSA 8-6920

5633

THE EFFECT OF TOTAL BODY X-IRRADIATION ON HEPATIC AND RENAL FUNCTION IN ALBINO RATS. Kee-Chang Huang, James R. Almand, and Lila A. Hargan. *Radiation Research* 1, 426-36(1954).

A single dose of total-body irradiation was given to albino rats. Livers in only 3 of 63 lost their capacity to inactivate antidiuretic hormone. No morphological change in livers was observed. PAH clearance and QO₂ changes are described. NSA 8-6921

5634

THE EFFECTS OF LOCALIZED CATHODE-RAY PARTICLE IRRADIATION OF THE HYPOPHYSIS AND WHOLE-BODY X-IRRADIATION ON GONADOTROPHIN, THYROTROPHIN, AND ADRENOCORTICOTROPHIN OF THE RAT PITUITARY. G. M. Mateyko and Abraham Edelman. *Radiation Research* 1, 470-86(1954). NSA 8-6922

5635

THE ACCUMULATION AND DESTRUCTIVE ACTION OF ASTATINE²¹¹ (LKA-IODINE) IN THE THYROID GLAND OF RATS AND MONKEYS. Joseph G. Hamilton, Patricia W. Durbin, and Marshall Parrott. *J Clin. Endocrinol. and Metabolism* 14, 1161-78(1954).

Disturbance in growth rate and other effects of Astatine²¹¹ are described. Initial effect on growth is attributed to acute radiation injury, later disturbance to endocrine changes secondary to depression of thyroid secretion. NSA 8-6923

5636

HISTOLOGIC EFFECTS OF VARIOUS TYPES OF IONIZING RADIATION ON NORMAL AND HYPER-PLASTIC HUMAN THYROID GLANDS. Stuart Lindsay, Morris E. Dailey, and Malcolm D. Jones. *J. Clin. Endocrinol. and Metabolism* 14, 1179-1218(1954).

Lesions observed in thyroid glands irradiated with I¹³¹, x rays, radon, or neutrons were qualitatively similar and are described NSA 8-6924

5637

PATHOGENESIS AND PATHOLOGY OF POST-IRRADIATION INFECTION. V. P. Bond, M. S. Silverman, E. P. Cronkite. *Radiation Research* 1, 389-400(1954).

Various phases of the acute radiation syndrome are described and physiological derangements leading to death are discussed. NSA 8-6925

5638

SUSCEPTIBILITY OF IRRADIATED ANIMALS TO INFECTION. L. L. Shechmeister. *Radiation Research* 1, 401-9(1954).

Animals exposed to either lethal or sublethal doses of x rays demonstrate increased susceptibility to experimental infection and bacteremia produced in these animals as a result of irradiation is an important factor in radiation death. Sublethal radiation was found to activate subclinical or latent infection in mice and possibly in rats. NSA 8-6926

5639

THE TIME-INTENSITY RELATIONS OF WHOLE-BODY ACUTE X-IRRADIATION AND PROTECTION BY β -MERCAPTOETHYLAMINE. Roberts Rugh and Helen Clugston. *Radiation Research* 1, 437-47(1954). NSA 8-6927

5640

BIO-FLAVONOIDS IN RADIATION INJURY. I. THE EFFECT OF IONIZING RADIATION ON CAPILLARIES. Isidore Arons, John Freeman, Boris Sokoloff, and Walter H. Eddy. *Brit. J. Radiol.* 27, 583-5(1954).

Pretreatment for 10 days with 600 mg/day of bio-flavonoids, extracted from citrus fruit and known as CVP or citrus-vitamin P, afforded protection against radiation injury to capillaries of nail-bed in healthy human subjects subjected to 200 r of x rays administered as single dose. NSA 8-6928

5641

MODIFICATION OF RADIATION INJURY IN EXPERIMENTAL ANIMALS. Leon O. Jacobson. *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 72, 543-55(1954).

Measures which affect survival and recovery of blood-forming tissues of mammals following exposure to LD₅₀ doses of ionizing radiation are reviewed. Possible mechanisms of action of protective measures are discussed. NSA 8-6929

5642

STUDIES WITH RADIOPHOSPHORUS IN DROSOPHILA. IV. EXPERIMENTS ON FLIES HOMOGENEously LABELED WITH P³². R. C. King and Louise P. Wilson. *J. Exp. Zool.* 126, 401-17(1954).

Death of adults occurs when over-all phosphorus content of tissues rises above 0.4%. No detectable difference was noted between labeled and control *Drosophila* with respect to egg hatchability, eclosion, time required for development from egg to adult, and sex ratio of resulting adults. Fecundity and fertility of F₁-labeled females were lowered. NSA 8-6936

5643

Argonne National Lab. ANNOTATED BIBLIOGRAPHY IN RADIOBIOLOGY. Sophie V. Stephens, Argonne National Lab. and Robert D. Boche, Air Force Radiation Lab., Univ. of Chicago, comps. [1953]. 360p. (ANL-5111).

Bibliography includes more than 2100 references on: effect of external radiation, effects of internal radiation, metabolism, and toxicology of internally deposited radioelements, radiation sickness, mechanism of radiation effects, growth and development, genetics and cytology. Most references have accompanying abstracts. NSA 8-974

5644

Rochester, N. Y. Univ. Atomic Energy Project. INDEX OF REPORTS AND PUBLICATIONS BY THE UNIVERSITY OF ROCHESTER ATOMIC ENERGY PROJECT. Henry A. Blair. July 31, 1955. 213p. Contract W-7401-eng-49. (UR-423).

This index covers the declassified and unclassified work of the University of Rochester Atomic Energy Project from its beginning in 1943 until July 1955. It contains titles of the work described in Manhattan District and Atomic Energy Commission reports as well as of material published in books and journals. The titles are grouped under broad subject headings, and an author index is included. NSA 10-3092

5645

RADIATION STERILIZATION. VII. PROBLEMS IN USING HIGH-VOLTAGE ELECTRONS FOR STERILIZATION. W. D. Bellamy and E. J. Lawton. *Nucleonics* 12, No. 4, 54-7(1954).

Results are presented from a study of bacteria and enzyme inactivation by electrons from modified 1-Mev peak resonant-transformer x ray unit. Machine was operated

at 800 kv peak and 200 μ a beam current, delivering a dose of approximately 286,000 rep/sec at a distance of 10 cm from the stainless steel window. Dose-rate dependence and side effects are discussed, and other areas where research is needed are pointed out. NSA 8-3200

5646

EFFECT OF 200 ROENTGENS FRACTIONAL WHOLE BODY IRRADIATION IN THE BURRO. John H. Rust, Bernard F. Trum, John Heglin, Eve McCulloh, and Thomas J. Haley. *Proc. Soc. Exptl. Biol. Med.* 85, 258-61(1954).

Response of burro to 200 r fractional Co⁶⁰ γ ray whole-body exposure was similar to but slower than that observed with a daily dose of 400 r. Platelet response is described. Significant hyperferremia was observed in the burro after whole body exposure to one or more 600 r doses. NSA 8-3201

5647

INFLUENCE OF TOTAL-BODY X-IRRADIATION UPON TISSUE MAST CELL NUMBER. Douglas E. Smith and Yvette S. Lewis. *Proc. Soc. Exptl. Biol. Med.* 85, 306-7(1954).

Mast cell counts were made on cheek pouches of hamsters subjected to total-body x ray exposure. Marked increase in number of atypical mast cells was accompanied by reduction in total number of mast cells postexposure. Repopulation of cheek pouch with mast cells is relatively slow, being incomplete even at the end of 33 days. NSA 8-3202

5648

THE EFFECT OF RADIATION ON ASCITES TUMOUR CELLS. Ilse Lansitzki. *Brit. J. Radiol.* 27, 288-35(1954).

Mouse ascites tumor cells, which grow freely suspended in the abdominal cavity of the animals, can be considered an anaplastic form in contrast to the more differentiated spindle cells from which they are derived. On explanation into tissue culture and on subcutaneous injection *in vivo* the free round cells become transformed into spindle cells. T2146 and S37 ascites tumor cells were exposed *in vitro* to γ radiation before and after establishment of the spindle forms in tissue culture and injected subcutaneously into C3H mice immediately after radiation. The radiation effect on the tissue cultures, as measured by the number of tumors obtained from irradiated grafts of cultures, was the same in both tumor strains and independent of whether the cells were exposed as round or spindle forms. Exposure to γ radiation *in vitro* of S37 ascites tumor cells and S37 spindle cells derived from subcutaneous tumors showed the former to be much more radiosensitive. The MLD was 500 r units for the ascites form and 2600 r units for the subcutaneous sarcoma. It is tentatively suggested that the great radiosensitivity of the ascites tumor cells may be related to the fact that many of these cells do not reconstruct fully after mitosis and be due to an action of radiation similar to that seen on premitotic cells in other tissues, and to their low metabolic activity. NSA 8-3203

5649

Los Alamos Scientific Lab. SPECIFIC IONIZATION AND RELATIVE BIOLOGICAL EFFECTIVENESS OF IONIZING RADIATION IN MAMMALIAN SYSTEMS. THE APPLICATION TO THE PROBLEM OF COSMIC RAY HAZARDS. John B. Storer and Adolph T. Krebs, Army Medical Research Lab., Fort Knox and John E. Furchner, Los Alamos Scientific Lab. [1954]. 24p. (AECU-2835).

Authors attempt to evaluate potential hazard from cosmic radiation at various altitudes. Data on origin, incidence, and energy of cosmic particles are reviewed, and data are tabulated from studies of relative effectiveness of various particles in producing biological effects.

5650

Atomic Energy Project, Univ. of Calif., Los Angeles
INFLUENCE OF POST-IRRADIATION MEDICATION
WITH ANTIBIOTIC JM-57H ON SURVIVAL TIME IN MICE.
Thomas J. Haley, Eve F. McCulloh, and W. G. McCormick,
Apr. 5, 1954. 11p. Contract AT-04-1-GEN-12. (UCLA-287)

Results obtained indicate that medication must be
started during the first post-irradiation week before
massive bacteremia occurs, otherwise such therapy will
not be beneficial. NSA 8-3206

5651

INVESTIGATIONS OF BIOLOGICAL RADIATION PROTECTION.
III. THE INFLUENCE OF SPLEEN PROTECTION AND OF
SPLEEN AND LIVER IMPLANTS ON THE SURVIVAL OF
THE X-IRRADIATED MOUSE. Hanns Langendorff, Ruprecht
Koch, and Hedwig Sauer. *Strahlentherapie* 93, 274-80
(1954).

Intraperitoneal implantation, into mice, of homologous
and heterologous spleen material, and heterologous liver
material, raises radioresistance. Humoral factor is
suggested as source of the protection observed. NSA 8-3207

5652

INVESTIGATIONS OF BIOLOGICAL RADIATION PROTECTION.
IV. THE SIGNIFICANCE OF SULFHYDRYL COMPOUNDS
IN BIOLOGICAL RADIATION PROTECTION. Hanns Langendorff,
Ruprecht Koch, and Hedwig Sauer. *Strahlentherapie* 93,
281-88 (1954).

Cysteine, cysteine + cortineurine, cysteamine,
N-acetylcysteamine, cystinamine, and thiourea have
protective effect against x ray action in mice, Dithiopropanol
does not. N-acetylcysteamine and thiourea display this
effect even if given 2 hr prior to exposure. X ray resistance
is not increased by all components containing the SH group.
NSA 8-3208

5653

PUBLIC HEALTH ASPECTS OF ATOMIC POWER
DEVELOPMENT. Shields Warren. *Arch. Ind. Hyg. and
Occupational Med.* 9, 183-5 (1954). NSA 8-3209

5654

CYSTEINE PROTECTION OF THE CORNEA AGAINST
BETA RADIATION. James E. McDonald. *Arch. Ophthalmol.*
51, 301-10 (1954).

In rabbit eyes, subconjunctival injection of a total
of 1 cc of 8% cysteine (free base) in two areas protects
the epithelium, stroma, and endothelium of the cornea
against the application of 40,000 rep of β radiation one
hour later, using the Sr^{90} ophthalmic applicator. NSA 8-3210

5655

STATE CONTROL OF PROTECTION AGAINST IONIZING
RADIATION. Lauriston S. Taylor. *Am. J. Roentgenol.
Radium Therapy Nuclear Med.* 71, 691-702 (1954).

Practices in various countries relating to protection
against ionizing radiation are reviewed. Problems in
development of a philosophy and codes of practice relative
to the use of radiation and its control by the state are
discussed. NSA 8-3212

5656

PROTECTION AGAINST THE LETHAL EFFECTS OF X
RADIATION IN MICE BY 4-ACYLPYROGALLOL.
Antoine Lacassagne, Jean-François Duplan, and N. P. Buu-Hai.
Compt. rend. 238, 1279-81 (1954). (In French).

Ketones derived from pyrogallol, particularly
4-decanoylpyrogallol and 4-lauroylpyrogallol, are found
to protect mice effectively against the lethal effects of
x radiation. NSA 8-3213

5657

EFFECTS OF EARLY EXSANGUINOTRANSFUSION ON
IRRADIATED DOGS. Charles P. Powell and Herbert B.
Gerstner. *J. Lab. Clin. Med.* 43, 595-602 (1954).

Method has been developed for replacement of more
than 90% of a recipient dog's blood by stored donor blood
In 20 dogs so treated within 2 hr following exposure to a

lethal dose (420 r) of total body x radiation there were
no significant differences between treated and untreated
groups in general clinical course, in most laboratory
studies, nor in survival time. Marked leukocytosis
occurred post-irradiation in transfused dogs, and
persisted for 2 days, in contrast to leukopenia in untreated
controls. NSA 8-3214

5658

CLINICAL OBSERVATIONS OF ATOMIC BOMB RADIATION
SICKNESS (PART I). Koichi Ishibashi. *Nagoya J. Med.
Sci.* 14, 163-75 (1951).

Author summarizes observations of 108 patients who
suffered either directly or indirectly from radiation at
time of the atomic explosion at Hiroshima. NSA 8-3215

5659

CLINICAL OBSERVATIONS OF ATOMIC BOMB RADIATION
SICKNESS. (PART II). Koichi Ishibashi. *Nagoya J. Med.
Sci.* 14, 176-83 (1951).

Author summarizes observations on 60 patients during
the year following their exposure to radiation from the
atomic explosion at Hiroshima. NSA 8-3216

5660

CLINICAL OBSERVATIONS OF ATOMIC BOMB RADIATION
SICKNESS. (PART III). Koichi Ishibashi. *Nagoya J.
Med. Sci.* 14, 184-92 (1951).

Clinical observations made on 62 patients who suffered
from burns and mechanical injuries, as well as radiation
sickness, at time of atomic explosion at Hiroshima are
summarized. NSA 8-3217

5661

CLINICAL OBSERVATIONS OF ATOMIC BOMB RADIATION
SICKNESS. (PART IV). Koichi Ishibashi. *Nagoya J. Med.
Sci.* 14, 193-205 (1951).

Author presents a summary of hematological data on
injured patients. Data were collected over a 3 year
period following the atomic explosion at Hiroshima.
NSA 8-3218

5662

Los Alamos Scientific Lab.
THE CHRONIC TOXICITY OF URANIUM²³³ AND URANIUM²³⁸.
DELAYED EFFECT IN RATS FOLLOWING A SINGLE
INJECTION. John B. Storer, Wright Langham, L. E.
Ellinwood, J. E. Furchner, W. Schweitzer, and P. Sanders.
June 1953. 17p. Contract W-7405-eng-63. (LA-1634).

Rats were studied for 50 wk after single injection of
 U^{233} and U^{238} , doses ranged from 1/82 to 1/2 the $\text{LD}_{50/30}$.
There was no shortening of survival time, decrease in
weight gain, or increase in tumor incidence, no radio-
graphic evidence of skeletal damage, no indication of
impaired kidney function, and no histologic evidence of
kidney damage. NSA 8-3221

5663

Mound Lab.
BIOLOGICAL RESEARCH QUARTERLY PROGRESS REPORT
THROUGH DECEMBER 17, 1953. D. S. Anthony. Mar.
10, 1954. 10p. Contract AT-33-Gen-53. (MLM-952).

This report includes data on: mortality and tumor incidence
in rats receiving single and repeated intravenous injections
of Po, gross chronic effects of Ac on rats and mice,
histopathological effect of varying single doses of Ac on
mice, mouse toxicity resulting from ingestion of dead
animals containing Ac, effect of radiation on sulphydryl
contents of *E. coli* and *S. cerevisiae*. NSA 8-3222

5664

Los Alamos Scientific Lab.
THE RELATIVE BIOLOGICAL EFFECTIVENESS OF
TRITIUM BETA RAYS IN PRODUCING SPLENIC AND THYMIC
WEIGHT LOSS IN MICE. F. C. V. Worman, Donna F.
Turney, and Virginia Lotz. Jan. 1954. 13p. Contract
W-7405-eng-36. (LA-1641)

Beta radiation from tritium was found to be approximately
1.3 times as effective as gamma radiation in producing

splenic atrophy and approximately 1.5 times as effective in producing thymic atrophy. Assuming equivalence of r, rem, and rep of radium gamma rays, the average RBE of tritium beta radiation was 1.4 for biological test systems used. NSA 8-3639

5665

Los Alamos Scientific Lab.

STUDIES OF THE EFFECTS OF MASSIVE, RAPID DOSES OF GAMMA RAYS ON MAMMALS. Wright H. Langham, Samuel M. Rothermel, Kent T. Woodward, Clarence C. Lustbaugh, John B. Storer, and Payne S. Harris. Nov. 1953. 60p. Contract W-7405-eng-36. (LA-1643).

Results are reported from detailed studies of pathological, hematological, and biochemical radiation syndrome in mice and rats following exposure to various massive doses of γ radiation. Data are included on dose rate effect on splenic and thymic weight loss of mice and median survival time of monkeys, and on effect of cysteine on median survival time of rats. NSA 8-3640

5666

USING Co^{60} AND FISSION PRODUCTS IN PORK IRRADIATION EXPERIMENTS. H. J. Gomberg, S. E. Gould, J. V. Nehemias, and L. E. Brownell. Nucleonics 12, No. 5, 38-42(1954).

Gamma radiation from a 10-kilocurie Co^{60} source and from spent fuel slugs was used to study feasibility of controlling trichinosis by irradiation of pork. Exposure of hog carcasses in routine manner was found to be feasible. Techniques and dosimetry used in tests are described. NSA 8-3641

5667

HOW BIOLOGICAL EFFECTIVENESS VARIES WITH X-RAY ENERGY. Walter S. Moos. Nucleonics 12, No. 5, 46-9(1954).

Studies indicating difference in radiation effects with variation of x ray energy are reviewed. Data on biological effectiveness of x radiation of various voltages on survival of bacteria are presented. Author concludes that biological effectiveness is dependent on x ray wavelength and is affected by transition effect, absorption, and specific ionization. NSA 8-3642

5668

THE DIAGNOSTIC VALUE OF THE IMMEDIATE PERIPHERAL LEUKOCYTE RESPONSE FOR THE RAT TO WHOLE BODY ROENTGEN IRRADIATION. J. Gershon-Cohen and M. B. Hermel. Am. J. Roentgenol. Radium Therapy, Nuclear Med. 71, 846-52(1954).

Several groups of rats were exposed to 85 to 5000 r. Initial progressive lymphopenia occurred during first 4 hr after exposure, initial drop being directly proportional to dose. Lethal doses caused lymphocyte counts to fall below $500/\text{mm}^3$. Following doses of irradiation in midlethal ranges, leukocytosis occurred almost simultaneously with lymphopenia during first few hours postirradiation. NSA 8-3643

5669

IRRADIATION OF T-1 BACTERIOPHAGE WITH LOW VOLTAGE ELECTRONS. Marguerite Davis. Arch. Biochem. and Biophys. 49, 417-23(1954).

Author's data on bombardment of T-1 bacteriophage with low-energy electrons which corroborate evidence for existence of an internal morphology of the virus. NSA 8-3644

5670

CHANGES IN LENS DURING THE FORMATION OF X-RAY CATARACT IN RABBITS. Ruth van Heyningen, Antonette Pirie, and J. W. Boag. Biochem. J. (London) 56, 372-9(1954).

Glyoxalase and acetaldehyde oxidase activity and levels of coenzyme A and nicotinic acid in lens decrease during development of x ray cataract, aldolase activity decreases only when lens is opaque. Significance of these observations is considered in relation to known changes in glutathione and protein sulfhydryl groups in cataract. NSA 8-3645

5671

STUDIES ON CELL DIVISION. II. X-RADIATION AS A DIVISION INHIBITING AGENT. Edward Spoerl, L. E. Loveless, T. H. Weisman, and R. J. Balske. J. Bacteriol. 67, 394-401(1954).

Effects of continuous and short-term x radiation upon division, growth, and viability of yeast and *E. coli* cultures were as follows; cell division was inhibited selectively with either method of irradiation and, in addition, a small inhibition of yeast growth occurred simultaneously with inhibition of yeast cell division. Inhibition of division included inhibition of budding and of cell separation process. NSA 8-3646

5672

SOME OBSERVATIONS ON THE EFFECT OF GAMMA IRRADIATION ON THE BIOCHEMISTRY OF REGENERATING RAT LIVER. John F. Thompson, Magdalene S. Carttar, and Wallace W. Tourtellotte. Radiation Research 1, 165-75 (1954).

The only consistent biochemical effects of γ radiation (800 r) found in regenerating rat liver were a diminution in concentration and turnover of DNA phosphorus. Increased rate of incorporation of P^{32} into cytoplasmic RNA in regenerating rat liver was contributed to by all subcellular cytoplasmic elements (to approximately the same extent by each). NSA 8-3648

5673

SOME CHARACTERISTICS OF BIOLOGICAL DAMAGE INDUCED BY IONIZING RADIATIONS. L. H. Gray. Radiation Research 1, 189-213(1954).

Mechanisms of biological damage induced by ionizing radiations are reviewed. Aspects of radiation damage which may be considered characteristic of the agent producing them, and early methods of detecting the damage are discussed. NSA 8-3649

5674

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF RADIATION FROM A NUCLEAR DETONATION OF TRADES-CANTIA CHROMOSOMES. Alan D. Conger. Science 119, 36-42(1954).

Data are presented to demonstrate the biological effectiveness of radiation from a nuclear detonation as compared with γ and fast neutron irradiation administered in the laboratory in production of chromatid aberrations in Tradescantia. NSA 8-3650

5675

AN INTERESTING PHENOMENON ASSOCIATED WITH IRRADIATION OF DRY MAIZE SEEDS. Drew Schwartz. Science 119, 45-6(1954).

Data are presented (graph of relationship between seedling height and radiation dose) on maize plants grown from a nuclear detonation and comparison is made with data from similar studies in which seeds were exposed to γ radiation from Co^{60} source. Apparent growth following exposure to high doses was due to cell elongation and the maximum height of seedlings was reached in 5 days. NSA 8-3651

5676

THE PRODUCTION OF DOMINANT LETHALS IN DROSOPHILA BY FAST NEUTRONS FROM CYCLOTRON IRRADIATION AND NUCLEAR DETONATIONS. William K. Baker and Elizabeth Von Halle. Science 119, 46-9(1954).

Authors present data on relative biological effectiveness of fast neutrons from cyclotron irradiation and from nuclear detonations. The criterion of effect was the induction of dominant lethals in Drosophila. It is concluded that frequency of dominant lethals may be useful as a rather rapid, but crude, biological measurement of fast neutron dosage at high levels. Data are compared with those on Tradescantia. NSA 8-3652

5677

X-RAY BREAKAGE OF LILY CHROMOSOMES AT FIRST MEIOTIC METAPHASE. Helen V. Crouse. *Science* **119**, 485-7 (1954).

Studies indicate that x radiation produces an effect on fully condensed meiotic lily chromosomes which is **detectable at first meiotic division in form of bridges** which are interpreted as being half-chromatic bridges. NSA 8-3653

5678

School of Aviation Medicine

THE BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION. REPORT NO. 7. THE EFFECT OF ANESTHETIC AGENTS ON RATS FOLLOWING WHOLE BODY IRRADIATION. Kenneth H. Burdick. Feb. 1954. 9p. (AF-SAM-21-3501-0005-7).

Effects of five anesthetic agents (cyclopropane, ethylene, ether, nitrous oxide, and thiopental) were observed in 375 rats, irradiated with 570 r and anesthetized at 1 to 3 hr, 24 hr and 7 days after irradiation. Results suggest that a critical change in response to anesthesia may occur immediately after irradiation, before onset of acute radiation syndrome. NSA 8-3655

5679

Army Medical Research Lab., Fort Knox

EFFECT OF PARTIAL SHIELDING BY GRIDS ON SURVIVAL OF X-IRRADIATED RATS. J. G. Kereiakes, W. H. Parr, J. B. Storer, and A. T. Krebs. Feb. 12, 1954. 12p. (AMRL-139). *Proc. Soc. Exptl. Biol. Med.* **86**, 153-56 (1954).

Exposure of rats to equal volume-dose of x radiation (200 kg roentgens) through grids having various hole size diameters but a constant ratio of open area to closed area, **resulted in increasingly greater survival as the hole size was decreased.** It is concluded that increased survival probably results from repair initiated in irradiated areas by adjacent normal tissue. Importance of these local effects in comparison to remote effects is discussed. NSA 8-3656

5680

Radiation Lab., Univ. of Calif., Berkeley

CHEMISTRY DIVISION QUARTERLY REPORT [FOR] SEPTEMBER, OCTOBER, NOVEMBER 1953. Jan. 11, 1954. 70p. Contract W-7405-eng-48. (UCRL-2455).

Data on effect of irradiation of mice on concentration of coenzyme A and DPN-TPN in liver are included in this report. NSA 8-3666

5681

THE EFFECTS OF FAST NEUTRONS FROM A NUCLEAR DETONATION ON CHROMOSOME BREAKAGE IN TRADE-SCANTIA. J. S. Kirby-Smith, C. P. Swanson, C. W. Sheppard, and E. B. Darden, Jr. *Science* **119**, 42-5 (1954).

Relative biological efficiency for detonation neutrons as compared with fast neutrons from cyclotron was calculated as $1 \pm 25\%$. Use of *Tradescantia* as biological dosimeter for fast neutrons is discussed. NSA 8-3819

5682

Argonne National Lab.

BIOLOGICAL AND MEDICAL RESEARCH DIVISION QUARTERLY REPORT. Apr. 1954. 81p. (ANL-5247).

Includes reports on: metabolism in irradiated *Tetrahymena*, changes in bean plants from irradiated seed, acute and chronic response of mice to total body x irradiation, toxicity of Sr^{89} in mice, relative biological effectiveness of fast neutrons and Co^{60} γ radiation in mice, radiation effects on innate and acquired immunity, effects of radiation-protective agents on antibody formation in irradiated rabbits; cell response to constant irradiation, neutron irradiation of phosphates and bone, protective action of vasoconstrictor drugs in irradiated chick. NSA 8-3941

5683

Engineering Research Inst., Univ. of Mich.

UTILIZATION OF THE GROSS FISSION PRODUCTS.

PROGRESS REPORT NO. 6. L. E. Brownell, L. C. Anderson, H. J. Gomberg, L. L. Kempe, J. J. Martin, J. V. Nehemias, G. T. Van Wylen, and E. T. Vincent. Mar. 1954. 266p. (COO-198).

Includes report on: x ray sterilization of food, effect of irradiated food on growth and reproduction in rats, dose/growth response of *Tetrahymena*, radiosterilization of tissue-culture media. NSA 8-3944

5684

Air Force Radiation Lab., Univ. of Chicago

QUARTERLY PROGRESS REPORT NO. 11. Apr. 15, 1954. 106p. Contract AF-33(038)-27353. (NP-5155).

Reports effect of various chemical agents on radiation effects and mortality in mice, rats, and other animals. NSA 8-3945

5685

Massachusetts Inst. of Tech.

BACTERICIDAL EFFECTS OF IONIZING RADIATIONS AS INFLUENCED BY DIFFERENT CONDITIONS OF ATMOSPHERE, MEDIUM, AND PHYSICAL STATE IN WHICH SAMPLES ARE IRRADIATED. QUARTERLY PROGRESS REPORT FOR THE PERIOD OCTOBER 1, 1953 TO DECEMBER 31, 1953. Bernard E. Proctor and Samuel A. Goldblith. Jan. 1, 1954. 73p. Contract AT(30-1)-1164, Report No. 6. (NYO-3342).

Effects of several different conditions upon bactericidal action of ionizing radiations were studied. Conditions studied, atmospheres of oxygen, air, inert gases, and vacuum, nutrient and non-nutrient suspension media, viscosity or thickness of bacterial suspensions. NSA 8-3946

5686

Massachusetts Inst. of Tech.

QUARTERLY PROGRESS REPORT FOR THE PERIOD JANUARY 1, 1954 TO MARCH 31, 1954. Bernard E. Proctor and Samuel A. Goldblith. Apr. 1, 1954. 11p. Contract AT(30-1)-1164, Report No. 7. (NYO-3343).

Studies on bactericidal effects of ionizing radiations as influenced by different conditions of atmosphere, medium, and physical state have been continued and are described. NSA 8-3947

5687

Technical Information Service, AEC

BIOLOGICAL EFFECTS OF NEUTRONS, GAMMA RADIATION, AND NEUTRON-GAMMA COMBINATIONS. A SELECTIVE BIBLIOGRAPHY OF UNCLASSIFIED LITERATURE. Lore Rose David, comp. May 1954. 38p. (TID-3052).

Lists 190 items. NSA 8-3948

5688

Naval Radiological Defense Lab.

THE RESPONSE OF ENDOMETRIAL INTRAOCULAR IMPLANTS FOLLOWING TOTAL AND REGIONAL X IRRADIATION OF THE HOST. E. M. Jacobsen, D. J. Kimeldorf, and S. J. Baum. Feb. 10, 1954. 20p. (USNRDL-425).

Intraocular endometrial implants in mature female Dutch rabbits responded to effects of total-body x irradiation (800 r) by an immediate increase in area within 24 to 48 hr postirradiation. Implants in sham irradiated controls exhibited only slight increase in area. Apparently either total-body irradiation or local irradiation of pituitary region can effectively alter pituitary-gonadal axis in this species. NSA 8-3950

5689

PATHOLOGIC CHANGES IN NORMAL HUMAN THYROID TISSUE FOLLOWING LARGE DOSES OF I-131. Gould A. Andrews, Ralph M. Kniseley, Robert R. Bigelow, Samuel W. Root, and Marshall Brucer. *Am. J. Med.* **16**, 372-81 (1954).

Early histologic changes occurring in normal thyroid tissue after relatively large doses of I^{131} are described. NSA 8-3952

5690
THE LETHAL FLUX OF NEUTRONS AT ENERGIES UP TO 3 MEV. L. Cave. Brit. J. Radiol. 27, 273-82(1954).

For isotropic incidence the 50% lethal flux varies from $1.6 \times 10^{12} \text{ n/cm}^2$ at thermal energy to $1.7 \times 10^{10} \text{ n/cm}^2$ at 3 Mev. These values are calculated from assumptions that the 50% lethal dose of γ rays is 400 r, the relative biological efficiency of protons is 6.5, and that the criterion for lethal effects is the equivalent amount of ionization produced in the whole body. NSA 8-3953

5691
LETHAL EFFECTS OF ULTRAVIOLET AND X-RADIATION ON THE PROTOZOAN FLAGELLATE *ASTASIA LONGA*. Henry W. Schoenborn. Physiol. Zool. 26, 312-19(1953).

Sigmoid survival curves were obtained after subjecting a protozoan flagellate, *A. longa* strain J, to either x rays or ultraviolet light. NSA 8-3954

5692
TESTS FOR A ROLE OF H_2O_2 IN X-RAY MUTAGENESIS. II. ATTEMPTS TO INDUCE MUTATIONS BY PEROXIDE. R. F. Kimball, J. Z. Hearon, and N. Gaither. Radiation Research 3, 435-43(1955). NSA 10-1986

5693
IRRADIATION OF PARTS OF INDIVIDUAL CELLS. Raymond E. Zirkle and William Bloom. Science 117, 487-93(1953).

In mitotic cells of newt heart cultures, a few dozen protons delivered to chromosomes produce severe aberrations, whereas a few thousand to cytoplasm, spindle, or centriolar region are without detectable effect. Some of these types of chromosome aberrations are readily localized and help in the study of certain aspects of mitotic movement. NSA 8-3956

5694
OXYGEN POISONING AND X-IRRADIATION: A MECHANISM IN COMMON. Rebeca Gerschman, Daniel L. Gilbert, Sylvanus W. Nye, Peter Dwyer, and Wallace O. Fenn. Science 119, 623-6(1954).

It is concluded that both irradiation and oxygen poisoning produce some of their lethal effects through at least one common mechanism, possibly that of the formation of oxidizing free radicals. NSA 8-3957

5695
STUDY OF THE THYROID FUNCTION IN THE IRRADIATED ANIMAL. P. Marques, A. Bru, H. Planel, A. Serres, and L. Chardon. J. radiol. et electrol. 35, No. 1-2, 15-21(1954). (In French).

Thyroid function during the course of radiation sickness was studied in 32 dogs and 30 guinea pigs which received total-body irradiation or total-body irradiation with thyroid protected. NSA 8-3958

5696
IMPAIRED ORGANIC BINDING OF RADIOIODINE BY THE THYROID FOLLOWING RADIOIODINE TREATMENTS OF HYPERTHYROIDISM. Richard H. Kirkland. J. Clin. Endocrinol. and Metabolism 14, 565-71(1954).

Results suggest that radioiodine acts upon the thyroid in such a manner as to prevent or impair organic binding of the trapped iodide. NSA 8-3959

5697
PROTECTIVE ACTION OF LOW OXYGEN TENSION AND EPINEPHRINE AGAINST X-RAY MORTALITY IN THE CHICK. S. Phyllis Stearner, Emily J. B. Christian, and Austin M. Brues. Am. J. Physiol. 176, 455-60(1954).

Epinephrine in oil, or low oxygen tension, markedly reduced radiation mortality in young chicks, while combined treatment had a synergistic protective effect. It is postulated that the decreased supply of oxygen to the tissues

produced by exposure at low oxygen tension is augmented by epinephrine, resulting in more severe hypoxia of the visceral organs. NSA 8-3961

5698
INVESTIGATIONS ON BIOLOGICAL RADIATION PROTECTION. V. FURTHER INVESTIGATIONS ON THE EFFECT OF HETEROLOGOUS SUPRARENAL IMPLANTATION ON THE SURVIVAL RATE OF THE X-IRRADIATED MOUSE. H. Langendorff, R. Koch, and H. Sauer. Strahlentherapie 93, 381-8(1954). (In German).

Postirradiation (650 or 500 r) implantation of heterologous adrenal tissue (rats) into mice resulted in increased survival from 8 to 20% for males, and from 10-52% for females irradiated with 500 r. No influence on survival was observed in those irradiated with 650 r. NSA 8-3962

5699
THE EFFECT OF LEVULOSE ON RADIATION SICKNESS. K. Fochem. Strahlentherapie 93, 466-72(1954). (In German).

Damage to liver during high x ray dosages and therapeutic effects of fructose determined by means of bromosulphthalein test. NSA 8-3963

5700
ANOXIA AS A FACTOR OF RADIORESISTANCE. A. Lacassagne. J. radiol. et electrol. 35, No. 1-2, 12-15(1954). (In French).

Author proposes that the mechanism of radioresistance appears to be the lessening of reactions of secondary oxidations, caused by the oxidizing agents freed by irradiation, that the best means of augmenting radioresistance is to diminish the amount of free O_2 in the tissues. NSA 8-3964

5701
ON THE PERCUTANEOUS RADIATION EFFECT OF THORIUM X. Eberhard Günsel. Strahlentherapie 93, 573-8(1954). (In German).

Studies with young rats show that γ rays of Ra^{224} may cause radiation sickness, death and strong reactions of the bone marrow. Genetic damages, changes in zones of cartilage growth and atrophic alterations of testicles are discussed. NSA 8-3965

5702
Pittsburgh Univ. School of Medicine
STUDIES ON THE SERUM PROTEINS OF THE X-IRRADIATED RAT. Marie A. Fischer, Margaret Z. Magee, and Ellen Purvis Coulter. [May 5, 1954]. 17p. (AECU-2877).

Total body x irradiation of the rat caused an increase in α and β globulin of serum when compared with findings in nonirradiated, starved rats. NSA 8-4185

5703
Utah Univ. Coll. of Medicine
A STUDY OF THE IRRADIATION SYNDROME. PART I. WATER, ELECTROLYTE AND NITROGEN BALANCES. Roy E. McDonald, Ross E. Jensen, Herbert C. Urry, Vern S. Bohn, and Philip B. Price. [1953?]. 23p. (AECU-2882).

Data are reported from a study of effects of acute total-body irradiation upon water, electrolyte and N balances in dogs in which typical hemorrhagic syndromes had been produced. NSA 8-4186

5704
Food Research Inst.
A. STUDY ON THE EFFECT OF RADIATION ON HEAT RESISTANCE OF BACTERIAL SPORES. B STUDY OF THE EFFECT OF RADIATION ON STAPHYLOCOCCUS ENTEROTOXIN. C. RADIATION STUDIES ON CHEESE SPREADS. REPORT NO. 3 COVERING JULY 1, 1953-MARCH 31, 1954. H. Sugiyama, M. J. Surgalla, and R. O. Wagenaar. 20p. (AECU-2901).

Partially purified Staphylococcal enterotoxin was inactivated at a dosage of 1, 800, 000 rep, but not at 160, 000 or 460, 000 rep. Clostridium botulinum spores in cheese were inactivated at dosages varying from 550, 000 to 1, 000, 000 rep. The toxin producing ability of spores was unaltered by sublethal dosages. (Co^{60} γ rays). NSA 8-4187

5705

Naval Medical Research Inst., Bethesda
MORPHOLOGIC EFFECTS OF IRRADIATION OF THE SALIVARY GLANDS OF RATS. James A. English. Feb. 1, 1954. 12p. (NM-006-012. 04. 66).

Salivary glands of rats were examined 16 hr to 100 days following application of 200 kvp x rays (1000 or 1500 r). Postirradiation changes consisted primarily of alteration in size, shape and staining characteristics of nuclei of acinar cells. Changes were observed in other salivary glands, but were not characteristic enough to serve as invariable means of identification. Normal rat salivary glands are described. NSA 8-4188

5706

School of Aviation Medicine
BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION. EFFECTS OF WHOLE-BODY X-RADIATION IN GUINEA PIGS WHILE UNDER VARIOUS SIMULATED FLYING CONDITIONS. REPORT NO. 11. Eugene B. Konecni and William F. Taylor. Apr. 1954. 12p. (NP-5179).

Results indicate that the general conditions met while flying were not detrimental to the guinea pig in combination with exposure to ionizing radiation. (Major variables were (1) cold, (2) hypoxia, (3) breathing 100% oxygen, and (4) diet, in various combinations.) NSA 8-4189

5707

Atomic Energy Project, Western Reserve Univ.
QUARTERLY PROGRESS REPORT [FOR] JANUARY-MARCH 1954. Hymer L. Friedell. 8p. Contract W-31-109-eng-78. (NYO-4960).

This report includes data on: incorporation of P^{32} into acid-soluble tissue fractions in normal and irradiated rats, and effects of bone marrow injections on radiation injuries. NSA 8-4190

5708

CHANGES IN CLOT RETRACTION TIME AND PLATELET ADHESIVENESS FOLLOWING WHOLE BODY IRRADIATION. J. Philip Savitsky and Sol Sherry. Proc. Soc. Exptl. Biol. Med. 85, 587-90(1954).

Inhibition of platelet adhesiveness and a prolongation of clot retraction time were observed in blood of dogs 3 days after exposure to whole-body radiation. Inhibition of clot retraction time was reversed *in vitro* by adding an excess of Ca. A plasma factor, which decreased platelet adhesiveness and inhibited clot retraction, was demonstrated 8 days postirradiation and was most pronounced during thrombocytopenia. NSA 8-4192

5709

EFFECT OF DIET AND TRACE MINERALS ON ERYTHROCYTE FRAGILITY AND X-IRRADIATION MORTALITY IN RATS. Marguerite A. Constant and Paul H. Phillips. Proc. Soc. Exptl. Biol. Med. 85, 678-82(1954).

Data indicate that fragility of erythrocytes pre-irradiation was less important in determining lethality of irradiation for rat than were the type and adequacy of diet. Long term feeding of polycythemic levels of cobalt increased the mortality rate of animals given whole body irradiation. NSA 8-4193

5710

PROLONGATION OF THE LAG PHASE OF IRRADIATED ESCHERICHIA COLI. E. Beutler, Melba J. Robson, and L. O. Jacobson. Proc. Soc. Exptl. Biol. Med. 85, 682-5 (1954).

Authors studied modifying effects on E. coli growth of: temperature during growth, storage of irradiated organisms, and the addition of mouse blood, inactivated rabbit serum, 0.5% cysteine solution, filtrate of actively growing E. coli cultures, fresh spleen, liver and kidney mash, and growing non-irradiated E. coli cultures. Evidence that sublethal effects of x irradiation in bacteria differ from lethal effects is discussed. NSA 8-4194

5711

EFFECT OF X-RAYS ON THE PERMEABILITY AND BARRIER FUNCTIONS OF SUBCUTANEOUS CONNECTIVE TISSUE AND LYMPHATIC NODES. P. N. Kiseley. Vestnik Roentgenol. i Radiol., No. 6, 8-14(1953). (In Russian).

Data obtained by irradiating mice and infecting them show that therapeutic doses of x rays affect permeability and barrier functions of lymphatic nodes in same manner as the affect those functions of skin or connective tissue. Doses higher than 300 r damage lymphatic nodes permanently and do not increase their barrier action. (Lower doses reduce barrier action transiently, then increase it.) NSA 8-4196

5712

EFFECTS OF ANEURIN (VITAMIN B_1) ON THE GLYCOGEN FORMATION FUNCTION OF LIVER OF RATS DURING GENERAL EXPOSURE TO VARIOUS DOSES OF X-RAYS. B. M. Graevskaya, R. Ya. Keylina, and S. E. Manoylov. Vestnik Rentogenol. i Radiol., No. 6, 22-5(1953). (In Russian).

Experiments conducted on 15 rats showed that the glycogen forming function of the liver may be partially restored if vitamin B_1 is given after rats have been exposed to x rays. Doses of 500 r were found to be adequate to suppress oxidation systems of entire organism. Possible mechanisms of observed effect are considered. NSA 8-4197

5713

THE EFFECTS OF TESTOSTERONE PROPIONATE AND TESTOSTERONE CYCLOPENTYLPROPIONATE UPON MORBIDITY AND MORTALITY IN MICE FOLLOWING LETHAL TOTAL-BODY IRRADIATION. Mitchell W. Spellman, James C. Carlson, and C. Walton Lillehei. Cancer 7, 617-21(1954).

Testosterone cyclopentylpropionate (long-acting), injected once every 14 days with or without pretreatment, significantly reduced mortality and morbidity in mice following lethal doses of total-body irradiation, while testosterone propionate enhanced morbidity and gave no protection against lethal effects. NSA 8-4199

5714

THE ROLE OF HIGH IONIC CONCENTRATIONS IN PROTECTION AGAINST X-IRRADIATION. C. S. Bachofer and M. Aelred Pottinger. J. Gen. Physiol. 37, 663-75 (1954).

Various levels of protection against x ray injury in bacteriophage were achieved by addition of inorganic salts to aqueous virus suspensions during exposure. Highest survival values were obtained with nitrite salts. Data are included to show protective effects afforded by various concentrations of nitrate ions, sulfate ions, chloride ions, ammonium salts, metallic salts, and by variations in pH. NSA 8-4200

5715

ON THE RADIOSENSITIVITY OF THE ADULT RAT IN HYPOTHERMY. Francois Baclesse and Maurice Marios. Compt. rend 238, 1926-8(1954). (In French).

Hypothermy caused by administration of 3-chloro-10(3-dimethylaminopropyl)-phenothiazine (I) and refrigeration increases x ray resistance of adult male rats.

Modification is not caused by (I) but by lowering of body temperature. NSA 8-4201

5716

Quartermaster Food and Container Inst., Chicago
IONIZING RADIATIONS. THEIR PRODUCTION, EFFECTS,
AND UTILIZATION (WITH SPECIAL REFERENCE TO
FOOD AND PACKAGING TECHNOLOGY). BIBLIOGRAPHIC
SERIES NO. 4. May 1954. 218p. (NP-5214).

Over 2000 references covering theoretical and practical
aspects of using ionizing radiations for food sterilization
are presented. NSA 8-4474

5717

Atomic Energy Project, Univ. of Calif., Los Angeles
RESPONSE OF THE BURRO TO 100 R FRACTIONAL
WHOLE BODY GAMMA RAY IRRADIATION. Thomas J.
Haley, Eve F. McCulloh, W. G. McCormick, Bernard
F. Trum, and John H. Rust. July 10, 1954. Contract
AT-04-1-GEN-12. 18p. (UCLA-295).

Response of burro to 100 r daily Co^{60} γ ray acute
whole-body irradiation is described. General symptoms of
radiation injury were similar to, but slower in developing
than symptoms when daily dose of radiation was higher.
Hematological changes include significant hyperferremia
when total irradiation reached 400 r. NSA 8-4475

5718

Atomic Energy Project, Univ. of Calif., Los Angeles
ROENTGEN STUDIES OF X-IRRADIATION EFFECTS ON
GASTRO-INTESTINAL MOTILITY. M. S. Billings, L. R.
Bennett, and L. M. Burlingame. June 15, 1954. 13p.
Contract AT-04-1-GEN-12. (UCLA-296).

Effect of 450 r total- and partial-body irradiation on
gastric motility was studied in 400 adult female rats.
Total-body irradiation produced a marked and long-
lasting delay of stomach function. Animals receiving
irradiation to upper or lower half of their bodies had
retardation of gastric motility of lesser intensity and
duration than those exposed to whole-body irradiation.
NSA 8-4476

5719

California. Univ. Berkeley. Radiation Lab.
THE EFFECT OF HIGHLY IONIZING RADIATIONS ON
CELL SURVIVAL. A STUDY OF THE RELATIVE BIOLOGICAL
EFFECT ON YEAST CELLS (THESIS). Joseph A. Sayeg.
Apr. 1954. 102p. Contract W-7405-eng-48. (UCRL-2293).

Haploid cells (SC-7) of yeast (*Saccharomyces
cerevisiae*) were irradiated with various beams to determine
lethal effect as a function of rate of energy loss (REL).
A 220-kv Ge maximar x ray machine, a 50-kv Picker x
ray machine, and a Po^{210} α source were used in conjunction
with cyclotron-produced radiations. At each of 8 values
of the REL, survival curve was exponential. NSA 8-4477

5720

INFLUENCE OF X-IRRADIATION UPON BODY WEIGHT
AND FOOD CONSUMPTION OF THE RAT. Douglas E.
Smith and Ella B. Tyree. Am. J. Physiol. 177, 251-60
(1954).

Beginning on the 1st day after irradiation there were
changes in body weight and in consumption of food that
fell into distinct patterns in relation to x-ray dosage.
Similar changes occurred after exposure of practically any
region of the body. Degree and duration of effects depended
upon portion of body irradiated. Possible relationship
between results and known histological and functional
alterations in gastrointestinal tract are discussed.
NSA 8-4478

5721

RADIATION EFFECTS ON MAMMALIAN SYSTEMS. Harvey
M. Patt. Ann. Rev. Physiol. 16, 51-80(1954).

Data on acute effects of high energy radiation on
mammalian systems are extensively reviewed. NSA 8-4479

5722

VARIABLE EFFECTIVENESS OF 180-KEV AND 31-MEV
RADIATION FOR LETHAL EFFECTS ON C57 MICE.
Hedi Fritz-Niggli. *Experientia* 10, 209-10(1954). (In
German with English Summary).

Mice were subjected to whole body irradiation with
homogeneous dose of 31 mev and 190 kev x rays. A
quantitative evaluation of effectiveness was obtained, using
survival time of mice (between irradiation and death).
The 180 kev rays were more effective than the 31 mev
rays. NSA 8-4480

5723

HETEROLOGOUS TRANSPLANTATION OF TUMORS
AFTER TREATMENT OF THE HOST ANIMAL WITH
RADIOACTIVE ISOTOPES. W. Bollag and Cl. Meyer.
Experientia 10, 215-16(1954). (In German, with English
Summary).

Successful heterologous transplantation of mouse
Crocker sarcoma on young rats that were pretreated with
 P^{32} and Au^{198} are described. Growth tendency of tumors
varied according to character of the radioisotope, mode
of administration, and interval between injection of
radioactive substance and heterotransplantation. NSA 8-4481

5724

STUDIES ON SUSCEPTIBILITY TO INFECTION FOLLOWING
IONIZING RADIATION. I. THE TIME OF ONSET AND
DURATION OF THE ENDOGENOUS BACTEREMIAS IN MICE.
Carolyn W. Hammond, Marianne Tompkins, and C. Phillip
Miller. J. Exptl. Med. 99, 405-10(1954).

Most bacteremias occurred between 7th and 15th
days after exposure to 550-r total-body x irradiation.
Duration varied with microorganism, *Pseudomonas bacteremia*
was always rapidly fatal, those caused by *Proteus* and *E. Coli*
continued for 72 and 48 hrs.; bacteremia caused by *Para-
colobactrum* was tolerated for as long as 5 days. NSA 8-4482

5725

THE QUANTITATIVE ASPECTS OF PERMANENT AND
TEMPORARY STERILITY INDUCED IN FEMALE
HABROBRACON BY X-RAYS AND β RADIATION. Daniel
S. Grosch and Robert L. Sullivan. Radiation Research
1, 294-320(1954).

Study made of radioinduced sterility in female
Habrobracon. Data on egg production and hatchability
following exposure to various doses of x and β radiation
are presented and factors influencing induction of sterility
are discussed. NSA 8-4483

5726

MORTALITY DUE TO X-RAY IN SPLENECTOMIZED
MICE. Antolin Raventos. Am. J. Physiol. 177, 261-3
(1954).

Infant and pubertal mice were subjected to a mid-
lethal x ray dose after splenectomy. Postirradiation
mortality was only slightly higher in splenectomized mice
than in their unoperated or sham-operated litter mates.
No difference in influence of splenectomy upon radio-
sensitivity was found between the two age groups.
NSA 8-4485

5727

DEVELOPMENTS IN INTERNAL DOSE DETERMINATIONS.
K. Z. Morgan and M. R. Ford. *Nucleonics* 12, No. 6,
32-9(1954).

Choice of values for maximum permissible concentrations
(MPC) of a radioisotope for chronic exposures, and the
basis of calculation of the MPC for single exposures are
discussed. Criteria for recalculation of certain MPC
values based on radiation dose to gastrointestinal tract
for continuous exposure are reviewed. NSA 8-4486

5728

MODIFICATION OF THE RADIATION SYNDROME IN THE
CHICK BY PARTIAL BODY SHIELDING. S. Phyllis

Stearner, Emily J. Christian, and Austin M. Brues.
Radiation Research 1, 270-81(1954).

Shielding small areas of the body during x irradiation reduced subsequent mortality in young chicks. Shielding kidney region prevented severe renal lesions, but normal function was not maintained. Irradiation of kidney region alone produced renal lesions and substantial mortality, especially in initial postirradiation period. NSA 8-4488

5729

MUTATION IN DROSOPHILA MELANOGASTER MALES EXPOSED TO β -RADIATION FROM NEUTRON ACTIVATED PHOSPHORUS-BAKELITE PLAQUES. R. C. King, Brookhaven National Lab., Upton, N. Y. [1954]. 21p. (BNL-1849).

Beta rays from neutron-activated, phosphorus-bakelite plaques were found to be 60% as efficient as 90-kv x rays in producing sexlinked recessive lethal mutations. Recalculation of earlier data indicated that experimental and calculated values for fraction of total P^{32} β -particle energy absorbed by the gonad of P^{32} -labeled *Drosophila* males do not disagree as was previously thought. NSA 8-4855

5730

Hanford Works, Richland, Wash.
(p.7-94) BIOLOGY RESEARCH - ANNUAL REPORT (FOR) 1953, Jan. 4, 1954. 163p. Contract W-31-109-Eng-52. (HW-30437).

Includes reports on: effect of reactor effluent on young salmon and trout and on cereal plants, radiosensitivity of vitamins, mutagenic effects of P^{32} in *Neurospora*, effects of tritium oxide on some synthetic processes in *Chlorella*. NSA 8-4857

5731

Hanford Works
(Pages 95-163) of ANNUAL REPORT (ON) BIOLOGY RESEARCH (FOR) 1953, Jan. 4, 1954. 75p. Contract W-31-Eng-52. (HW-30437).

Report includes description of toxicity of I^{131} in sheep and rabbits. NSA 8-4858

5732

School of Aviation Medicine
BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION. (A PRELIMINARY INVESTIGATION). SEQUELAE FOLLOWING APPLICATION OF HIGH-INTENSITY X-RADIATION TO THE HEAD OF RABBITS. Herbert B. Gerstner, John E. Pickering, and Alois J. Dugi. May 1954. 8p. Project No. 21-3501-0005, Report No. 15. (NP-5222).

Heads of 28 rabbits were exposed to high-intensity x rays; total dose to brain was 12,500 r (12.5 kv) $\pm$ 1500 r. Sequelae included; latent or prodromal period, convulsive phase, somnolent phase, **atoxic phase**, and death. NSA 8-4859

5733

Atomic Energy Project, Univ. of Calif., Los Angeles
EFFECT OF X-IRRADIATION ON GASTRIC SECRETION AND THE ACCOMPANYING GROSS AND HISTOLOGICAL CHANGES IN THE "SHAY" RAT STOMACH. Lawrence E. Detrick, Harvey C. Upham, Dorothy Highby, Virginia Debley, and Thomas J. Haley. July 2, 1954. 19p. Contract AT-04-1-Gen-12. (UCLA-298).

Pre-irradiation of rats subjected to pyloric ligation resulted in great variation in response. Effects on pepsin-HCl activity are described, and results compared to changes resulting from irradiation alone. NSA 8-4860

5734

Atomic Energy Project, Univ. of Rochester
THE EFFECTS OF X-RADIATION ON THE METABOLISM OF BAKERS' YEAST. William J. Bair. May 26, 1954. 254p. Contract W-7401-eng-49. (UR-321).

Results of an investigation of effects of 90,000 r of 250-kv x rays on active transport of cations by bakers yeast cells are presented. Studies of cell growth suggest that there are two effects of radiation: (1) permanent growth inhibition and (2) temporary inhibition of cell division. NSA 8-4861

5735

INDEPENDENT X-RAY EFFECTS ON CHROMOSOME BREAKAGE AND REUNION. Sheldon Wolff and K. C. Atwood. Proc. Natl. Acad. Sci. U. S. 40, 187-92(1954).

Effects of x ray dose fractionation on two-hit chromosome aberrations in root tips of *Vicia faba* with and without protective agent, BAL were studied. Findings indicate that chromosome breakage and radiation-induced delay of reunion are different and independent effects of radiation. NSA 8-4862

5736

INDUCED POLLEN LETHALS FROM SEEDS OF DATURA STRAMONIUM EXPOSED TO RADIATION FROM A NUCLEAR DETONATION. J. L. Spencer and A. F. Blakeslee. Proc. Natl. Acad. Sci. U. S. 40, 441-6(1954).

Relative effectiveness of fast neutrons from a nuclear detonation appeared to be about 13 or 14 times that of either gamma rays or x rays when mutation rates based on pollen lethals in *Datura* were compared. NSA 8-4863

5737

THE EFFECTS OF FAST-NEUTRON RADIATION FROM A NUCLEAR DETONATION ON CHROMOSOME ABERRATION IN DATURA. Henry T. Yost, Jr., Jean Cummings, and A. F. Blakeslee. Proc. Natl. Acad. Sci. U. S. 40, 447-51(1954).

Data obtained from this material indicate that the relative biological efficiency of fast neutrons to γ or x rays is about 14. Types of aberration and number of aberrations per affected cell are the same for neutrons, x rays, and γ rays. No new or unusual types of biological change were observed as result of exposure to extremely high intensity of radiation from the explosion. NSA 8-4864

5738

EFFECT OF PHOSPHORUS-32 ON GROWTH AND VIABILITY OF RAT EMBRYOS. Melvin R. Sikov and Thomas R. Noonan. Federation Proc. 13, 453, 137(1954).

Results from study of effects of various doses of intraperitoneally injected P^{32} solutions on growth and viability of rat embryos are summarized. NSA 8-4865

5739

DAMAGE TO POSTERITY CAUSED BY IRRADIATION OF THE GONADS. H. J. Muller. Am. J. Obstet. Gynecol. 67, 467-83(1954).

Damage to future generations resulting from irradiation of the gonads, and the amount of damage caused by a given dose of radiation are discussed. Data from genetic studies on *Drosophila* and on mice are reviewed and applied in predicting damage to posterity. NSA 8-4866

5740

MUTATION RATES AT SPECIFIC AUTOSOMAL LOCI IN THE MATURE AND IMMATURE GERM CELLS OF DROSOPHILA MELANOGASTER. Mary L. Alexander. Genetics 39, 409-28(1954). NSA 8-4867

5741

MECHANISM OF RADIATION ANENCEPHALY, ANOPHTHALMIA, AND PITUITARY ANOMALIES. REPAIR IN THE MAMMALIAN EMBRYO. Samuel P. Hicks. Arch. Pathol. 57, 363-78 (1954).

Results demonstrate that despite extensive necrosis of differentiating neural cells and cells in an analogous stage in other developing systems, complete or nearly complete repair can occur in many zones. Radiation malformations are therefore the result of a balance between

radiation damage and the capacity to repair in any given anlage or developing zone. NSA 8-4868

5742
RELATIVE BACTERICIDAL EFFICIENCIES OF THREE TYPES OF HIGH-ENERGY IONIZING RADIATIONS.

S. A. Goldblith, B. E. Proctor, S. Davison, B. Kan, C. J. Bates, E. M. Oberle, M. Karel, and D. A. Lang. Food Research 18, 659-77(1953).

Results indicate that under conditions of equal absorption of energy, the relative bactericidal effectiveness of high-energy cathode rays would be less than that of γ rays or of x rays. E. coli and B. thermoacidurans were the organisms used. NSA 8-4869

5743
THE MANNER OF DEPENDENCE OF THE "PERMISSIBLE DOSE" OF RADIATION ON THE AMOUNT OF GENETICS DAMAGE. H. J. Muller. Acta Radiol. 41, 5-20(1954) NSA 8-4870

5744
AN ANALYSIS OF THE CHANGING RADIATION RESPONSE OF THE DEVELOPING MOUSE EMBRYO. Liane Brauch Russell and W. L. Russell. J. Cellular Comp. Physiol. 43, Supplement 1, 103-49(1954).

Experiments in which several thousand genetically controlled mouse embryos were irradiated with doses of 25-400 r, and at stages of development ranging, by 24-hr intervals, from day 1/2 to day 13 1/2 post conception are reported. NSA 8-4871

5745
INFLUENCE OF DISSOLVED GASES ON HYDROGEN PEROXIDE FORMATION AND BACTERIOPHAGE INACTIVATION BY RADIATION. Michael Ebert and Tikvah Alper. Nature 173, 987-9(1954).

Bacteriophage inactivation experiments revealed that at high dose rates, survival curves were of exponential form for both electron and x irradiation. NSA 8-4915

5746
Brookhaven National Lab.
QUARTERLY PROGRESS REPORT [FOR] JANUARY 1-MARCH 31, 1954. (UNCLASSIFIED SECTION). 65p. (BNL-289).

Includes reports on: pituitary tumors radioinduced in castrated male mice; virulence of irradiated type III pneumococci; sensitivity of mice to anaphylactic shock after γ radiation. NSA 8-4983

5747
Kansas Univ. Graduate School
ENERGY ABSORPTION IN BONE (THESIS). Bennie S. Friesen. Jan. 1954. 60p (AECU-2895). NSA 8-5044

5748
Washington Research Labs., National Canners Association, D. C.
INVESTIGATION OF GAMMA STERILIZATION. RESEARCH REPORT NO. 5-53. B. H. Morgan. June 1953. 46p. (AECU-2885).

Data are presented from studies of effects of γ radiation on bacterial spores. NSA 8-5087

5749
Washington Research Labs., National Canners Association, D. C.
INVESTIGATION OF GAMMA STERILIZATION. RESEARCH REPORT NO. 7-53. B. H. Morgan. Dec. 1953 37p. (AECU-2886).

Data are presented from studies of effects of γ radiation on bacterial spores. NSA 8-5088

5750
INDUCED CHROMOSOME MUTATIONS IN DROSOPHILA MELANOGASTER BY FAST ELECTRONS AND X RADIATION. G. Hohne and G. Schubert. Strahlentherapie 94, 72-8(1954). (In German)

Drosophila melanogaster was exposed to a 3-Mev electron beam from a betatron and to 200-kv x radiation, such as is generally used in therapy, for the purpose of studying the effect of these radiations on chromosome mutations. With respect to the reciprocal translocations between the 2nd and the 3rd chromosome that were covered by the analysis of the crossing over, it was found that the increase in the rate of mutation induced by the radiation was a little greater than proportional to the dose. No differences were found between the effects produced by these two radiations of unlike differential ionization. NSA 8-5091

5751
ON THE INFLUENCE OF SMALL REPEATED RADIATION DOSES ON THE FERTILITY AND LITTER SIZE OF THE WHITE MOUSE. H. Langendorff and M. Langendorff. Strahlentherapie 94, 119-25(1954). (In German).

If male mice are irradiated daily with 2.5 r and paired with normal females, fertility decreases more rapidly than in controls. Decreased fertility is preceded by initial fluctuation which often results in a minor temporary increase in fertility. Number of offspring are unaffected. Genetic factors are believed not to be involved. NSA 8-5092

5752
MALFORMATIONS OF THE ADULT CLAW FROG (XENOPUS LAEVIS DAUD.) AFTER X RADIATION IN THE EMBRYONIC STAGES. Hans R. Schinz and Hedi Fritz-Niggli. Strahlentherapie 94, 147-51(1954). (In German).

Irradiation of Xenopus laevis in early embryonic stages did not prevent some of the animals from developing into full-fledged toads. Majority were normal; malformations observed in the remainder are described. NSA 8-5093

5753
DIFFERENTIATION AND THE REACTION OF RAT EMBRYOS TO RADIATION. James G. Wilson. J. Cellular Comp. Physiol. 43, Supplement 1, 39-75(1954).

Rats embryos on 8th, 9th, 10th, or 11th day of gestation were exposed to doses of 12.5 to 600 r directly through an abdominal incision in the mother. Irradiated and non-irradiated embryos were compared as to weight, malformations, and rate of intrauterine motility. NSA 8-5094

5754
THE EFFECT OF IONIZING RADIATIONS ON AMPHIBIAN DEVELOPMENT. Roberts Rugh. J. Cellular Comp. Physiol. 43, Supplement 1, 39-75(1954).

Studies on effects of radiation on amphibia undergoing metamorphosis are reviewed, and data are presented from studies of radiosensitivity of each developmental stage, most frequent types of abnormality following irradiation of embryos, and modifications produced in radiation injury by cysteinamine. NSA 8-5095

5755
THE EFFECT OF AUXIN ON FLOWER INITIATION. A. C. Leopold and K. V. Thimann. Am. J. Bot. 36(4), 342-7(1949).

Exposure of barley to weak x ray doses or solution of coumarin increases flower formation about 25%. There was generally strong positive correlation between the number of flower primordia and the weight of plants, indicating that auxin affects flower formation in a manner parallel to its effect on growth. Studies with x rays are only a small part of the total study reported. BA 23-24794

5756
CHANGES IN SOME GASTROINTESTINAL FUNCTIONS FOLLOWING X-IRRADIATION. Paul F. Fenton and Harrison M. Dickson. Am. J. Physiol. 177, 528-30(1954).

Gastric emptying and food intake in mice were reduced for less than 24 hrs after 500 r exposure. Inhibitory effect

of hypertonic solutions on gastric evacuation was abolished by radiation. Fecal output of total solids and of nitrogen were reduced for 48 hr postexposure. Irradiation had no effect on pancreatic and intestinal amylase content under these conditions. Amylase content of pancreas was found to decrease with age. NSA 8-5090

5757

A STUDY OF THE OUTCOME OF PREGNANCY IN WOMEN EXPOSED TO THE ATOMIC BOMB BLAST IN NAGASAKI. James N. Yamazaki, Stanley W. Wright, and Phyllis M. Wright. *J. Cellular Comp. Physiol.* **43**, Supplement 1, 319-28 (1954).

Among 30 mothers (pregnant at the time of A-bombing) with one or more major signs of radiation injury, there were 7 fetal deaths (23.4%), 6 neonatal and infant deaths (26%), and 4 instances of mental retardation among 16 surviving children (25%). Over-all morbidity and mortality was approximately 60% in this group. In mothers without major signs, but within 2000 meters of blast, over-all mortality was 10%, in controls, 6%. NSA 8-5097

5758

PROBABLE SIDE-EFFECT OF NUCLEAR REACTIONS IN THE BIOLOGICAL ACTION OF FAST PROTONS. Lars Ehrenberg and Goran Andersson. *Nature* **173**, 1086 (1954).

Dry dormant seeds of Bonus barley were irradiated with 160-Mev protons in synchrocyclotron. Certain qualitative effects were found to be intermediate between those of sparsely ionizing (x and γ rays) and densely ionizing radiations (pile neutrons and α particles). Unexpected effects are attributed to secondary ionization by short-range particles resulting from inelastic collisions of high-energy protons with the nuclei of the seed. NSA 8-5098

5759

CELLULAR DESTRUCTION AND PROTEIN BREAKDOWN INDUCED BY EXPOSURE TO X-RAYS. I. Kurt Schreier, Nicola DiFerrante, George W. Gaffney, Louis H. Hempelmann, and Kurt I. Altman. *Arch. Biochem. and Biophys.* **50**, 417-20 (1954).

Breakdown of C^{14} -labeled tissue proteins was investigated. Data suggest that radiation causes an expansion in the first glycine pool as evidenced by increased correction dilution coefficient during the 6 to 24 hr and 0 to 18 hr collection periods. Level of hippuric acid excretion remains unchanged after exposure to ionizing radiation. NSA 8-5099

5760

EFFECT OF TOTAL BODY IRRADIATION ON RABBIT PITUITARY AS MEASURED BY GONADOTROPIN RESPONSE IN CHICKS. John J. Lane, John R. Paysinger, R. L. Murphree, John H. Rust, and Bernard F. Trum. *Proc. Soc. Exptl. Biol. Med.* **86**, 36-8 (1954).

Rabbit pituitaries from animals exposed to (1) 750 and (2) 1100 r of total body Co^{60} γ irradiation showed an early suppression of gonadotropin principles as measured by chick gonad response. Suppression was evident 8 days after (1), and 1 day (2) and effect was sustained for 7 days. Thereafter, gonadotropin activity in both groups returned to normal level. NSA 8-5100

5761

USE OF TISSUE CULTURE MEDIUMS STERILIZED WITH GAMMA RADIATION FROM COBALT-60. Donald J. Merchant, Richard D. Stewart, Lloyd I. Kempe, and John T. Graikoski. *Proc. Soc. Exptl. Biol. Med.* **86**, 128-31 (1954).

Plasma, serum, and embryonic extract contaminated with gram negative and non-sporeforming gram positive bacteria have been sterilized by a dosage of 2×10^5 rep of γ radiation from Co^{60} , without damage to the materials with regard to their use in tissue culture media. NSA 8-5101

5762

IRRADIATION OF THE PITUITARY OF THE RAT WITH HIGH ENERGY DEUTERONS. C. A. Tobias, D. C. Van

Dyke, M. E. Simpson, H. O. Anger, R. L. Huff, and A. A. Koneff. *Am. J. Roentgenol. Radium Therapy Nuclear Med.* **72**, 1-21 (1954).

Pituitary glands of rats were exposed to 3150 to 25,200 rep. Degree of destruction after irradiation was found to be a function of time as well as of dose. NSA 8-5102

5763

MODIFICATION OF ERYTHROPHAGOCYTOSIS IN VITRO AFTER SINGLE TOTAL IRRADIATION OF NORMAL AND SPLENECTOMIZED RATS. Jean-Francois Duplan, Geraud de Brien, and Odette Lartigue. *Compt. rend.* **238**, 2567-9 (1954). (In French).

Radioinduced modifications in erythrophagocytosis in spleen were demonstrated by comparing data on erythrophagocytotic index of normal, splenectomized, normal-irradiated, and splenectomized irradiated rats. NSA 8-5103

5764

SEX HORMONES AS PROTECTIVE AGENTS AGAINST RADIATION MORTALITY IN MICE. E. A. Mirand, J. G. Hoffman, M. C. Reinhard, and H. L. Goltz. *Proc. Soc. Exptl. Biol. Med.* **86**, 24-7 (1954).

Diethylstilbestrol and estradiol benzoate reduce acute radiation mortality in mice. Testosterone propionate and dephostosterone cyclopentylpropionate do not protect against acute lethal radiation dose. Estrogens protect when given for 7 days before or after exposure. No toxic effects due to estrogens or androgens were seen when hormones were administered for 7 days postexposure. NSA 8-5106

5765

PROTECTIVE EFFECT OF HYPOXIA AGAINST IRRADIATION INJURY OF THE RAT BONE MARROW AND SPLEEN. W. A. Rambach, H. L. Alt, and John A. D. Cooper. *Proc. Soc. Exptl. Biol. Med.* **86**, 159-61 (1954).

Rats irradiated in hypoxic atmosphere show a slightly higher cellularity and much greater rate of DNA synthesis in bone marrow and spleen after 96 hr than do rats irradiated at "ground level." Thirty hr of intermittent hypoxia preceding irradiation at low oxygen tension does not give additional protection. Irradiation of animals at low oxygen pressures appears to reduce biological effectiveness of 800 r on bone marrow to 600 r. NSA 8-5107

5766

EFFECTS OF PANTOTHENIC ACID AND ITS ANALOGS IN RADIATION INJURY BY P^{32} . Camillo Artom. *Proc. Soc. Exptl. Biol. Med.* **86**, 162-5 (1954).

Significant protection against injurious effects of P^{32} were observed when pantothenic acid was administered to mice on a deficient diet. Pantoyltaurine was almost as effective as the natural vitamin. ω -methyl pantothenate was totally ineffective. NSA 8-5108

5767

EFFECTS OF RADIOMIMETIC SUBSTANCES ON EMBRYONIC DEVELOPMENT, WITH SPECIAL REFERENCE TO NITROGEN MUSTARDS. Dietrich Bodenstein. *J. Cellular Comp. Physiol.* **43**, Supplement 1, 179-205 (1954).

Studies of effects of nitrogen mustard and of sex hormones on amphibian embryonic development are reviewed, radiomimetic effects of these substances are discussed. NSA 8-5115

5768

INFLUENCE OF X-IRRADIATION ON OXYGEN POISONING IN MICE. Rebeca Gerschman, Daniel L. Gilbert, Sylvanus W. Nye, and Wallace O. Fenn. *Proc. Soc. Exptl. Biol. Med.* **86**, 27-9 (1954).

Survival time of mice in 6 atmospheres of oxygen was about 40 min. Average survival times were prolonged 12, 22, 34, and 146 min, respectively, when mice were irradiated (8800 r) 30, 48, 72, and 84 hr previously.

Anorexia may have contributed to observed protection.
NSA 8-5116

5769

Radiation Lab., Univ. of Calif., Berkeley
MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT
[FOR] OCTOBER, NOVEMBER, DECEMBER, 1953. Apr.
1954. 62p. Contract W-7405-eng-48. (UCRL-2553).

Several new macromolecular components were found in extracts of dividing yeast cells, not in extracts from resting cells. X irradiation was found to have no influence on stability of microsomes or on ability of yeast cells to produce the new components when induced to divide. Histopathological effects of At in rats were studied, and results compared with effects of ^{131}I . NSA 8-5466

5770

CHANGES IN THE PROTEOLYTIC AND ANTIPROTEOLYTIC ACTIVITY OF THE BLOOD SERUM IN MAN AND ANIMALS FOLLOWING EXPOSURE TO X-RAYS. (PROJECT NO. 21-3501-0004, REPORT NO. 4). Kenneth L. Burdon and Rufus K. Guthrie. Baylor Univ. Coll. of Medicine and School of Aviation Medicine. Feb 1954. 28p. (NP-5257).

Profound and prolonged disturbance in normal levels of serum proteolytic and antiproteolytic activity occurred after exposure to x radiation in both humans and guinea pigs. Degree of this disturbance was related to intensity of radiation. NSA 8-5470

5771

Naval Radiological Defense Lab.
SPLEEN DESOXYRIBONUCLEIC ACID CONTENT AS AN INDEX OF RECOVERY IN X-IRRADIATED MICE INJECTED WITH SPLEEN HOMOGENATE. L. J. Cole and M. E. Ellis. June 2, 1954. 29p. (USNRDL-438).

Results indicate that the spleen DNA level provides a sensitive biochemical index of recovery following x irradiation. It is proposed that this endpoint be employed as a biochemical assay for the spleen radiation protection factor. NSA 8-5471

5772

THE RELATIONSHIP BETWEEN THE HAIR GROWTH CYCLE AND THE RESPONSE OF MOUSE SKIN TO X-IRRADIATION. Thomas S. Argyris. Am. J. Anatomy 94, 439-71(1954). NSA 8-5472

5773

VARIATIONS IN THE MITOCHONDRIAL FRACTION OF THE RAT LIVER AFTER TOTAL AND LIVER FIELD IRRADIATION (1000 r). H. Ryser, H. Aebi, and A. Zuppinger. Experientia 10, 304-5(1954). (In German).

While succinodehydrogenase activity remains unaltered, the oxidation of pyruvate, as well as the structural stability of the mitochondria, are found to be reduced, entailing a decrease in oxidative phosphorylation. (Isolated mitochondria were studied after localized irradiation of liver or total body irradiation of rats). NSA 8-5473

5774

THE RELATION BETWEEN X-RAY DOSAGE AND THE FREQUENCY OF SIMULATED HEALING OF CHROMOSOME BREAKAGES IN *DROSOPHILA MELANOGASTER* FEMALES. Irwin H. Herskowitz. Proc. Natl. Acad. Sci. U. S. A. 40, 576-85(1954).

Female *Drosophila* were treated with two different dosages of x radiation and number of exceptional F_1 individuals of appropriate types was determined. Analysis of data indicates that all exceptional flies may be considered to carry gross chromosomal rearrangements, and that gross rearrangements occur more frequently after x irradiation of oocytes than after irradiation of oögonia. NSA 8-5474

5775

CARCINOGENIC ACTIVITY OF RADIOACTIVE PHOSPHORUS.

Simon Koletsky, and James H. Christie. Proc. Soc. Exptl. Biol. Med. 86, 266-8(1954).

Osteogenic sarcoma and carcinoma of face were produced in rats by internal administration of 1-3.5 μc of P^{32} per gram of body weight. Incidence of neoplasm ranged from 22 to 50%. Latent period of tumor development was lengthened with smaller doses, amounts less than 1 μc /gram failed to induce neoplasms. NSA 8-5475

5776

UTILIZATION OF GROSS FISSION PRODUCTS. PROGRESS REPORTS [OF UNIVERSITY OF CHICAGO, FOOD RESEARCH INSTITUTE, AND AMERICAN MEAT INSTITUTE FOUNDATION] FOR PERIOD ENDING MARCH 31, 1953. Johan Baarli and Lester S. Skaggs, Univ. of Chicago, R. O. Wagenaar, H. Sugiyama, and M. J. Surgalla, Food Research Inst., and C. F. Neven, Jr., D. M. Doty, and B. S. Schweigert, American Meat Inst. Foundation. 59p. (AECU-2718).

Authors describe refrigerated Co^{60} source and describes radiation effects on: protein and non-protein N components, proteolytic enzyme systems, heme pigments and fats in meat, *Staph. enterotoxin* and *C. botulinum* toxin, bacterial spores and microorganisms associated with food and food spoilage and food poisoning. NSA 8-31

5777

Brookhaven National Lab.
FREQUENCY OF CHROMOSOME ABERRATIONS PRODUCED BY FRACTIONAL DOSES OF X-RAYS IN *TRADESCANTIA*. Dale Steffensen and T. J. Arnason. [1953?] 17p. (BNL-1524).

Tradescantia microspores were x-irradiated with 360 r. Frequency of centric reunions was consistently higher with single continuous dose than with two 180-r doses separated by 4, 8, 12, and 24 hr. There was no significant difference in reunion frequency with increasing time intervals between fractions. Frequency of one-hit chromosome breaks appeared to be independent of dosage fractionation. NSA 8-32

5778

School of Aviation Medicine
THE BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION. EARLY EFFECTS OF HIGH INTENSITY X-RADIATION ON SKELETAL MUSCLE. Herbert B. Gerstner, Robert B. Lewis, and Everett O. Richey. May 1953. 13p. (NP-4793, Report 5).

Isolated frog muscles irradiated with doses above 50 kr showed early fatigue, contracture, prolonged relaxation time, decreased contraction amplitude for heavy loads, and histologic changes noted 8 hr postexposure. Intact rabbit muscles exposed to 72 kr exhibited gradual impairment of function with total loss of function 24 hr postirradiation, accompanied by severe histologic changes. NSA 8-33

5779

Air Force Radiation Laboratory, Univ. of Chicago
[PHYSIOLOGICAL EFFECTS OF RADIATION.] p. 1-66 of QUARTERLY PROGRESS REPORT NO. 8. July 15, 1953. 113p. (NP-4846(p. 1-66)).

Adenosine triphosphatase and 5-nucleotidase activity of spleen and thymus gland proved useful in screening chemical agents for prophylactic and therapeutic action against x ray injury in rats. Data on effects of p-aminopropiophenone on response of these enzyme systems to x rays are included. Report also describes x ray effect on cholinesterase activity of various rat tissues, effect of anesthetization 2 hr postirradiation on 30-day mortality of rats, effect of x rays on response of rats to morphine sulfate or methadone hydrochloride, effect of hemin and maleic hydrazide on lethality. NSA 8-35

5780

Air Force Radiation Lab., Univ. of Chicago
[RADIATION EFFECTS.] p. 67-109 of QUARTERLY PROGRESS
REPORT NO. 8. July 15, 1953. 113p. (NP-4846(p. 67-109)).

Reports on: amino acid excretion patterns of radio-sensitive and resistant rats, liver catalase activity in rats and guinea pigs after LD₅₀ of x rays, lack of prophylactic effect of allyl thiourea against x ray injury in mice, x ray survival of 3 species of amoebae. Survival times (mice) following administration of 13 compounds for possible prophylactic or therapeutic effects against x ray injury are tabulated. NSA 8-36

5781

School of Aviation Medicine

BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION. THE EFFECT OF LOCAL BRAIN X-IRRADIATION ON THE PINNA REFLEX OF GUINEA PIGS. Herbert B. Gerstner, Eugene B. Konecni, and William F. Taylor. Sept. 1953. 15p. (NP-4856, Report 8).

Twenty guinea pigs were exposed (head only) to 8000 r of x rays. In majority of animals x rays caused complete abolishment of pinna reflex within 24 hr. Statistically significant rise of threshold became evident 3 hr postexposure. NSA 8-37

5782

NUCLEIC ACID METABOLISM OF THE BONE MARROW AND SPLEEN IN THE RAT. THE COMBINED EFFECTS OF X-RAY AND HYPOXIA. W. A. Rambach, H. L. Alt, and J. A. D. Cooper. School of Aviation Medicine and Northwestern Univ. Medical School. Aug. 1953. 11p. (NP-4879, Report 2).

Hypoxia at simulated altitude of 25,000 ft during irradiation reduces injury to rat bone marrow and spleen. Degree of leukopenia, weight loss, and decrease in spleen size are less pronounced in irradiated hypoxia animals. Thirty hours of intermittent hypoxia preceding irradiation in a low atmospheric pressure does not give added protection to bone marrow and spleen. NSA 8-38

5783

NUCLEIC ACID METABOLISM OF THE BONE MARROW AND SPLEEN IN THE RAT. THE EFFECT OF X-RAY AND THE EFFECT OF HYPOXIA. W. A. Rambach, J. A. D. Cooper, and H. L. Alt. School of Aviation Medicine and Northwestern Univ. Medical School. June 1953. 11p. (NP-4881, Report 1).

Significant decrease in incorporation of P³² into DNAP and RNAP were observed in bone marrow and spleen of rats after 800 r total body x irradiation. A significant increase was seen following hypoxia. These changes are correlated with morphologic variation in cellularity and cell types within the organs. NSA 8-39

5784

School of Aviation Medicine

BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION. CHANGES IN STRIATED MUSCLE FOLLOWING SINGLE INTENSE DOSES OF X-RAYS. R. B. Lewis. Sept. 1953. 9p. (NP-4921, Report No. 6).

Author describes effects of large x ray doses on rabbit legs. Doses of 6000r caused slight muscle atrophy, 12,000-24,000 and 36,000 r caused coagulation necrosis of smaller muscle areas and atrophy of muscle fibers in nonnecrotic areas, 72,000 r produced destructive lesions of scattered muscle fibers within 3 hr postexposure, and damage increased with time postexposure. NSA 8-40

5785

GENETIC EFFECTS OF THERMAL NEUTRON IRRADIATION IN PLANTS. E. F. Frolk, p.81-87 of CONFERENCE ON THE USE OF ISOTOPES IN PLANT AND ANIMAL RE-

SEARCH HELD ON JUNE 12, 13, AND 14, 1952. (Kansas State Coll. and Argonne National Lab. and Isotopes Div., AEC). Apr. 1953. 276p. (TID-5098).

Data are presented to illustrate effects of irradiation of F₁ maize pollen on F₁ plants, seedling development following irradiation of maize and barley seed, and chromosomal aberrations produced by thermal neutrons. Biological effects produced by thermal neutrons and x rays are compared. NSA 8-41

5786

EFFECTS OF RADIATIONS ON THE GROWTH AND DEVELOPMENT OF PLANTS. Norbert J. Scully. p.242-47 of CONFERENCE ON THE USE OF ISOTOPES IN PLANT AND ANIMAL RESEARCH HELD ON JUNE 12, 13, AND 14, 1952. (Kansas State Coll. and Argonne National Lab. and Isotopes Div., AEC). Apr. 1953. 276p. (TID-5098).

X-ray effects on plant growth and development are reviewed. Chromosomal aberrations, arrest of cell division and radiosensitivity of seeds are discussed. Cytological and growth and development responses of plants subjected to external radiation (x rays and slow neutrons), and of individual plants subjected to internal radiation (C¹⁴-labeled natural organic constituents of plant) are discussed. NSA 8-42

5787

California. Univ. Berkeley, Radiation Lab.

THE METABOLIC PROPERTIES OF VARIOUS MATERIALS. p. 3-59 of MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT, JANUARY, FEBRUARY, AND MARCH 1953. June 11, 1953. 57p. (UCRL-2243(p. 3-59)).

Relative biological effectiveness of β particles from radiopotassium and α particles from At²¹¹ were studied. Distribution of tracer amounts of Na²² and changes in blood picture were employed as criteria of radiation damage in 4 studies with rats, weight changes and alterations in total differential leukocyte counts were employed as criteria of radiation damage in one study with monkeys. NSA 8-44

5788

California. Univ. Berkeley, Radiation Lab.

RADIATION CHEMISTRY AND BIOLOGICAL STUDIES OF RADIATION EFFECTS. p. 60-113 of MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT, JANUARY, FEBRUARY, AND MARCH 1953. June 11, 1953. 54p. (UCRL-2243 (p. 60-113)).

Body growth and thyroid growth were impaired soon after irradiation of rat pituitary glands with deuterons at each dose level employed, degeneration of testes occurred much later. NSA 8-45

5789

Rochester. Univ. N. Y. Atomic Energy Project.

LUMINOUS BACTERIA AS A RADIOBIOLOGICAL TEST ORGANISM, WITH SPECIAL REFERENCE TO THE RADIATIONS FROM A 130-INCH FREQUENCY MODULATED CYCLOTRON. G. Hoyt Whipple. Aug. 25, 1953. 86p. Contract W-7401-eng-49. (UR-249).

Total light emission from suspension of luminous bacteria (*Achromobacter fischeri*) during an interval of about 8 hr is shown to be convenient index of biological damage produced by penetrating radiations. Doses as small as 500 r were measured. System was used to estimate biological effectiveness of high energy radiations from frequency modulated cyclotron. NSA 8-46

5790

Rochester, Univ. N. Y. Atomic Energy Project.

QUARTERLY TECHNICAL REPORT, APRIL 1 THRU JUNE 30, 1953. Sept. 2, 1953. 26p. (UR-268).

Soft diet fed to dogs before and after an LD₅₀ exposure to x rays was found to be ineffective in reducing degree

or extent of gastro-intestinal hemorrhage. An exposure to x rays resulting in a mortality of between LD₁₀ and LD₁₅ did not sensitize mice to histamine at dosage levels of either 50 mg/kg or 1000 mg/kg given between 5th and 20th day post-irradiation. NSA 8-47

5791

Atomic Energy Project, Univ. of Rochester
STUDIES ON THE PATHOGENESIS OF DEATH DUE TO X-RAY EXPOSURE. I. ABNORMALITIES OF THE EPINEPHRINE AND NOREPINEPHRINE RESPONSES OF CAROTID ARTERIES OF FASTING DOGS RECEIVING 250 KVP EXPOSURE OF 250 R AND 550 R. W. B. Mason, S. Alpert, and D. J. Smith. Sept. 8, 1953. 17p. Contract W-7401-eng-49. (UR-278).

5792

STERILIZATION OF SCREW-WORM FLIES WITH X-RAYS AND GAMMA-RAYS. R. C. Bushland and D. E. Hopkins. J. Econ. Entomol. 46, 648-56(1953).

Flies reared from 6-day-old pupae treated with 5000 r x rays or γ rays were sterile, and adult males from irradiated pupae had shortened life span. Other findings are also presented. NSA 8-50

5793

I. BUDDING AND REGENERATION IN HYDRAS IRRADIATED BY X RAYS. Paul Brien and J. P. Van Den Eckhout. Compt. rend. 237, 756-8(1953). (In French).

Hydra fusca, isolated individuals or groups of 5 or 6, were placed in 1 mm of water and irradiated (4300 r for 10 min. After exposure they were placed in 120 cm³ of water at 19°. X rays destroyed interstitial cells. For 10 days after exposure appearance, budding and regeneration were normal but young hydras formed were not viable. Histogenesis and organogenesis were weakened by cellular changes of the polyps budding on the stolon. NSA 8-51

5794

STUDY OF THE PHASES OF RADIATION RESPONSE IN THE RAT. L. F. Lamerton, L. A. Elson, and W. R. Christensen. Brit. J. Radiol. 26, 510-18(1953).

Authors describe observations on rats given 500-600 r or 400-450 r, with respect to weight loss, growth rate, occurrence of generalized infection, and blood counts. Preliminary trials of β -mercaptoethylamine as a protective agent gave promising results (severity of both initial weight loss and subsequent anemia were reduced). NSA 8-53

5795

THE DEPOSITION OF Sr⁹⁰ IN RABBIT BONES FOLLOWING INTRAVENOUS INJECTION. Jennifer Jowsey, Barbara Rayner, Margaret Tutt, and Janet Vaughan. Brit. J. Exptl. Pathol. 34, 384-91(1953).

Rabbits 1 day and 5-7 weeks old were injected with Sr⁹⁰, and retention and distribution of the isotope were studied by sacrificing animals at intervals up to 18 months post-injection. Findings are described, significance in terms of risk of tumor development are considered. NSA 8-52

5796

Atomic Energy Project, Univ. of Rochester
TREATMENT WITH SUCCESSIVE ANTIBIOTICS OF DOGS EXPOSED TO TOTAL BODY X-IRRADIATION. Molly P. Coulter and Robert W. Miller. Sept. 8, 1953. 10p. Contract W-7401-eng-49. (UR-276).

Sixty dogs were given total-body exposure of 450 r of 250 kv x rays (LD₅₀), 30 received penicillin and streptomycin from 7th-14th days postirradiation, aureomycin from 15th-21st days. Remaining 30 served as untreated controls. Fifteen of controls died, compared with 3 treated dogs. Use of broad spectrum antibiotics on schedule contrived to avoid development of resistant bacteria proved beneficial when administered prophylactically for acute radiation syndrome in dogs. NSA 8-60

5797

Atomic Energy Project, Univ. of Rochester
THE EFFECT OF A PROTEIN FREE DIET ON RECOVERY FROM X-IRRADIATION INJURY IN THE RAT. Milton J. Schlesinger, Jr. Sept. 11, 1953. 30p. Contract W-7401-eng-49. (UR-279).

Young adult rats were irradiated (400 and 250 r x rays one week apart) and placed on protein-free diet immediately after first exposure. Results indicate that protein-deficient diet leads to an increased number of mortalities in irradiated animals compared to mortality figures for groups of animals on an 18% casein diet treated in similar manner. NSA 8-61

5798

Naval Radiological Defense Lab.

THERAPEUTIC EFFECT OF RAT BONE MARROW INJECTION IN RATS EXPOSED TO LETHAL WHOLE-BODY X RADIATION. M. C. Fishler, L. J. Cole, V. P. Bond, and W. L. Milne. Sept. 8, 1953. 26p. (USNRDL-410).

Single intravenous injection of normal homologous rat bone marrow into Sprague-Dawley rats after whole-body x radiation in lethal and supralethal range, 675-770 r, elicited a modification of response which was reflected in decreased mortality and enhanced body weight recovery as compared with irradiated controls. After 800 r, administration of bone marrow had no effect on survival or on mean survival time. NSA 8-62

5799

Kansas State Coll.

STUDIES OF INSECTS AND INSECTICIDES WITH TRACERS. Paul A. Dahn. p. 162-99 of CONFERENCE ON THE USE OF ISOTOPES IN PLANT AND ANIMAL RESEARCH. Apr. 1953. 38p. (TID-5098(p. 162-99)).

A review of literature on biological effects of irradiation is included. NSA 8-82

5800

Radiation Lab., Univ. of Calif., Berkeley

BIOLOGICAL STUDIES OF RADIATION EFFECTS AND METABOLIC PROPERTIES OF VARIOUS MATERIALS. p. 3-47 of MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT, APRIL, MAY, AND JUNE 1953. Sept. 21, 1953. 45p. Contract W-7405-48. (UCRL-2345(p. 3-47)).

Evidence is presented to confirm high radioresistance of budding yeast and establishes these cells as the radio-resistant component of the populations studied. Hematological effects of α particles from injected At²¹¹ in rats and monkeys are presented in tabular form. NSA 8-431

5801

Brookhaven National Lab.

TOLERANCE OF CERTAIN HIGHER PLANTS TO CHRONIC EXPOSURE TO GAMMA RADIATION FROM COBALT⁶⁰. Arnold H. Sparrow, and Eric Christensen. [1953]. 8p. (BNL-1588).

Radiation tolerance of 31 species of higher plants to chronic γ irradiation from Co⁶⁰ was determined. Most sensitive plants: Lilium longiflorum and Tradescantia paludosa, most resistant: broccoli and Gladiolus. It is suggested that plants with large chromosomes tend to be more sensitive than most plants with small chromosomes. There was a severe effect on growth of: Lilium and Tradescantia with daily exposure of 30-40 r, broccoli and Gladiolus with daily exposures of 2500 and 6000 r. NSA 8-434

5802

Brookhaven National Lab.

ROOT PRODUCTION IN PLANTS FOLLOWING LOCALIZED STEM IRRADIATION. Eric Christensen. [nd]. 7p. (BNL-1596).

Acute x irradiation applied to short regions of stems of certain intact seedlings caused development of adventitious roots immediately above irradiated site. Effective dosages

varied with species; showed wide range in any one species. Roots were produced in *Xanthum* following 1500 to 12,000 r; in *Nicotiana glauca* following 6000 r; in *Lycopersicum esculentum* following 24,000 r; and in *Phaseolus* following 16,000 r. Blocking of phloem resulting in obstruction to downward movement of organic materials is suggested as an explanation for adventitious root development. NSA 8-435

5803

Brookhaven National Lab.

GROWTH AND MUTATION OF BACTERIA DURING CONTINUOUS IRRADIATION. B. A. Rubim. [1953]. 35p. (BNL-1617).

Bacteria were grown during continuous exposure to radiation intensities up to 10,000 r/hr. Growth rate was equal to that of nonirradiated controls, maximum crop of cellular material was also equal. Period before inception of growth increased as a function of dose, as did mutation frequency. Nucleic acid content of irradiated cultures was indistinguishable from that of controls. NSA 8-436

5804

Massachusetts Inst. of Tech.

QUARTERLY PROGRESS REPORT FOR THE PERIOD JULY 1, 1953 TO SEPTEMBER 30, 1953. Bernard E. Proctor and Samuel A. Goldblith. Oct. 1, 1953. 11p. Contract AT(30-1)-1164. (NYO-3341).

Data from studies on relative bactericidal effects of high energy γ , x, and cathode rays on spores of *B. thermoacidurans* in saline are presented. Modifications in bacterial radiosensitivity produced by varying the thickness, volume, atmosphere, and medium are discussed. NSA 8-437

5805

Atomic Bomb Casualty Commission

INTERIM REPORT [FOR] JANUARY 1 THROUGH JUNE 30, 1951. PART I. RESEARCH. 115p. (NYO-4432).

Research program of Atomic Bomb Casualty Commission is summarized. Data are presented from genetic studies, pediatric and adult medical studies, and autopsy studies on both exposed and control groups. NSA 8-438

5806

TERMINAL PHENOMENA ASSOCIATED WITH MASSIVE DOSES OF X-RAYS. Howard L. Andrews and Kirkland C. Brace. Am. J. Physiol. 175, 138-40(1953).

Series of 27 guinea pigs were exposed to 25,000 r of x rays over whole body or with various areas shielded. All animals showed striking drop in heart rate and body temperature, and slow waves appeared in electroencephalogram. Clinical signs of central nervous system dysfunction appeared after a few thousand r had been delivered, and persisted until death. Dysfunction appears to be subcortical and not the direct result of ionization in brain tissue. NSA 8-439

5807

EFFECT OF WHOLE BODY X-IRRADIATION ON BLOOD CONSTITUENTS. W. E. Cornatzer, O. Engelstad, and John P. Davison. Am. J. Physiol. 175, 153-5(1953).

Determinations of plasma constituents in dogs before and after 500 r whole-body x rays revealed statistically significant increases in plasma cholesterol, uric acid, and a decrease in albumin-globulin ratio and percentage of cholesterol ester. NSA 8-440

5808

OSSEOUS DAMAGES IN IRRADIATION OF RENAL TUMORS IN INFANCY AND CHILDHOOD. Walter M. Whitehouse and Isadore Lampe. Am. J. Roentgenol. Radium Therapy Nuclear Med. 70, 721-9(1953).

Vertebral damage and unilateral underdevelopment of ilium were exhibited by patients given irradiation therapy for renal tumors in childhood. Degree of bone damage appears to be related to factors in dosage. NSA 8-441

5809

EFFECTS OF IRRADIATION ON ANABOLISM OF ANTIBODY AND OF SERUM ALBUMIN AND GLOBULIN. Kingsley M. Stevens, Irving Gray, and Melvin S. Schwartz. Am. J. Physiol. 175, 141-6(1953).

Effects of 500 r of whole-body x irradiation upon uptake of S^{35} -methionine into (1) antibody, (2) serum globulin, (3) serum albumin and (4) total protein in normal and immunized rabbits were studied. Results indicate (1) is depressed 30-50%; (2) and (3) are greatly stimulated. Effects are attributed to primary effect upon desoxyribonucleic acid metabolism. NSA 8-442

5810

SYNERGISTIC EFFECT OF INTERNAL IRRADIATION AND PHLEBOTOMY ON PRODUCTION OF CIRRHOSIS AND ASCITES IN DOGS. P. F. Hahn, Ella Lea Carothers, and Houston Brummit. Am. J. Physiol. 175, 162-6(1953).

Intravenous administration of large amounts of radioactive Au colloid may result, in young dogs, in ascites and hepatic cirrhosis, but in large series of adult dogs under similar conditions ascites did not develop. Phlebotomy superimposed upon such irradiation procedures, however, did result in production of ascites in adult dogs, even when total irradiation of liver and spleen was several times smaller than that used with Au injections alone. NSA 8-442

5811

INDUCTION OF PITUITARY TUMORS BY MEANS OF IONIZING IRRADIATION. A. C. Upton and J. Furth. Proc. Soc. Exptl. Biol. Med. 84, 255-7(1953).

Pituitary tumors were induced in mice by single exposure to ionizing radiation, greatest incidence occurred among mice exposed to doses of γ radiation below LD_{50} . Tumors were four times more frequent among females than among males. Neutrons were apparently more efficient than γ rays in inducing these neoplasms, data suggest 40-70 rem is an effective dose. Latency period was very long, with maximum incidence at 17 to 25 months postirradiation. NSA 8-444

5812

EVIDENCE FOR X-RAY INDUCED RECESSIVE LETHAL MUTATIONS IN YEAST. Robert K. Mortimer and Cornelius A. Tobias. Science 118, 517-8(1953).

X ray induced recessive lethal mutations were demonstrated following exposure of diploid yeast to doses of 2500 r and 7500 r of x rays. Extension of radiobiological data on haploid and diploid yeast to triploid and tetraploid yeast cells indicates that some other form of lethal damage is also induced by x rays. NSA 8-445

5813

Oak Ridge National Lab.

HEALTH PHYSICS DIVISION SEMIANNUAL PROGRESS REPORT FOR PERIOD ENDING JULY 31, 1953. K. Z. Morgan. Oct. 20, 1953. 39p. Contract W-7405-eng-26. (ORNL-1596).

Includes description of progress in study of maximum permissible Co^{60} -concentration experiments in mice. NSA 8-446

5814

Atomic Energy Project, Univ. of Calif., Los Angeles
RECENT ATTEMPTS TO ALTER THE RESPONSE TO IONIZING RADIATIONS. Wilbur A. Selle, George D. Mason, and Robert H. Newman. Sept. 15, 1953. 73p. Contract AT-04-1-Gen-12. (UCLA-264).

Authors summarize 118 recent papers concerning attempts to alter response of animals to ionizing radiations. Data from studies of role of animal's own normally functioning reticulo-endothelial system in defense against radiation effects are included. NSA 8-447

5815

Atomic Energy Project, Univ. of Calif., Los Angeles

INFLUENCE OF GANGLIONIC BLOCKING AGENTS ON SURVIVAL TIME IN RADIATED MICE. Thomas J. Haley, John Heglin, and Eve McCulloh. Oct. 16, 1953. 9p. Contract AT-04-2-Gen-12. (UCLA-269).

Banthine, nicotine, Prantal, tetraethylammonium chloride, Su-1194, and Pendiomide Dibromide (0.45, 0.9, 1.35, and 1.8×10^{-6} M), administered intramuscularly daily to mice receiving 550 r acute whole body x irradiation did not significantly increase survival time or decrease total mortality. While not beneficial, they were judged not detrimental. NSA 8-448

5816

Atomic Energy Project, Univ. of Calif., Los Angeles
INFLUENCE OF WATER SOLUBLE VITAMIN E ON SURVIVAL TIME IN RADIATED MICE. Thomas J. Haley, Eve F. McCulloh, and W. G. McCormick. Nov. 2, 1953. 9p. (UCLA-271).

Injection of water-soluble vitamin E (25.5% α -tocopherol) in daily doses of 0.5, 1.0, 2.0, and 3.18 mg/animal, prior to and throughout postirradiation period, did not benefit mice receiving 550 r acute whole-body x irradiation. The two higher doses significantly decreased both the ST₅₀ day and the day of total mortality, indicating that these doses acted synergistically with the irradiation. NSA 8-449

5817

COMPARATIVE PROTECTIVE EFFECT OF CYSTEINE AGAINST FAST NEUTRON AND GAMMA IRRADIATION IN MICE. Harvey M. Patt, John W. Clark, and Howard H. Vogel, Jr. Proc. Soc. Exptl. Biol. Med. 84, 189-93 (1953).

Cysteine pretreatment confers significant protection against acute lethal effects of (1) γ and (2) fast neutron irradiation in mice. Protection observed with (2) is about half of that found with (1). Data supports concept of a true dose-reduction in the sense that primary mechanisms are involved. Inverse relation between protective efficiency and ionization density is comparable to that noted for oxygen effect, may be interpreted in terms of spatial distribution of radicals formed in H₂O, and their reactions. NSA 8-450

5818

TRANSFUSION OF SEPARATED LEUKOCYTES INTO IRRADIATED DOGS WITH APLASTIC MARROWS. G. Brecher, K. M. Wilbur, and E. P. Cronkite. Proc. Soc. Exptl. Biol. Med. 84, 54-6 (1953).

Feasibility of recirculating separated leucocytes was demonstrated in dogs with complete bone marrow aplasia induced by x irradiation. Transfused granulocytes were shown to migrate to sites of infection. NSA 8-451

5819

Hanford Works

ABSORPTION OF PLUTONIUM FED CHRONICALLY TO RATS. 1. FRACTION DEPOSITED IN SKELETON AND SOFT TISSUES FOLLOWING ORAL ADMINISTRATION OF SOLUTIONS OF VERY LOW MASS CONCENTRATION. Joseph Katz, Harry A. Kornberg, and Herbert M. Parker. Aug. 10, 1953. 20p. (HW-28991). NSA 8-454

5820

WHOLE BLOOD CLOTTING, CLOT RETRACTION AND PROTHROMBIN UTILIZATION IN BURROS FOLLOWING TOTAL-BODY GAMMA RADIATION. B. F. Trum and J. H. Rust. Proc. Soc. Exptl. Biol. Med. 82, 347-51 (1953).

Burros were exposed to a lethal dose of whole-body gamma radiation. They had symptoms characteristic of the acute radiation syndrome, four died during the first week. There were hemorrhagic symptoms, retardation of whole blood clotting, severe thrombocytopenia, a lessening of clot reaction and pronounced diminution of prothrombin utilization rate. There was no demonstrable circulating anticoagulant.

5821

Engineering Research Inst., Univ. of Mich.

UTILIZATION OF THE GROSS FISSION PRODUCTS. PROGRESS REPORT NO. 5. L. E. Brownell, L. C. Anderson, H. J. Gomberg, L. L. Kempe, J. J. Martin, W. W. Meinke, J. V. Nehemias, R. B. Morrison, L. Thomassen, G. J. Van Wylen, E. T. Vincent, and R. A. Wolfe. Sept. 1953. 202p. (COO-196).

Includes reports on: effects of a diet of irradiated food on animals; control of trichinosis infections in pork by irradiation; nutritive value of irradiated media for protozoa with essential amino acid and vitamin B needs similar to those of man; and radiosterilization of bacteriological culture media. NSA 8-703

5822

Brookhaven National Lab.

STUDIES ON INDUCED MUTATION IN MAIZE. E. J. Dollinger. [1953?]. 57p. (BNL-1622).

Results are reported from investigations of nature of radio-induced mutations at certain selected chromosomal loci in maize. NSA 8-706

5823

HISTOLOGICAL EFFECTS UPON THE PARS ANTERIOR OF THE RAT FOLLOWING HYPOPHYSEAL CATHODE-RAY IRRADIATION AND WHOLE-BODY X-IRRADIATION. G. M. Mateyko, Washington Square Coll. of Arts and Science, New York Univ. and H. A. Charipper, Brookhaven National Lab. [1953?]. 39p. (BNL-1624).

Observations made on lethal effects of localized hypophyseal irradiation, the alterations in cellular ratios, and cytological changes indicate that the pituitary gland is a radiosensitive tissue. NSA 8-707

5824

MECHANISMS OF HYPERSENSITIVITY AND THEIR SIGNIFICANCE IN RELATION TO CERTAIN ASPECTS OF RADIATION SYNDROME: A CRITICAL REVIEW. REPORT NO. 1. Kenneth L. Burdon, School of Aviation Medicine and Baylor Univ. Coll. of Medicine. Aug. 1953. 44p. Contract AF33(038)-15985. (NP-4978).

Selected papers on hypersensitivity and related topics are reviewed. Critical comparisons are made between cellular-histamine theory of allergy, the humoral (anaphylatoxin) theory, and the protease-activation theory. Author feels that a better understanding of the mechanism of allergic reactions may elucidate some basic biological processes affected in radiation sickness. NSA 8-708

5825

Naval Radiological Defense Lab.

PERFORMANCE STUDIES ON ANIMALS SUBJECTED TO IONIZING RADIATION. (SEMI ANNUAL PROGRESS REPORT FOR THE MEDICAL DEPARTMENT OF THE UNITED STATES AIR FORCE) JUNE 30, 1951 TO JUNE 30, 1952. July 15, 1952. 21p. (USNRDL-356; ATI-163404). NSA 8-709

5826

Naval Radiological Defense Lab.

COMBINED EFFECTS OF TOTAL BODY X IRRADIATION AND RADIANT ENERGY THERMAL BURNS; 1. STUDY OF BLOOD COAGULATION. W. M. Davis, A. K. Davis, W. Lee, and E. L. Alpen. Oct. 22, 1953. 24p. (USNRDL-413, AFSWP-473).

Total-body x irradiation (500 r) produces rapidly developing thrombocytopenia and defective clotting mechanism; 100 r dose is followed by brief thrombocytosis then transient mild thrombocytopenia. Combined effects of thermal burns and total-body x rays; brief initial fall in platelets (seen in burns alone) followed by same degree of thrombocytopenia seen in rats receiving exposure at particular dose given. Clotting defect is not so severe in

combined injury animals as in irradiated animals.
NSA 8-710

5827

Naval Radiological Defense Lab.
INCREASED TOLERANCE TO HYPOXIA IN IRRADIATED
AND IN FOOD DEPRIVED RATS. D. B. Newsom and D. J.
Kimeldorf. Aug. 6, 1953. 20p. (USNRDL-414).

Irradiated rats were significantly more resistant to
lethal effects of hypoxia than were nonirradiated controls.
Effect disappears 5 days after 500 or 600 r of total body
x radiation. When deprived of food for 72 hr, nonirradiated
animals exhibited an increase in hypoxic tolerance
comparable to that of irradiated animals. NSA 8-711

5828

THE EFFECT OF RADIATION WITH HIGH DOSES OF
X-RAYS ON THE CONNECTIVE BASOPHILE GRANULOUS
CELLS. Massimiliano Campani. Translated from Boll.
soc. med. chir. Modena 48, 3-8(1948). 3p. (AEC-tr-1745).

Intense whole-body x irradiation increased liberation
of metachromatic granules from connective basophile
granulous cells in skin of mice and caused their diffusion
into the surrounding tissues. NSA 8-713

5829

THE EFFECT OF LOW AND HIGH X-RAY DOSAGE ON
THE ASCORBIC ACID CONTENT OF THE SUPRARENAL.
A. Hochman and L. Bloch-Frankenthal. Brit. J. Radiol.
26, 599-600(1953).

Low and high doses of total-body x irradiation exerted
equal effect on ascorbic acid content of rat adrenals.
(Ascorbic acid content is decreased after total body x
irradiation.) Therapeutic effect of x rays on some ailments
is discussed. NSA 8-714

5830

A STUDY OF THE PHASES OF RADIATION RESPONSE IN
THE RAT. II. THE EFFECTS OF NON-UNIFORM IRRADI-
ATION. L. F. Lamerton, L. A. Elson, and E. B. Harriss.
Brit. J. Radiol. 26, 568-76(1953).

Acute phase of irradiation response was much more
marked under conditions of uniform whole body irradiation
than with partial body irradiation. Preliminary investigations
on nature of radiation-induced anemia, using radioactive
Fe, are described. Studies utilized young rats to evaluate
"initial reaction" (change in growth rate and blood picture in
first few days post-exposure) and "acute reaction"
beginning about 10 days postexposure. NSA 8-715

5831

RADIATION HAZARDS FROM THE USE OF DENTAL X-RAY
UNITS. W. E. Nolan and H. W. Patterson. Radiology 61,
625-96(1953).

Potential hazards to dentists, technicians, and
patients during dental roentgenography were studied.
Recommendations for safe procedures are presented.
NSA 8-716

5832

RENAL DAMAGE IN X-RAY THERAPY. J. W. J. Carpender.
Radiology 61, 649-50(1953).

Dangers of overdosage to kidneys during x irradiation
of abdomen are reviewed. NSA 8-717

5833

Brookhaven National Lab.
ADRENAL CHOLESTEROL, LIVER GLYCOGEN, AND
WATER CONSUMPTION OF FASTING AND X-IRRADIATED
RATS. L. F. Nims, and Elizabeth Sutton. [1953?] 23p.
(BNL-1631).

Studies on hypophysectomized, fasting, and x irradiated
rats reveal: initial rapid fall in liver glycogen results
from anorexia of irradiation, while secondary rise results
from increased pituitary-adrenal activity in response to
stimuli from both whole body exposure and fasting state.
Stimuli from latter two sources seem to be roughly additive.
NSA 8-725

5834

A GLOSSARY OF TERMS IN NUCLEAR SCIENCE AND
TECHNOLOGY. NATIONAL RESEARCH COUNCIL
CONFERENCE ON GLOSSARY OF TERMS IN NUCLEAR
SCIENCE AND TECHNOLOGY. New York, American
Society of Mechanical Engineers. 1953. 278p.

Sections on biophysics and radiobiology are included.
NSA 8-968

5835

ANNUAL REVIEW OF NUCLEAR SCIENCE. VOL. 3.
Stanford, Annual Reviews, Inc. 1953. 412p.

Chapters on the interaction of nuclear radiations
with chemical and biological materials and systems in
addition to standard topics such as nuclear reactions,
structure, and instrumentation are included. NSA 8-969

5836

Delaware Univ., Newark.
RESEARCH PERTAINING TO X-RADIATION DAMAGE IN
THE PARASITIC WASP, HABROBRACON. FINAL REPORT
FOR THE PERIOD JULY 1, 1950 TO AUGUST 31, 1953
Arnold M. Clark. Nov. 30, 1953. 29p. (Contract AT(30-1)-
953. (AECU-2764).

Author studied relation between chromosome number
and radiosensitivity in *Habrobracon*. Differential radio-
sensitivity between haploids and diploids depends upon stage
of development at which organisms are irradiated and cannot
be correlated with gene number. No direct correlation was
found between radiosensitivity pattern and O₂ consumption,
phosphatase activity, nucleic acid changes, or catalase
activity. NSA 8-973

5837

ON THE STIMULATION OF PLANT BUDS BY X-RAYS.
P. Reiss. Compt. rend. soc. biol. 92, 984-6(1925).
(In French).

5838

Hanford Works
INHIBITION OF GROWTH OF *CHLORELLA PYRENOIDOSA*
BY BETA-EMITTING RADIOISOTOPES. J. W. Poner and
H. J. Knauss. Oct. 19, 1953. 17p. Contract W-31-109-
eng-52. (HW-29666).

C. pyrenoidosa cells were grown for 3 days in presence
of several levels of H₂O, P³², Sr⁹⁰-Y⁹⁰, and S³⁵ and then
subcultured for 3 days in nonradioactive inorganic nutrient
solution. Growth rates decreased in proportion to radiation
dose above levels of 1000 rep/day. Reduced rate continued
in subculture. Increase in average cell size occurred
during growth of algae in radioactive solutions. NSA 8-975

5839

Atomic Bomb Casualty Commission
THE GROWTH AND DEVELOPMENT PROGRAM OF THE
ATOMIC BOMB CASUALTY COMMISSION. ANALYSIS OF
OBSERVATIONS ON MATURATION, BODY BUILD AND
POSTURE TAKEN IN 1951 ON 4,800 HIROSHIMA CHILDREN.
Earle L. Reynolds. Oct. 30, 1952. 69p. (NYO-4459).
NSA 8-976

5840

Rochester, Univ., N. Y. Atomic Energy Project
SEVERE NEUROLOGICAL DYSFUNCTION IN A FASTING
DOG FOLLOWING 550 r EXPOSURE TO 250 Kvp X-RAYS
IN: QUARTERLY TECHNICAL REPORT [FOR] JULY
1 THRU SEPTEMBER 30, 1953. Nov. 10, 1953. 47p.
Contract W-7401-eng-49. (UR-290).

Severe neurological dysfunction and multiple subarachnoid
hemorrhages were observed in a dog following total body
exposure to 550 r of x rays. NSA 8-977

5841

VERTEBRATE RADIOBIOLOGY; EMBRYOLOGY.
Roberts Rugh. Ann. Rev. Nuclear Sci. 3, 271-302(1953).

Results of the better controlled experiments of the
last several years concerning radiation effects on embryos
are summarized. Most deal with highly penetrating x or

γ rays. Author also considers factors affecting the gamete. NSA 8-978

5842

VERTEBRATE RADIOBIOLOGY: HISTOPATHOLOGY AND CARCINOGENESIS. J. Furth and A. C. Upton. Ann. Rev. Nuclear Sci. 3, 303-38(1953).

Survey of recent literature disclose trend to correlate radiation sensitivity with nucleic acid synthesis and enzyme activity. Authors emphasize the marked difference between neoplasms due to local action and those dependent to some extent on an indirect mechanism. All species appear to be susceptible to former. Includes 204 references. NSA 8-979

5843

CELLULAR RADIOBIOLOGY. Arnold H. Sparrow and Frederick Forro, Jr. Ann. Rev. Nuclear Sci. 3, 339-68 (1953).

Authors review research designed to determine complete picture of radiation effects on cells. Includes 279 references. NSA 8-980

5844

PRACTICAL ASPECTS OF RADIATION INJURY. Louis H. Hempelmann and Joseph G. Hoffman. Ann. Rev. Nuclear Sci. 3, 369-32(1953).

Authors describe: acute radiation injury in man; possible therapy suggested by current animal experimentation; late tissue reactions which arise at various dosage levels. NSA 8-981

5845

SOME OBSERVATIONS ON THE RELATION BETWEEN DOSE MEASURES AND BLOOD CHANGES. Matts Helde and T. Wahlberg. Acta Radiol. 40, 435-42(1953).

Relationship between frequency of blood picture changes of certain types and irradiation received during various periods of time in occupational exposure was investigated. Relationship between effect and dose per short periods shows considerably better correlation than does effect with dosage per week. NSA 8-982

5846

HISTOLOGIC LESIONS IN THE THYROID GLANDS OF PATIENTS RECEIVING RADIOIODINE FOR HYPERTHYROIDISM. Morris E. Dailey, Stuart Lindsay, and Earl R. Miller. J. Clin. Endocrinol. and Metabolism 13, 1513-29(1953).

Authors describe variety of lesions observed upon histologic examination of thyroid glands from 23 patients who had received ^{131}I for diagnosis or treatment of hyperthyroidism. Pathogenesis of lesions is discussed. NSA 8-983

5847

LACK OF PROTECTIVE EFFECT OF ALLYL THIOUREA AGAINST X-IRRADIATION. Robert N. Feinstein and Gladys J. Cotter. Science 118, 552(1953).

Authors describe their experiments in which allyl thiourea had no protective effect whatsoever. NSA 8-984

5848

THE EFFECT OF EXPOSURE TO THE ATOMIC BOMBS ON PREGNANCY TERMINATION IN HIROSHIMA AND NAGASAKI: PRELIMINARY REPORT. J. V. Neel, W. J. Schull, D. J. McDonald, N. E. Morton, M. Kodani, K. Takeshima, R. G. Anderson, J. Wood, R. Brewer, S. Wright, J. Yamazaki, M. Suzuki, and S. Kitamura. Science 118, 537-41(1953).

Data collected over 7 yr period are analyzed. NSA 8-985

5849

STUDIES OF THORIUM X APPLIED TO HUMAN SKIN. III. THE RELATIVE EFFECTS OF ALPHA AND BETA-GAMMA IRRADIATION IN THE PRODUCTION OF ERYTHEMA. Victor H. Witten, Earle W. Brauer, Vera

Holmstrom, and Robert Loevinger. J. Invest. Dermatol. 21, 249-57(1953).

Relative biologic effectiveness of α component was found to be many times greater than that of the β - γ component as judged by degree of erythema and pigmentation produced. NSA 8-986

5850

PREVENTIVE AND THERAPEUTIC EFFECTS OF CERTAIN CHEMICAL SUBSTANCES AGAINST RADIATION. Andre Herne. Bruxellas-med. 33, 2267-77(1953). (In French).

Efficacies of several substances in reducing physical and chemical effects of radiation are reviewed. It is concluded that cysteine-amine offers most protection and is least toxic. Includes 23 references. NSA 8-989

5851

Radiation Lab., Univ. of Calif., Berkeley
CHEMISTRY DIVISION QUARTERLY REPORT, JUNE, JULY, AUGUST, 1953. Sept. 30, 1953. Contract W-7405-eng-48. 96p. (UCRL-2355).

Includes a report on effect of x irradiation of mice on liver concentration of a number of coenzymes. NSA 8-1002

5852

EFFECTS OF IRRADIATION BY X-RAY UPON ANAEROBIC GLYCOLYSIS IN SPLEEN HOMOGENATES. Jean Hickman and Gilbert Ashwell. J. Biol. Chem. 205, 651-9(1953).

Glycolytic enzymes in spleen homogenates prepared from spleens of mice exposed to a lethal dose of radiation were studied. Effects were as follows: (1) Triosephosphate dehydrogenase was unaffected (2) phosphorylation coupled to oxidation of triosephosphate was decreased (3) glycolysis proceeding from hexosediphosphate to lactic acid was decreased (4) adenylic acid which disappeared was completely accounted for as the sum of adenosine, hypoxanthine and hypoxanthine riboside (author). NSA 8-1045

5853

Brookhaven National Lab.
QUARTERLY PROGRESS REPORT [FOR] JULY 1 - SEPTEMBER 30, 1953. (Unclassified section). 57p. (BNL-259).

Reports studies on: induced resistance to stem rust in oats by thermal neutron irradiation of seed; γ ray effects on keeping qualities of potatoes; and tumor induction in radiothyroidectomized mice by x irradiation of whole body or of head. NSA 8-1276

5854

Air Force Radiation Lab., Univ of Chicago
[PHYSIOLOGICAL EFFECTS OF RADIATION]. p.1-70 of QUARTERLY PROGRESS REPORT NO. 9. Oct. 15, 1953. 131p. Contract AF-33(038)-27353. (NP-4961(p. 1-70)).

Reports studies on: protective effects of cysteine and/or p-amino-propiophenone on radioinduced increase in adenosine triphosphatase activity of rat spleen and thymus, effects of 10,000 and 30,000 r on increasing 5-nucleotidase activity of mouse tissues; effect of caffeinedexedrine, and benzedrine on postirradiation weight loss and survival of rats; metabolic activity of irradiated rat tissue slices; x ray effect on mouse tissue cholinesterase activity. NSA 8-1283

5855

Air Force Radiation Lab., Univ. of Chicago
[RADIATION EFFECTS]. p. 71-120 of QUARTERLY PROGRESS REPORT NO. 9. Oct. 15, 1953. 131p. Contract AF33-038-27353. (NP-4961(p. 71-120)).

Includes reports on: protective effects of various anesthetic agents (thiopental sodium, cyclopropane, p-aminopropiophenone, catalase, and mixtures of O_2 , H_2 , He, and N_2) on radiation mortality in mice, rats, and amoeba; effects of x rays on amount of acetone and

ammonia in expired air of rabbits; effect of whole-body x rays on adenylic acid levels in rat spleen. NSA 8-1284

5856

THE INITIATION AND DEVELOPMENT OF CELLULAR DAMAGE BY IONIZING RADIATIONS. L. H. Gray. Brit. J. Radiol. 26, 609-18(1953).

Author reviews modern concepts of this subject.

Influence of primary localization of ionizing particles and influence of radioinduced chemical changes on biological damage are discussed. NSA 8-1286

5857

EFFECT OF WHOLE BODY X-IRRADIATION ON ASCORBIC ACID OF RAT TISSUES. H. L. Oster, A. L. Kretchmar, and F. H. Bethell. Proc. Soc. Exptl. Biol. Med. 84, 470-3(1953).

While mid-lethal whole-body x rays may directly reduce tissue ascorbic acid of Long-Evans strain rats, animals of Wistar strain exhibited a tendency toward an increase (except for adrenals). X ray effects are attributed to activation of the pituitary. NSA 8-1287

5858

REPRODUCIBILITY OF X-RAY SURVIVAL CURVES FOR YEAST CELLS. Thomas H. Wood. Proc. Soc. Exptl. Biol. Med. 84, 446-52(1953).

Accurate and reproducible x ray survival curves were obtained for both haploid and diploid yeast under carefully controlled conditions. NSA 8-1288

5859

INFLUENCE OF HIBERNATION ON SURVIVAL TIME AND WEIGHT LOSS OF X-IRRADIATION GROUND SQUIRRELS. John Doull and Kenneth P. DuBois. Proc. Soc. Exptl. Biol. Med. 84, 367-70(1953).

While hibernation markedly increased survival time in *Citellus tridecemlineatus* following lethal x ray doses, it did not alter ultimate mortality. NSA 8-1289

5860

ROENTGEN PARALYSIS IN THE MOUSE. V. V. Brunst. Am. J. Roentgenol. Radium Therapy Nuclear Med. 71, 131-8(1954).

Mice 1, 2, 3, 4, 5, 6, 10, 15, 20, and 25 days old were x irradiated with 3400 and 5000 r midway between fore and hind limbs through localizer slit 4 mm wide. Results indicate that a change in x ray sensitivity of spinal cord occurs approximately 4-5 days after birth. NSA 8-1290

5861

INFLUENCE OF WHOLE BODY X-IRRADIATION, COLD EXPOSURE AND EXPERIMENTAL ACIDOSIS ON PROTEIN COMPOSITION AND AZORUBIN BINDING CAPACITY OF RAT SERUM. Ulrich Westphal, Stanley G. Priest, John F. Stets, and George L. Selden. Am. J. Physiol. 175, 424-8(1953).

Total protein and albumin were significantly reduced in rat serum 2 and 3 days post irradiation, α and β globulin increased, γ globulin decreased. No effect on azorubin-binding capacity was noted. NSA 8-1291

5862

THE CONCENTRATION OF OXYGEN DIFFUSED IN TISSUES AT THE TIME OF IRRADIATION AS A FACTOR IN RADIOTHERAPY. L. H. Gray, A. D. Conger, M. Ebert, S. Hornsey, and O. C. A. Scott. Brit. J. Radiol. 26, 638-48(1953).

X ray sensitivity of tumor cells increased in well-oxygenated medium, sensitivity to fast neutrons was affected only slightly. Influence of O tension on x ray effects on cells in tissue culture was studied. NSA 8-1292

5863

BRAIN AND LIVER PHOSPHORUS METABOLISM IN THE ACUTE IRRADIATION SYNDROME. Warner H. Florsheim and M. E. Morton. Am. J. Physiol. 176, 15-19(1954).

Incorporation of peripherally administered tracer phosphate into brain tissue was not changed by x irradiation (20,000 r). Phosphorylative efficiency of liver slices irradiated *in vitro* likewise was unchanged. Clinical and histological irradiation changes are not attributable to changes in levels of blood glucose or brain cholinesterase. NSA 8-1293

5864

EFFECTS OF PLOIDY AND LINEAR ENERGY TRANSFER ON RADIOBIOLOGICAL SURVIVAL CURVES. Raymond E. Zirkel and Cornelius A. Tobias. Arch. Biochem. and Biophys. 47, 282-306(1953).

Radiobiological influence of linear energy transfer was investigated with respect to inhibition of cell division in a diploid strain of yeast, a haploid strain of yeast derived from the diploid, and a unicellular green algae. NSA 8-1294

5865

A STUDY ON THE PROTECTIVE ACTION OF 2,3-DIMERCAPTOPROPANOL (BAL) ON RADIATION-INDUCED CHANGES IN THE OVARIAN FOLLICLES IN MICE. Erik Odeblad. Acta Radiol. 40, 493-9(1953).

Mice were given P^{32} (5 μ c/g) or total-body dose of 400-600 r of x rays; some mice were treated with BAL. Histological studies of ovaries obtained by sacrificing animals 4 or 6 days postexposure revealed significant radiation protection afforded by BAL in P^{32} treated mice only, no protection in x rayed mice. NSA 8-1295

5866

CITROVORUM AND IRRADIATION INJURY. Dorothy J. Buchanan, William N. Pearson, Chandra Amarasingham, Granville W. Hudson, and William J. Darby. Am. J. Physiol. 175, 437-9(1953).

Citrovorum factor (1 mg/day) injected intraperitoneally prior to and following whole-body irradiation failed to alter clinical course or leucopenia and subsequent leucopoiesis in female albino rats. NSA 8-1296

5867

TIME AS A FACTOR IN POSTIRRADIATION PROTECTION BY PARABIOSIS. R. T. Binhammer, M. Schneider, and J. C. Finerty. Am. J. Physiol. 175, 440-2(1953).

Significant number of irradiated animals without postirradiation treatment for as long as 4 days escaped seemingly inevitable radiation death when paired (parabiosis) with nonirradiated partners. Critical period for postirradiation protection by parabiosis lies between 6th and 10th post-irradiation days. NSA 8-1297

5868

TRANSPORT OF RADIUM SULFATE FROM THE LUNG AND ITS ELIMINATION FROM THE HUMAN BODY FOLLOWING SINGLE ACCIDENTAL EXPOSURES. L. D. Marinelli, W. P. Norris, P. F. Gustafson, and T. W. Speckman. Radiology 61, 903-15(1953).

Authors present data on 6 persons accidentally exposed to $RaSO_4$ dust and studied for one year. Excretion of Ra was found to differ from observations made in cases of chronic Ra poisoning in man. Significance of observations is discussed. NSA 8-1299

5869

[UTILIZATION OF FISSION PRODUCTS] THE EFFECTS OF GAMMA RADIATION ON SOME PHARMACEUTICAL PRODUCTS. J. Controulis, C. A. Lawrence, and L. E. Brownell. Parke, Davis and Co.; Phoenix Project Univ. of Mich. and Fission Products Lab., Engineering Research Inst., Univ. of Mich. [1953]. 13p. (AECU-2711).

Authors report effects of γ rays on: B. subtilis, Ca gluconate, ascorbic acid, pituitary gland fraction, estrone, diphtheria-tetanus-pertussis antitoxin-antiserum,

penicillin, streptomycin, aureomycin, chloromycetin, and terramycin. Complete sterility was obtained in samples contaminated with *B. subtilis* at end of 24-hr exposure to 2.04×10^6 rep γ radiation as measured in air. NSA 8-30

5870

ENZYMATIC ADAPTATION IN NON-VIABLE CELLS.

S. Spiegelman, L. S. Baron, and H. Quastler. Federation Proc. 10(1), 130-1(1951).

Viability and adaptability in *Saccharomyces cerevisiae* Strain K could not be separated by cell destruction methods. Ultraviolet and N-mustard treatment gave an indication that non-viable cells could adapt. Doses of x rays, while resulting in 99.9% loss in viable cells, did not decrease capacity to adapt to either galactose or maltose
BA 25-26261

5871

CATARACT INDUCTION (IN MICE) BY SLOW NEUTRONS AND X-RAYS. K. W. Christenberry and J. Furth. Federation Proc. 10(1), 351-2(1951).

An abstract. BA 25-26543

5872

EFFECTS OF RADIATION ON LENS. Frank B. Johnson and Solbert Permutt. Federation Proc. 10(1), 359(1951).

An abstract. BA 25-26545

5873

THE EFFECT OF DESOXYCORTICOSTERONE (DOCA), N-HEXYL BUTYRATE, ALPHA-NAPHTHYLTHIOUREA, AND GUM ARABIC ON THE SURVIVAL OF RATS RECEIVING A LETHAL DOSE OF X-RAYS. G. Lambert, J. Maisin, M. Mandart, F. Meersseman, G. Podio, and E. Plugers. Compt. rend. soc. biol. 144(5/6), 449-52(1950).

DOCA did not protect rats, 1 ml n-hexyl butyrate sensitized them to irradiation. Injection of alpha-naphthylthiourea provoked a still greater sensitization (inhibited if substance injected was suspended in gum arabic). Gum arabic alone provided protection against x ray effects. BA 25-26547

5874

CIRCULATING BLOOD CELLS FOLLOWING RADIATION IN HIBERNATING WOODCHUCK. Falconer Smith and Marie M. Grenan. Federation Proc. 10(1), 128(1951).
BA 25-26549

5875

BIOLOGICAL HAZARDS OF ATOMIC ENERGY. Nature 167(4244), 355-8(1951).

This report is based on proceedings of a conference at the Royal Institution dealing with biological effects (clinical, plant physiology, etc.), tolerance levels and protection, and genetic implications. BA 25-26560

5876

PITUITARY AND ADRENAL ASCORBIC ACID IN X-IRRADIATED RATS. K. D. Venters and E. E. Panter. Federation Proc. 10(1), 141(1951).

An abstract. BA 25-27219

5877

EFFECTS OF BETA RAYS ON MAMMALIAN NERVE ACTIONS POTENTIALS. Edgar L. Gasteiger. Federation Proc. 10(1), 48(1951).

An abstract. BA 25-27468

5878

NEW INTERPRETATIONS OF SOME PROBLEMS CONCERNING ABNORMAL MITOSES. H. Marquardt. Naturwissenschaften 37, 416-424, 433-438(1950).

The possible types of injury to the nucleus and methods of analysing chromosome breaks are described. A survey is given of previous research and the theory relating to the cause of breaks. (from abstract). PBA 21-813

5879

THE ROLE OF CONNECTIVE TISSUES IN THE RADIATION OF TUMORS. B. Jolles. Brit. Cancer 4, 77-89(1950).

Analysis of radiation reaction in 18 cases of accessible tumors treated by sieve-chessboard method reveals that rate and degree of indirect radiation reaction depends on histological organization of stroma and on the dose. The sieve, in effect, protects connective tissue which, it is felt, acts as a local defense system against the tumor. BA 25-27897

5880

EFFECTS OF RADON RADIATION UPON MOUSE TUMORS. M. Spiegel-Adolf and R. Robbins. Federation Proc. 10(1), 250-1(1951).

An abstract. BA 25-27921

5881

AN ATTEMPT AT ELIMINATING INJECTED THOROTRAST FROM RABBITS BY 2,3-DIMERCAPTOPROPANOL (BAL). B. E. W. Nordenstrom-Blomquist. Acta Radiol. 34(6), 533-45(1950).

Author describes unsuccessful attempt to effect excretion of intravenous thorotrast in rabbits by 2,3-dimercaptopropanol (BAL). BA 25-27950

5882

EFFECT OF X-RADIATION ON FERMENTATION OF GLUCOSE BY LOW AND HIGH NITROGEN YEAST. F. G. Sherman. Federation Proc. 10(1), 125(1951).

An abstract. BA 25-28555

5883

THE ACTION OF X-RAYS ON CELLS IN ACTIVE NUCLEIC ACID METABOLISM. M. de Nicola. Pubbl. staz. zool. Napoli 22, 283-93(1950). (In Italian).

In testis of *Asellus* irradiated with doses of 250 r to 5000 r, mitosis and meiosis are arrested and germinal epithelium degenerates. Spermatogonia lose capacity to divide and DNA is slowly converted into RNA which is lost from cell which then dies. Author suggests x rays act specifically upon DNA. BA 25-29924

5884

CHROMOSOME- AND GENE-MUTATION RATES IN BARLEY GRAINS EXPOSED TO VARIOUS SOAKING AND COLD TREATMENTS DURING OR AFTER X-RADIATION, AND TO DOSAGE FRACTIONATION. Reinhard W. Kaplan. Z. indukt. Abstamm. -u. Vererbh. 83(3), 347-82(1951). (In German). BA 25-29935

5885

EFFECT OF X-RADIATION ON THE GROWTH OF *TORULOPS UTILIS*. Barbara M. Grant and F. G. Sherman. Federation Proc. 10(1), 54(1951).

An abstract. BA 25-30105

5886

ANEMIA AND ERYTHROPOIESIS IN THE IRRADIATED RAT: AN EXPERIMENTAL STUDY WITH PARTICULAR REFERENCE TO TECHNIQUES INVOLVING RADIOACTIVE IRON. C. F. Baxter, E. H. Belcher, E. B. Harriss and L. F. Lamerton. Brit. J. Haematol. 1, 86-103(1955).

5887

EFFECTS OF A SINGLE WHOLE-BODY EXPOSURE TO THE DEUTERON BEAM ON THE BLOOD AND TISSUES OF THE WHITE MOUSE. Paul D. Rosahn, Cornelius A. Tobias, and John H. Lawrence. Federation Proc. 10, 369(1951).

An abstract. BA 25-30109

5888

THE RESPONSE OF MICE TO INOCULATION WITH CERTAIN AVIRULENT BACTERIA AFTER EXPOSURE TO SUBLETHAL TOTAL BODY X-IRRADIATION. I. L. Shechmeister and V. P. Bond. Federation Proc. 10(1), 418(1951).

An abstract. BA 25-30111

5889

EFFECT OF ACUTE WHOLE BODY X-IRRADIATION UPON WATER AND ELECTROLYTE BALANCE. Robert J. Soberman, Richard P. Keating, and Roy D. Maxwell. Am. J. Physiol. 164(2), 450-6(1951).

Simultaneous measurements of total body water, extra-cellular space, Na space, whole blood, red cell and plasma volume, and plasma electrolytes were carried out repeatedly in adult female dogs following 450-500 r whole-body x irradiation. Except for an increase in plasma volume and a decrease in red-cell volume, no consistent changes were noted in any of the determinations. BA 25-30112

5890

BIOLOGY OF ASCITIC CARCINOMA OF MICE. III. THE EFFECTS OF FAST ELECTRONS AND X-RAYS ON ASCITIC CARCINOMA CELLS. W. Homann and Dieter Hofmann. *Strahlentherapie* 83(2), 291-300(1950). (In German).

Irradiation of ascites cells with fast electrons and x rays influences cell number and morphology. Damage after fast electron irradiation is very specific in nuclei (vacuolization and polymorphism), while cytoplasm shows only minor changes. X ray effects are more massive but less widely distributed (affect fewer cells than do fast electrons). BA 25-30988

5891

THE DIAGNOSIS, PROGNOSIS AND TREATMENT OF RADIATION INJURIES PRODUCED BY ATOMIC BOMBS.

E. P. Cronkite. *Radiology* 56(5), 661-9(1951).

Author reviews animal experimental data concerning effects of lethal total body irradiation with x rays on mice, dogs, and goats with special consideration of changes produced in the blood BA 25-32855

5892

INJURY FROM ATOMIC BOMBS. E. DeCoursey. *Radiology* 56(3), 645-52(1951).

Author presents a brief review of forces of atomic bomb and describes pathologic effects and clinical symptoms produced in man. BA 25-32856

5893

THE QUESTION OF GENETIC INJURY FOLLOWING X-RAY IRRADIATION OF THE OVARIES IN THE TREATMENT OF STERILITY. Ira J. Kaplan. *J. Obstet. Gynaecol. Brit. Empire* 57, 767-79(1950). BA 25-32858

5894

REPORT OF "SYMPOSIUM ON RADIATION CHEMISTRY." F. H. Krenz. *Nucleonics* 7(4), 67-70(1950).

Participants all agreed that there were chemical effects on solutes in irradiated solutions which were due to free radicals and H_2O_2 formed from the solvent. "Target area" of an organism or cell structure, therefore, is larger than the particular physical or chemical structure actually damaged. BA 25-32859

5895

THE EFFECT OF X-IRRADIATION ON RATS WITH AND WITHOUT BARTONELLA MURIS. Paul E. Rekers. *J. Infectious Diseases* 88(3), 224-9(1951).

Rats free of a common laboratory infection, such as B. muris, showed a mortality rate of 90% when exposed to single dose, total body x irradiation. When these rats had become infected with B. muris for 10 days or longer and then irradiated, there was not only prolongation of the survival period but a reduction in the mortality rate to 50%. Infection apparently increased their tolerance to x irradiation. BA 25-32861

5896

PROTECTION AGAINST RADIATION HAZARDS. Shields Warren and Austin M. Brues. *Nucleonics* 7(4), 70-6(1950).

Authors present a general review of principles serving as basis for present ideas of radiation safety with special references to peculiarities arising from radioactive isotopes in the body. BA 25-32870

5897

EFFECTS OF VIRUSES ON THE RADIOSENSITIVITY OF

GRAFTED TUMORS OF ALBINO MICE. Edoardo Gallico. *Bull. soc. vaudoise sci. nat.* 63(267), 269-96(1946).

Three groups of mice with adenocarcinomas grafted on mammary tissues received: (1) anti-variola vaccine injection into tumorous tissue; (2) x-ray therapy up to 7000 r; (3) both treatments. After 1 month, controls had tumor volume of 4950 cc; those given vaccine 1950 cc; and those irradiated, 700 cc. Vaccine was destroyed in tumors by x rays. In another study, vaccine given after each x-irradiation caused regression of tumors to 190 cc. BA 25-33740

5898

SENSITIVITY OF SOME BACTERIA TO SOFT ROENTGEN RADIATIONS (PLESIOROENTGEN). C. Gastaldi and E. Caffaratti. *Giorn. batteriol. e immunol.* 41(4), 218-27(1949).

Several bacterial species were exposed to soft x rays. Gram-negative bacteria were more sensitive to such radiation than gram-positive bacteria, spore-forming bacteria were most resistant. BA 25-34145

5899

SVALOF PRIMEX WHITE MUSTARD. G. Andersson. *Sveriges Utoadesforen. Tidskr.* 60(2), 234-6(1950).

This new variety selected from x-rayed material of common commercial seed, gives 4% higher seed yield and 6% higher oil yield. Whether improved characters are due to induced mutations or are based upon normal recombinations of genes within mother strain is unknown. A light yellowing of petals with a more reddish-brown tinge is ascribed to an x-ray effect on the mother line. BA 25-34524

5900

CONTINUOUS GAMMA RADIATION SUPPRESSES CROWN-GALL FORMATION IN TOMATOES. A. E. Dimond. *Phytopathology* 41(1), 10-11(1950).

Galls did not develop when inoculated plants received 30,000 r of gamma radiation at 80 r/hr. BA 25-34919

5901

BIKINI REPORT. Neal O. Hines. *Sci. Monthly* 72(2), 102-13(1951).

Bikini Atoll continues to show higher rate of radiation than was expected in view of fact that ocean water is constantly changing. It is believed that plants absorb and concentrate certain radioactive materials and that predators eating plants may increase concentration. BA 25-35701

5902

THE ACTIVITY OF ENZYMES EXTRACTED FROM YEAST CELLS EXPOSED TO RADIATION FROM RADON. K. D. Stewart and J. G. Aldous. *Proc. Nova Scotian Inst. Sci.* 22(4), 62(1950).

An abstract. BA 25-35812

5903

STUDIES ON RADIATION INJURY. Leon O. Jacobson. *Proc. Inst. Med. Chicago* 18(14), 326(1951).

Survival of adult mice exposed to whole-body x ray doses of 550 r or greater is enhanced if the spleen is exteriorized and shielded with lead during irradiation. BA 25-35835

5904

PROTECTION FROM X-RAY INDUCED INJURY BY HYDRATION. R. S. Caldecott. *Genetics* 40, 565(1955).

In experiments in which inhibition of seedling growth and frequency of chromosome aberrations were used as criteria of x ray effects, it was found that the effects decreased as H_2O content of the plant embryo increased from about 4% to 8%. Further hydration did not affect radiosensitivity further if embryo was kept in cold environment during irradiation.

5905

HYALURONIDASE ACTION IN NORMAL AND IN ROENTGEN-IRRADIATED RABBIT SKIN. Ray O. Noojin and Hugh B. Praytor. Arch. Dermatol. and Syphilol. 63(2), 191-9 (1951).

Irradiation of rabbits with x ray doses up to lethal dosages did not appear to alter appreciably the spreading effect of hyaluronidase injected into the skin of the irradiated animal. Administration of 1600 r at one time produced an immediate leukopenia and fall in hematocrit, and death of 3 of 6 animals within 3 weeks. BA 25-35838

5906

EFFECT OF X-IRRADIATION ON THE HYALURONIDASE-HYALURONIC ACID SYSTEM. Melvin D. Schoenberg, Robert E. Brooks, John J. Hall, and Herman Schneiderman. Arch. Biochem. 30(2), 333-40(1951).

X irradiation (9000 r) causes reduction in viscosity of vitreous humor and umbilical cord hyaluronate solutions and a continuing loss in viscosity after cessation of irradiation. Exposed solutions of hyaluronidase showed a marked decrease in enzymatic activity. BA 25-35842

5907

INDUCTION OF CATARACTS IN MICE BY SLOW NEUTRONS AND X-RAYS. K. W. Christenberry and J. Furth. Proc. Soc. Exptl. Biol. Med. 77(3), 559-60(1951).

An LD₅₀ dose of slow neutrons, was at least twice as effective in inducing cataracts as an LD₅₀ of x rays. (Total body x irradiation in dose as low as 32 r caused slight increase in percentage of mice developing lenticular opacities.) BA 25-36443

5908

X-RAY STIMULATION OF THE CICATRIZATION OF EXPERIMENTAL SKIN INJURIES IN RABBITS. M. Lupo and G. Pisanì. Ricerca sci. 21(6), 956-9(1951). (In Italian).

Two identical and symmetrical incisions were made in abdomens of rabbits. One wound was treated with x rays filtered through 6 cm layers of 20% agar in contact with wound; other wound (control) was lead shielded. Irradiated wound was stimulated in cicatrization, especially between 5th and 10th day postirradiation. BA 25-36814

5909

THE EFFECTS OF RIBONUCLEOTIDES ON MITOSIS IN THE GERMINAL EPITHELIUM OF IMMATURE RAT OVARIES CULTURED IN VITRO. James H. Berrian and Ernst J. Dornfeld. J. Exptl. Zool. 115(3), 513-20(1950).

Authors refer to experiments in which x and gamma irradiated tissue with blocked mitoses exhibited; cytoplasmic increases in ribonucleic acid derivatives and production of diffusible substances capable of spreading the effect. It is suggested that nucleotides may be the causal agents in radiation effects, since addition of nucleotides to cultures of rat ovaries produced effects on mitosis like those seen after irradiation. BA 25-36828

5910

ON THE EXPERIMENTAL PRODUCTION OF CASTRATION, STERILIZATION, AND INTERSEXUALITY AT AN EARLY STAGE OF DEVELOPMENT IN BIRDS BY LOCALIZED X-RADIATION. Etienne Wolf. Commun. 3^e, journees cyto-embryol. belgo-neerland 1949, 41-5(1949).

Author describes effects of x ray doses of 300-500 r on duck and chick embryos. He also studied effect of total-body irradiation with 300 r followed by localized radiation with 1100 r after 24 hours. BA 25-36928

5911

EVALUATION OF RADIOLOGICAL HAZARDS AND THERAPY OF RADIATION ILLNESS. C. F. Behrens. Radiology 56(5), 675-81(1951).

Author reviews radiologic hazards from point of view of military medicine and civilian defense, including

discussion of moral factors, calculated risk, and short discussion of therapeutic agents suggested for treatment of radiation illness. BA 25-37244

5912

Technical Information Service, AEC
UNCLASSIFIED BIBLIOGRAPHIES OF INTEREST TO THE ATOMIC ENERGY PROGRAM. Paul E. Postell, and Hugh E. Voress, comps. Oct. 2, 1953. 60p. (TID-3043).

This compilation contains annotated references to bibliographies prepared by the AEC project and to some from commercial, scientific, and other government organizations. The bibliographies are arranged by subject, and multiple listings are made for those which cover more than one subject. A table of contents lists the subjects covered. An author index is included. NSA 8-1

5913

Atomic Energy Commission
THE RESEARCH PROGRAM OF THE ATOMIC ENERGY COMMISSION BIOLOGY BRANCH. N. Edward Tolbert. p.31-40 of Conference on the Use of Isotopes in Plant and Animal Research. Apr. 1953. 10p. (TID-5098(p. 31-40)). NSA 8-2

5914

School of Aviation Medicine
THE EFFECT OF STRESS ON THE METABOLISM OF ASCORBIC ACID. PART II. INCREASED EXCRETION OF DEHYDROASCORBIC AND DIKETOGULONIC ACIDS BY RATS AFTER X-RAY IRRADIATION. Mary Mills Monier and Roslyn J. Weiss. Sept. 1953. 12p. (NP-4911, Report 2).

Following exposure of adult albino rats to 800 r single-dose total-body x irradiation, urinary excretion of DHA increased 150%, DKA excretion increased 230%. Increase in excretion of oxidized AsA in urine may be a general response to stress. NSA 8-4

5915

Ohio Agricultural Experiment Station
THE PHYSIOLOGY AND GENETICS OF PLANT PATHOGENIC MICROORGANISMS WHEN GROWN IN THE PRESENCE OF VARIOUS RADIOISOTOPES. T. Kommedahl, R. S. Davidson, Nancy J. Hockman, S. B. Hughes, and C. Kuehner. [June 1953] 16p. (AECU-2705).

Authors summarize data: on germination of spores in fungi grown on media containing P³², variants found after exposure to P³² in growth media, effects of Cs¹³⁴, P³², Sc⁴⁶, Co⁶⁰, or Ti²³⁴ on growth, biochemical effects of radiation on fungi, radiation effects on pathogenicity of fungi. NSA 8-28

5916

THE EFFECT OF WHOLE BODY X-IRRADIATION ON THE SUSCEPTIBILITY OF MICE TO BACTERIAL AEROSOLS. I. L. Shechmeister and V. P. Bond. Bacteriol. Proc. 1950, 103(1950).

An abstract. BA 24-35315

5917

EXERCISE FOLLOWING WHOLE-BODY (X-) IRRADIATION OF MICE. Falconer Smith and Willie W. Smith. Federation Proc. 9(1), 117(1950).

Exercise did not increase mortality or survival time nor did x radiation decrease ability to tolerate exercise. BA 24-35316

5918

RADIOACTIVE WASTE DISPOSAL. HOW WILL IT AFFECT MAN'S ECONOMY? Kenneth G. Scott. Nucleonics 6(1), 18-25(1950). BA 24-35320

5919

THE USE OF RADON SEEDS TO PRODUCE DEEP CEREBRAL LESIONS. S. N. Stein and E. W. Peterson. Proc. Soc. Exptl. Biol. Med. 74(3), 583-5(1950).

Radon seeds were precisely placed, by means of a stereotaxic instrument, through single small hole of entry,

in deaths of brain in monkeys. They produced large lesions associated with little shock. It is suggested that the method may be applicable for human neurosurgery. BA 24-36326

5920

INFLUENCE OF X-RAYS ON SEXUALITY AND THE FORMATION OF MUTANTS IN LESSER FUNGI. G. A. Nadson and G. S. Philippon. *Compt. rend. soc. biol* 93, 473-5(1925). (In French).

5921

THE EFFECT OF X-RAY IRRADIATION ON THE DEVELOPMENT OF THE MANDIBULAR JOINT OF THE MOUSE. M. S. Burstone. *J. Dental Research* 29(3), 358-63(1950).

Immature mice were x irradiated in area of mandibular condyle using contact x ray machine, diameter of irradiated field 5-7 mm, doses of 1500, 3000, and 5000. Characteristic radiation changes in condyle were reduction or cessation of osteoblastic activity, marrow aplasia, and subsequent fibrosis of the marrow. Ten days postirradiation, osteoblastic activity is slowly restored. Late changes are also described. BA 24-36351

5922

THE RELATION OF GROWTH PATTERNS IN RADIOACTIVE MEDIA TO THE MECHANISM OF GENETIC CHANGE IN *ESCHERICHIA COLI*. B. A. Rubin and P. Steinglass. *Bacteriol. Proc.* 1950, 51(1950). Abstract. BA 24-36691

5923

THE EFFECT OF THE IONTOPHORESIS OF ANTIHISTAMINES ON ULTRAVIOLET AND GRENZ RAY ERYTHEMA. F. Kalz and C. Bower. *Dermatologica* 101(1), 20-32(1950).

Influence of Neo-antergan and Pyribenzamine on erythema produced by Grenz rays was quite irregular. BA 24-36793

5924

THE INCIDENCE OF PENICILLIN-SENSITIVE VARIANT COLONIES IN PENICILLINASE-PRODUCING STRAINS OF *STAPHYLOCOCCUS PYOGENES*. Mary Barber. *J. Gen. Microbiol.* 3(2), 274-81(1949).

Attempts to increase rate of penicillin-sensitive colony formation with x rays and by growing them in presence of other organisms was unsuccessful. BA 24-36816

5925

INGESTION OF COLLOIDAL THORIUM DIOXIDE BY REPRESENTATIVE MINNOWS FROM THE CHICAGO REGION. Peter Frank and W. C. Allee. *Physiol. Zool.* 23(2), 134-9(1950).

Roentgenograms demonstrated that all of the several families of fresh water fishes tested engulf thorium dioxide during an exposure of 24 hr or less. Swallowing water that contained the suspension is most plausible explanation of method of intake. BA 24-38266

5926

STRUCTURE OF THE INCOMPATIBILITY GENE. II. INDUCED MUTATION RATE. D. Lewis. *Heredity* 3(3), 339-55(1949).

An abstract. BA 24-11299

5927

STUDIES ON THE RANJAN X-RAY MUTANT WHEATS. I. GENETICAL ANALYSIS OF THE ELEVEN VARIANTS. S. Ranjan. *Proc. Natl. Acad. Sci. India* 16B(5/6), 287-92(1946).

Of the 11 mutants studied, 8 bred true while 3 mutants broke (in reference to awn) and continued breaking from 3 to several generations. X ray treatment was felt to have produced modifications of molecular constitution of some genes. Such modifications led to newly adjusted states in a single generation in some mutants but in other strains continued to break, even in 7th generation. BA 24-11315

5928

COMPARATIVE LETHAL AND MUTAGENIC EFFECTS OF IONIZING RADIATIONS ON *ASPERGILLUS TERREUS*.

George E. Stapleton and F. L. Martin. *Am. J. Botan.* 36(10), 816(1949). BA 24-11325

5929

GROWTH OF KELOID AND CONSTITUTION. M. Hirao. *J. Constitutional Med.* 14(4/6), 96-103(1949).

Somatometry on 61 individuals suffering from keloid growth, as a mass-disease under special condition in a certain district (atomic bomb disease in Hiroshima) is reported. No correlation between growth of keloid and body-build was observed. BA 24-11360

5930

NITROGEN EXCRETION IN URINE AFTER ROENTGEN AND RADIUM IRRADIATION. K. F. Schultze. *Strahlentherapie* 37, 642-58(1930). (In German).

Author observed increased amounts of nitrogen in urine following radiation therapy.

5931

THE KINETICS AND SPECIFICITIES OF DEAMINATION OF NITROGENOUS COMPOUNDS BY X-RADIATION. W. M. Dale, J. V. Davies, and C. W. Gilbert. *Biochem. J.* 45(1), 93-9(1949).

Experiments are described showing deamination by x rays of some amino acids and their derivatives, polypeptides, and related nitrogenous compounds. Biological significance of results is discussed. BA 24-11723

5932

GROWTH AND O₂ CONSUMPTION, AS AFFECTED BY X-IRRADIATION, USING THE BACTERIUM, *SERRATIA MARCESCENS*. Ann C. Fowle and Kenneth C. Fisher. *Federation Proc.* 8(1), 50(1949).

An abstract. BA 24-12772

5933

SOME PHYSIOLOGICAL AFTER-EFFECTS OF X-RADIATION. Roberts Ruch. *J. Exptl. Zool.* 110(3), 357-74(1949).

Salamander larvae (*Amblystoma opacum*) were x rayed with single lethal dose of 25,000 r or 50,000 r. Neuro-muscular responses initially increased over controls, dropped off rapidly until 3rd or 4th day, recovered partially, and were lost completely 48 hr before cessation of cardiac activity. Other x ray effects: "freezing" of chromatophores in embryonic state, cessation of hind limb and gill development, and considerable hemorrhage. Effects of pre-exposure feeding of larvae are also discussed. BA 24-5753

5934

THE BIOLOGICAL EFFECT OF INJECTED RADIOACTIVE ISOTOPES. G. Schubert and W. Riezler. *Strahlentherapie* 76, 407-16(1947). (In German). BA 24-5759

5935

ALTERATION OF THE X-RAY SENSITIVITY OF *DROSOPHILA* BY MEANS OF RESPIRATORY INHIBITORS. William K. Baker and Elizabeth Sgourakis. *Genetics* 35(1), 96(1950).

An abstract. BA 24-8342

5936

EFFECTS OF HIGH DOSAGES OF X-RAYS IN *PARAMECIUM AURELIA*. E. L. Powers and Deborah Shefner. *Genetics* 35(1), 131(1950).

An abstract. BA 24-8395

5937

SOME EFFECTS OF GAMMA RAYS UPON RECOMBINATION FREQUENCIES AND ON CROSSING OVER IN *DROSOPHILA MELANOGASTER*. Maurice Whittinghill. *Genetics* 35(1), 140-1(1950).

An abstract. BA 24-8416

5938

RADIOACTIVE IMPURITIES IN THE AIR AS BIOCLIMATIC FACTORS. A. Krebs. Bioklimatische Beilblätter 8(3/4), 81-2(1941). (In German).

Radioactive substances in air of cellars and closed rooms was found in concentrations up to 10^{11} curie/cm³ which correspond with values effective in therapy with weak Ra emanation. Air of mines had especially high concentrations of radioactive substances. Because of inter-individual variability in sensitivity to radiations these radioactive substances in the air must be considered to be biologically significant. BA 24-8529

5939

STUDIES IN THE GENETICS OF DROSOPHILA. VI. ARTICLES ON GENETICS, CYTOLOGY AND TAXONOMY. 7. X-RAY PRODUCED MUTATIONS, DELETIONS AND MOSAICS IN *DROSOPHILA VIRILIS*. Eb. C. Girvin. Univ. Texas Publ. 4920, 42-56(1949).

Studies revealed a number of gynandromorphs and mosaics characterized by erratic distribution of nuclei to imaginal disc cells which form adult exoskeleton. A "yellow" mottled was found and involved a mutual X-6 translocation. Several loci studied had different mutation rates; rate of lethal mutations and deletions was found to be less in *D. virilis* than in *D. melanogaster*. BA 24-8364

5940

ACQUIRED RADIORESISTANCE OF THE CRYPT EPITHELIUM OF THE DUODENUM. M. A. Bloom. Radiology 55, 104-115(1950).

Female Carworth mice given repeated daily total body exposures to 60 r of x rays (200 kv, 15 ma, 0.5 mm Cu, 1.0 mm Al), histological studies carried out on duodenum. With continued irradiation, crypt cells became resistant to the radiation dose applied, showing negligible debris and persistent mitotic activity even after cumulative dose of 2100 r. Other observations also presented and discussed. BA 25-416

5941

RADIATION EFFECTS ON MICE AS RELATED TO SURVIVAL. John W. Gowen. Genetics 35(1), 111(1950).

When 6 inbred mouse strains of characteristically different WBC counts and typhoid susceptibility (8-90%) were x rayed with 0-700 r/sq cm of body surface, all 6 reacted alike. The decrease in resistance caused by radiation was exponential function of dosage. Decrease in WBC count observed at 1 and 2 wk postexposure. Altered resistance of irradiated mice attributed to destruction of phagocytic cells by the acute irradiation. BA 25-420

5942

EFFECT OF BODY EXPOSURE TO X-RAYS ON RATE OF INCORPORATION OF C¹⁴ CARBOXYL-LABELED ALANINE INTO MOUSE PROTEIN. L. H. Hempelmann, H. S. Carr, L. D. Frantz, Jr., R. Masters, and E. Lamdin. Federation Proc. 9(1), 183(1950).

An abstract. BA 25-421

5943

EFFECT OF OXYGEN ON RESPONSES OF LIVING CELLS TO X-RAYS WITH SPECIAL EMPHASIS ON BACTERIA. Alexander Hollaender, G. E. Stapleton, and F. L. Martin. Federation Proc. 9(1), 61-2(1950).

An abstract. BA 25-422

5944

PHYSIOLOGICAL AND PHARMACODYNAMIC STUDIES OF BLOOD FROM X-RAY PERSONNEL. David I. Macht and Stanley H. Macht. Federation Proc. 9(1), 82-1(1950).

An abstract. BA 25-424

5945

SENSITIVITY OF X-RAYED ANIMALS TO INFUSION OF HISTAMINE, ADENOSINE, AND TRYPSIN. K. D. Venters

and E. E. Painter. Federation Proc. 9(1), 129-30(1950). An abstract. BA 25-429

5946

THE CLINICAL USE OF RADIOACTIVE ISOTOPES. John H. Lawrence. Bull. New York Acad. Med. 26(10), 639-69(1950).

Author reviews tracer and therapeutic application of radioactive isotopes. BA 25-435

5947

ISOTOPIC TRACERS AND NUCLEAR RADIATIONS WITH APPLICATIONS TO BIOLOGY AND MEDICINE. William E. Siri. New York, McGraw-Hill Book Co., Inc. 1949.

Simplified statement of theory, methods, and principles involved in use of isotopic tracers is presented, with special reference to biology and medicine. Bibliography of more than 2000 papers dealing with general phases of the subject is included. BA 25-438

5948

EFFECT OF HIGH-VOLTAGE CATHODE RAYS ON AMINO ACIDS IN FISH MUSCLE. Bernard E. Proctor and Darshan S. Bhatia. Food Technol. 4(9), 357-61(1950).

Arginine, histidine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, valine, and cystine determinations were made on haddock fillets before and after irradiation with super-voltage cathode rays produced by a pressure-insulated, electrostatic Van de Graaff generator. BA 25-805

5949

AN EXPERIMENTAL STUDY ON THE EFFECT OF VARIOUS ALUMINUM COMPOUNDS UPON THE GROWTH AND THE RADIOSENSIBILITY OF MALIGNANT TUMOR. II. THE EFFECT OF VARIOUS ALUMINUM COMPOUNDS UPON THE RADIOSENSIBILITY OF MALIGNANT TUMOR. Tateki Hamawaki. Japan J. Obstet. Gynecol. 24(2), 11-15(1941).

An organic Al compound, called "Al No. 2" intensified the sensitivity of rabbit sarcomas to x irradiation with 1200 r. Action is attributed to Al content. "Al Nos. 4 and 5" likewise intensify radiosensitivity of rabbit sarcoma. Eosin and iodine content were also important. BA 25-1622

5950

THE ACTION OF THE GAMMA RAYS OF RADIUM ON GONAD DEVELOPMENT AND ON SEXUAL SOMATIC CHARACTERS IN THE CHICK EMBRYO. R. Dulbecco. Mem. accad. Lincei. 3(1), 1-20(1948). (In Italian).

Chick embryos (180) from primitive streak stage to 5-8 somites were exposed to γ rays for 24 hr. Fourteen survived for more than 8 days, 1 survived to 16th day. Germinal elements were absent in the 14 survivors, all had gonads of female sex. Of 20 embryos irradiated for 16 hr, 11 survived past 8th day, sexual elements were greatly reduced. BA 25-1841

5951

DEVELOPMENT OF MULLERIAN DUCTS IN MALE MOUSE FETUSES WHOSE TESTICLES WERE IRRADIATED WITH X-RAYS AT FOURTEEN DAYS OF AGE. Albert Raynaud and Marcel Frilly. Ann. endocrinol. (Paris) 11(1), 32-48(1950). (In French).

X irradiation of testicular region of 14-day-old male mouse fetus produced considerable destruction of testicular and surrounding tissues, including portions of Wolffian ducts. After treatment 4 fetuses developed varying portions of Mullerian ducts, 2 had well-developed uterine body, one with small right uterine horn. BA 25-1854

5952

KALANCHOE TUBIFLORA AS INFLUENCED BY RADIATION. Edna L. Johnson and Dorothy B. Kingsbury. Univ. of Colo. Studies, Ser. Biol. 1, 1-14(1950).

X irradiated leaf tips suspended in water developed more plantlets than did control leaves. BA 25-2970

5953

EFFECT OF X RAYS ON TESTES OF DECTICUS. U. Cocchi and B. Uggeri. *Strahlentherapie* 75, 96-109(1944). (In German).

X ray effects on testis of Decticus: 25 r caused pycnosis of secondary spermatogonia and primary spermatocytes; 100 r-all secondary spermatogonia were damaged, dosage 600 times higher than this damages all spermatocytes, and one 2400 times as great damages spermatids. Primitive spermatogonia, mature spermatozoa, and epithelial cells are more resistant. BA 25-3396

5954

THE EFFECT OF X-RAYS AND FAST ELECTRONS ON MITOTIC PROCESSES IN BARLEY ROOT TIP CELLS. H. Bleek, W. Paul, H. J. Schmermund, and G. Schubert. *Naturwissenschaften* 36(1), 28-9(1949). (In German).

Barley grains which had undergone inhibition (hydration) were exposed to x rays and/or fast electrons in doses of 500-2000 r. With increasing amounts of radiation, total number of mitoses decreased, while number of chromosome fragments and breakages increased. Equal doses of the two radiations were equally effective. Data indicate that effects are produced by more than a single hit. BA 25-3580

5955

EFFECT OF FAST ELECTRONS OF A 6 MEV-BETATRON ON DROSOPHILA EGGS. W. Dittrich, H. Fass, G. Hoehne, and G. Schubert. *Strahlentherapie* 81(2), 223-32(1950). (In German).

Drosophila eggs 3, 4, and 7.5 hr old were irradiated with fast electrons ($E = 3$ Mev) and x rays (180 kv, HWL; O, 25 mm Cu with doses up to 5000 r. Effects are described. BA 25-4009

5956

IMITATION OF CHONDRODYSPLASIA BY LOCALIZED ROENTGEN RAY INJURY. AN EXPERIMENTAL STUDY OF BONE GROWTH. A. Langenskiold and W. Edgren. *Acta Chir. Scand.* 99, 352-73(1950).

After irradiation (8000-20,000 r) of distal epiphyseal cartilage in femur, radius, and ulna in rabbits, deformities appeared which were similar to those seen in chondrodysplasia. BA 25-4001

5957

WHAT'S NEW IN ISOTOPES, 1950. R. R. Newell. *Calif. Med.* 73(1), 11-15(1950).

Author discusses treatment of injury due to total body irradiation, danger of cataracts, beta ray burns, industrial uses of atomic power, medical and biological research, new atomic instruments, and tracer elements. BA 25-4017

5958

VITAMIN "P" PROTECTION AGAINST RADIATION. Boris Sokoloff, James B. Redd, and Raymond Dutcher. *Quart. J. Florida Acad. Sci.* 12(3), 185-9(1949)(1950).

British brown breed rats (50) received a single total body exposure to 800 r x rays. In 20 controls, mortality rate was 80%, in 10 given 4 mg vitamin P for 3 days before and 7 days after exposure, mortality was 40%. Decrease in mortality to 10% occurred in 20 rats given 5 mg vitamin P daily for 7 days prior to exposure and 23 days afterward. In these rats, petechial hemorrhages were not pronounced, adrenal appeared normal. All controls showed gross hemorrhages and pathologic lesions in adrenal. BA 25-7446

5959

SOME PROBLEMS OF PARABIOSIS STUDIED IN AMPHIBIANS. I, II. Lea Urbani-Mistruzzi. *Atti. accad. nazl. Lincei Rend. Classe sci. fiz., mat. e nat., Ser. 8*, 6(4), 530-4; (6), 758-65(1949).

I. Amphibian embryos treated by lethal x ray doses and united in parabiosis with normal embryos, failed in competition with latter; were sometimes absorbed almost completely. II. *Rana esculenta* embryos at tail bud stage were x rayed and united in parabiosis with normal embryo suffers only mechanically from degeneration of exposed parabiont. Results show (1) x ray alterations are not transmitted to the parabiont, (2) cells and tissues exhibit differential radiosensitivity. BA 25-8332

5960

THE EFFECT OF THE VERNALIZATION OF THE SEEDS OF WINTER WHEAT ON THE SENSITIVITY OF THE BUDS TO THE ACTION OF X-RAYS. O. S. Engel. *Akad. Nauk. SSSR, Doklady* 71(6), 1151-3(1950). BA 25-9160

5961

AGE CHANGES IN THE SENSITIVITY OF SPROUTS OF X-RAYS. R. G. Trudova. *Akad. Nauk. SSSR, Doklady* 71(6), 1139-42(1950). BA 25-9165

5962

ON THE POSSIBILITY OF PROTECTING THE LIVING ORGANISM AGAINST ROENTGEN RAYS BY CHEMICAL MEANS. A. Forseberg. *Acta Radiol.* 33(3/4), 296-304(1950).

Cysteine, given to bacterial cells immediately before radiation, partly protects culture from irradiation injury. Other SH-containing chemicals act similarly, but not related chemicals without a sulphhydryl group. Cysteine, injected into the skin of guinea pigs, tends to prevent epilation after doses which without cysteine treatment result in epilation. BA 25-10032

5963

ON THE USE OF RADIOACTIVE SUBSTANCES IN SWEDEN, WITH SPECIAL REFERENCE TO IRRADIATION RISKS AND PROTECTION MEASURES. S. Benner. *Acta Radiol.* 33(3/4), 281-95(1950). BA 25-10034

5964

RADIOACTIVE ISOTOPES IN BIOLOGICAL EXPERIMENT. W. P. Rogers. *J. Proc. Australian Chem. Inst.* 17(3), 101-12(1950).

Nomenclature, definitions, nature, and application of isotope tracer experiments and effects of radiation on biological systems are discussed. BA 25-10040

5965

RESULTS OF TREATMENT OF GASTRIC HYPERACIDITY BY RADIUM, WITH SPECIAL REFERENCE TO DUODENAL ULCERATION. Murray McGeorge. *Quart. J. Med.* 19(74), 111-28(1950).

Patients with gastric hyperacidity (most had duodenal ulceration also) were treated by placing Ra in stomach. Method reduced acidity of resting juice and secretion of free acid after histamine stimulation, effect sometimes lasted several years. Symptoms were relieved in some cases. BA 25-10335

5966

DIFFERENTIATION AND IRRADIATION. S. R. Anderson. *Acta Radiol.* 33(1), 57-68(1950).

Therapeutic irradiation of 660 malignant tumors from mice and human beings with x rays and Ra failed to produce increased differentiation. Histologic changes observed in radiated tumors are considered to be nonspecific cellular degeneration. BA 25-10335

5967

THE INFLUENCE OF RADIATION UPON FISH EGGS. (1). THE INFLUENCE OF KC1 UPON THE HEART OF AN EMBRYO WHICH HAS BEEN KEPT UNDER RADIATION BY X-RAYS. Koichi Murachi. *Zool. Mag. (Dobutsugaku Zasshi)* 56(8), 5-7(1944). (In Japanese).

Embryonal red killifish were x irradiated in artificial sea water in vitro, eggs were subsequently cultured then

transferred to 1M KCl. Radiated embryos showed cessation of heart beat earlier than nonirradiated controls (in KCl), presumably because irradiated eggs were more permeable to KCl. BA 25-10928

5968

THE CYTOLOGY OF SULPHUR BACTERIA AFTER IRRADIATION WITH ALPHA RAYS. F. Hercik, Z. Hradecna, M. Nermut, and M. Rosenberg. Spisy Lekarske Fak. Masaryk. Univ. 22(8), 1-8(1948).

Sulfur bacteria were exposed to heavy doses of α rays (2,000,000 r) of Radon. Both irradiated and non-irradiated bacteria showed abnormally long plasmodesmids. Destruction of various structures by α rays was studied by means of electron microscope. BA 25-11055

5969

STUDIES ON THE STIMULATING ACTION OF THORIUM ON PLANT GROWTH. C. V. Gillern. J. Landwirtsch. 89(3), 233-9(1943). (In German).

Observations that thorium stimulated growth of plants is reportedly confirmed. Stimulating effect is believed to reflect better utilization of nutrients in the soil. BA 25-11908

5970

THE BIOLOGY OF BIKINI ATOLL, WITH SPECIAL REFERENCE TO THE FISHES. Leonard P. Schulz. Ann. Rept. Smithsonian Inst. 1947(3931), 301-16(1948).

Although countless animal individuals must have perished because of atomic bomb experiments, over-all picture of life on the reefs has changed very little. BA 25-12608

5971

DISTURBANCES IN NUCLEIC ACID METABOLISM PRODUCED BY X AND GAMMA RADIATIONS IN HUMAN MALIGNANT TUMORS. L. Hamilton. J. Nat. Cancer Inst. 10(6), 1374(1950).

An abstract. BA 25-13045

5972

CAPILLARY FRAGILITY AND VITAMIN P PROTECTIVE ACTION AGAINST RADIATION. Boris Sokoloff, James B. Redd, and Raymond Dutcher. Federation Proc. 9(1), 372(1950).

An abstract. BA 25-13144

5973

IRRADIATION, A NEW PROCESSING METHOD. M. C. Heffner and H. Barth. Am. Egg and Poultry Rev. 11(11), 12-4(1950).

In preliminary experiments, irradiation increased quality storage life of eggs. BA 25-13306

5974

OVARIAN AND LYMPHOID TUMORS IN FEMALE MICE SUBSEQUENT TO ROENTGEN-RAY IRRADIATION AND HORMONE TREATMENT. W. U. Gardner. Soc. Exptl. Biol. Med. 75(2), 434-6(1950).

Groups of 50 mice were irradiated (380-280 r total body) and then given weekly subcutaneous injection of: (1) 0.05 ml sesame oil, (2) 1.25 mg testosterone propionate, (3) 16.6 gamma estradiol benzoate. Survival: (1) 45, (2) 45, (3) 42 mice. Ovarian tumors occurred in: (1) 24, (2) 29; (3) 0 mice lymphoid tumors in: (1) 21; (2) 9; (3) 23 mice respectively. Estradiol enhanced lymphoid tumors and prevented ovarian tumors. Testosterone propionate largely inhibited lymphomagenic action of x rays. BA 25-13771

5975

SOLITARY PLASMACYTOMA OF HUMERUS IN A MESOTHORIUM WORKER. G. D. Lamb. J. Pathol. Bacteriol. 62(4), 585-9(1950).

Patient's skeleton contained 0.25 equivalent μ g of Ra an amount believed insufficient to account for neoplastic proliferation, but considered to be a possible cause for bizarre cell appearances found histologically. Dis-

articulation of arm produced specimen showing soft tumor composed of plasma cells, typical and atypical, including numerous multinucleate varieties with foamy cytoplasm, a type seen in tumors after irradiation. BA 25-13856

5976

THE EFFECT OF IRRADIATION ON THE DEVELOPING DENTAL SYSTEM OF THE SYRIAN HAMSTER. A ROENTGENOGRAPHIC STUDY. Karl W. Bruce. J. Dental Res. 29(5), 665(1950).

An abstract. BA 25-13895

5977

THE EFFECT OF CHRONIC X-RAY IRRADIATION ON THE RAT DENTITION. Peter P. Dale. J. Dental Res. 29(5), 687(1950)

An abstract. BA 25-13899

5978

THE EFFECTS OF SINGLE DOSES OF IRRADIATION UPON THE ERUPTION OF THE UPPER RAT INCISOR. H. Medak, I. Schour, and W. A. Klauber, Jr. J. Dental Res. 29(6), 839-42(1950).

Eighty rats were irradiated (100 kv, 5ma, std 12.5 cm, no filter, HVL 1 mm Al, 2.5 cm field, 320 r/min) on area of upper incisors. Following a dose of 500 and 1000 r, eruption proceeded at same rate as in controls; 2000 r, rate was depressed for 6-7 wks, then normal, 3000 and 4000 r, eruption stopped within 3 wks. BA 25-13928

5979

HIGH-INTENSITY ELECTRONS AS A TOOL FOR PREPARATION OF VACCINES. I. PREPARATION OF RABIES VACCINE. Ulrich Frædmann, Frederick B. Traub, and Wolfgang Huber. Federation Proc. 9(1), 382(1950). BA 25-14245

5980

EFFECT OF X-IRRADIATION ON ENTERIC CHOLERA AND COPROANTIBODY RESPONSE IN THE GUINEA PIG. William Burrows. Federation Proc. 9(1), 379(1950).

An abstract. BA 25-14410

5981

THE PRODUCTION OF MUTATIONS AT INDIVIDUAL LOCI IN DROSOPHILA BY IRRADIATION OF OOCYTES AND OOGONIA. H. J. Muller, R. M. Valencia, and J. I. Valencia. Genetics 35(1), 126(1950).

An abstract. BA 24-8388

5982

THE EFFECTS OF SUPPLEMENTARY TREATMENT WITH INFRA-RED RADIATION ON X-RAY INDUCED LETHALS AND CHROMOSOME ABERRATIONS IN FEMALES OF DROSOPHILA MELANOGASTER. Bentley Glass. Genetics 35(1), 109-10(1950).

An abstract. BA 24-8365

5983

INCIDENTAL FINDINGS OF MEGALOBlastic-LIKE CELLS IN BONE MARROW OF ONE OF TWO SWINE WITH MACROCYTIC ANEMIA AND ACHLORHYDRIA. F. Douglas Lawrason and E. P. Cronkite. Yale J. Biol. and Med. 22(1), 57-66(1949-50).

Hematological observation on two swine during period of about 17 months after exposure to atom bomb radiation at Bikini revealed macrocytic anemia and achlorhydria in both, and hyperplastic megaloblastic-like marrow in one. BA 24-5752

5984

BIOLOGICAL HAZARDS AND TOXICITY OF RADIO-ACTIVE ISOTOPES. A. M. Brues. J. Clin. Invest. 28(6 pt. 1), 1286-96(1949). BA 24-11709

5985

PENICILLIN ISOLATED BIOCHEMICAL MUTATIONS IN SALMONELLA TYPHIMURIUM; THEIR PROPORTIONALITY TO X-RAY DOSAGE, AND THEIR FAILURE TO SHOW RECOMBINATION. H. H. Plough. Genetics 35(1), 129-30(1950).

An abstract. BA 24-11310

5986

THE EFFECT OF OXYGEN ON THE FREQUENCY OF X-RAY INDUCED CHROMOSOMAL ABERRATIONS IN TRADESCANTIA MICROSPORES. Herbert Parkes Riley and Noiman H. Giles. *Genetics* 35(1), 131-2(1950).
An abstract. BA 24-11236

5987

X-RAY INDUCED GENETIC EFFECTS IN GERMINAL AND SOMATIC TISSUE OF DROSOPHILA MELANOGASTER. George Lefevre, Jr. *Genetics* 35(1), 120(1950).
An abstract. BA 24-14046

5988

MILLION VOLT X-RAY THERAPY. I. G. Williams. *Proc. Roy. Soc. Med.* 41(10), 709-18(1948).

No evidence of any biological difference in response (patients with incurable malignant disease) to million-volt therapy due to shorter wave length was found.
BA 24-14215

5989

PATHO-ANATOMICAL INVESTIGATION OF A CASE OF CUSHING'S DISEASE CURED AFTER X-RAY TREATMENT. K. Gaertner. *Virchow's Arch. pathol. Anat. u. Physiol.* 310, 388-94(1943). BA 24-14622

5990

STUDY OF THE TYPES OF REACTIONS OF STROMA OF ADULT OVARY WITH REGARD TO CHANGES IN HISTOLOGICAL COMPOSITIONS OF THE FOLLICLES. Paul Desai. *Arch. biol. (Lege)* 60(4), 409-39(1949). (In French).

Rabbit ovarian stroma, comprising 87-90% of normal gland, is reduced to 82% following x irradiation with 1050 gamma; increased to 94% when given divided doses of 970-1140 gamma. During pregnancy an ovary sterilized by x ray hypertrophies and takes on a pseudoglandular character simultaneously with intact ovary. Responsiveness and adaptability of ovarian stroma are thus demonstrated.
BA 24-14664

5991

INVESTIGATION ON AMENORRHEA CAUSED BY THE ATOMIC BOMB, IN FEMALE STUDENTS IN HIROSHIMA-SHL. Masaichi Ishizawa. *Japan J. Clin. and Exptl. Med.* 24, 30-3(1947).

Delay of appearance of menses and occurrence of amenorrhea are attributed to effects of atomic bomb. Author suggests lowered nutritional level and psychological disturbances may also have exerted some influence.
BA 24-14700

5992

THE TREATMENT OF AMENORRHEA IN YOUNG WOMEN. L. M. Randall. *Am. J. Obstet. Gynecol.* 53, 453-8(1948).

Use of low dosage x irradiation of pituitary body and/or ovaries in selected cases of amenorrhea is one method of treatment mentioned. BA 24-14745

5993

RADIUM AND ROENTGEN THERAPY IN THE TREATMENT OF MENOPAUSAL UTERINE BLEEDING. H. Schmitz and J. E. Towner. *Am. J. Obstet. Gynecol.* 53, 199-206(1947).

Among other effects observed following radiation therapy, myomas occurred among 236 of 412 patients who received radiation therapy for functional climacteric uterine bleeding. BA 24-14754

5994

EXPERIMENTAL STUDIES CONCERNING THE INTERRUPTION OF FUNCTION OF THE KIDNEYS BY MEANS OF ROENTGEN RADIATION. Tadahiro Miyakawa. *Tohoku J. Exptl. Med.* 40(2), 168-88(1941). (In German).

Author describes x ray effects on urine, blood, P. S. P. excretion and kidney tissues of male rabbits given 3000, 6000, 9000 r (single dose), or 6000 r (divided dose),

applied to kidneys. The localized irradiation had a marked effect on peripheral blood leukocyte picture.
BA 24-14819

5995

THE PRESERVATION OF RABBIT CORNEA FOLLOWING EXPOSURE TO THE CAPACITRON. T. D. Duane and O. S. Lee. *Am. J. Ophthalmol.* 32(5), 671-8(1949).

Most striking phenomenon exhibited by irradiated corneas was loss of capacity to swell. Author suggests effect may be interpreted as denaturation of corneal proteins by fast electrons. (Corneas were irradiated *in vitro* then stored for periods up to 53 days in air, N₂, saline, *in vacuo*, or frozen.) Respiration and bacterial growth also inhibited, and transplants of the corneas healed well but remained opaque. BA 24-14858

5996

EXPERIMENTAL INVESTIGATIONS OF THE EFFECTS OF ROENTGEN RAYS ON THE EYE. Erik Poppe. *Skrifter Norske Videnskaps-Akad. Oslo, Mat.-Naturv. Kl.* 1942(2), (1942). BA 24-14911

5997

ADENOCARCINOMA OF THE UTERUS. J. E. Hundley, S. Diggs, and T. Kardash. *Am. J. Obstet. Gynecol.* 57(1), 52-68(1949).

Study of effects of x ray therapy of adenocarcinoma of uterus revealed marked variations in tissue reaction. Where growth was confined to endometrium, necrosis, coagulum formation, cellular enlargement with nuclear destruction, fragmentation, and giant-cell formation were common responses to radiation. Radiation was less effective in cases where growth involved myometrium. Extreme sensitivity of follicular system of ovary to radiation was noted. BA 24-15685

5998

DEMONSTRATION OF PROTECTIVE ENZYMES IN THE URINE OF TUMOR PATIENTS BY MEANS OF THE ABDERHALDEN REACTION, AND EXPERIMENTAL PROVOCATION OF THE FORMATION OF SPECIFIC PROTECTIVE PROTEINASES BY MEANS OF X-RAYS. R. Merten. *Z. ges. exptl. Med.* 109, 333-46(1941). (In German).

By giving small x ray doses it was possible to provoke formation of specific protective proteinases in cancer patients whose urine might otherwise contain only very small amounts of the cancer specific proteinases.

BA 24-15699

5999

THE EXPONENTIAL COURSE OF THE IRRADIATION EFFECT CURVES. W. Minder. *Radiol. Clin.* 18(5), 300-5(1949). (In German).

Inactivation of bacteriophages and viruses by ionizing rays follows exponential curves. Sensitive regions in cells can be calculated from target theory giving values ranging from 80 to 400 A in diameter. Calculations made from experiments with irradiated chemical compounds lead author to conclude that biological sensitive regions are to be interpreted as volumes within which radiation energy may be transferred without loss. BA 24-16329

6000

CHANGE OF MATING TYPE IN PARAMECIUM BURSARIA FOLLOWING EXPOSURE TO X-RAYS. Ho Lee. *J. Exptl. Zool.* 112(1), 120-30(1949).

Mating types A, B, C, and D of var. I of *P. bursaria* (stock culture number: A-BG35, B-La3, C-Wat 1, and D-WM1) were subjected to x irradiation for 4 sec at 10 min intervals (50 kv, 10 ma). Change in mating types (A to D, D to A, C to B, and B to C) is believed to indicate that x ray effect is indirect, inducing autogamy which results in change of type. Percentage of change increases with time of exposure. BA 24-16966

6001

EFFECT OF X-RAYS UPON ARMADILLIDIUM. Kiyoshi Takewaki. *Dobutsugaku Zasshi* (Zool. Mag.) 57(1/2), 6-8(1947). (In Japanese).

Samples of *A. vulgare* were x irradiated (50-100 min, 150 kv, no filter, 5 ma, 31 cm focus to sample, 75 r/min). Death ratio of females was higher than that of males; molting was inhibited or delayed. Testes were unaffected; ovaries were injured to various degrees. Fat tissue did not increase as it does in castration. BA 24-17036

6002

RADIOACTIVE MATERIALS GIVE CROPS NO BENEFIT, FIRST TESTS INDICATE. *Am. Fertilizer* 109(11), 12-13(1948).

Studies conducted in 14 states with low level radioactive materials show no beneficial effect upon crop growth or quality of: cotton, sweet potatoes, corn, oats, alfalfa, wheat, barley, beans, potatoes, tobacco, peanuts, sugar beets, and tomatoes. BA 24-21342

6003

ABOUT THE REFERENCE BETWEEN CHOLESTEROL TISSUES CHANGES AND THE ROENTGEN INDISPOSITION. R. Hammel. *Strahlentherapie* 38, 308-14(1930). (In German).

In the human body the cholesterol level usually decreases after x-ray therapy. A relationship between the cholesterol decrease in the serum and the roentgen-sickness has not been established.

6004

THE INFLUENCE OF THE ROENTGEN IRRADIATION ON THE SODIUM CONTENT OF THE BLOOD SERUM. K. Adler and M. Adler. *Strahlentherapie* 42, 584-90(1931). (In German).

6005

THE EFFECT OF X-RAYS ON THE BONE MARROW. R. Toppner. *Z. ges. exptl. Med.* 109(3), 369-405(1941). (In German).

Author describes effect of various x ray doses on rat bone marrow. Effect is concluded to be a direct one. Effects were seen as early as 30 min postexposure. Small doses (25-300 r) caused initial shift to left; larger doses caused shift to right and decrease in total cellularity of marrow parenchyma. Other changes are also described. BA 24-17521

6006

INJURIES BY IRRADIATION OF ORAL CANCERS. F. Vándor. *Fogorvosi Szemle* 42(7), 260-7(1949). (In Hungarian).

Acute and late effects on teeth, gums, and jaws are described. Late effects are: atrophy of gums leading to periodontoclasia; teeth often become fragile. Gingival retraction followed by caries of tooth neck. In some instances, bone necrosis of jaws occurred. BA 24-17522

6007

SAFETY CRITERIA IN RADIOACTIVE WATER MONITORING. H. A. C. McKay and G. N. Walton. *Nucleonics* 5, 12-21 (1949).

Basic principles of monitoring water containing radio-isotopes are discussed mathematically with regard to maximal permissible concentration consistent with biological safety. Tables are given for reference in determining hazards associated with most commonly used and most dangerous isotopes when disposed of in water. BA 24-17528

6008

APPLIED BIOPHYSICS. A SYMPOSIUM. N. Howard-Jones. Brooklyn, Chemical Publ. Co. 1949. 293p.

Applications of radiology and nuclear physics to biological problems described are. Effects of x rays, neutrons, α rays, β rays, and other ionizing radiations are considered. BA 24-17550

6009

RADIATION DAMAGE TO THE GENETIC MATERIAL. H. J. Muller. *Am. Scientist* 38(1), 33-59(1950).

Origin of mutations and general effect on population are reviewed. Harmful mutations are discussed. BA 24-17296

6010

EFFECTS OF X-RAYS ON THE METABOLISM OF NUCLEIC ACIDS IN HEMATOPOIETIC TISSUES. C. E. Carter. *Federation Proc.* 8(1), 351(1949).

An abstract. BA 24-18228

6011

THE EFFECT OF X-RADIATION ON THE JAWS OF MICE. M. S. Burnstone and B. M. Levy. *J. Dental Research* 28(6), 656(1949).

An abstract. BA 24-18600

6012

ACTION OF RADIOTHERAPY ON THE DEVELOPMENT OF THE MAXILLAE. THE DENTAL GERMS AND THE SALIVARY GLANDS. J. Cauhepe Dechaume and M. Goudaert. *Presse med.* 57(20), 262-3(1949).

Two cases of angioma treated by x rays or Ra are described. Authors feel that certain factors which hinder development of the mandible and induce facial deformations act as radiation does, by electively modifying proliferation of cartilage or periosteum. BA 24-18605

6013

MICROGENIA AS A LATE SEQUENCE OF X-RAY INJURY. THREE CASE REPORTS. Gy. I. Fodor. *Fogorvosi Szemle* 42(2/3), 55-8(1949).

Three years after application of x ray therapy for hypertrichosis of face, a progressive microgenia began to develop. BA 24-18621

6014

THE EFFECT OF X-RAY IRRADIATION ON THE ERUPTION OF THE UPPER INCISOR OF THE ALBINO RAT. H. Medak, I. Schour, and W. A. Klauber. *J. Dental Research* 28(6), 633-4(1949).

An abstract. BA 24-18668

6015

THE EFFECT OF A SINGLE EXPOSURE TO X-RAY IRRADIATION ON THE GROWTH RATE OF DENTIN OF THE RAT INCISOR. M. Weinreb, I. Schour, H. Medak, and W. A. Klauber, Jr. *J. Dental Research* 28(6), 633(1949).

An abstract. BA 24-18700

6016

ERYTHEMA MULTIFORME FOLLOWING HIGH VOLTAGE ROENTGEN THERAPY. REVIEW OF THE LITERATURE AND REPORT OF THREE CASES. Harry L. Arnold, Jr. *Arch. Dermatol and Syphilol* 60(1), 143-9(1949).

Deep x ray therapy may exceptionally be followed in a few days by generalized reaction (erythema multiforme and/or fever), probably resulting from allergenic effect of absorption of tissue killed by irradiation. BA 24-18710

6017

UNUSUAL LOSS OF HAIR FOLLOWING X-RAY IRRADIATION. Charles Gefferth. *Paediatrica Danubiana* 3(3), 124-33 (1948). (In French).

In feeble-minded children, x irradiation with a dose below that used for epilation may cause extensive loss of hair even if no direct rays fall on skull according to the author. BA 24-18738

6018

EFFECT OF GRENZ RAYS ON LEPROUS INFILTRATIONS. III. RESPONSE OF LESIONS OF THE ANTERIOR PORTIONS OF THE EYEBALL. F. Sager and B. Miterstein. *Arch. Ophthalmol.* (Chicago) 38(1), 78-88(1947).

Grenz rays (6-14 kv, 700-1200 r/dose, total doses of 5500-11,600 r) were applied to lepromatous changes of anterior segments of eyeball in (1) 3 practically sightless eyes, and (2) 3 eyes with fairly good vision. In (1) all 3

lepromas became reduced in size or disappeared, (2) only 2 exhibited favorable response. No damage to cornea, lens or deeper structures of eye was noted during 2-4 yr observation period. BA 24-19945

6019

RADIATION THERAPY IN THE TREATMENT OF LAMENESS IN HORSES. Myron Thom. North Am. Veterinarian 30(12), 762-70(1949).

Author summarizes effect of radiation on inflammatory lesions, suggests radiation therapy as substitute to firing in the horse. BA 24-20523

6020

RADIORESISTANCE AND RADIOSENSITIVITY OF SWINE EXPOSED TO ATOMIC BOMB RADIATION. John L. Tullis. Federation Proc. 8(1), 373(1948).

An abstract. BA 24-20544

6021

FERTILIZATION EXPERIMENTS WITH PLANTORADON. H. H. Baetge and E. Begemann. Z. Pflanzenernähr., Dung. u. Bodenk. 44(2/3), 198-200(1949).

Considerable increases of yield attributed to radio-active complement of fertilizer, "Plantoradon" were not confirmed in these experiments with tomato and kohlrabi, although a slight effect could not be denied, according to authors. BA 24-20960

6022

ON THE EFFECT OF RADIOACTIVE RAYS ON TROPISMS AND GROWTH OF PLANTS. W. Schmidt. Rundschr. deut. bot. Ges. 1244(1), 3-4(1944). (In German).

Radiation of walls of room affected phototropic testing of pine seedlings. Room effect was diminished by hardening the seedlings. BA 24-21545

6023

THE ROLE OF THE ENZYME CATALASE IN PLANT EXTRACTS. IL Hans v. Euler, Sif Edels and Inger Gernow. Arkiv. Kemi 26A(5), 1-10(1948). (In German).

Germination of *Hordeum distichum*, *Secale cereale*, *Lepidium sativum*, *Phleum pratense*, and *Raphanus radiculicola* in 0.001M streptomycin depressed catalase activity of leaf extracts and caused defective chlorophyll formation, but had little effect on catalase activity of roots or seeds. Seedlings surviving strong ultraviolet or x ray irradiation during germination were chlorophyll deficient and had subnormal catalase activity. BA 24-21681

6024

EFFECTS OF CONTINUOUS GAMMA RADIATION ON TOMATO PLANTS AND FUSARIUM WILT. A. E. Dimond. Phytopathology 40(1), 7(1950).

Irradiation reduced fruit set of tomatoes before terminal growth was inhibited. It did not inhibit Fusarium wilt. BA 24-21818

6025

A COMPARISON OF X-RAY INDUCED GENETIC EFFECTS IN GERMINAL AND SOMATIC TISSUES OF *DROSOPHILA MELANOGASTER*. George Lefevre, Jr. Univ. of Michigan, Dissertation. 1949. 146p

After comparing data on influence of various intrinsic and extrinsic factors on x ray induced and spontaneous mutation, it was concluded that the two mutation processes are qualitatively different. Author believes mutation induced by ionizing radiation in *Drosophila*, as in maize, are losses or destructions of genetic material, and unlike spontaneous mutations, induced mutations are incapable of further change. BA 24-22526

6026

WIDE FIELD IRRADIATION AND THE PLATELET COUNT. W. M. C. Brown. Acta Radiol. 32(5/6), 407-27(1949).

Effect of wide field x ray treatment on platelet count is described for normal and abnormal hemopoiesis and the relative merits of platelet, lymphocyte, and total white

cell counts as biological indicators of exposure are considered. BA 24-22693

6027

INCREASED TOLERANCE OF MICE TO LETHAL X-RADIATION AS A RESULT OF PREVIOUS SUBLETHAL EXPOSURES. Eugene P. Cronkite, Clyde R. Sipe, Dean C. Eltzholtz, William H. Chapman, and F. W. Chambers. Proc. Soc. Exptl. Biol. Med. 73(2), 184-6(1950).

Exposure of mice to three successive weekly, sublethal doses of x ray (144 r) followed by one month of rest produced an increased resistance to administration of 703 r as shown by increased survival. BA 24-22695

6028

EFFECTS OF RADIATION UPON THE BLOOD. M. Jeanne Fairweather. Texas J. Sci. 1(4), 29-33(1949).

Mice were subjected to a single 200 r x ray dose. Average total leucocyte count dropped from 15,610/cm³ to 3880/cm³ on first day postirradiation, average differential count was altered from 83% lymphocytes and 17% neutrophils to 72% and 28%, respectively. Erythrocyte count increased slightly, immediately after exposure, decreased within a few days. Hemoglobin level exhibited slow and steady decrease. BA 24-22697

6029

A NOTE ON THE FAILURE OF NON-ISOTOPIC URANIUM TO INHIBIT RESORPTIVE PROCESSES IN THE RAT FEMUR. W. F. Neuman, M. W. Neuman, and B. J. Mulryan. J. Biol. Chem. 182, 151-152(1950).

Previously reported inhibition of resorptive processes in bones of rats injected with radioactive uranyl nitrate were compared with similar studies using non-isotopic uranyl nitrate. Results indicate that previously observed inhibition was due to radiation, not to specific chemical effect of uranium. BA 24-22699

6030

RESULTS AND EXPLANATIONS OF BIOLOGICAL-RADIATION DOSAGE-EFFECT CURVES. K. G. Zimmer. Biol. Zentr. 63, 72(1943).

Results and illustrations of tests on biological material are presented in three groups: 1) tests on genes, viruses, phage, and chromosomes; 2) tests on bacteria, yeast cultures, and unicellular organisms; 3) tests on multicellular animals, plants, eggs, etc. Hit theory is considered to provide best explanation of results. BA 24-22703

6031

A COMPARISON OF CHEMICAL CHANGES IN MACKEREL TISSUES TREATED BY IONIZING RADIATION. J. T. R. Nickerson, S. A. Golblith, and B. E. Proctor. Food Technol. 4(3), 85-8(1950).

Proteolytic action of enzymes in mackerel flesh was nearly as potent in irradiated as in nonirradiated tissue. (Whole mackerel or fillets were irradiated with supervoltage cathode rays, dose of 1,500,000 rep). BA 24-22994

6032

ROENTGEN STIMULATION OF CULTURES OF *S. TYPHI* AND *S. AUREUS*. O. Andreoni, M. Lupo, and G. Pisani. Ricerca sci. e ricostruz. 19(11/12), 1305-7(1949).

Stimulation is said to be produced when the relation between primary and secondary radiations (generated in the organic matter) attains an optimal value, which may be experimentally determined. BA 24-24047

6033

THE EFFECTS OF X-RAY ON RHABDITIS SPECIES. Lyell J. Thomas and Henry Quastler. J. Parasitol. 35(1, Sec. 2), 20(1949).

Abstract describes mutations in Rhabditis exposure to various doses of x rays when in (1) dry and (2) wet or normal condition. BA 24-25447

6034

RADIOACTIVE MATERIALS IN SOIL-FERTILIZER RESEARCH. F. W. Parker. *Plant Food J.* 2(2), 4-9, 33(1948).

Use and influence of radioactive materials on plant growth is discussed. Experimental results show considerable variation in various crop responses to P fertilizers. Soil fertility directly affects amount of fertilizer P that is used by the plant. BA 24-24908

6035

SOME PHYSICAL OCCURRENCES IN GENE-MUTATIONS DUE TO RADIATION. H. Pasqual Jordan, K. G. Zimmer, and N. W. Timofeeff-Ressovsky. *Z. indukt. Abstamm.-u. Vererbl.* 82(1), 67-73(1948). (In German).

Authors present a critique of the target theory with regard to what constitutes a "hit." BA 24-25883

6036

A SOFT X-RAY MUTANT OF *ASPERGILLUS NIGER* VAN TIEGHEM. Violet M. Diller, Alice G. Tytell, Alfred A. Tytell, and H. Kersten. *Plant Physiol.* 25(2), 340-54 (1950).

An atypical strain of *A. niger* isolated from colony subjected to soft x rays from Cu target is described. Pigmentation was practically absent, sporulation was depressed, and growth rate was much slower than for normal strain. BA 24-25885

6037

HEMOLYTIC EFFECT OF RADIATION. OBSERVATIONS ON RENAL BILE FISTULA DOGS SUBJECTED TO TOTAL BODY RADIATION AND ON HUMAN BLOOD IRRADIATED *IN VITRO*. R. Wendell Davis, Nieves Dole, Mary Jane Izzo, and Lawrence E. Young. *J. Lab. Clin. Med.* 35(4), 528-37(1950).

Excretion of urine bilirubin increased after total-body irradiation although accelerated destruction of mature erythrocytes could not be established or disproved. Heparinized normal human blood exposed *in vitro* to x radiation gave similar findings. BA 24-26045

6038

RADIATION. Leslie F. Nims. *Ann. Rev. Physiol.* 11, 527-44(1949).

Author reviews mechanism of ionizing radiation effects on living cells, blood and hematopoiesis, skin, and other tissues, and effects of internal radiation. Includes 156 references. BA 24-26049

6039

FAILURE OF CORTISONE OR ACTH TO REDUCE MORTALITY IN IRRADIATED MICE. Willie W. Smith, Falconer Smith, and E. C. Thompson. *Proc. Soc. Exptl. Biol. Med.* 73(3), 529-31(1950).

In mice given whole body x irradiation of LD₉₅₋₁₀₀ daily, intraperitoneal injection of 0.2 mg cortisone failed to prevent death, increase survival or reduce x-ray effect on RBC count, Hb, reticulocytes, WBC count or body weight, pre-exposure injection did not reduce mortality. Subcutaneous adrenocorticotrophic hormone, 0.25 mg twice per day, or in 2 injections prior to exposure did not delay or prevent death of mice given LD₃₀₋₆₀. BA 24-26050

6040

THE BEHAVIOR OF EOSINOPHILIA AS INDICATOR OF SUCCESS IN X-RAY IRRADIATION. H. Vieten. *Arztl. Wochschr.* 1946, 226-9(1946).

Blood pictures were followed during and after 5 therapeutic x irradiations of 75 r in children and 8 in adults on 5 successive days (total of 30 patients). If irradiation was therapeutically satisfactory, blood eosinophilia regressed, otherwise eosinophilia remained high or fluctuated widely. Result can vary from series to series in same patients. BA 24-26051

6041

EFFECT OF X-IRRADIATION ON INTESTINAL MOTILITY.

Robert A. Conrad. *Federation Proc.* 9(1), 24(1950).

Abstract describes *in vivo* and *in vitro* observations on intestinal motility before and after irradiation of the rat. Effects of atropine, nicotine, physostigmine and vagotomy were also observed. BA 24-26525

6042

ADRENAL CORTEX AND SURVIVAL OF RATS AFTER X-IRRADIATION. Abraham Edelmann. *Federation Proc.* 9(1), 36(1950).

An abstract. BA 24-26595

6043

EXPERIMENTAL STUDIES ON THE PATHOLOGICAL PHYSIOLOGY OF CORNEAL EPITHELIUM; CELL MOVEMENT IN WOUND HEALING, CELL DIVISION, MITOSIS INHIBITION AND OTHER NUCLEAR PHENOMENA. W. Buschke. *Ophthalmologica* 118(4/5), 407-33(1949).

X rays are one of several factors capable of inhibiting mitosis in corneal epithelium of rat. BA 24-26765

6044

CONTRIBUTION TO THE STUDY OF THE MIGRATION OF REGENERATIVE CELLS IN PLANARIA. Francoise Dubois. *Bull. biol. France et Belg.* 93(3), 213-83(1949). (In French).

X irradiation in sufficient amount can suspend regeneration and cause death in 3-7 wk in decapitated animals. When anterior 2/5 of animal is irradiated and the head subsequently removed, regeneration occurs only after a delay of about 30 days. During this delay period, regenerative cells migrate from uninjured areas to the top of the irradiated area. The greater the migration the greater the delay. BA 24-28405

6045

TESTS ON THE EFFECT OF DIFFERENT RADIATIONS AND ELECTROMAGNETIC FIELDS UPON *TRIBOLIUM DESTRUCTOR* UYT. (Col., Tenebrionidae). O. Silvo. *Ann. Ent. Fennici* 15(3), 141-2(1949).

When x rayed (40 kv, 60 ma, 50 kv, 50 ma, 60 kv, 40 ma, 6 periods, 5 sec each, total 30 sec radiation), *T. destructor* adult and larvae beetles completely lost their ability to propagate. BA 24-28527

6046

AUTOSOMAL LETHALS IN EXPERIMENTAL POPULATIONS OF *DROSOPHILA MELANOGASTER*. Bruce Wallace. *Evolution* (New York), 172-4(1950).

Three experimental populations of *D. melanogaster* were analyzed for second chromosome lethals. **Treatments:** (1) males, 7000 r, females, 1000 r, (2) both sexes, 1000 r, (3) not irradiated. Lethal frequency in (3) increased on the average 0.53% per generation in (1) frequency decreased from 18.3 to 10.1% in 3 generations, remaining constant for another 2 generations. Author concludes that half of induced lethals were deleterious in heterozygous condition, possibly through effects of coincident chromosomal aberrations. BA 24-28795

6047

INFLUENCE OF DIET ON THE BIOLOGICAL EFFECT CAUSED BY A SINGLE IRRADIATION OF THE WHOLE BODY BY X-RAYS. M. Lourau and O. Lartigue. *Experimentia* 6(1), 25-6(1950). (In French).

Diet proved to have an important effect on x ray sensitivity of guinea pigs. Two diets were fed, differing only in the fresh vegetable which supplemented the basal ration of oats and bran. Cabbage was added in first instance, beets in the second. The latter diet increased considerably the mortality rate as well as the hemorrhages, but had no effect on bone marrow damage. BA 24-29205

6048

THE INFLUENCE OF CANCER OF THE UTERUS AND

ITS RADIUM TREATMENT ON THE LIPOID BALANCE. Sakari Paivainen, and Tauno Kalaja. Acta. Soc. Med. Fennica "Duodecim" Ser. A 24(3), 75-95(1947).

Relatively small therapeutic doses of roentgen and radium rays were found to cause changes in blood lipid values. BA 24-29929

6049

COMPARISON OF THE OLIGODYNAMIC EFFECT AND THE ACTION OF SECONDARY RADIATION ON BACTERIA. Y. Seuderling. Acta Soc. Med. Fennica "Duodecim" Ser. Fennica A. 23(2), 121-4(1947).

Author compares oligodynamic action of elements on bacteria to effect of secondary radiation from same elements evoked by soft and hard primary x rays. Combined action of above-mentioned factors was also studied. Results show that oligodynamic action is chiefly chemical, but action of secondary radiation is of physical nature. BA 24-30374

6050

INHIBITION OF PLANT GROWTH BY IRRADIATION. III. SUCCESSIVE RADIATION EFFECTS, HOMOLOGOUS RESPONSES. Henry Quastler, and Marianne Baer. J. Cellular Comp. Physiol. 35(1), 75-94(1950).

Growing seedlings of Mung beans (*Phaseolus aureus*) were subjected to x irradiation. Resulting diverse responses, when analyzed into distinct components, were homologous to reactions found in dry seeds. Different radiation effects are characterized by their timing, making it possible to distinguish distinct growth mechanisms by their differential response to irradiation. BA 24-30984

6051

FORM-BUILDING MIGRATION OF REGENERATIVE MATERIAL IN HYDRA. V. F. Evlakhova. Compt. rend. acad. sci. URSS 53(4), 369-72(1946).

Fragments of *Pelmatohydra oligactis* were x rayed, then grafted onto (1) untreated pieces of same species, (2) untreated pieces of different species, or (3) untreated stalks of same species without interstitial cells. Hydras in (1) and (2) lived and regenerated, those in (3) disintegrated. When oral ends were amputated, x rayed hydras all died, unexposed hydras lived. In regeneration, interstitial cells migrate from intact to injured area. BA 24-31268

6052

THE ANALYSIS OF WAVE-LENGTH FACTOR FROM THE VIEW-POINT OF QUANTUM BIOLOGY. Fred Hercik. Spisy lekarske fak. Masaryk. univ. (Brno C. S. R) 22(6), 1-18(1948).

Dry spores of *Rhizopus nigricans* were irradiated with alpha, gamma, and monochromatic x-rays with wavelength of 0.56 and 4.1A. Survival curves for alpha and x-rays of wave-length 4.1A had 1-hit character while that for wave-length of 1.54A had 2-hit and for 0.56A had 4-hit character. Mean lethal dose was found to increase with increased number of hits required. Author suggests possibility of these targets being identical with genes. BA 24-31661

6053

ROENTGENOTHERAPEUTIC CHANGES IN THE SMALL INTESTINE, SURGICAL ASPECTS. Horace M. Wiley and Everett D. Sugarbaker. Cancer 3(4), 629-40(1950).

Radiation reaction in small intestine was observed in 9 patients out of 600 treated for cancer of uterus, 300 of whom were treated 4 or more years previously. Average time for radiation treatment until development of incapacitating symptoms was 26.5 months. Pathological picture was one of extensive fibrosis of intestinal wall with ulceration of mucosa and secondary inflammatory changes. Medical and surgical aspects of therapy are discussed. BA 24-31950

6054

PUBLIC HEALTH ASPECTS IN THE DEVELOPMENT OF ATOMIC ENERGY. Shields Warren. Bull. New York Acad. Med. 26(7), 435-9(1950).

Safe handling of radioactive materials is discussed. Instruments can detect one millionth of therapeutic dose of radioactive P and work with radioactive isotopes should not be considered dangerous. Hazards of radioactive wastes must be considered and guarded against. BA 24-31958

6055

RADIATION THERAPY AS A METHOD OF TREATMENT FOR THE RELIEF OF AMENORRHEA AND STERILITY. Ira Kaplan. J. Mt. Sinai Hosp. 14(3), 424-41(1947).

Because of successful results of irradiation in a large number of cases, and absence of adverse effects according to subsequent follow-up of children born of irradiated mothers, author concludes that irradiation, when properly given, is harmful neither to mother nor to offspring and is a valuable therapeutic procedure for treatment of amenorrhea and relief of sterility. BA 24-32616

6056

PROSPECTS OF TREATMENTS BY NITROGEN MUSTARDS AND BY RADIOACTIVE ISOTOPES. A. Herve. Rev. med. Leige 3(19), 555-62(1948).

Author describes pathology of digestive tract, lymphoid tissue and bone marrow under the influence of radioisotopes and nitrogen mustards. BA 24-32823

6057

CASTRATION OF THE AVIAN EMBRYO. Etinne Wolff. Compt. rend. soc. biol. 144(7/8), 526-9(1949).

X-ray castration of duck and chick embryos was performed in order that neutral individuals could be studied. Irradiation was localized to medial angle of coelomic cavity, total dose 3500 r, applied before sexual differentiation of gonads could be observed histologically BA 24-3309A

6058

INVESTIGATIONS ON THE EFFECT OF ELECTRO-MAGNETIC AND X-RAY TREATMENTS ON PLANT TROPISMS. Garbiele Gaetani d' Aragona. Ann. sperim. agrar. (Rome) 3(5), 1081-1100(1949).

Subsequent to treatment of young growing points of *Centaurea americana*, *Ipomoea japonica* var. *coerulea*, *Helianthus annuus* var. *nanus*, *Solanum lycopersicum*, *Brassica campestris* var. *rapa* and *Triticum vulgare*, with electromagnetic fields and x rays, they were placed in horizontal position and orthotropic bending studied. Low frequency treatment reportedly accelerated bending, high frequency delayed bending. BA 24-34294

6059

CHROMOSOME BREAKAGE BY X-RAYS AT LOW TEMPERATURE AND THE RADIODECOMPOSITION OF WATER. A. C. Faberge. Genetics 35(1), 104-5(1950).

Effect of temperature on sensitivity of Tradescantia pollen chromosomes to x irradiation parallels its effect on H₂O₂ production by x irradiation of O₂-containing water, except that H₂O₂ production stops below -116°C. BA 24-35040

6060

THE EFFECT OF BORON ENRICHMENT ON SLOW NEUTRON IRRADIATED TISSUES. Alan D. Conger. Genetics 35, 102(1950).

Inflorescences from Tradescantia plants grown in boric acid solution for about 2 mo were exposed to slow neutrons, and frequency of chromatid aberrations was compared with frequency in normal (non-boron-enriched) inflorescences. Boron enriched plants showed 4-5 times more aberrations than controls. BA 24-35080

6061

BACTEREMIA AS A FACTOR IN THE LETHAL EFFECT OF X-RADIATION. Carolyn W. Hammond, C. Phillip Miller, and Marianne Tompkins. *Bacteriol Proc.* 1950, 104(1950).

An abstract. BA 24-35310

6062

EFFECT OF TOTAL BODY X-RADIATION ON PLASMA ALKALINE PHOSPHATASE OF RATS. Stephan Ludewig. *Federation Proc.* 9(1), 198(1950).

An abstract. BA 24-35312

6063

WATER AND ELECTROLYTE CHANGES IN RAT INTESTINE AFTER TOTAL BODY X-RADIATION. E. E. Painter and E. W. Pullman. *Federation Proc.* 9, (1), 97(1950).

An abstract. BA 24-35314

6064

X-RAY INDUCED PHYSIOLOGICAL MUTATIONS IN *O. MULTIANNULATUM*. Nils Fries. *Arkiv Bot.* 32A(8), 1-9(1945). (German).

Ascospores were irradiated on agar (Coolidge tube, 50 kv, 2-3 ma, for 100 min, at 6 and 12 cm). Six of 527 single-cell cultures were very slow growing; each lacked ability to synthesize a chemical necessary for growth (biotin, p-aminobenzoic acid, unidentified substances in malt and yeast extracts and adenin) and 2 of the 6 were unable to reduce and assimilate 4- and 6-valent S. Five of the 6 mutants were hereditary; inability to utilize 4 valent S was not. BA 24-66

6065

LATE EFFECTS OF RADIUM AND PLUTONIUM ON BONE. Margaret A. Bloom and William Bloom. *Arch. Pathol* 47(5), 494-511(1949). NSA 1-16

6066

A DIFFUSIBLE SUBSTANCE IN IRRADIATED TISSUES. B. Jolles. *Nature (London)* 164(4158), 63-4(1949).

When 2 small skin areas near each other were x-irradiated, the reaction was greater than when irradiated areas were farther apart. Minimal separation for no increase (over effect on exposed symmetrical single area) for areas of 2.5 x 2.5 cm was 3 cm. BA 24-285

6067

THE INFLUENCE OF RADIATION ON THE ENZYMIC ACTIVITY OF INTESTINAL JUICE. Masataka Matsuo and Masamitsu Kawaharada. *Tohoku J. Exptl. Med.* 40(5/6), 535-41(1941).

X-radiation had no effect on enzyme activity of intestinal fluid *in vitro* in terms of peptonase and esterase components. Irradiation of a Thiry-Vella intestinal loop produced marked variations in enzymatic activity. BA 24-726

6068

INJURY AND RECOVERY OF MOUSE TESTES FOLLOWING WHOLE-BODY EXPOSURE IN X-RADIATION. Allen Eschenbrenner. *Federation Proc.* 8(1), 354(1949).

An abstract. BA 24-1080

6069

RADIOTHERAPY IN SMALL DOSES AS A STIMULANT IN OVARIAN INSUFFICIENCY. Romeo do. Nizza. *Rev. med. Rosario* 37(1), 69-79(1947).

"Stimulant" radiotherapy in menstrual disturbances is discussed in light of the 24 case reports presented. BA 24-1121

6070

MUST WE HIDE? R. E. Lapp. Cambridge, Mass. Addison-Wesley Press, Inc. 1949. 182p.

Medical and public health aspects of atomic bombing are discussed. BA 24-2238

6071

RELATION BETWEEN THE RADIATION DOSE TOLERATED

BY THE SKIN AND THE DISTANCE OF THE RADIANT SOURCE FROM THE SKIN. J. Klumpar. *Acta Radiol.* 31(3), 223-32(1949).

Surface dosage of γ rays required to produce certain degree of skin reaction during a course of Ra therapy depends on distance from radiophore to skin surface. At small distances a 5-times greater surface dose may be applied than at greater distances. Depth dose 4 mm below surface believed responsible for skin reaction. BA 24-3405

6072

DEPOSITION AND FATE OF PLUTONIUM, URANIUM, AND THEIR FISSION PRODUCTS INHALED AS AEROSOLS BY RATS AND MAN. K. G. Scott, D. J. Axelrod, J. Crowley, and J. G. Hamilton. *Arch. Pathol.* 48(1), 31-54(1949). NSA 3-1178

6073

PRODUCTION OF RADIOACTIVE MOSQUITOES. C. C. Hassett, and D. W. Jenkins. *Science* 110(2848), 109-10(1949).

Second-instar larvae of *Aedes aegypti*, reared in distilled water containing 0.05-10 $\mu\text{c/ml}$ of $\text{Na}_2\text{HP}^{32}\text{O}_4$, were greatly retarded in development, particularly at higher concentrations. In 1 $\mu\text{c/ml}$, adults emerged in 15 days and showed marked accumulation of radio-phosphorus. Third and early fourth instar larvae developed normally in 10 $\mu\text{c/ml}$ concentration of radioactive salt. BA 24-3410

6074

RELATION OF EXIT DOSE AND OTHER DOSAGE FACTORS TO ROENTGEN INJURIES. June C. Shafer, Carl B. Braestrup, and Jerome K. Fisher. *Arch. Dermatol and Syphilol* 59(4), 472-83(1949).

Authors review 160 cases of chronic radiodermatitis (85 occurring after treatment of benign dermatoses) with reference to exit dose of x radiation as factor in production of chronic roentgen injuries. Importance of using low voltage in therapy of superficial inflammatory dermatoses in order to avoid late roentgen damage to skin is emphasized. BA 24-4200

6075

BEHAVIOR OF EMBRYOS OF *R. ESCULENTA* WHICH ARE FIRST EXPOSED TO LETHAL AND SUB-LETHAL DOSES OF X-RAYS AND THEN JOINED WITH NORMAL EMBRYOS IN PARABIOSIS. Lea Mistruzzi. *Acta Pontificia Acad. Sci.* 8(12), 101-6(1944).

The data presented demonstrate the beneficial influence of the normal organism on the vitality of an irradiated individual which otherwise would have succumbed. BA 24-4272

6076

MULTIPLE BASAL CELL EPITHELIOMAS IN A FIVE-YEAR-OLD CHILD. Isabel M. Scharnagel and George T. Pock. *Am. J. Diseases Children* 77(5), 647-51(1949).

Authors describe occurrence of several hundred basal cell epitheliomas in 5 yr old boy who had had 4 x ray treatments for enlarged thymus shortly after birth. BA 24-4110

6077

EFFECT OF OXYGEN ON THE FREQUENCY OF CHROMOSOME ABERRATIONS PRODUCED BY ALPHA-RAYS. J. M. Thoday and John Read. *Nature* 163(4134), 133-4(1949).

Anaerobic exposure of *Vicia faba* root tips to α radiation (radon solution) produced less inhibition of 10 day growth and a smaller percent of anaphase abnormalities (fragments and bridges) than did aerobic exposure. These differences were less than those observed following x radiation under similar conditions. Authors propose that since O_2 promotes decomposition of water by these radiations,

H₂O₂ may be associated with processes involved in chromosome structural changes. BA 23-25450

6078

THE GERM-PLASMA PROBLEM. Edgar Knapp. *Naturwissenschaften* 32, (14/26), 139-47(1944).

This review includes a section on x ray effects, explains why germ plasma must be a well-defined atomic structure. BA 23-25481.

6079

MUTANT STRAINS OF *OPHIOSTOMA MULTIANNULATUM* REQUIRING COMPONENTS OF DIFFERENT NUCLEOTIDES. Nils Fries. *Arkiv Botan.* 33A(7), 1-7(1946).

Out of 94 x ray-induced physiological mutants of ascospores and conidia, 36 strains showed the following types: 13 mutants grew with uracil, 3 required adenine, 19 required adenine but hypoxanthine also produced good growth, 1 mutant required guanine. Nucleotides bound in tobacco-mosaic virus could not be utilized by mutants tested. BA 23-25501

6080

INHERITANCE OF MUTATIONAL CHANGES INDUCED BY RADIATION IN *PARAMECIUM AURELIA*. R. F. Kimball. *Genetics* 34(4), 412-24(1949).

Reduced vigor observed in exautogamous progeny of irradiated paramecia is an expression of micronuclear mutations induced by β and x radiation. BA 23-25539

6081

THE ACTION OF TESTOSTERONE PROPIONATE ON THE REGENERATION OF TESTES DAMAGED BY X-RAY. C. A. Joel. *Endokrinologie* 24(5/6), 310-71(1942).

Testes of 24 rats were exposed to 360 and 450 r; 12 received testosterone propionate (total dose 30 mg) and remaining rats served as controls (no treatment). Treated rats exhibited same degenerative changes in spermatogenesis at 25 days postexposure as untreated, irradiated controls. On the 50th day after exposure they showed regeneration to normal (control showed degeneration, no regeneration). Author concludes that x rays have direct action on germinal epithelium and spermatogenic function. BA 23-26236

6082

ON THE TENDENCY OF EWING'S SARCOMA TO HEAL SPONTANEOUSLY AND ON THE ALTERATIONS DUE TO IRRADIATION. Lars Unander-Scharin. *Acta Orthopaed. Scand.* 18(4), 436-76(1949).

In 17 cases given irradiation therapy, disintegration of tumor cells was closely related to irradiation. There was quantitative but not a qualitative difference between late effects of irradiation and spontaneous changes in a tumor. Author concludes that effect of irradiation is to intensify changes which take place spontaneously.

BA 23-26555

6083

REPORT OF EXPERIMENTAL BREEDING WORK WITH SOYA BEAN AT THE SWEDISH SEED ASSOC. IN THE YEARS 1944-1946. G. Andersson, and G. Olsson. *Sveriges Utsadesforen. Tidskr.* 57(5), 460-82(1947).

Extensive material was obtained from experiments involving the x raying of dormant seeds. Mutants showing earlier and higher yields than initial material have been produced by x rays. BA 23-28090

6084

MUTATION EXPERIMENTS WITH CULTIVATED PLANTS. I. X-RAY TREATMENTS OF WINTER AND SUMMER BARLEY VARIETIES. H. Stubbe and G. Bandlow. *Zuchter* 17/18(10/12), 365-74(1947).

Forty thousand kernels of each of two summer barley varieties, Donaria and Haisa (*Hordeum distichum nutans*) and two winter barley varieties, Friedrichswerther

Berg and Peragis (*H. vulgare pallidum*), were treated with 5000-15,000 r of x rays. Large percentages of progeny were lost due to cold winter and war; 34 mutants found in those remaining are described. BA 23-28144

6085

Hanford Works

GROSS EFFECTS OF GROWTH INHIBITING LEVELS OF TRITIUM OXIDE ON *CHLORELLA PYRENOIDOSA*.

J. W. Porter and M. S. Watson. *Nov.* 20, 1953. 18p. Contract W-31-109-Eng-52. (HW-30056).

Growth and cell division rates, average cell size, number of viable cells, and genetic effects were studied in *Chlorella* growing in presence and absence of tritium oxide. NSA 9-1498

6086

Naval Radiological Defense Lab.

STUDIES ON THE CHEMICAL NATURE OF THE RADIATION PROTECTION FACTOR IN MOUSE SPLEEN. 1. ENZYMATIC INACTIVATION BY DESOXYRIBONUCLEASE AND TRYPSIN. L. J. Cole, and M. E. Ellis. *Nov.* 23, 1953. 32p. (USNRDL-418).

Authors conclude that spleen radiation protection factor is non-cellular in nature and that chemically it is a desoxyribonucleoprotein. NSA 8-1499

6087

RELATIVE BIOLOGICAL EFFECTIVENESS OF FAST NEUTRONS, GAMMA RAYS, X RAYS ON GRASSHOPPER NYMPH OVARIOLES. (*MELANOPLUS DIFFERENTIALIS*.) Theodore Tahmisian and Howard H. Vogel, Jr. *Proc. Soc. Exptl. Biol. Med.* 84, 538-43(1953).

In order to destroy every egg in each grasshopper ovariole, with the exception of the most advanced, it was necessary to irradiate the total body with 350 r x rays, 420 r Co⁶⁰ γ rays, or 22.5 rep of fast neutrons. Thus, the relative biological effectiveness of Co⁶⁰ γ rays; 200 kv x rays; fast neutrons, for this specific effect, is 1.0: 1.2: 19. This is correlated with relative specific ionization and linear energy transfer. It is suggested that damage to the grasshopper ovariole could be used as a biological dosimeter for fast neutron doses in the range 10 to 50 rep. NSA 8-1501

6088

EVALUATING THE SAFETY OF RADIATION-STERILIZED FOODS. A. J. Lehman and E. P. Lang. *Nucleonics* 12(1), 52-4(1954).

Radiation Sterilization V. The official position of the U. S. Food and Drug Administration with reference to the sterilization of food and drugs by ionizing radiation is set forth. NSA 8-1502

6089

EFFECT OF X-IRRADIATION ON TISSUE HYDRATION IN THE MOUSE. Roberts Rugh. *Nucleonics* 12(1), 28-33(1954).

Data are presented on changes in wet and dry weight and percentage of water in 10 separate organs and the remaining carcass of mice 3 days after exposure to a lethal x ray dose. NSA 8-1503

6090

STUDIES WITH CYSTEINAMINE AND CYSTEINE IN X-IRRADIATED ANIMALS. Robert L. Straube and Harvey M. Patt. *Proc. Soc. Exptl. Biol. Med.* 84, 702-4(1953).

Intravenous, equimolar amounts of cysteinamine were 5 times as effective as cysteine, given postirradiation. Maximally tolerated doses of each give equivalent protection. The two agents appear additive in protection effect. NSA 8-1505

6091

EFFECT OF 2,3-DIMERCAPTOPROPANOL (BAL) UPON DISTRIBUTION AND EXCRETION OF PLUTONIUM. Bergene Kavin and D. Harold Copp. *Proc. Soc. Exptl. Biol. Med.* 84, 576-7(1953).

Intramuscular injection of BAL in doses therapeutically effective in As and Hg poisoning had no effect on distribution and excretion of injected Pu. NSA 8-1508

6092

U. S. Atomic Energy Commission, Washington
CIVIL DEFENSE AND ATOMIC WARFARE, A SELECTIVE
READING LIST. SUPERINTENDENT OF DOCUMENTS
1953. 48p. NSA 8-1770

6093

Brookhaven National Lab.
EFFECTS OF IONIZING RADIATION ON IMMUNITY.
William M. Hale, Institute of Pathology, Coll. of Medicine,
Univ. of Tenn., Memphis, and Richard D. Stoner, Brook-
haven National Lab. [1953?] 30p. (BNL-1665).

Ionizing radiation has been found to reduce markedly,
or to abolish, active or passive immunity to bacterial
infections and reduce resistance and active immunity to
animal parasite infections. It has little effect on acquired
immunity to viral infection or active or passive immunity
to bacterial toxins. Antibody formation may be greatly
inhibited, this effect varying with radiation dose, species,
time of antigenic stimulus, nature of stimulus, and route
of administration of antigen. NSA 8-1774

6094

Brookhaven National Lab., Upton, N. Y.
INCREASED SUSCEPTIBILITY OF MICE TO ANAPHYLACTIC
SHOCK FOLLOWING COBALT 60 GAMMA RADIATION.
Richard D. Stoner, Brookhaven National Lab. and William
M. Hale, Institute of Pathology, Coll. of Medicine, Univ
of Tenn., Memphis. [1953?] 19p. (BNL-1673).

Gamma radiation exposure of 650 rep markedly
enhanced active anaphylactic shock in mice sensitized with
alum-precipitated tetanus toxoid and challenged with fluid
tetanus toxoid 7 days postirradiation. Antihistaminic
agents affording almost complete protection from fatal
anaphylaxis in mice are described. NSA 8-1775

6095

Atomic Bomb Casualty Commission
THE GROWTH AND DEVELOPMENT PROGRAM OF THE
ATOMIC BOMB CASUALTY COMMISSION. ANALYSIS ON
BODY MEASUREMENTS TAKEN IN 1951 ON 4,800
HIROSHIMA CHILDREN. Earle L. Reynolds. June 12,
1952. 90p. (NYO-4458) NSA 8-1776

6096

California. Univ., Los Angeles. Atomic Energy Project
LETHALITY IN RABBITS AS A FUNCTION OF DEPTH DOSE
DISTRIBUTION AND AVERAGE DOSE. M. A. Greenfield,
M. S. Billings, A. Norman, A. E. Lewis Jan. 27, 1954.
19p. Contract AT-04-1-GEN-12. (UCLA-278).

No difference in lethality resulting from the two
different depth-dose distributions used. NSA 8-1777

6097

EFFECT OF IRRADIATION WITH COBALT-60 ON
TRICHINA LARVAE. H. J. Gomborg and S. E. Gould.
Science 118, 75-7(1953).

Trichinous rat muscle and isolated trichina larvae
were obtained by digestion of trichinous rat muscle exposed
in Co⁶⁰ irradiation unit to doses of 5120-20,480 r. Data
are tabulated to show dosages of Co⁶⁰ γ radiation required
for sterilization and for inhibition of maturation of trichina
larvae. NSA 8-1779

6098

CHANGES IN THE CENTRAL NERVOUS SYSTEM FOLLOWING
IRRADIATION WITH 23-Mev X-RAYS FROM THE BETATRON.
A. Arnold, P. Bailey, R. A. Harvey, L. L. Haas, and
J. S. Laughlin. Radiology 62, 37-46(1954).

Studies to determine and analyze effects of x irradiation
on normal brain of monkey and on tumors of central
system in man reveal that central nervous system of both

monkey and man is more radioresponsive than has been
generally supposed. NSA 8-1780

6099

THE BLOOD COUNT IN RADIOGRAPHERS-A GROUP
SURVEY. N. R. Fletcher. Radiography 20, 19-24(1954).

Possible radiation-induced blood changes are reviewed,
blood records of a group of radiographers are analyzed.
NSA 8-1782

6100

CHANGES IN THE CELLULAR ELEMENTS OF BLOOD
FOLLOWING ADMINISTRATION OF P³². Santosh Mitra,
K. L. Bhattacharya, A. Bose, and K. P. Chakraborty
Acta Radiol. 40, 593-602(1953).

White albino rats were given doses of P³² ranging
from 0.3 μ c/g to 4.5 μ c/g. Changes in cellular elements
of blood were studied. Doses up to 2 μ c/g were sublethal,
rats receiving 4.5 μ c/g died within 12 days. Radiosensitivity
and life cycle of blood cells are directly proportional.
Dosage rate is an important factor. NSA 8-1783

6101

THE CHEMISTRY OF BIOLOGICAL AFTER-EFFECTS OF
ULTRAVIOLET AND IONIZING RADIATIONS. A SYMPOSIUM.
III. INACTIVATION OF BACTERIOPHAGE AFTER IRRADIATION.
Tikvah Alper. Brit. J. Radiol. 27, 50-4(1954).

During a series of experiments to determine the
effect of O on radioinduced inactivation of bacteriophages
it was observed that part-inactivated phage particles retain
their ability to adsorb to bacteria and to reproduce themselves,
unless acted on by certain specific agents. There is some
evidence that, at room temperatures, part-inactivated phage
in air-free suspensions does undergo slow inactivation on
standing, but the possible presence of H₂O₂ in small amounts
has not been excluded. The agents acting on part-inactivated
phage appear to be of a reducing nature. Neither OH nor HO₂
radicals have been found to cause part-inactivation or
immediate inactivation. Part-inactivation is a surface
phenomenon. It does not occur in the irradiation of phage
by ultraviolet light, nor in the x irradiation of suspensions
highly protected against indirect action NSA 8-1786

6102

THE CHEMISTRY OF BIOLOGICAL AFTER-EFFECTS OF
ULTRAVIOLET AND IONIZING RADIATIONS. A SYMPOSIUM.
VII. ATTEMPTED ESTIMATION OF ORGANIC PEROXIDES IN
X-IRRADIATED MICE. V. J. Horgan, and J. St. L.
Philpot. Brit. J. Radiol. 27, 63-72(1954).

Mice were given LD₁₀₀ of x rays and carcasses were
then extracted with n-butanol. Properties of oxidizing
extract did not show it to be identical with any known
peroxides. NSA 8-1790

6103

THE CHEMISTRY OF BIOLOGICAL AFTER-EFFECTS OF
ULTRAVIOLET AND IONIZING RADIATIONS. A
SYMPOSIUM. VIII. PROTECTION OF MICE AFTER
WHOLE-BODY X IRRADIATION. P. Bonet-Maury, and F.
Patti. Brit. J. Radiol. 27, 72-6(1954).

Pre-irradiation exposure to coal gas, KCN, and
malontrile gave definite protection as indicated by
percentage mortality and by observation of animals
surviving longer than one month. None of post-treatments
tested led to survival of mice exposed to lethal doses
of 800 r. Data are tabulated on dose, mode of administration,
number of animals, mean survival time, and percent
surviving. NSA 8-1791

6104

ADENOSINE TRIPHOSPHATASE AND 5-NUCLEOTIDASE
ACTIVITY OF HEMATOPOIETIC TISSUES OF IRRADIATED
ANIMALS. Kenneth P. Dubois and Donald F. Petersen.
Am. J. Physiol. 176, 282-6(1954).

Periodic adenosine triphosphatase and 5-nucleotidase measurements on spleen and thymus glands from rats and mice exposed to sublethal doses of x rays show that these tissues exhibit an increased ability to hydrolyze adenosine triphosphate and 5-adenylic acid. Effect becomes evident as early as 3 hr post irradiation and reaches a maximum within 72 hr. Dose-effect relationship is described. NSA 8-1793

6105

Brookhaven National Lab.

PROTECTIVE PROPERTIES OF CYSTEINE, SODIUM HYPOSULFITE AND SODIUM CYANIDE AGAINST RADIATION INDUCED CHROMOSOME ABERRATIONS. Knut Mikaelson. [1953] 17p. (BNL-1674).

Protective effects of these agents against chromosome fragmentation induced by γ irradiation in Tradescantia is demonstrated. NSA 8-1794

6106

GLUTATHIONE AND X-RAY INJURY IN HYDRA AND PARAMECIUM. George E. Daniel, and Helen D. Park. J. Cellular Comp. Physiol. 42, 359-67 (1953).

Glutathione added to irradiated saline media prevented damaging effects on the tentacles of hydra and reduced lethal effects on paramecia, observed when animals were placed in untreated irradiated saline. NSA 8-1796

6107

RADIATION SICKNESS IN THE MONKEY. Earl Eldred, and William V. Trowbridge. Radiology 62, 65-73 (1954).

Authors describe various features of radiation sickness in the monkey. Alterations in blood picture, reported elsewhere, appear to be the most sensitive index of radiation injury. NSA 8-1797

6108

RELATIVE BIOLOGICAL EFFECTIVENESS OF RADIUM AND OTHER ALPHA EMITTERS IN CF NO. 1 FEMALE MICE. Miriam P. Finkel. Proc. Soc. Exptl. Biol. Med. 83, 494-8 (1953).

Paper compares Pu^{239} , Po^{210} , U^{233} , Th^{223} , AND Ra^{226} with respect to LD_{50} for mice during a period of 20-100 days after intravenous administration. These emitters are also compared with respect to number of bone tumors produced. NSA 8-1802

6109

AN INTERNATIONAL BIBLIOGRAPHY ON ATOMIC ENERGY. VOL. 2. SCIENTIFIC ASPECTS, SUPPL. 2. United Nations, N. Y., Atomic Energy Section, Department of Security Council Affairs, 1953. 320p. (AEC/INF/10/Rev. 1/Add. 2).

This bibliography lists 7997 articles from world literature published during 1951-52. One section is devoted to biological and medical effects of high energy radiation. It is not annotated. NSA 8-1814

6110

HOW OXYGEN CAUSES AN INCREASE IN CHROMOSOMAL ABERRATION YIELD. D. Conger. Genetics 40, 568 (1955).

In tradescantia, oxygen causes an increase in x-ray induced aberration yield by increasing the primary breakage rate.

6111

RETINAL CHANGES FOLLOWING IONIZING RADIATION. P. A. Cabis and D. V. L. Brown. Am J. Ophthalmol. 40, 84-88 (1955).

Histological changes in eyes of monkeys receiving whole body exposure to 2000 r are described. Rods were completely destroyed by 2000 r. To effect change in all three types of retinal neurons required a dose of more than 30,000 r.

6112

Hanford Works

THE EFFECT OF TRITIUM OXIDE ON SOME SYNTHETIC

PROCESSES OF CHLORELLA PYRENOIDOSA. J. W.

Porter and H. J. Knauss. Dec. 29, 1953. 12p. (HW-30252) Contract No. W-31-109-Eng-52.

Irradiated cells synthesized 2-8 times as much triglycerides as did control cells. Irradiated cells also incorporated more C^{14} into the nucleic acid fraction, and less into the chlorophyll a fraction, than did controls. NSA 8-2086

6113

Naval Medical Research Inst, Bethesda

THE USE OF SMALL LABORATORY ANIMALS IN MEDICAL RADIATION BIOLOGY. 3. REPRODUCIBILITY OF THE LETHAL EFFECT OF TOTAL-BODY IRRADIATION IN MICE. Friedrich Ellinger, Jasper E. Morgan, and Ellsworth B. Cook. Nov. 24, 1953. 8p. (NM-006-012.04.65). NSA 8-2087

6114

School of Aviation Medicine

THE ANTIBODY RESPONSE OF ANIMALS EXPOSED TO X-RADIATION. Roland B. Mitchell, Gale H. Keyes, Dorothy T. Anderson, and Allyn W. Kimball. Aug. 1950. 11p. (NP-1883) Project No. 21-47-002, Report No. 1. NSA 8-2088

6115

Atomic Energy Medical Research Project, Western Reserve Univ.

THE DIFFERENTIAL EFFECT OF X-IRRADIATION ON THE INCORPORATION OF DESOXYRIBONUCLEIC ACID PRECURSORS. Helen Harrington and Paul S. Lavik. Feb. 1, 1954. 17p. (NYO-4023)

Irradiation markedly and consistently inhibited the incorporation (1) of P^{32} into DNA phosphorus, (2) of crotic acid-2- C^{14} into DNA pyrimidines and (3) of sodium formate- C^{14} into DNA guanine. Incorporation of adenine-8- C^{14} into DNA purines was not inhibited, and even appeared to be above normal in some instances. There was no significant effect on incorporation of formate- C^{14} into DNA thymine or adenine. NSA 8-2089

6116

Radiation Lab., Univ. of Calif., Berkeley

MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT [FOR] JULY, AUGUST, SEPTEMBER, 1953. Nov. 27, 1953. 38p. Contract No. W-7405-eng-48. (UCRL-2418).

Includes reports on: chronic histopathological effects of injected At^{211} in rats, with particular attention to thyroid and parathyroid tissues, chronic At^{211} toxicity experiments on monkeys. Evidence is presented to show that x-ray induced lethal mutation frequency of haploid yeast is not altered by hydrostatic pressures reaching 10,000 psi. NSA 8-2090

6117

Radiological Lab., Univ. of Calif., San Francisco, School of Medicine

HEMATOLOGY AND RADIOIODINE SECTIONS. p. 27-67 of ANNUAL REPORT [FOR] 1953. 45p. Contract AT-11-1-Gen-10. (UCSF-8(p. 27-67)).

Hematological effects of total-body irradiation and effects of I^{131} on bone marrow are described. NSA 8-2092

6118

Atomic Energy Project, Univ. of Rochester

EFFECTS OF DAILY LOW DOSES OF X-RAYS ON SPERMATOGENESIS IN DOGS. George W. Casarett. Nov. 25, 1953. 67p. Contract W-7401-eng-49. (UR-202).

Effects on spermatogenesis of daily whole-body exposure to low doses of x rays for an indefinite time were studied in dogs. Decline in absolute sperm count was first observed after 20 wk (60 r) and reached lowest levels generally after about 60 wk (180 r) of exposure.

Data on semen analysis and results of test breeding are tabulated. NSA 8-2093

6119

Atomic Energy Project, Univ. of Rochester
RECOVERY FROM RADIATION INJURY IN MICE AND ITS EFFECT ON LD₅₀ FOR DURATIONS ON EXPOSURE UP TO SEVERAL WEEKS. H. A. Blair. Feb. 10, 1954. 22p. Contract W-7401-eng-49. (UR-312).

Lethality of x and γ irradiation applied for various durations from short times up to a few weeks is representable by an appropriate solution of the differential equation $dI/dt = A\gamma - \beta(I - \alpha\gamma t)$ in which I is injury, γ the dose rate, t the time of exposure and A, β , and α are constants. NSA 8-2094

6120

EVIDENCE FOR A NUCLEAR PRECURSOR OF RIBO- AND DESOXYRIBONUCLEIC ACID. Alfred Marshak. J. Cellular Comp. Physiol. 32(3), 381-406(1948).

Theory is advanced to explain the mode of action of ionizing radiation in inhibiting mitosis. BA 23-20236

6121

A MUTATION OF *O. hookeri* INDUCED BY X-RAYS SHOWING A DIVERGENT HEREDITARY REACTION. Hans Marquardt. Flora 37, 152-65(1943).

Normal *O. hookeri* was pollinated with pollen grains treated with x rays. From seeds of 35 capsules only 32 flowering plants were obtained. One of these was a large-leaved and large-flowering mutant. Mutant characteristics persisted. Chromosome number of the mutant was normal (14), but a translocation had occurred between 2 chromosomes in irradiated pollen, resulting in a ring of 4 chromosomes. BA 23-20279

6122

ACHIEVEMENTS AND AIMS IN THE BREEDING OF FRUIT TREES AND SHRUBS. M. Schmidt. Zuchter 19(5/6), 135-53(1948).

Artificial somatic mutations were obtained by treating sprouts with x rays. BA 23-20287

6123

CHROMOSOME MUTATIONS OF *D. MELANOGASTER* BY ROENTGEN RAYS OF VARIOUS WAVE LENGTHS. A. Catsch, A. Kanellis, Gh. Radu, and P. Welt. Naturwissenschaften 32(27/39), 228(1944).

Effectiveness of 1000, 2000, and 4000 r doses of soft and hard x rays was not statistically differentiable in this study of induction of chromosome mutations. BA 23-20296

6124

A COMPARISON OF THE EFFECTS OF ROENTGEN RAYS AND HIGH SPEED NEUTRONS ON THE CHROMOSOME MUTATION RATE OF *D. MELANOGASTER*. A. Catsch, O. Peter, and P. Welt. Naturwissenschaften 32(27/39), 230-1(1944).

Neutrons found to be less efficient than x rays in producing chromosome mutations. Author concludes that with x rays a multiple hit process is involved, with fast neutrons, a single hit process. BA 23-20297

6125

THE INDUCTION OF MUTATIONS IN *PARAMECIUM AURELIA* BY BETA RADIATION. R. F. Kimball. Genetics 34(2), 210-22(1949).

P. aurelia were exposed to beta radiation from plaques of P³² in doses ranging up to 13,000 rep. Irradiated animals and their descendants showed no effect as long as they multiplied vegetatively; but considerable death and reduced fission rate occurred after autogamy (which produced homozygous condition). Irradiation within 1 hr before cytoplasmic division was least effective. Fractionated doses were as effective as same total dose in single exposure. BA 23-20304

6126

CALCIUM AND POTASSIUM METABOLISM (ASSIMILATION) IN ROENTGEN IRRADIATED RABBITS. K. Adler and M. Adler. Strahlentherapie 44, 481-88(1932).

Increased fluid loss was observed in x irradiated rabbits. Elimination of calcium was increased during the 1st 24 hr., following which there was retention. Elimination of K is increased during the first 4-5 post-exposure days; the greatest loss occurring on the 3rd day when fluid loss is also maximal. After this initial period of K loss, the element tends to be retained.

6127

THE EFFECT OF ROENTGEN IRRADIATION ON THE CHANGES OF MINERAL SUBSTANCES IN RATS BEARING MULTIPLE SARCOMATA. L. Kluge and H. G. Zwerg. Strahlentherapie 46, 293-310(1933). (In German).

Roentgen irradiation produced a big increase in calcium contents of the tumors of female rats weighing 150-200 g. This increase can also be produced by irradiating parts of the body other than the tumor. Hormone levels may be changed by irradiation.

6128

PHARMACOLOGICAL MODIFICATION OF RESISTANCE TO RADIATION. A PRELIMINARY REPORT. John B. Graham and Ruth M. Graham. Proc. Nat. Acad. Sci. U. S. A. 35(2), 102-6(1949).

Horse serum, if administered 10 days before x irradiation of mice, increases resistance, if administered 10 days after irradiation it has opposite effect. Testosterone propionate, estradiol benzoate, stilbesterol, and desoxycorticosterone (each in oil) were also tested for their possible value in increasing resistance to radiation. BA 23-20485

6129

X-RADIATION EFFECTS ON THE RESTITUTION OF DISSOCIATED MICROCIONA. C. K. Liu. Biol. Bull. 95(2), 259(1948).

An abstract. BA 23-20487

6130

EFFECT OF RADIUM BAND γ RAYS ON THE SPROUTING OF SEEDS OF *PISUM SATIVUM*. R. Bruynoghe and J. Maisin. Compt. rend. soc. biol. 93, 851-2(1925).

6131

MATING TYPES AND CONJUGATION OF FOUR DIFFERENT RACES OF *PARAMECIUM CALKINSI* AND THE EFFECT OF X-RAYS ON THE MATING REACTION. Ralph Wichterman. Biol. Bull. 95(2), 271(1948).

An abstract. BA 23-20491

6132

A SYMPOSIUM ON THE PROTEINS. (MEDICINE AND BIOLOGY MONOGRAPHS NO. 5) Marcel Florkin. Liege Maison Desoer. 1947. 283p. (In French).

Contains paper, "Action of X-Rays on the Nucleo-proteins of the Cell Nucleus", by M. Errera. BA 23-20523

6133

CELLULA. PART 3. H. Handovsky. Tabulae Biol. 19(3), 1-316(1948).

This is a series of reviews, largely tabular, including a section on actions of x rays and corpuscular radiation on cells and tissues, by A. Dognon and H. Biancani. BA 23-20524

6134

SOME EFFECTS OF THE ADMINISTRATION OF THORIUM NITRATE TO MICE. S. J. Patrick. Can. J. Research. 26E(6), 303-16(1948).

The LD₅₀ for an aqueous solution of Th(NO₃)₄ administered orally to mice were between 1.76-2.0 g Th/hg of body wt. Mice supplied with 0.1% solution of Th(NO₃)₄ as their only source of water exhibited a greater mortality than a control group. Subcutaneous injection of 50 mg of Th as

the nitrate solution into mice produced acute, necrotizing, inflammatory reaction at site of injection, but no other effects. Aerosol solution had no effect on mortality. BA 23-21149

6135

UNILATERAL ATROPHY OF THE RAMUS DUE TO ROENTGEN THERAPY. Michel Dechaume and Jean Cauhepe. Dental Rec. 68(11), 262-5(1948).

Authors describe deformity of the right mandible which appeared at age of 12 in boy who at 5 months received 6 doses of 300 r and again at 5 years was treated by 4 doses of 300 r. At 19 deformity consisted of shortening of right ramus of mandible, length of body of mandible was not affected. Other effects described. BA 23-21274

6136

THE EFFECT OF RADIUM AND URANIUM ON THE GROWTH OF SKELETONEMA COSTATUM GREV. B. Peterson. Medd. Goreborgs Botan Tradgard 17, 107-12 (1947).

Pure Skeletonema cultures were studied using nutrient solution containing one of 4 concentrations of RaCl. Concentration ranged from 10^{-11} - 9×10^{-6} g/litre had an obstructive effect on diatom growth. BA 23-22148

6137

THE ACTION OF RADIATIONS ON VIRUSES AND BACTERIA. D. E. Lea. Brit. Med. Bull. 4(1), 24-6(1946).

Chemical effects of radiation on inorganic and organic solutes are described. Inactivation of phage S-13 and vaccinia virus is explained on basis of target theory. Effects of radiation on bacteria; mutations, reduction of motility, temporary inhibition of division and lethal action. Interference with division (allowing growth in the sense of increasing volume, but no division so that rod-shaped bacteria become long filaments) results when bacteria are grown in irradiation media. BA 20-15791

6138

CYTOLOGICAL EFFECT OF SLOW NEUTRONS. Alan D. Conger. Federation Proc. 8(1), 27(1949).

Slow neutrons cause chromosome breaks in Tradescantia. Breaks are lethal to the cell at subsequent mitosis. Slow neutron exposures of 15 min. duration produced visible aberrations in 50% of cells. Chromosome breaks increase linearly with dose and most important action in slow neutron irradiation appears to be nitrogen capture with emission of a proton. BA 23-25430

6139

THE PRIMARY PHYSICAL EFFECT INDUCING CHROMOSOME MUTATIONS. II. INFLUENCE OF AGING OF SPERM AFTER IRRADIATION ON THE TRANSLOCATION FREQUENCY IN D. MELANOGASTER. A. Buzzati-Traverso. Rept. Inst. Lombardo Sci. e Lett. Cl. Sci. 77, 31-6(1943/44).

Frequency of x ray induced translocation in D. melanogaster sperm shows nonsignificant variation when x-rayed males fertilize females immediately after irradiation and when sperm are utilized 15 days later. A 15-day aging of sperm should not reduce ability of chromosome breaks to rejoin in new positions. BA 23-28160

6140

DOMINANT LETHALS INDUCED BY X-RAYS IN SPERM OF THE CHALCIDOID WASP NASONIA BROVICORNIS ASHMEAD (MORMONIELLA VITINERIS (WALKER) FIDE MUESEBECK IN LIT.) D. T. Ray. Biol. Bull. 95(2), 257(1948).

An abstract. BA 23-28177

6141

INVESTIGATIONS OF THE EFFECTS OF ROENTGEN RAYS ON THE DEVELOPMENT OF AMPHIBIA. II. THE EFFECT OF LOCAL ROENTGEN RAYS ON THE DEVELOPMENT OF THE TAIL OF THE AXOLOTL. V. V. Brunst. Zool.

Jahrb. Abt. Allg. Zool. u. Physiol. Tiere 61(1/2), 45-74(1945).

Local roentgen experiments confirmed earlier studies using whole body irradiation in which x rays caused inhibition of growth and cell-increase, but not of differentiation process. A stimulating effect of x rays is found for only a short time. BA 23-28362

6142

BODY CONTENT OF RADIUM IN INDIVIDUALS WITH NO KNOWN EXPOSURE. J. B. Hursh and A. A. Gates. Federation Proc. 8(1), 958(1949).

An abstract. BA 23-28517

6143

THE EFFECT OF SUPERVOLTAGE CATHODE RAYS ON THE NON-ENZYMATIC BROWNING REACTION OF DRIED FRUITS AND ON CHEMICAL COMPOUNDS RELATING THERETO. Bernard E. Proctor and Samuel A. Goldblith. Science 108, 519-22(1949).

Authors suggest that radiation probably changes hydroxymethylfurfural to levulinic acid but that this is not the major basis of cathode ray bleaching of fruit. BA 23-28665

6144

THE NATURE OF INTESTINAL RADIATION DEATH. Henry Quastler. (University of Illinois and the Carle Foundation, Urbana, Illinois). Radiation Research 4, 303-20(1956). NSA 10-7421

6145

INVESTIGATION OF THE STIMULATING EFFECT OF THORIUM NITRATE ON PLANT GROWTH. C. von Gillern. Bodenkunde u. Pflanzenernahr. 27, 197-202 (1942). (In German).

Stimulating effect of thorium is stronger on clay than on sandy soils. In cereals thorium increases straw yield rather than grain yield, it also has a beneficial effect on grass development. These results show that stimulating effect of thorium applies more to stalks than to fruit. BA 23-30145

6146

ON THE TETRAPLOID SPERMATOCYTES PRODUCED BY IRRADIATION IN PODISMA MIKADO (ACRIDIDAE). Sajiyo Makino. Japan J. Genetics 15(2), 80-82(1939).

Several tetraploid spermatocytes were found in testes of irradiated animals. These cells contained 22 chromosomes (2 x's) which show heteropycnosis and remain separate throughout subsequent stages. BA 14-59

6147

THE SIGNIFICANCE OF PHOSPHORUS DEFICIENCY IN RADIATION-INDUCTION OF MUTATIONS IN ANTIRRHINUM MAJUS. H. Doring and H. Stubbe. Z. indukt Abstamm. -u. Vererbl. 75, 352-57(1938).

Pollen of normal and phosphorus-deficient plants was irradiated, pollen was then used to fertilize normal plants. Radiation had a higher mutational value in P-deficient pollen than in normal pollen. (Mutation rate in normal and P-deficient nonirradiated plants was equal.) BA 14-73

6148

RECOVERY OF CARBON-MONOXIDE POISONED RATS AFTER X-RAY TREATMENT. John A. Cameron. Proc. Soc. Exptl. Biol. Med. 42, 29-30(1939).

Albino rats were exposed in pairs to CO gas containing 5% O₂ until breathing ceased. One of each pair was then exposed 5-10 min to x rays delivered at 123 r/min. In 3 cases both rats recovered, in 21 cases both died, in 15 other cases the radiated rat recovered and control died. BA 14-269

6149

THE EFFECT OF GAMMA RADIATION ON CELLS IN VIVO. PART II. (1) SINGLE EXPOSURES OF THE FASTING

TADPOLE AT ROOM TEMPERATURE. (2) SINGLE EXPOSURES OF THE NORMAL ANIMAL AT LOW TEMPERATURES. A. Glucksmann, and F. G. Spear. Brit. J. Radiol. 12, 486-98(1939).

Tadpoles (in which mitotic activity may be depressed by fasting and by low temperature) were exposed to 208 r of γ radiation. Effects on the response to radiation of 1 and 2 week periods of fasting, refeeding after fasting, chilling and return to room temperature after chilling were studied, using counts of mitotic cells and of degenerated cells as major criteria of radiation effects. There was less degeneration in fasting and in chilled tadpoles after irradiation, but degeneration began to increase if fasting animals were fed or chilled animals were warmed. BA 14-270

6150

ROENTGEN RAY THERAPY IN PNEUMOCOCCUS TYPE I INFECTION IN RABBITS. W. Paul Havens and Stephen Casper. Proc. Soc. Exptl. Biol. Med. 42(1), 179-80 (1939).

Roentgen irradiation 30 min after inoculation of rabbits failed to (1) prevent bacteremia and (2) protect animals given Type I pneumococcus intradermally. Large doses of x rays had deleterious effect on host's response; bacteremia was more pronounced and mortality was higher. BA 14-271

6151

CULTURE OF HUMAN MARROW: STUDIES OF THE EFFECTS OF ROENTGEN-RAYS. Edwin E. Osgood and George J. Bracher. Ann. Internal Med. 13, 563-75(1939).

Marrow cultures were x rayed *in vitro* and compared with control cultures at various times after exposure. In irradiated cultures, the number of lymphocytes decreased first, followed by granulocytes in order of increasing maturity. Observations on some colchicine treated cultures after radiation are also presented. BA 14-272

6152

ACTION OF X-RAYS ON THE FUNCTION OF THE CORTICAL MOTOR CENTERS. V. Rascanu, M. Kapri, and Gh. Popovici. Compt. rend. soc. biol. 129, 710-12(1938). (In French).

X rays and ultraviolet were found to increase the sensitivity of motor centers to electrical stimulation. BA 14-273

6153

NOTE ON THE WORK OF H. SCHERIBER, "ON THE PRIMARY EVENT IN THE BIOLOGICAL EFFECT OF RADIATION." K. Sommermeyer. Arch. exptl. Zellforsch. Gewebezuchr. 23, 249-50(1939). (In German). BA 14-274

6154

ON THE ROENTGEN RESISTANCE OF CAUSATIVE AGENTS OF TRANSMISSIBLE FOWL LEUKOSIS IN COMPARISON WITH TRANSMISSIBLE MOUSE TUMORS AND THE CAUSATIVE AGENTS OF TRANSMISSIBLE FOWL SARCOMA. Karl Jarman. Arch. wiss. u. prakt. Tierheilk. 74, 67-74 (1939). (German).

Causative agents of transmissible fowl sarcoma and erythroleukosis are radioresistant and are considered to be of the nature of enzymes since x rays have little effect on enzymes in comparison to living organisms. BA 14-788

6155

NOTE OF MODIFICATIONS IN THE MORPHOGENESIS OF *DROSOPHILA MELANOGASTER* OCCURRING UNDER NEUTRON BOMBARDMENT. E. V. Enzmann, and C. P. Haskins. Am. Naturalist 73, 470-472(1939).

Developmental abnormalities arising in young larvae after exposure to (1) neutrons, and (2) x rays were compared. Qualitative and quantitative differences were noted and are described BA 14-940

6156

CONTRIBUTION TO THE STUDY OF "RADIO-RACES"

OF YEASTS. II. PHYSIOLOGIC CHARACTERISTICS OF SOME RADIO-RACES OF A WINE YEAST. A. Lacassagne, M. Schoen, and P. Beraud. Ann. fermentations [Paris] 5, 130-158(1939). (French).

Cultures of *Saccharomyces ellipsoideus* var. *chambertin* were exposed to α radiation from Po in the medium during the period 1930-1936. Seven new "radio-races" were isolated from irradiated cultures, all having stable characteristics which are described. The new strains had smaller "giant" colonies than did parent strain and greater respiration rate. The cytochrome content was found to be greater in the "radio-races." The characteristics of the new strains were nearly obliterated if they were grown in the same culture with the original race. Increase fermentation observed in the new races under aerobic conditions is attributed to the increased respiration. BA 14-1245

6157

FURTHER STUDIES ON THE EFFECT OF INFRA-RED RADIATION ON X-RAY-INDUCED CHROMATID ABERRATIONS IN *TRADESCANTIA*. C. P. Swanson. Proc. Natl. Acad. Sci. U. S. 38(5), 237-44(1949).

Treatment with infra-red at any time interval after x raying up to fixation produced significant increase in exchange aberrations. Somewhat less marked increases were recorded for single and double deletions at all time intervals except at 4 and 18 hrs in the case of double deletions. BA 23-22792

6158

STRAIN INTERMIXTURE IN *ASPERGILLUS FONSECAECUS*. Kenneth B. Raper and Dorothy I. Fennell. Am. J. Botany 35(10), 802(1948).

Color mutants characterized by tan to light brown conidial heads sometimes develop naturally in members of the *A. niger* group and mutants of this type may apparently be produced from almost any strain by the application of various external stimuli, including ultraviolet and x-irradiation. Such mutants remain stable when serially retransferred upon suitable laboratory media. BA 23-22826

6159

DETECTION OF THE MUTAGENIC EFFECT OF TRANS-MUTATION. Benjamin A. Rubin. Genetics 33(6), 626-7 (1948).

A mutagenic effect of P^{32} radiation (β rays) on bacteria much beyond that expected from total calculated ionization is attributed to another force, probably transmutation (radioactive decay.) Calculations and data are included. BA 23-22827

6160

SOME RADIOBIOLOGICAL PROBLEMS. L. Halberstaedter. Progr. med. 2, 105-21(1948).

Mechanisms of x ray effects in unicellular and lower animals are reviewed. X rays have a direct effect according to target-hit theory, and an indirect effect associated with intermediate ionization of water molecules. The more concentrated the object, the more prominent is the former. Effects are more complicated when x ray is used in therapy or in experiments in higher animals. BA 23-23045

6161

FIRST RESULTS OF THE RADIOBIOLOGICAL RESEARCHES BASED ON THE RADIOSENSITIVITY OF THE EGGS OF *B. MORI*. P. Lamarque and Ch. Gros. Rec. trav. inst. Natl. Hyg. 2(1), 320-32(1945).

Advantages of *B. mori* eggs for use in radiobiological experiments and experimental technic for cultivation and irradiation are given. Small size of eggs allows irradiation of great numbers simultaneously. Lethal dose is about 5000 r. BA 23-23047

6162

INFLUENCE OF GRENZ RAYS ON CELL DIVISION AND WOUND HEALING IN THE CORNEAL EPITHELIUM. G. K. Smelser and R. L. Pfeiffer. Arch. Ophthalmol. 39(1), 1-8(1948).

Right eyes of a series of rats were irradiated with a dose of 410 r, mitotic figures in both eyes were counted at intervals of 6 hr-12 days. Grenz rays caused prompt cessation of mitosis which recovered slightly in 12 hr, but 60-80% fewer mitotic figures were found in irradiated eyes for 5 days. From 6 to 10 days the number of mitoses was normal or above, but not sufficiently increased to compensate for the 5 day depression. Eyes of 12 or 13 irradiated animals given thermal burns 8 days after exposure healed more slowly than normal. BA 23-23051

6163

RADIATION EFFECTS ON TISSUES STUDIED WITH C¹⁴-LABELED GLYCINE. Kurt L. Altman, George W. Cassarett, Thomas R. Noonan, and Kurt Salomon. Federation Proc. 8(1), 349(1949).

Young adult male rats were exposed (total body) to a 300 r or 600 r x ray dose and received C¹⁴ labeled glycine by stomach tube or intravenous injection at various times after exposure. Rats receiving 2 μ c of the labeled compound immediately after exposure and killed 24 hr later retained remarkably high proportion of the label in the gastro-intestinal contents (16.7% retained after 300 r, 32.8% after 600 r; 0.82% in controls). After i.v. injection, uptake by muscle was depressed in all irradiated rats. When glycine was injected 48 hr after exposure, C¹⁴ content of brain was approximately 3x that of controls. Other changes were noted in expired CO₂ (increased C¹⁴ when labeled compound was given 48 hrs after exposure), in testes, kidneys and liver. BA 23-23052

6164

EFFECT OF ACUTE X-RADIATION ON DISTRIBUTION AND EXCRETION OF RADIO SODIUM IN THE RAT. L. R. Bennett, Vera C. Bennett, and Joe W. Howland. Federation Proc. 8(1), 350(1949).

An abstract. BA 23-23053

6165

OBSERVATIONS ON LUNG PATHOLOGY FOLLOWING THE INHALATION OF RADIOACTIVE CERIUM. Hermann Lisco and M. P. Finkel. Federation Proc. 8(1), 360-61 (1949).

An abstract. BA 23-23060

6166

INFLUENCE OF THE ADRENALS ON HEMATOPOIETIC REGENERATION IN THE X-IRRADIATED RAT. H. Betz. Compt. rend. soc. biol. 145, 465-7(1951).

Rats subjected to adrenalectomy before x irradiation did not show the marked erythroblastic and myeloblastic changes seen in the spleen of rats subjected to irradiation only. Administration of desoxycorticosterone acetate negated the effect of adrenalectomy.

6167

MECHANISM OF THE PROTECTIVE ACTION OF POTASSIUM CYANIDE AGAINST THE LETHAL ACTION OF X-RAYS IN MICE. H. Betz. Compt. rend. soc. biol. 144, 593-5 (1950).

Injection of 0.1 mg of KCN intraperitoneally into mice immediately before subjecting them to whole body exposure to 720 r of x rays prevented shock but did not prevent degenerative changes in lymphoid tissues and testes.

6168

INFLUENCE OF POTASSIUM CYANIDE ON THE MORTALITY OF MICE X-IRRADIATED IN FRACTIONAL DOSES. H. Betz and L. Fruhling. Compt. rend. soc. biol. 144, 595-7(1950).

Injection of 1/60 mg of KCN intraperitoneally immediately before each of 12 consecutive daily whole body exposures to 84 r (x rays) increased the mortality among the exposed mice. Authors suggest that the adverse effect may be due to accumulation of SCN-which is known to enhance x ray toxicity.

6169

THE EFFECT OF RAYS ON LIFE PROCESSES OF INDIVIDUAL CELLS. P. Wels. Strahlentherapie 47, 401-7 (1933).

Author suggest that primary action of radiation on living cells is some change in viscosity of cell contents, which results in inhibition of cell division.

6170

THE BEHAVIOR OF COAGULATION TIME AND ERYTHROCYTE RESISTANCE AFTER IRRADIATION. C. Bignami and F. Pizzetti. Scr. Ital. Radi Biol. 6, 229-44(1939), Zentr. ges. Radiol. 31, 549(1940).

6171

Rochester, N. Y. Univ. Atomic Energy Project COMPARISON OF X AND β RADIATION EFFECTS IN RABBITS. F. W. Bishop. Also included in NNES VI, 2, H. A. Blair, ed. McGraw-Hill Book Co., N. Y. 1954. [nd]. Decl. Aug. 17, 1946. Sp. (MDDC-203).

The effectiveness of various doses of 30 Kv x rays and of β rays in causing erythema of the locally irradiated rabbit ear was studied. The dose of β rays required to produce minimal erythema was about 3 times as large as the x ray dose producing the same effect. The β ray doses producing first signs of epilation and definite epilation in all animals were 4 x and 4.5x (respectively) the corresponding x ray doses.

6172

PHENOCOPIES AND X-RADIATION IN DROSOPHILA MELANOGASTER. Richard Blano and Werner Braun. Univ. Calif. (Berkeley). Pubs. Zool. 49, 31-50(1942).

6173

THE EFFECT OF X-RADIATION UPON BRISTLE PATTERN IN DROSOPHILA MELANOGASTER. Richard Blano and Claude A. Villee, Jr. Univ. Calif. (Berkeley). Pubs. Zool. 49, 51-60(1942).

6174

Argonne National Lab., Lemont, Ill. BIOLOGICAL EFFECTS OF EXTERNAL X AND GAMMA RADIATION. PART II. Raymond E. Zirkle, ed. 1956. 487p. (TID-5220).

Part I was issued as NNES-IV-22B. Part II reports. Studies on effects of doses of x and γ radiation on growth, organ weight, susceptibility to parasites, blood, liver function, and body water content; effects of age and exposure rate on radiosensitivity. NSA 11-833

6175

BIOCHEMICAL PROCESSES IN THE BRAIN IN DIRECT IRRADIATION BY X-RAYS. N. N. Blokhin, B. M. Graevskaya and R. Ya. Keilina. Byull. Eksptl. Biol. Med. 23, 338-42(1947). (Russian).

6176

DEPOSITION OF C¹⁴ IN THE METAPHYSIS OF LONG BONES OF YOUNG RATS. William Bloom. Anat. Record 103, 425(1949).

Autoradiographs prepared 2 days after intraperitoneal injection of 2 μ c of C¹⁴ per gram in newly weaned rats showed large amounts of the isotope deposited in the metaphyses of long bones. Autoradiographs 48 hr. later showed that the labelled metaphyses had already been resorbed and replaced with normal C¹⁴-free tissue, hence the isotope did not hinder bone growth.

6177

Oak Ridge National Lab., Tenn. A NOTE ON THE DEPOSITION OF C¹⁴ IN BONE. William

Bloom, Howard J. Curtis, and Franklin C. McLean. [nd]. Decl. Dec. 3, 1946. 5p. (MDDC-516). *Science* 105, 45(1947).

The patterns and time courses of deposition of C^{14} and Sr^{89} in rats are compared, in terms of results of autoradiographic studies.

6178

Rochester, N. Y. Univ. Atomic Energy Project
OBSERVATIONS ON POPULATIONS OF ANIMALS EXPOSED TO CHRONIC ROENTGEN RADIATION. Robert D. Boche. [nd]. Decl. Aug. 17, 1946. 56p. (MDDC-204).

The effects of chronic exposure to roentgen radiation on survival and reproduction in dogs, rabbits, mice and monkeys are described and documented.

6179

Rochester, N. Y. Univ
STUDIES ON THE EFFECTS OF MASSIVE DOSES OF ROENTGEN RADIATION ON MORTALITY IN LABORATORY ANIMALS. Robert D. Boche and Francis W. Bishop. [nd]. Decl. Aug. 19, 1946. 13p. (MDDC-250).

Dose effect relationships are analyzed using data from experiments on rats, dogs and monkeys. Mortality and average survival time are tabulated and interpreted graphically for experiments on the three species of various doses of x rays.

6180

RADIATION MYELITIS OF THE BRAIN STEM. F. Boden. *J. Fac. of Radiologists* 2, 79(1950).

The central nervous system should not be subjected to dosages of radiation more than 3500-4500 r/17 days. Above this level, degeneration of previously healthy tissue is likely to occur.

6181

EFFECT OF X-RAYS ON THE OXYGEN CONSUMPTION OF EMBRYONIC CELLS. E. J. Boell, O. M. Ray and J. H. Bodine. *Radiology* 29, 533-40(1937).

Effects of x rays on growth, respiration and oxidative mechanism of grasshopper eggs and embryos were studied. It appears that x rays do not primarily affect the respiratory mechanism, but in some way alter the fundamental organization of protoplasm. CA 32-599

6182

EXPERIMENTAL INVESTIGATIONS ON THE DAMAGE PRODUCED BY X RAYS IN THE BONE MARROW. J. Boffil and O. Miletzky. *Ann. med. (Paris)* 47, 220-44 (1946).

Dogs and guinea pigs were subjected to x irradiation of the whole body except for the sternum in dogs and a foot or the head in guinea pigs. Other animals of both species received local irradiation only. Bone marrow aspiration biopsies were studied and observations are described.

6183

CLINICAL AND PATHOLOGICAL ASPECTS OF RADIO-NECROSIS IN THE BRAIN OF MAN. L. van Bogaert and J. Hermanne. *Ann. med. (Paris)* 49, 14(1948).

6184

QUANTUM PHYSICS AND BIOLOGY. Rudolph Bojanowsky *Verhandl. naturforsch. Ver. Brunn* 73, Vortrage VIII-X (1941).

6185

BLOOD ABNORMALITIES AS THE RESULTS OF IRRADIATION. H. N. Brinnitzer. *Strahlentherapie* 52, 699-716(1935).

Small doses used in radiation therapy of ovary reduce circulating lymphocytes to 1/3 or 1/4 of original number.

6186

Brookhaven National Lab., Upton, N. Y.
RADIATION, GENES AND ENZYMES. David Bonner. p. 51-4 of CONFERENCE ON BIOLOGICAL APPLICATIONS OF NUCLEAR PHYSICS, JULY 12-27, 1948. July 1948. 154p. (BNL-C-4).

6187

THE INDIRECT ACTION OF X-RAYS ON CHROMOSOMES. Gertrude Bonnier. *Intern. Congr. Radiol.*, 6th Congress, London, 1950. p45.

Experiments in which irradiated female *Drosophila* and normal males were mated (2 different sets of marker genes) are described. Excessive elimination of untreated chromosome was observed and is considered to be an indirect effect of radiation. It is tentatively suggested that x rays produce chemical mutagens which are capable of inducing gene mutations and chromosome breaks.

6188

EFFECT OF ROENTGEN IRRADIATION ON THE SERUM CONTENT OF HAEMAGGLUTININS IN HUMAN BLOOD. D. Borowskaja. *Nature* 158, 269(1946).

The author found that x rays do not alter the kind or amount of sheep-cell agglutinins in the serum of men receiving x ray therapy. The rise of titre observed in some cases must be attributed to active immunization, not to the effect of radiation on the reticuloendothelial system.

6189

THE EFFECT OF ROENTGEN AND RADIUM RAYS AND RADIOACTIVE SUBSTANCES ON THE FORMED ELEMENTS OF BLOOD AND THEIR PLACE OF ORIGIN. H. Bosch *Habilitationsschrift* 1938, *Zentr. ges. Radiol.* 31, 299(1940).

6190

ACUTE RADIATION SYNDROME. John Z. Bowers. *J. Am. Med. Assoc.* 145, 63-5(1951).

6191

ULTRASHORT APPLICATION TIME OF PENETRATING ELECTRONS: A TOOL FOR STERILIZATION AND PRESERVATION OF FOOD IN THE RAW STATE Arno Brasch and Wolfgang Huber. *Science* 105, 112-17(1947).

6192

THE DISTRIBUTION OF RADIOACTIVE COBALT IN PIGS. R. Braude. *Brit. J. Nutrition* 3, 289-92(1949).

6193

APLASTIC ANEMIA FOLLOWING X-RAY TREATMENT AND PYRAMIDON (AMINOPYRINE) COMBINED C. D. Brink. *S. African Med. J.* 12, 251-2(1938).

6194

IRRADIATION WITH RADIUM RADIATION AND AUTOMATISM. H. Zwaardemaker. *Arch. neerl. sci. Ser. 3C* 12(4), 502-19 (1928). (In French).

Production of automatines is believed to be stimulated by bioradioactivity.

6195

ABSTRACTS OF PROCEEDINGS OF THE SIXTH CONFERENCE ON RADIATION CATARACTS, WASHINGTON, D. C., MARCH 18, 1955. D. V. L. Brown and J. E. Pickering. (Natl. Academy of Sciences - National Research Council, Wash., D. C. Div. of Medical Sciences). 129p. (TID-21665) \$4.00(CFSTI).

6196

National Research Council, Div. of Medical Sciences. FIFTH CONFERENCE ON RADIATION CATARACTS FOR THE UNITED STATES ATOMIC ENERGY COMMISSION. ABSTRACTS AND PROCEEDINGS. Mar. 26, 1954. 116p. (AECU-3018).

Summaries and discussions on papers presented at this conference on radioinduced cataracts are presented. Topics discussed include recent neutron dosimetry experiments, the present status of tissue-wall-tissue-gas dosimetry, various values of the RBE, effects of deuterons and α particles on the rabbits' lens, chronic neutron exposures in rats and mice; new experiments on radiation effects, studies on lens metabolism, radiation cataract studies; Operation Greenhouse studies on mice cataracts, iris

atrophy, Harderian gland adenomas, and the relative effectiveness of cyclotron fast neutrons in cataract production in mice, rats, and guinea pigs; effects of cyclotron irradiation of mice and rabbits; the effect of radiation on amino acids; radiation effects on the lachrymal gland; studies of Japanese cataracts in relation to shielding; and the current status of the cataract research program on monkeys. (For preceding period see AECU-3019).

6197

SURGICAL TREATMENT OF RADIATION BURNS. James Barrett Brown, Frank McDowell and Minot P. Fryer. Surg. Gynecol. Obstet. 88, 609-22(1949).

6198

PATHOLOGIC EFFECTS OF IONIZING RADIATIONS AND RADIOACTIVE MATERIALS. Austin M. Brues. Biochem. J. 42, 22(1948).

6199

ISOTOPES: RADIOACTIVE: TOXICITY. Austin Brues and O. Glasser. Vol. 2, p. 465-71 of Medical Physics, The Year Book Publishers Inc., Chicago(1950).

Authors discuss nature of hazards, chronic radiation toxicity changes induced by isotopes, dosimetry and clinical use of isotopes.

6200

CARCINOGENIC ACTION OF SOME SUBSTANCES WHICH MAY BE A PROBLEM IN CERTAIN FUTURE INDUSTRIES. Austin M. Brues, H. Lisco and M. P. Finkel. Cancer Research 7, 48(1947).

6201

Argonne National Lab., Lemont, Ill.
RETENTION OF C¹⁴ ADMINISTERED AS BICARBONATE TO ADULT AND EMBRYONIC MICE. Austin M. Brues and Agnes N. Stroud. Nov. 1950. 19p. (AECU-1091, UAC-326).

6202

Argonne National Lab., Lemont, Ill. Chicago University, Metallurgical Lab.
EFFECT OF TOTAL BODY X RAY ON WEIGHTS OF ORGANS IN THE RAT. A. M. Brues, G. Sacher and H. O. France. June 1946. Decl. Aug. 7, 1947. 15p. (MDDC-1197; CH-3835).

Weights of major visceral organs were affected proportionately less than the body weight as a whole in growing male rats receiving a total dose of 1498 r in daily doses of 13.82 r. Weights of lymphoid tissue and gonads were reduced proportionately more than was body weight. Retardation in growth of irradiated animals is similar to that in inanition except for changes in highly radiosensitive organs.

6203

COMPARATIVE CARCINOGENIC EFFECTS BY X-RADIATION AND P³². Austin M. Brues, George A. Sacher, Miriam P. Finkel and H. Lisco. Cancer Research 9, 545(1949).

The lymphomagenic action of injected P³² was compared with that of single and fractionated doses of x rays in CF, female mice. Effectiveness of both types of radiation tended to increase with dose until a "saturation" dose level was reached.

6204

HISTAMINE AND ROENTGEN INTOXICATION. REPORT ON THE THERAPEUTIC ACTION OF A SYNTHETIC ANTIHISTAMINE PREPARATION; DIMETINA. P. E. Panzironi and E. Zilli. Nuntius Radiol., Belluno, 13/3-4 167-85(1947).

6205

EFFECTS OF FAST ELECTRONS OF A 6 MEV-BETATRON ON BIOLOGICAL SUBJECTS. Gerhard Schubert. Intern. Congr. Radiol., 6th Congress, London, 1950. p. 164.

Studies using B. coli, Hordeum, V. faba, D. melanogaster, S. maculosa, chick heart fibroblasts, rat erythroblasts and Ehrlich's carcinoma were carried out to evaluate the biological effectiveness of physically equal doses of fast electrons (2-6 MeV) and 200 kV x rays. In most instances there were quantitative differences in the effectiveness of equal doses of the two types of radiation and these are attributed to differences in specific ionization and ion cluster formation. Qualitative differences in response were observed in some systems and these are interpreted in light of "concentration", "saturation" and "accumulation."

6206

THE EFFECT ON THE NURSING MOUSE OF THERAPEUTIC DOSES OF I¹³¹. Roberts Rugh. Intern. Congr. Radiol., 6th Congress, London, 1950. p. 168-9.

Suckling mice begin to remove I¹³¹ by way of milk of their I¹³¹-bearing mothers within 8 min. of the time that the mothers are injected with the isotope. Within 4 hr. after injection, I¹³¹ in the nursing litter may exceed that in the mother. Ratios of I¹³¹ in tissues of nursing vs. non-nursing mothers are presented to show that distribution of the isotope is drastically altered by lactation. Histological observations of thyroid glands of mothers and litters are also described.

6207

THE VIABILITY OF INDIVIDUALS HETEROZYGOUS FOR RECESSIVE LETHALS. E. Novitski and C. Stern. Science 108, 538-9(1948).

The assumption that individuals heterozygous for recessive lethals are equivalent to homozygotes free of lethal alleles was tested for 33 sex-linked lethals in D. melanogaster and found not to be correct for the majority of them.

6208

INFLUENCE OF OXYGEN TENSION ON RADIOSENSITIVITY. John Read. Internat. Congr. Radiol., 50, 6th Congress, London, 1950. p. 50.

After reviewing previous studies of the influence of oxygen on the response of normal and tumor tissue to x radiation experiments of V. faba roots are described. Qualitatively, histological changes (abnormal anaphases) are similar in root tips irradiated in presence and in absence of oxygen, but are quantitatively much greater in the oxygen series. Oxygen exerts its effect only if it is present during irradiation. Radiosensitivity readjusts itself after only a brief lag period if the oxygen concentration in a root is suddenly changed. The effect of anaerobiosis is the same regardless of gas used to displace oxygen in the medium during exposure. Anaerobiosis does not diminish the effect of nitrogen mustard. Oxygen enhances the effect of all x ray doses studied to the same extent, specifically by a factor that increases with concentration in a sigmoid fashion to a maximum of 3 with x rays and 1.3 with α rays.

6209

INFLUENCE OF VARIOUS LIPIDS UPON THE HEALING PROCESS OF EXPERIMENTAL RADIATION BURNS. Emanuel Revici. Internat. Congr. Radiology, 6th Congress, London, 1950. p. 175.

The author produced radiation "burns" in rats by means of 10 mg radium needles and studied the effect of locally administered lipids that varied with respect to their polar groups (carboxyl or hydroxyl) on the healing process. Lipids with a hydroxyl radical promoted rapid healing, lipids with carboxyl groups retarded healing.

6210

NEW OBSERVATIONS AND EXPERIMENTAL FINDINGS ON THE EFFECT OF VERY SMALL ROENTGEN DOSES. R. Pape. Radiol. Austriaca 4, 35-51(1951).

Rats and guinea pigs were used in these studies in effects of repeated exposure to very small x ray doses. Single or repeated exposure to doses of from 1-20 r caused nuclear changes in cells of spleen, 312 doses of 0.25 caused a 3 fold increase in leukocyte counts of rats. A combination of doses was found which increased spermatogenesis. Tuberculous guinea pigs exposed to small doses showed stimulation of the reticulo-endothelial system, decreased exudation and increased cell resistance. The author discusses the neurohormonal aspect of transient leukocyte depression following small doses. Observations on growing plants are also included.

6211
IMPORTANT VARIATIONS IN THE ORGANIC FINDINGS AFTER TOTAL AND LOCAL IRRADIATION AND THE PARTICULAR EFFECTS OF SMALL SCALE DOSAGES. THE SPLEEN AS A TEST FOR VARIOUS RADIATION EFFECTS. R. Pape and N. Jellinke. Radiol. Austriaca 3, 43-62(1950).

Histological studies were carried out on spleens (rat) that had been irradiated locally (in vivo) with x ray doses of (1) 100 r or more (2) 30 r or less. Lymphoblasts showed nuclear changes when examined 3 hr. after 2-5 r. Recovery following local exposure to larger doses occurs by rapid influx of mature lymphocytes by way of the circulation in contrast to the recovery pattern after total body exposure to the same larger doses when regeneration is slow and delayed. Preliminary small dose of 3-20r appeared to confer considerable protection against a subsequent dose of 300 r

6212
HISTOLOGICAL FINDINGS AFTER VERY SMALL DOSES OF IRRADIATION. R. Pape. Internat. Congr. Radiol., 6th Congress, London, 1950. p. 162-3.

Changes in the rat spleen following total body exposure to single or repeated doses of 1-20 r and after daily doses of 0.25 r for 1 year are described. Lymphocytes increased in the spleen (to 3x normal) after a year of 0.025 r/day. Effects of larger doses (300-600 r) following repeated small doses are also described. Effects of small doses on the spleen are considered in light of changes observed in the inflammatory response in various tissues and in spermatogenesis. Small doses are considered to have a protective effect on cells.

6213
EFFECTS OF RADIO-PHOSPHORUS IN MINUTE DOSES ON BLOOD AND SOME IMPORTANT ORGANS. R. K. Pal and B. N. Mitra. Indian. J. Physiol. and Allied Sci. 4, 42-9(1950).

Rabbits sustained severe injury of their bone marrow after being injected with P^{32} . There was also a marked hypercalcemia and injury of thyroid, kidneys and liver.

6214
DELAYED EFFECT OF X-RAYS ON PEPSIN. R. S. Andersen. Brit. J. Radiol. 27, 50(1954).

There is some immediate loss of enzyme activity in pepsin when it is irradiated in either the presence of absence of oxygen. On standing, there is a further loss which is temperature-dependent and is more marked following irradiation in air. The observed changes are not affected by the concentration of the enzyme in solution during irradiation and appear to be due to changes in the protein molecule *per se*.

6215
INVESTIGATIONS WITH RADIOACTIVE Sr, P AND Fe. Daniel Q. Posin. Proc. Montana Acad. Sci. 3 and 4, 10-15(1942-43).

6216
PROTECTIVE EFFECT OF FLAVONE DERIVATIVES ON MORTALITY IN IRRADIATION OF THE RABBIT AND

MOUSE. R. Paris, Edmond Vairel and J. Vavasseur. Ann. pharm. franc. 9, 68-78(1951).

6217
OBSERVATIONS ON TISSUES FROM THE MONKEY HEAD IN CELL CULTURES WITH SPECIAL REFERENCE TO RADIATION EFFECTS. C. M. Pomerat and W. Hild. Report of School of Aviation Medicine (USAF), Randolph Field, Texas. (1956). (AF-SAM-57-15).

Tissues were studied in tissue cultures of cerebellum, cerebrum, meninges, retina and pituitary after *in vivo* exposure of the head of 10,000 r of γ radiation from Co^{60} . NSA 11-7908

6218
Oak Ridge National Lab., Tenn.
RECENT DEVELOPMENTS IN YEAST GENETICS. Seymour Pomper. May 10, 1950. 25p. (ORNL-696, Wallerstein Labs. Communications 14, 31-41(1951)).

6219
EPILEPSY AFTER ROENTGEN IRRADIATION OF THE HEAD IN CHILDHOOD. G. Schaltenbrand. Nervenarzt 8, 62-66(1935). (In German).

6220
TIME-INTENSITY FACTORS IN TOTAL-BODY IRRADIATION. Edith Paterson. Internat. Congr. Radiol., 6th Congress, London, 1950. p.161. also: Brit. J. Radiol. 25, 427(1952).

Mice exposed to 250 Kv x rays were used in this study of the role of over-all time of irradiation in the biological effectiveness of a given dose. Criteria of effectiveness included LD_{50} , mean survival time and variance. Over-all times of 10 min. were compared with times of 24 and 48 hr, and with 5, 10 and 20 days. For any given time factor, probits of mortality % plotted against dose gave a straight line. The LD_{50} rises as over-all time is extended to daily doses. Other observations are also reported and discussed.

6221
THE EFFECT OF RADIO-ACTIVE PHOSPHORUS ON THE BLOOD OF THE GROWING CHICK. K. G. Scott and S. F. Cook. Proc. Natl. Acad. Sci. U. S. 23, 265-72(1937).

Hematological effects of P^{32} administered as H_3PO_4 to birds were different from effects of x rays. Lymphocytes were relatively little affected by P^{32} but neutrophil granulocytes were markedly reduced in number, probably due to deposition of the isotope in bones. Growth of the treated birds was normal and the birds showed no permanent injury.

6222
PATHOLOGY OF SWINE EXPOSED TO TOTAL BODY GAMMA RADIATION FROM AN ATOMIC BOMB SOURCE. J. L. Tullis, B. G. Lamson and S. C. Madden. Am. J. Pathol. 31, 41-61(1955).

Lymphoid organs in swine reacted similarly to an amount of total body gamma radiation which was 100% lethal. Necrosis of lymphoid cells, arrest of mitotic activity, depletion of hematopoietic cells of marrow, damage to the epithelium lining basal mucosal glands of the small intestine, destruction of spermatogonia and ulcers in the alimentary tract were observed.

6223
EFFECT OF EXTRA VITAMIN B FEEDING ON RATS EXPOSED TO WEAK GAMMA RADIATION. G. M. Scott. Brit. J. Radiol. 19, 329-32(1946).

General condition, weight gain and fertility were studied in rats exposed to 60-85 r of γ radiation per week for 4 months. Some of the rats received Vitamin B supplements, some did not. Rats receiving the supplement had greater weight gain, better coats and some lessening of radiation effect on fertility. Irradiated females had normal incidence of pregnancies but many abortions. Irradiated male rats sired no offspring.

6224

Argonne National Lab., Lemont, Ill. Chicago University Metallurgical Lab.
STUDIES OF THE HEMOLYTIC EFFECT OF RADIATION. S. Schwartz, et al. July 10, 1946. Decl. Sept. 23, 1947. 51p. (MDDC-1342).

The authors review evidence (from studies on animals and man) indicating that large radiation exposures do cause hemolysis. Suggestions for additional investigations to elucidate this effect are included.

6225

Argonne National Lab., Lemont, Ill. Chicago University Metallurgical Lab.
STUDIES OF LIVER FUNCTION IN EXPERIMENTAL ANIMALS WITH SPECIAL REFERENCE TO RADIATION AND METAL EXPOSURE. Samuel Schwartz, Lorraine Schneider, Lillie Mae Porter, Mary Tinsley, and Jean Wallace. July 31, 1947. Decl. May 12, 1948. 37p. (AEC-2020).

6226

Argonne National Lab., Lemont, Ill. Chicago University Metallurgical Lab.
STUDIES OF PORPHYRIN METABOLISM. IV. THE EFFECT OF IRRADIATION ON COPROPORPHYRIN EXCRETION. Samuel Schwartz, Ralph Zagaria and Cecil James Watson. June 20, 1947. Decl. Aug. 8, 1947. 28p. (MDDC-1221; CH-3719).

Lethal or nearly lethal doses of x rays, Sr^{89} or Pu caused diminished excretion of coproporphyrin in urine and feces of dogs. No significant change in the ratio of coproporphyrin I/coproporphyrin III was found in these studies.

6227

EXPERIMENTAL STUDY OF THE EFFECT OF X-RAYS ON THE MATURE BRAIN. W. Scholz. Z. ges. Neurol. Psychiat. 150, 765(1934). (German).

Gross and microscopic anatomical changes in the brains of dogs after x irradiation are described and illustrated by photographs.

6228

MORPHOLOGIC CHANGES IN BRAIN TISSUE UNDER THE INFLUENCE OF ROENTGEN AND RADIUM RAYS. W. Scholz. Electro-radio-biologica 2, 1051(1934). (German).

6229

ON THE SUSCEPTIBILITY OF THE BRAIN TO ROENTGEN AND RADIUM RAYS. W. Scholz. Klin. Wochschr. 189(1935). (German).

Skulls of 8 young and 20 adult dogs were administered with x rays or radium. Gross and microscopic pathology of brains was studied at periods ranging from 16 hr. to 3 yr. after exposure. Young animals developed necrotic ischemic lesions associated with hemorrhage. Both internal and external hydrocephalus were observed in survivors. Adults developed no inflammatory lesions earlier than the 4th to the 9th post-exposure week.

6230

HISTOLOGICAL FOCAL CHANGES IN THE HUMAN BRAIN DUE TO LOCAL ANOXIA. W. Scholz. Arch. Psychiat. Nervenkrankh. u. Ztschr. ges. Neurol. u. Psychiat. 181, 621(1949). (In German).

6231

LATE DAMAGE FROM ROENTGEN IRRADIATION OF THE HUMAN BRAIN. W. Scholz and Y. K. Hsu. Arch. Neurol. Psychiat. 40, 928(1938). (German).

6232

ANALYSIS OF A MUTABLE SYSTEM IN MAIZE. E. J. Dollinger. Genetics 40, 570(1955).

Author discusses the control of mutation by a dominant mutation-activator factor, Ma, in Maize.

6233

REVERSE MUTATION AT THE FORKED LOCUS IN

DROSOPHILA MELANOGASTER. X-RAY INDUCED MUTATION IN THE MALE GERM LINE. G. Lefevre, Jr., M. M. Green, and P. C. Farnsworth. Genetics 40, 581 (1955).

6234

OCULAR HISTOPATHOLOGY OF SOME NAGASAKI ATOMIC BOMB CASUALTIES. T. G. Schlaegel, Jr. Am. J. Ophthalmol. 30, 127-35(1947).

6235

THE EFFECT OF RADIOACTIVE PHOSPHORUS UPON A SUSPENSION OF *ESCHERICHIA COLI*. Clarence F. Schmidt. J. Bacteriol. 55, 705-9(1948).

The lethal effect of P^{32} for *E. coli* increased with increasing concentrations of the isotope but complete lethality was not obtained even with the highest concentration used. Lethality data are analyzed.

6236

OBSERVATIONS ON THE ROENTGEN TREATMENT OF INTRACRANIAL GLIOMATA WITH ESPECIAL REFERENCE TO THE EFFECT OF IRRADIATION UPON THE SURROUNDING BRAIN. J. E. A. O'Connell and A. Brunschwig. Brain 60, 230(1937).

6237

STUDY OF X-RAY EFFECT ON NERVES. H. Schaefer and W. Schmitz. Fortschr. Gebiete Roentgenstrahlen. 48, 247(1933).

Authors report and discuss their studies on the action potential in x irradiated frog nerves.

6238

THE RELATION BETWEEN X-RAY DOSAGE AND THE FREQUENCY OF CHROMOSOMAL ABERRATIONS. Karl Sax and Robert T. Brumfield. Am. J. Botany 30, 364-70(1943).

6239

THE EFFECT OF TEMPERATURE ON X-RAY INDUCED CHROMOSOME ABERRATIONS. Karl Sax and E. V. Enzmann. Proc. Natl. Acad. Sci. U. S. 25, 397-405 (1939).

When nuclei are irradiated during resting stage or mid-prophase, high temperatures accelerate reunion of broken ends, many breaks being reunited in their original positions. Low temperatures delay reunion and result in many illegitimate unions (chromosome aberrations). The temperature effect is reversed in early prophase chromosomes. Physiological and genetic factors that may account for the various response to altered temperature are discussed.

6240

X-RAY INDUCED CHROMOSOME ABERRATIONS AND THEIR SUBSEQUENT BEHAVIOR. Karl Sax. Genetics 25, 134(1940).

Both chromosome and chromatid aberrations produced by x-rays. Frequency of aberrations produced by single breaks shows a linear relation to dosage, while those dependent upon two breaks increase as the square of dosage. Many aberrations produce single or double chromatid bridges at anaphase. When these bridges break, new fusions of broken ends occur, although some broken ends appear to behave as normal ends.

6241

EFFECT OF X-RAY RADIATION AND OF STARVATION ON HEMOGLOBIN SYNTHESIS IN THE RAT. K. Salomon, K. I. Altman, G. W. Casarett and T. R. Noonan. Federation Proc. 8, 247(1949).

6242

IRRADIATION KERATOSES AND CARCINOMA. J. A. Duffy. Amer. J. Roentgenol. 42, 540(1939).

6243

Argonne National Lab., Lemont, Ill.
PRELIMINARY REPORT: DAILY DOSE LETHALITY

DATA FOR RABBITS. George A. Sacher. p. 128-35 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT AUGUST, SEPTEMBER, OCTOBER 1950. Austin M. Brues. [nd]. 199p. (ANL-4531).

6244

Argonne National Lab., Lemont, Ill.
SOME BIOLOGICAL PHENOMENA UNDERLYING RADIATION MORTALITY. George Sacher and Sylvanus A. Tyler. August 1, 1947. Decl. May 26, 1948. 33p. (AECD-2024-F) NSA 1-40F

In recent years much progress has been made in the application of modern statistical methods to the evaluation and comparison of dosage-mortality curves based on small samples. In this paper an extensive body of dosage-mortality data is analyzed. Records on some thousands of mice which received single doses of X-rays were available. These mice were irradiated in groups which were kept together throughout the period of observation. On each group of mice, information was obtained on (1) the X-ray dose given, (2) age, (3) the proportion of the group which died within twenty days after treatment, and (4) the mean survival time of the nonsurvivors. The analysis was directed toward exhibiting the relations between these variables as clearly and completely as possible. The aim was to determine whether mortality could be investigated as a physiological variable, i.e., whether degree of killing and mean time to death could reveal anything about the functional nature of the mechanisms of radiation injury and mortality. There are several observations which can be made. First, the existence of successive orders of injury can be postulated. A given order of injury can appear only when injury of the previous order has reached a certain degree of severity. Second, if successive orders of injury exist, and if the appearance or non-appearance of a certain order of injury depends on external factors other than the administered dose, then multiple-valued relations between dose and mortality can exist. Present evidence indicates that the rate of mortality at a given time after irradiation is dependent on the instantaneous intensity of injury existing at that time, and further that rate of mortality is a rapidly increasing function of intensity of injury. The results so far reported are sufficient to justify the further investigation of the process of radiation injury and mortality, by methods which could be developed for use with data from properly designed experiments.

6245

ON DEEP X-IRRADIATION AND VEGETATIVE NERVOUS SYSTEM. A. Rutz. Arch. Klin. Chir., Langenbecks 145, 663(1927).

6246

CONCERNING THE REGENERATION OF LYMPHORETICULAR TISSUE AFTER RADIATION INJURY. Rudolph Pape and Alexandra Piringer-Kuchinka. Strahlentherapie 101, 523-35(1956).

Regeneration of lymphoreticular tissue of spleen after 1000 r regional irradiation has been examined in 39 rats. Rapid destruction is matched by proliferation of the remaining large and small reticulum cells. Within 27 to 30 hours, follicles poor in cells become abundant in cells. The amitosis and especially the meromitosis are of highest importance. Destructive processes are dependent on dose while regeneration is subordinate to physiological changes in rest of the body. NSA 11-3292

6247

SOME PRE-LETHAL EFFECTS IN AMBLYSTOMA OPACUM LARVAE EXPOSED TO 25,000 R X-RADIATION. Roberts Rugh. Anat. Record 103, 500-1(1949).

Radiation damage included severe nuclear injury and cessation of growth. Greatest damage was seen in central nervous system and sense organs. Cartilage and muscle showed least damage.

6248

RADIOIODINE AND HISTOPATHOLOGICAL EFFECTS. Roberts Rugh. J. Morphol. 89, 457-99(1951).

Nursing female mice were injected with radioiodine in doses of 3, 10 to 20 μ c/g. of body weight and histological studies were carried out on the thyroids and other tissues of the mother and the sucklings. Suckling mice divert radioiodine from the mother's thyroid.

6249

BIOLOGICAL ACTION OF X-RAYS, NITROGEN MUSTARDS, DIEPOXIDES AND PEROXIDES. W. C. J. Ross. Nature 165, 808-9(1950).

Mustards, diepoxides and peroxides produce breaks in the long chromosomes of *V. faba* at specific regions by a carbonium ion mechanism in contrast to x rays which produce random breaks by a free radical mechanism.

6250

THE INDUCTION OF ACTIVATED, STABLE STATES IN THE CHROMSOMES OF TRADESCANTIA BY INFRA-RED AND X RAYS. C. P. Swanson and Henry T. Yost, Jr. Proc. Natl. Acad. Sci. U. S. 37, 796-802(1951).

A temperature shock of 48°C. for seconds between exposures of Tradescantia inflorescences to infra-red and x rays, and to x rays and infra-red, effectively prevents the infra-red from increasing the frequency of chromosome aberrations. (from abst.) BA 27-24111

6251

THE EFFECT OF INTRAPERITONEALLY INJECTED RADIUM CHLORIDE UPON THE PERIPHERAL BLOOD OF ALBINO MALE RATS. Paul Roofe and Frank E. Hoecker. Anat. Record 103, 555-6(1949).

Red cells counts, white cell counts, platelet counts differential leukocyte counts and erythrocyte osmotic fragility were studied in rats injected intraperitoneally with 10, 20, 30, 40 or 50 μ g of RaCl. Depression of leukocyte counts was greater with greater dosage and with longer time after injection. Differential counts were not significantly affected.

6252

MEDULLARY DISORDERS PRODUCED BY ROENTGEN RAYS. et Bertin-Sans Rodet. LaSemaine med. 18, 195(1898). (French).

6253

X-RAY INDUCED CHROMOSOME DELETIONS IN RELATION TO MUTATION RATE IN TRADESCANTIA. Charles M. Rick. Genetics 25, 132(1940).

Irradiated Tradescantia microspores contain small spherical chromosome fragments which are, for the most part, deletions of ring structures. They are generally a two-hit effect and are produced at random. Effect of high and low temperatures on the phenomenon are described and discussed. The close parallelism between fragment production and point mutations is emphasized.

6254

NEWER INVESTIGATIONS OF RADIATION EFFECTS AND THEIR CLINICAL APPLICATIONS. L. Reynolds. Am. J. Roentgenol. Radium Therapy 55, 135(1946).

6255

THE EFFECT OF NITROGEN MUSTARD ON THE GROWTH OF THE BROAD BEAN ROOT (VICIA FABA). John Read. Brit. J. Radiol. 23, 504-5(1950).

The effects of nitrogen mustard are compared with effects of ionizing radiation on the bean root. A major difference is the influence of oxygen which enhances radiation damage but not nitrogen mustard damage. Author discusses possible interpretations of the observations, especially the concept of the free radical mechanism of radiation injury.

6256

Rochester, N. Y. Univ.
TRANSPLANTATION OF BONE MARROW INTO DOGS

THAT HAVE RECEIVED TOTAL BODY SINGLE DOSE. RADIATION. Paul Rekers. [nd]. Decl. Apr. 26, 1948. 197p. (AECD-1966).

Details of experimental techniques and results of extensive studies on transplantation of bone marrow into heavily irradiated dogs are presented. Observations on lethality, mode of death, blood changes and changes in hematopoietic tissues are among those reported.

6257

NECROSIS OF THE HEART MUSCLE AFTER ROENTGEN IRRADIATION. Wegelin. Schweiz. med. Wochschr. 57, 895 (1927).

Two cases are described: a 57 year old and a 60 year old patient with cancer of the esophagus.

6258

THE QUESTION OF THE EFFECT OF X-RAYS ON THE CENTRAL NERVOUS SYSTEM. A. Rachmanow. Strahlentherapie 23, 318 (1926).

6259

Argonne National Lab., Lemont, Ill.

THE LETHAL ACTION OF X-RADIATION, STABLE ISOTOPES OF FISSION ELEMENTS, Sr^{89} AND (Ba-La)¹⁴⁰ ON GOLDFISH. C. Ladd Prosser, C. W. Hagen, Jr., and W. Grundhauser. July 1947. Decl. Nov. 20, 1947. 21p. (MDDC-1480, ANL-4017).

Solutions of stable barium at 1 ppm killed 50 per cent of goldfish within 30 days. Cerium was toxic at 10 ppm, and bromine, at 1000 ppm. Solutions of strontium and iodine were nontoxic, at least up to 1000 ppm. Single doses of 850 r X radiation killed 50 per cent of goldfish within 30 days. Half a group of goldfish receiving 100 r daily were dead at 26 days; half a group at 50 r daily were dead at 33 days, whereas half the controls and those receiving 25 r daily were dead at 40 days. Calculations of radiation dosage show that in solutions containing fission products at 1 $\mu\text{c}/\text{ml}$, the dose due to external radiation is a small fraction in comparison with that due to internal radiation. In solutions of Sr^{89} at an initial concentration of 0.1 $\mu\text{c}/\text{ml}$, deaths were no more frequent than among controls. At an initial concentration of 0.4 $\mu\text{c}/\text{ml}$, however, a significant number of deaths occurred. On the basis of measurements of accumulated Sr^{89} , the median total accumulated dose of internal beta radiation varied from 1,580 to 27,550 rep at daily (24 hour) rates of 50 to 680 rep. Lethal doses for goldfish in aquaria in which Sr^{89} was replenished monthly were similar to those given in a single dosage. This similarity was also observed for lethal doses in single experiment with (Ba-La)¹⁴⁰.

6260

Argonne National Lab., Lemont, Illinois, Chicago University, Metallurgical Lab.

THE CLINICAL PHYSIOLOGY OF DOGS EXPOSED TO DAILY TOTAL-BODY DOSES OF X-RAYS. C. L. Prosser and M. C. Moore. Feb. 6, 1947. Decl. Sept. 9, 1947. 109p. (MDDC-1271, CH-3658).

6261

Argonne National Lab., Lemont, Ill., Chicago University, Metallurgical Lab.

THE CLINICAL PHYSIOLOGY OF DOGS EXPOSED TO SINGLE TOTAL-BODY DOSES OF X-RAYS. C. Ladd Prosser, Elizabeth E. Painter, and Marquerite N. Swift. Dec. 12, 1946. Decl. Sept. 2, 1947. 187p (MDDC-1272, CH-3738).

6262

Argonne National Lab., Lemont, Ill.

ACCUMULATION AND DISTRIBUTION OF RADIOACTIVE STRONTIUM, BARIUM-LANTHANUM, FISSION MIXTURE AND SODIUM IN GOLDFISH. C. Ladd Prosser, William

Pervinsek, and Jane Arnold. Feb. 15, 1945. Decl. Nov. 18, 1946. 40p. (MDDC-496, CH-3233).

Small non-feeding goldfish accumulated radioactive strontium, barium-lanthanum, fission mixture elements and sodium from solution in which they were immersed. Accumulation was rapid initially and continued at a rate greater than the loss of radioactivity in the medium by decay and adsorption. Hence, the ratio of the concentration of active material in the fish to that in the solution increased with time. After a few days this concentration ratio was usually between 10 and 100. The concentration ratio was independent of dose over the range investigated (0.01 μc to 1.0 $\mu\text{c}/\text{ml}$). Calcareous tissues, such as skeleton and scales, accumulated about 75 per cent of the radio-strontium and radio-barium in the whole fish. Lanthanum and a mixture of cerium, yttrium and zirconium-columbium appeared to be accumulated in visceral tissues, especially the intestine, and to be more actively adsorbed on feces and glass than were the alkaline earths. The comparable distribution, particularly of bone-seekers, on immersion and injection indicated that these elements were taken up through gill and oral membranes and were distributed by the blood. Radio-strontium was present in greater proportion in the gills at six hours than later. Fission mixtures shifted in abundance from soft parts to bony portions of the gills during the first few days. Injection experiments indicated that there was no fecal excretion of strontium but that there was a small amount of fecal excretion of Ba^{140} - La^{140} and of fission mixture. Some fission mixture components appeared to be taken out of the medium, either from feces of water, and precipitated along the intestinal folds. The yolk of eggs in ripe ovaries accumulated some components of fission mixture but not strontium or barium. Young growing or regenerating bone accumulated more radioactive material than did older bone, cartilage accumulated none of the bone-seekers. Large mature goldfish accumulated radioactive material more slowly than did small fish. This may have been in part related to their calcium turnover. Uptake of strontium⁸⁹ and uptake of fission mixture were shown to be greater when the surrounding pond water was low in calcium (1.8 p.p.m.) than when it was high in calcium (36 p.p.m.). Inactive strontium also retarded the uptake of radio-strontium. When the fish were transferred from active to inactive pond water they lost some Ba-La and fission mixture radioactivity from soft tissues during the first few hours but they did not lose the major part of their radioactivity any faster than by decay alone. The rate of loss of radio-strontium appeared to be unaffected by the calcium content of the water. Goldfish were unable to desorb any appreciable quantities of fission elements from suspended clay.

6263

Argonne National Lab., Lemont, Ill.

LETHAL CHANGES INDUCED BY X RAYS IN PARAMECIUM AURELIA. E. L. Powers, Charlene M. Allen, Charles F. Ehret, Sylvia D. Mayer, Richard Sato, and D. Shefner. p. 159-64 of BIOLOGICAL AND MEDICAL DIVISIONS: QUARTERLY REPORT FEBRUARY, MARCH, APRIL 1949. Austin M. Brues and Hermann Lisco. [nd]. 198p. (ANL-4291).

6264

Argonne National Lab., Lemont, Ill.

LETHAL EFFECTS OF P^{32} ON PARAMECIUM AURELIA. E. L. Powers, Jr., Deborah Shefner, M. J. Richard and R. Sato. August 1, 1947. Decl. May 26, 1948. 4p. (AECD-2024-P, ANL-4078). NSA 1-40P

Further results on the response of *P. aurelia* to exposure to P^{32} , Sr^{89} , 90 and Y^{90} have been obtained, and a partial summary statement of observations to date is presented.

There is observed increasing death with increasing P^{42} radioactivity. Death following exposure to the Sr solution increases with increasing activity. Comparison of survival following phosphorus exposure to that following strontium treatment at the same activity level, reveals that in all instances survival of the phosphorus-treated animals is the same or significantly lower than survival of strontium-treated animals. From these data it appears that the phosphorus-treated animals are injured to a greater extent than the strontium-treated animals. NSA 1-40P.

6265

INVESTIGATION INTO THE TIME FACTOR IN THE ROENTGEN IRRADIATION OF CANCER CELLS. PROTRAC-TION EXPERIMENTS WITH A TRANSPLANTABLE MOUSE CARCINOMA. B. R. Poulsen. *Acta Radiol.* 26, 463-83(1945).

6266

THE LETHALITY OF DICENTRIC CHROMOSOMES IN DROSOPHILA. G. Pontecorvo and H. J. Muller. *Genetics* 26, 165(1941).

Among 8,880 F_1 , from crosses of brown ebony trip-loids by non-brown non-ebony males given 4,000 r, 133 showed just one autosomal recessive and only 3 showed both recessives. The frequency of aneupentric trans-locations produced would have been expected to result in over 800 zygotes showing both recessives, had these zygotes lived. Hence, over 99% of these aneupentric rearrangements are lethal per se even though many aneupentrics formed from union of sister chromatid frag-ments after simple chromosome breakage are not lethal. (from author's abstract).

6267

IONIZING RADIATION AS A TEST OF MOLECULAR ORGANIZATION. L. Pollard. *Am. Scientist* 39, 99(1951).

6268

URINARY ELIMINATION OF 17- KETO STEROIDS AFTER IRRADIATION OF THE HYPOPHYSIS. R. Pietra. *Folia Endocrinol. (Pisa)* 3, 209-23(1950).

Excretion of 17 ketosteroids in the urine was not altered after x irradiation of patients.

6269

EFFECTS OF RADIUM ON THE NORMAL TISSUES OF THE BRAIN AND SPINAL CORD OF DOGS AND ITS THERAPEUTIC APPLICATION. E. P. Pendergrass, J. M. Hyman, K. M. Houser, and V. C. Rambo. *Am. J. Roentgenol.* 3, 553(1922).

6270

INTRACRANIAL COMPLICATIONS FOLLOWING IRRADIATION FOR CARCINOMA OF THE SCALP. E. P. Pendergrass, P. J. Hodes, and R. A. Groff. *Am. J. Roentgenol.* 43, 213(1940).

6271

MECHANICAL AND THERMAL INJURY FROM THE ATOMIC BOMB. Herman L. Pearse and J. Thomas Payne. *New Engl. J. Med.* 241, 647-53(1949).

6272

INFLUENCE OF TEMPERATURE ON RADIOSENSITIVITY IN THE FROG (RANA PIPIENS). Harvey M. Patt, Marguerite N. Swift, and Ella B. Tyree. *Federation Proc.* 7, 90-1(1948).

Survival of frogs following total body exposure to an x ray dose of 1000 or 3000 r was greatly increased by keeping the animals at temperature of 5-6°C after exposure but not by lowering their body temperature during or for the first 24 hr. after exposure only. When irradiated frogs were returned to room temperature environment 60-130 days after exposure, radiation injury became manifest as though it had merely been delayed by cold.

6273

NATURE OF CYSTEINE INDUCED RADIORESISTANCE;

SULFHYDRYL LEVELS AND DISTRIBUTION OF CYSTEINE SULFUR. Harvey M. Patt, Douglas E. Smith, Margaret E. Blackford and Robert L. Straube. *Am. J. Physiol.* 163, 740-1(1950).

Uptake, retention and distribution of labelled cysteine was studied in rats receiving whole body exposure to 800 r of x rays.

6274

THE TIME-INTENSITY FACTOR IN X-RAY IRRADIATION. Edith Paterson. *Brit. J. Radiol.* 17, 26-30(1944).

6275

ROLE OF THE UNPAIRED ELECTRON IN CARCINOGENESIS. Harold F. Park. *J. Phys. and Colloid Chem.* 54, 1383-4 (1950).

6276

RADIOACTIVITY, RADIANT ELECTRICITY AND THE EFFECT OF POTASSIUM ON PLANTS. I. Szolnoki. *Ernahr. Pflanze* 26, 177-180(1930).

This is a general discussion of work on plant pigments, photosynthesis and respiration. BA 6-15629

6277

Argonne National Lab., Lemont, Ill.
PHYSIOLOGICAL OBSERVATIONS ON RABBITS EXPOSED TO SINGLE DOSES OF X RAYS. E. E. Panter, C. Ladd Prosser and M. C. Moore. 1946. *Decl. Mar.* 4, 1947. 79p. (MDDC-761; CH-3727).

Most of the acute deaths among rabbits after single total-body X-radiation occur in the first two days or at 10-15 days after irradiation. Signs of clinical depression are seen in survivors of sublethal doses during each of these periods, termed the initial shock period and the principal acute radiation death period. The femoral arterial blood pressure of unanesthetized rabbits declined rapidly from a control of approximately 98 mm Hg to a minimum of about 50 mm Hg at 1-1/2 hours after doses of 600 r or greater. Proportionately smaller reductions in blood pressure occurred after 400 and 200 r. The threshold for 10-20 mm drop was approximately 50 r. During the first few hours the heart rate increased and rectal temperature rose, although the latter effect was largely due to confinement in treatment boxes. Survivors of the initial shock period showed partial recovery of blood pressure, but at about 10 days, blood pressure again declined, particularly in rabbits which died acutely. Low blood pressures were not observed at this time after doses of 400 r or less. Plasma protein concentration declined slightly during the acute post-irradiation period. Plasma volume as measured by Evans blue space was not significantly altered in the initial shock period after a dose of 800 r. Intradermally injected dye (Evans blue) spread more rapidly in the irradiated than in non-irradiated skin during the first few hours after irradiation. At the same time intravenously injected dye appeared in the interstitial space of a patch of irradiated skin much earlier than in non-irradiated skin. At 10-20 days after irradiation, intravenously injected fluorescein appeared within a few seconds in an irradiated area of skin and in several minutes in a non-irradiated area. These results indicate increased flow in skin lymphatics in the first few hours and increased passage out of capillaries in this period as well as during the period of maximum erythema. During the day following a dose of radiation in the lethal range, rabbits eat less than 20 per cent and drink less than 60 per cent of their normal amounts. Thereafter, food and water consumption increase partially but remain below normal in rabbits which die in the acute period. Recovery in survivors occurs gradually over about a month. Average weight loss is marked (10-15 per cent) in the first three days; weight remains diminished for about one week, after which some rabbits die and others begin a gradual recovery in weight which is not complete by 30 days. Some individual

rabbits show two minima in food and water intake and in weight; one at 1-2 days, and the second, at 10-15 days. Rabbits show a polyuria on the 2nd day after receiving 800 r. Thereafter urine output decreases slightly below control values but not as much as water intake decreases. Non-irradiated rabbits were transfused with 50 ml of blood from irradiated rabbits. Blood removed from rabbits 1-1/2 hours after 800 r caused an average fall of 26.2 mm in arterial blood pressure of the recipients, blood removed 5-12 days after irradiation caused variable but much smaller fall in the pressure of the recipient. Blood from non-irradiated donors had no significant depressant effect. Histamine analyses of blood and plasma were made by the method of Code. The plasma of non-irradiated rabbits had an average of 0.3 μ g/ml, while plasma removed about 1-1/2 hour after 800 r contained a mean of 0.6 μ g/ml. The values for whole blood declined due to removal of cells in subsequent sampling.

6278

SUSCEPTIBILITY OF X-RAYED ANIMALS TO HISTAMINE AND TO ADENOSINE. Elizabeth E. Painter and M. C. Moore. *Federation Proc.* 7, 90(1948).

6279

THE BIOLOGICAL MEASUREMENT OF RADIATIONS. C. Packard. *Am. J. Roentgenol. Radium Therapy* 41, 441-3(1939).

The advantages of using a biological dosimeter are discussed, with special reference to the use of *Drosophila*.

6280

Argonne National Lab., Lemont, Ill.
RADIO CERIUM (^{140}Ce). R. Overstreet, L. Jacobson, K. Scott, and H. Fisher. [nd]. *Decl. July 14, 1947*. 1p. (MDDC-1142-B, CH-554; A-678).

Preliminary results of experiments in which animals received radio-cerium by intramuscular or intraperitoneal injection or by stomach tube are included in this report. These studies were intended primarily to determine distribution and retention of the isotope.

6281

INTRA-UTERINE DEATH TIME IN SEMI-STERILE MICE. Eileen M. Otis. *Anat. Record* 105, 533(1949).

"Inviability" of zygotes considered to be due to unbalanced chromosomes, was studied in semisterile mouse pedigrees descended from chronically x irradiated males. The time of intrauterine death is compared with the times of appearance and differentiation of various organs and tissues in the embryos. Extrapolating from the time scale for the mouse to that for man, it is suggested that the observed time of intrauterine failure in the mouse would correspond to the 2nd to 6th week of human pregnancy

6282

EXPERIMENTAL STUDIES ON THE EFFECT OF ROENTGEN RAYS ON THE BLOOD AND SOME COMPARISONS WITH THE EFFECT OF RADIUM AND ULTRA VIOLET LIGHT. P. Linser and E. Helber. *Dtsch. Arch. Klin. Med.* 83, 479(1905). (In German).

Barley embryos at various stages of development were exposed to x ray doses ranging from 50 r to 800 r. Less mature embryos were affected by doses as low as 200 r, in contrast to nearly mature embryos which showed little effect after 500 r. There appeared to be a threshold dose for cytological effects and this dose was lower than that required to produce effects at a tissue or organ level.

6283

HEREDITARY BIOLOGICAL INVESTIGATIONS ON THE EVALUATION OF INHERENT DEFECTS AND MALFORMATIONS. B. Ostertag. *Verhandl. deut. pathol. Ges.* 31, 293(1938).

6284

THE EFFECTS OF OCCUPATIONAL EXPOSURES TO

X-RAYS AND RADIOACTIVE SUBSTANCES. John R. Nuttal. *Clin. J. (London)* 72, 181-5(1943).

6285

DOSE-EFFECT RELATIONSHIP IN X-IRRADIATED BARLEY EMBRYOS. L. W. Mericle, V. R. Phelps, and A. C. Wheeler. *Genetics* 40, 585(1955).

6286

ON THE SINGLE EVENT HYPOTHESIS IN RADIOGENETICS. I. Opatowski and Alice M. Christiansen. *Bull. Math. Biophys.* 12, 19(1950).

6287

DISCUSSION ON THE EFFECTS OF OCCUPATIONAL EXPOSURE TO X-RAYS AND RADIOACTIVE SUBSTANCES. John R. Nuttal, J. C. Mottram, S. Russ and J. M. Vaughan. *Proc. Roy. Soc. Med.* 35, 717-22(1942).

6288

RECOVERY AND REGENERATION OF SPLEEN AND THYMUS AFTER SINGLE AND DIVIDED DOSES OF TOTAL BODY X RAY. A. N. Stroud and A. M. Brues. *Fed. Proc.* 14, 148(1955).

The authors investigated the compensatory and recovery changes in the spleen and thymus of totally irradiated female mice, comparing the responses to those following single large doses and weekly divided doses. In each case, after minimum weight had been reached, a recovery phase followed in 2 or 3 weeks. (from authors' summary).

6289

Brookhaven National Lab., Upton, N. Y.
METABOLISM OF BONE SEEKING ELEMENTS. William P. Norris. p. 78-9 of CONFERENCE ON BIOLOGICAL APPLICATIONS ON NUCLEAR PHYSICS; JULY '2-27, 1948. July 1948. 154p. (BNL-C-4).

6290

BLOOD CHANGES IN RADIOLOGIC WORK. Nils G. Nordenson. *Acta Radiol.* 27, 416-32(1946).

Author describes a group of hematological changes observed in 1,566 radiation workers and compares these findings with the hematological observations in 450 controls.

6291

THE DISTRIBUTION OF INJECTED RADIOACTIVE POTASSIUM IN RATS. T. R. Noonan, W. O. Fenn and L. Haeghe. *Am. J. Physiol.* 132, 474(1941).

6292

Argonne National Lab., Lemont, Ill.
REPORT ON HAND STUDY. Margaret Nickson. Aug. 1, 1945. *Decl. Aug. 29, 1947* 37p. (MDDC-1270; CH-3368).

Observations have been made of the hands of 973 laboratory and office personnel. Deviations from normal have been noted and photographs taken. Finger ridge impressions have been made of 1287 individuals of whom 15 showed some abnormality. Capillary counts have been done on 838 individuals. The number of capillaries in a given area of nail fold shows some correlation with possible exposure to radioactive materials.

Capillary photographs have been taken of 93 individuals. There is a rough correlation between the morphology of the capillaries and the exposure of the hands of young individuals. Normal aging tends to produce the same or similar changes. Further capillary studies are necessary to confirm or deny the apparent relationship between hand exposure and increased or prematurely aged terminal capillaries. Photographs and a bibliography of 119 references are included.

6293

Argonne National Lab., Lemont, Ill.
EFFECT OF SINGLE DOSE X RAY TO THE NAIL FOLD AREA OF HUMAN SUBJECTS. PRELIMINARY REPORT. M. Nickson. June 20, 1947. *Decl. Sept. 11, 1947*. 6p. (MDDC-1269; CH-3833).

The nail told area of the left fourth finger of fifteen subjects was observed before and after a single radiation exposure. The total dose ranged from 200 r to 600 r. From this brief and incomplete study it appears that radiation exposures of 600 r or less when given as a single dose under the conditions described, produce no constant microscopic or macroscopic reaction. The transitory effects were most often microscopic and consisted of hyperemia of the small terminal vessels and dilation of vessels visible in this area before and after radiation.

6294

Argonne National Lab., Lemont, Ill.
SECOND REPORT OF HAND STUDY PROGRAM. M. Nickson and L. Warner. January 1947. 21p. (MDDC-1217; CH-3753).

Methods to determine early radiation damage or damage which has occurred without the individual's being conscious of any change fall into two categories, macroscopic and microscopic. Two methods were used in the laboratory for determining macroscopic changes: (1) direct inspection of the hands. (2) The hands were photographed, the photographs enlarged and the enlarged photographs were studied. There are two macroscopic changes in the skin after acute and chronic radiation, namely erythema following acute radiation, and atrophy after chronic radiation. Unfortunately, both radiation erythema and/or atrophy will also result from stimulation other than radiation. Microscopic examinations of the vessels at the base of the nail were made. Of the 593 individuals studied for radiation damage to finger ridges, 18% had some abnormality. All of these abnormalities were minimal. Reversible changes due to mechanical flattening of the ridges were found among machinists, carpenters, and others doing manual labor. Such findings which may be confusing after a single examination can be excluded by repeated studies after time intervals to allow for regeneration. Capillary counts were found to range between 18 and 22 in over half of the individuals studied and between 18 and 27 in 80%. Persons with dark skin pigment had slightly lower counts whereas persons over 50 years of age had counts in the high portion of the average range. Sex had no effect on the count. Radiation exposure at levels received in the laboratory had no effect on the count during the period of time covered by this study. This report is a continuation of studies described in MDDC-1270.

6295

SECTORING IN COLONIES FROM IRRADIATED CELLS OF *ESCHERICHIA COLI*. H. B. Newcombe. *Genetics* 36, 570(1951).

With ultraviolet doses of 500 and 100 to 100 ergs/mm² 15-20% of colonies sectoried; with gamma dose of 40,000 to 80,000 r 6-7% sectoried. Sectoring, which survives selection, could be due to delayed mutation, genetic interchange between two nuclei in treated cells, mutation in incompletely split chromosomes, or mutation in hereditary particles other than chromosomal genes. (from abstract).

6296

THE POSSIBILITY OF EFFECTS ON THE VEGETATIVE NERVOUS SYSTEM AFTER ROENTGEN-RADIUM IRRADIATION. M. Nemenow. *Strahlentherapie* 53, 472 (1935). (German).

6297

CHROMOSOME ABERRATIONS AND VIABILITY IN *APOTETIX ELAECYPHALUS* HANCK. Robert K. Nabours and Florence M. Stebbins. *Genetics* 25, 129-30(1940).

6298

AN ATTEMPT TO OBTAIN SEX-LINKED MUTATIONS IN A DIOECIOUS PLANT. M. J. Murray. *Genetics* 25, 128 (1940).

6299

OUTCOME OF 625 PREGNANCIES IN WOMEN SUBJECTED TO PELVIC RADIUM OR ROENTGEN IRRADIATION. D. P. Murphy. *Am. J. Obstet. Gynecol.* 18, 179(1929).

6300

THE EFFECT OF IRRADIATION ON THE PLASMA ERYTHROPOIETIC STIMULATING FACTOR. J. W. Linman and F. H. Bethell. *Blood* 12, 123-29(1957).

An erythropoiesis-stimulating factor could be demonstrated in protein-free filtrates of rabbits made anemic by x-irradiation alone or made anemic by administration of phenylhydrazine after x irradiation. Data suggest that the erythropoiesis-stimulating factor is not produced by a highly radiosensitive tissue.

6301

THE ACTION OF THE ROENTGEN RAYS UPON ACTIVITY OF KOCH'S OLD TUBERCULIN IN SKIN TESTS. T. Abramowitsch and I. Rabuchin. *J. Tuberkulose* 51, 462-7(1928). (In German).

In a 1:1000 concentration, O. T. usually showed decrease activity after it had been x irradiated; occasionally activity was increased.

6302

ROENTGEN RAYS AND THE CENTRAL NERVOUS SYSTEM. D. G. Skefer. *Black Sea Region, Rostov-Don. Press of Azov.* (1936).

6303

ATOMIC BOMB CASUALTY COMMISSION REPORT, MAY (1954). SUMMARY OF STUDIES ON CHILDREN EXPOSED IN UTERO TO THE ATOMIC BOMB IN HIROSHIMA CITY. W. W. Sutow.

6304

THE ACTION OF BENZOL, ROENTGEN RAYS AND RADIO-ACTIVE SUBSTANCES ON THE BLOOD AND BLOOD-FORMING TISSUES. Lawrence Selling and Edwin E. Osgood. Chap. 39, Vol. IV of *Handbook of Hematology*. H. Downey, New York; Paul B. Hoeber, Inc. (1938).

6305

INDUSTRIAL MEDICINE ON THE PLUTONIUM PROJECT. Robert S. Stone. New York, McGraw Hill Book Company, Inc. 1951. 511p. (National Nuclear Energy Series Division IV, Volume 20).

This volume includes chapters on medical services of the Plutonium Project, biological bases for maximum permissible exposures, protective measures for personnel, clinical and hematological studies on personnel, retention and excretion of plutonium and uranium, biochemical effects of radiation and metals, and clinical and hematological studies on patients receiving whole body x irradiation.

6306

BIOLOGICAL EFFECTS OF EXTERNAL BETA RADIATION. Raymond E. Zirkle. New York, McGraw Hill Book Company, Inc. 1951. 242p. (National Nuclear Energy Series Division IV. Plutonium Project Record Volume 22E).

Reports of the initial Plutonium project studies of the effects of β radiation on laboratory animals are collected in this volume. Dosimetry, laboratory methods, clinical and histological studies on experimental animals and studies of lethality of extensive exposure to β rays are described. Studies on tumor induction in acutely and chronically exposed animals are included.

6307

Argonne National Lab., Lemont, Ill., Chicago University, Metallurgical Lab.

THE RADIOBIOLOGICAL IMPORTANCE OF SPECIFIC IONIZATION. R. E. Zirkle. Sept. 21, 1943. Decl. Oct. 9, 1946. 30p. (MDDC-444; CH-946).

The relative effectiveness of fast neutrons, x rays and γ rays on plants and animals are compared and the effectiveness ratios are shown to reflect the specific ionization of the radiations. Ratios differ depending on the effect measured. Implications of the differences in effectiveness of the three types of radiation with respect to health protection are discussed.

6308

SOME EFFECTS OF ALPHA RADIATION UPON PLANT CELLS. R. E. Zirkle. J. Cellular Comp. Physiol. 2, 251-74(1932).

Alpha rays from polonium retard and inhibit three processes in the germination of spores of *Pteris longifolia*: cracking of the spore wall, development of chlorophyll and cell division. Numbers of unscreened α particles per protoplast required to produce 50% inhibition of cracking, greening and division are 33,000, 13,000 and 4,000, respectively. (2,000, 800 and 250 α -particles per nucleus and 8.3×10^{-6} , 3.3×10^{-6} and 1.0×10^{-6} ergs, respectively, per μ^3 of the protoplast). (from author's summary).

6309

Oak Ridge National Lab., Tenn.
THE EFFECT OF AGE ON THE RADIOSENSITIVITY OF MICE. R. E. Zirkle, E. Anderson, E. F. Riley and H. J. Curtis. Mar. 28, 1946. Decl. Oct. 29, 1946. 6p. (MDDC-418, MonH-89).

The dose of radiation required to kill 50% of groups of male and female mice of age groups ranging from 1.5 to 12 months was determined. Females were more resistant than males, but no change in radiosensitivity with age was observed.

6310

PLUTONIUM PROJECTS SYMPOSIUM. Raymond Zirkle, et al. Radiology 49, 269-365(1947).

These papers report studies on the acute lethal action of slow neutrons on mice and effects of chronic irradiation on mice, guinea pigs and rabbits. Individual papers are included and indexed as separate references in this bibliography.

6311

THE TOLERANCE DOSE OF BRAIN TISSUE UNDER DEEP X-IRRADIATION. W. Zeman. Strahlentherapie 81, 549(1950). (German).

6312

THE QUESTION OF X-RAY EFFECT ON BRAIN TUMORS. W. Zeman. Arch. Psychiat. u. Z. ges. Neurol. u. Psychiat. 182, 713(1949).

6313

SOME BLOOD EXAMINATIONS OF X RAY WORKERS. J. C. Mottram. Brit. J. Radiol. 5, 156(1932) N. S.

6314

THE ACTION OF IONIZING RAYS ON SEA-URCHINS. V. THE MITOTIC OBSERVATIONS ON THE EFFECTS OF ROENTGEN RAYS UPON THE UNFERTILIZED EGGS AND SPERM. H. Yamashita, K. Mori and M. Miwa. Gann 34, 239-45(1940).

All stages of mitosis between fertilization and first cleavage were studied in normal and x irradiated sea urchin eggs. Delay in first cleavage was found to be a phenomenon of the nuclear streak phase and prophase. On the basis of these and earlier observations, the author suggests that the nuclear streak phase is a critically important stage with respect to radiation injury of living cells. (from authors' abstract).

6315

SOME EFFECTS OF RADIATION ON LIVING BONE. Helen Qumcey Woodard. Internat. Congr. Radiol., 6th Congress, 1950. p. 161-2.

Approximately 1.5 cm of one hind leg of male albino mice was x irradiated; rest of body shielded. Alkaline phosphatase activity of irradiated and control legs was measured at intervals of 4-50 days after exposure. Doses of 900 r-1500 r depressed the enzyme activity in irradiated bones within 4-7 days. There was partial recovery but not complete recovery even after 50 days following 900 r. A dose of 3000 r nearly abolished alkaline phosphatase activity and was not followed by recovery.

6316

GLUTATHIONE AND ASCORBIC ACID IN THE TISSUES OF NORMAL AND TUMOR-BEARING ALBINO RATS. G. E. Woodward. Biochem. J. 29, 2405-12(1935).

Doses of x ray sufficient to retard tumor growth decreased the values of glutathione in Walker No. 256 carcinoma and Philadelphia No. 1 sarcoma. An ascorbic acid-like substance in the tumors was decreased only in sarcoma after irradiation. Tumors resistant to radiation showed no change in either chemical constituent after irradiation.

6317

A STUDY OF THE LOCAL ROENTGEN REACTION ON THE SKIN OF MICE, WITH SPECIAL REFERENCE TO THE VASCULAR EFFECTS. F. Devik. Acta. Radiol., Suppl., 119, 1-72(1955).

Dermal necrosis following irradiation reflects epithelial damage paralleling that seen in the intestinal tract. Mitosis and differentiation stop, the basal layer disappears. These changes are followed in turn by squamous metaplasia, acanthosis, dyskeratosis and parakeratosis. Ulceration represents failure to replace shed epithelium. Epithelial cells within the heavily irradiated field - not the neighboring shielded cells - are the ones that become hyperplastic.

6318

DIFFERENCE IN THE EFFECTS OF X-IRRADIATION IN RAT EMBRYOS OF DIFFERENT AGES. James G. Wilson and John W. Karr. Anat. Record 106, 259-60 (1950).

Development of embryos exposed and irradiated in utero on the 9th day of gestation was more seriously affected than was that of embryos irradiated on the 10th day. The lethal dose was 200 r on the 9th, 400 r on the 10th day. Sublethal doses caused specific malformations in survivors, the eye being the most common site, followed by brain. Other abnormalities found are also described.

6319

EFFECTS OF X-IRRADIATION ON EMBRYONIC DEVELOPMENT IN THE RAT. James G. Wilson. Anat. Record 103, 520-1(1949).

6320

CHANGES IN CHROMOSOME SENSITIVITY TO X-RAYS. G. B. Wilson and B. R. Nebel. Genetics 25, 140(1940).

Microspores of *Tradescantia reflexa* Raf. were irradiated at various stages preceeding first pollen-grain metaphase. Using degree of chromosome alteration at first pollen-grain metaphase as an index of radio-sensitivity, the authors found a positive correlation between speed of mitotic development and "sensitivity."

6321

THE NON-INDUCTION OF MUTATIONS BY X-RAYED CYTOPLASM. Anna R. Whiting. Genetics 35, 139-40(1950).

Habrobracon eggs irradiated with x ray doses greater than 2500 r during first meiotic metaphase failed to hatch and were found to have chromosome injury severe enough to prevent movement of the egg pronucleus. Such eggs, when fertilized, may develop into haploid androgenetic males. No mutations appeared in any such males (sperm

were not irradiated) and they transmitted only paternal traits to their offspring.

6322

THE EFFECTS OF ATOMIC ENERGY ON THE BLOOD. Lionel Whitby. Prensa med. argent. 34, 648-50(1947).

Effects of radiation on the blood are reviewed and illustrated by the changes observed in victims of atomic bomb explosion.

6323

PHYSIOLOGICAL AND PATHOLOGICAL CHEMISTRY OF THE SKIN. E. Urbach and H. Schnitzler. Klin. Wochschr. 8, 2179-84(1929). (In German).

Toxic action of massive doses of x ray is described. Blood urea nitrogen level increased three fold; Cl decreased. Effects were similar to those of protein intoxication. (Experiments on animals).

6324

ASPECTS OF THE CHEMICAL AND BIOLOGICAL ACTION OF RADIATIONS. J. Weiss. Trans. Faraday Soc. 43, 314-24(1947).

Author discusses absorption of energy from x rays, γ rays, α particles and neutrons; free radical formation, recombination of free radicals and the target theory.

6325

ROENTGEN LEUKOPENIA AND VITAMINS B₂ COMPLEX AND C. B. Weicker and H. Bublitz. Z. ges. exptl. Med. 105, 521-531(1939).

6326

Argonne National Lab., Lemont, Ill.
THE RADIOSENSITIVITY OF AUXIN BIOSYNTHESIS. R. P. Weber and S. A. Gordon. p. 91-3 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH; QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1951. Austin M. Brues. [nd]. 133p. (ANL-4713).

Preliminary experiments on the radiosensitivity of the enzyme complex involved in the conversion of tryptophan to auxin in bean seedlings are summarized.

6327

Argonne National Lab., Lemont, Ill.
THE RADIOSENSITIVITY OF AUXIN BIOSYNTHESIS. R. P. Weber and S. A. Gordon. p. 79-80 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT MAY, JUNE, JULY, 1951. Austin M. Brues. [nd]. 112p. (ANL-4676).

The ability of plant tissue to produce auxin is rapidly decreased by doses of ionizing radiation in the range of 25-100 r. The authors' experiments indicate that the radiosensitivity is due to the lability of enzymes involved in auxin production rather than to sensitivity of intermediates formed during auxin synthesis of auxin itself. (from authors' abstract).

6328

Argonne National Lab., Lemont, Ill.
RADIATION INDUCED CHANGES IN ULTRAVIOLET ABSORPTION SPECTRA OF URINE: II. QUANTITATIVE SPECTROPHOTOMETRIC STUDIES. Lee Wattenberg, and Samuel Schwartz Nov. 1946. Decl. Feb. 26, 1947. 33p. (MDDC-701; CH-3661).

Quantitative analysis (U-V absorption at 245 mu) for kynurenic acid was carried out on urine of 13 dogs after lethal x ray doses administered as a single or multiple exposures. An increase in kynurenic acid was observed in urine of 12 of the 13 dogs shortly before death. A similar increase was observed shortly before death in urine of 1 of 2 dogs dying from injury due to injected plutonium.

6329

Argonne National Lab., Lemont, Ill.
RADIATION INDUCED CHANGES IN ULTRAVIOLET ABSORPTION SPECTRA OF URINE: I. GENERAL EFFECTS.

L. Wattenberg and Samuel Schwartz. June 18, 1946. Decl. Feb. 25, 1947. 31p. (MDDC-700; CH-3541).

Changes in the ultraviolet absorption spectra of urine from dogs receiving either external or internal radiation are described. Increases in kynurenic acid and uric acid were observed.

6330

INACTIVATING MUTATIONS PRODUCED BY X-RAYS IN BACTERIOPHAGES. J. D. Watson. Genetics 33, 633-4 (1948).

In addition to inactivating phage, x rays suppress the phages ability to infect bacteria. For every 3 inactivating hits, one adsorption-suppressing hit occurs. Mechanisms of x ray and ultraviolet inactivation and reactivation of phage are discussed.

6331

ROENTGEN RAY INTOXICATION. II. THE CUMULATIVE EFFECT OR SUMMATION OF X-RAY EXPOSURES GIVEN AT VARYING INTERVALS. S. L. Warren and G. H. Whipple. J. Exptl. Med. 38, 725(1923).

The clinical and histological consequences of a single large x ray dose over the abdomen of dogs was compared with effects of sublethal doses to the same area followed, during the period of clinical intoxication, by smaller doses. Small but repeated doses of radiation given within a 5 or 6 day period caused almost the same cell injury and clinical intoxication as did a single dose equal to the sum of smaller doses. If the smaller doses were given at intervals of 6 days or longer, their effects no longer appeared to be additive.

6332

THE ATOM BOMB: HAZARDS INCIDENT TO ITS USE. Stafford L. Warren, Fred A. Bryan, and Robert J. Buettner. Ind. Med. 16, 276-8(1947).

6333

BLOOD FINDINGS IN CYCLOTRON WORKERS. S. Warren. Radiology 39, 194-9(1942).

Results of routine blood studies carried out repeatedly on 85 cyclotron workers over periods varying from 3-30 months are described. The men in question received minimal radiation doses. Four of the group showed minor variations in the leukocyte counts which are described and discussed.

6334

EFFECTS OF RADIATION ON NORMAL TISSUES. Shields Warren. A. M. A. Arch. Pathol. 34, 443, 562, 749, 917-31, 1070-84, and 35, 121-39, 305-23, 340-53 (1942).

The author reviews the literature on the effects of x rays, radium, radon, neutrons and radioactive isotopes on the tissues of experimental animals and man.

6335

PHYSIOLOGICAL EFFECTS OF NUCLEAR ENERGY. Shields Warren. Occupational Med. 2, 447-51(1946).

6336

STUDIES IN RADIATION SICKNESS: II. VITAMINS B₁ AND C AND SMALL INTESTINAL CHANGE IN RADIATION SICKNESS. W. S. Wallace. Southern Med. J. 34, 170-3 (1941).

6337

THE SITE OF DAMAGE IN AMOEBAE EXPOSED TO X-RAYS. M. J. Ord and J. F. Danielli. Quart. J. Microscop. Sci. 97, 29-37(1956).

Authors studied the role of nucleus and cytoplasm (using technique of nuclear transplantation) in irradiation damage in *Amoeba proteus*. Evidence is presented to show that irradiated cytoplasm can damage the unirradiated nucleus, i. e. not all nuclear damage need be direct. Cytoplasmic effect is reversible. The 50% lethal doses

were in the ratio of 120,000 r for nuclei to 290,000 r for cytoplasm.

6338

SUBCELLULAR FRACTIONATION OF MOUSE SPLEEN RADIATION PROTECTION ACTIVITY. L. J. Cole, M. C. Fishler and V. P. Bond. *Federation Proc.* 12, 27(1953).

Various subcellular fractions of LAF₁ mouse spleen homogenates were tested for their protective effect in LAF₁ mice exposed to an LD₁₀₀ x ray dose. Only the fraction consisting of nuclei conferred protection. A crude nuclei acid extract prepared from the nuclei did not retain the protective properties.

6339

EXPERIMENTAL STUDIES ON EARLY LENS CHANGES AFTER ROENTGEN IRRADIATION. I. MORPHOLOGICAL AND CYTOCHEMICAL CHANGES. Ludwig von Sallman A. M. A. Arch. Ophthalmol. (Chicago) 45, 149-64(1951).

An x ray dose of 2000 r to the eyes of rabbits caused cataractous changes within 4-10 weeks in 53 of 56 animals exposed. The histological changes in lenses at various intervals after exposure are described.

6340

INTENSITY OF RADIATION AND SELECTIVE ACTION.

J. VanRoojen. *Brit. J. Radiol.* 12, 547-53(1939).

Author considers 2 hypothetical cell types that differ with respect to radiosensitivity and reparability and mathematically constructs a dose-intensity curve to predict the action of x rays on them. Implications of this type of analysis for tumor therapy are a major consideration.

6341

United States Atomic Energy Commission
U. S. GOVERNMENT PRINTING OFFICE, WASHINGTON,
D. C. (1950). CONTROL TO RADIATION HAZARDS IN THE ATOMIC ENERGY PROGRAM.

6342

THE GENETIC EFFECTS OF LOW INTENSITY IRRADIATION.

Delta E. Uphoff and Curt Stern. *Science* 109, 609-10(1949).

6343

THE TARGET PRINCIPLE IN BIOLOGY. N. W. Timofeev-Ressovskii and K. G. Zimmer. *Hirzel, Berlin.* (1947).

6344

STUDIES OF THE ACTION OF RADIATION ON THE VEGETATION NERVOUS SYSTEM. A. Zimmern and P. Chailley-Bert. *Bull. mem. soc. radiol. med. France.* 17(157), 106-9(1929).

Authors describe the action of x- and ultraviolet-rays on vagal and sympathetic excitation, referring to clinical studies on man and to physiological tests. Action of x rays on dog pneumogastric nerve is also described. BA 6-18659

6345

CEREBRAL INJURIES CAUSED BY ATOMIC BOMBARDMENT.

Y. Uchimura and H. Shiraki. *J. Nervous Mental Disease* 116, 654(1942).

6346

ON THE PATHOLOGICAL CHANGES IN THE BRAIN IN ATOMIC BOMB CASUALTIES. Y. Uchimura and H. Shiraki. *Folia Psychiat. et Neurol. Japon.* 6, 155(1952). (In German).

6347

THE EFFECT OF ULTRAVIOLET AND ROENTGEN RAYS ON THE REDOX-POTENTIAL OF THE FROG MUSCLE IN VIVO. Y. Uchimura. *J. Biochem.* 25, 207-17(1937).

Irradiation with ultraviolet or x rays increased the redox potential of frog muscle, the U-V effect being manifest shortly after irradiation, the x ray effect after a latent period. Recovery occurred sooner after U-V effect than after x ray effect. The author suggest that radiant energy acts by activating reducing agents in tissue.

6348

ALTERATION OF ISOELECTRIC POINT OF CELL COLLOIDS IN PLANTS UNDER THE INFLUENCE OF X-RAYS. R. G. Trudova. *Doklady Akad. Nauk. S.S.S.R.* 72, 197-9(1950). (In Russian).

Results of exposure of plants to 250, 500 and 13,000 are presented in tabular form. Following 250 r, maximal dislocation of the isoelectric point for nuclear colloids was observed one hour after, for plasma colloids five hours after x radiation. Following 500 r, a significant dislocation of the isoelectric point of nuclear colloids was observed 15 minutes after radiation. The maximum was attained one hour after radiation for nuclear colloids, and for plasma colloids the dislocation gradually decreased with time. Following 13,000 r a significant dislocation of the isoelectric point of colloids of plasma and nucleus occurred immediately after radiation; maximal dislocation being observed 15 minutes after irradiation.

6349

SOME EXPERIMENTS ON THE EFFECTS OF X-RAYS IN THERAPEUTIC DOSES ON THE GROWING BRAINS OF RABBITS. D. F. D. Turner and T. J. George. *Brit. Med. J.* 524(1910-11).

6350

EFFECTS OF RADIATION EXPOSURE ON THE CELLS OF THE PERIPHERAL BLOOD. E. K. Marks. (Argonne National Lab.). (1947). (MDDC-912).

6351

PROLIFERATION AND VASCULARIZATION OF ADULT HUMAN EPITHELIUM IN SUBCUTANEOUS TISSUES OF X-IRRADIATED HETEROLOGOUS HOSTS. H. W. Toolan. *Proc. Soc. Exptl. Biol. Med.* 78, 540-3(1951).

6352

RADIOLOGICAL USE OF FAST PROTON, DEUTERON AND ALPHA PARTICLE BEAMS. C. A. Tobias, H. O. Hoanger and J. H. Lawrence. *Internat. Congr. Radiol.*, 6th Congress, London, 1950. p. 51-2.

Beams of particulate radiation from the cyclotron at U. of California, Berkeley, were compared with conventional x rays with respect to lethal effect on mice, tumor regression in mice bearing mammary carcinoma, skin changes in mice, the lethal effect on rats when various body regions were subjected to the beams, and effects on microorganisms.

6353

SPONTANEOUS AND RADIATION INDUCED MUTABILITY IN GEOGRAPHICALLY DIFFERENT RACES OF *DROSOPHILA MELANOGASTER*. N. W. Timofeev-Ressovskii. *Biol. Zentr.* 60, 267-75(1940).

6354

Tennessee Univ.

QUARTERLY PROGRESS AND WORK ACCOMPLISHMENT REPORT FOR QUARTER ENDING SEPTEMBER 30, 1951. [nd]. 33p. (ORO-54).

Progress is reported in the study of the fission-products metabolism in domestic animals and the dependence of their behavior upon normal mineral metabolism. Blood-volume values for swine were determined using the P³²-labeled red-cell method. Swine with average body weight of 10 lb were found to average 7.4 ml of blood per 100 g body weight, while those averaging 344-lb body weight had 4.6 ml of blood per 100 g body weight. Values for intermediate body-weight groups are also included. Blood values for the south-western burro (*Equus asinus asinus*) were determined and are presented in tabular form. The multicurie irradiation field for large animals was loaded, calibrated, and placed in operation. Normal blood values for the healthy burro have been established to serve as a basis for following the changes caused by irradiation. Particular attention is invited to the results of a preliminary experiment on the

effects of whole-body irradiation upon the subsequent fertility of the male rabbit. These data emphasize the fact that observations on the sperm themselves or even on the initial fertilization do not suffice to give a true measure of irradiation effects on fertility; it is necessary, therefore, to use the number of viable young produced as the criterion. As an indication of results, it was shown that while control rabbits in 34 matings produced an average of 6.56 viable young per mating, the values for males exposed to 100, 200, and 300 r were 3.4 in 15 matings, 4.5 in 26 matings, and 3.2 in 16 matings, respectively. NSA 6-504

6355

THE EFFECTS OF X-RADIATION ON THYMUS NUCLEIC ACID. Babette Taylor, Jesse P. Greenstein and Alexander Hollaender. Science 105, 263-4(1947).

Authors studied viscosity changes in irradiated solutions of thymus nucleate.

6356

EFFECT OF ROENTGEN THERAPY ON GLIOMAS. I. M. Tarlov. A. M. A. Arch. Neurol. Psychiat. 38, 357(1937).

6357

THE EXPERIMENTAL BASES OF TOTAL AND SUBTOTAL RADIOTHERAPY. Y. H. T' Ang. J. belge radiol. 28, 207-99 (1939).

6358

BONE MARROW IN THE TREATMENT OF RADIATION INJURY. John M. Talbot. Internat. Congr. Radiol., 6th Congress, London, 1950, p. 125.

The effects of bone marrow injections on the blood picture and on lethality in rats exposed to LD₅₀ x ray doses or to benzene are described. Marrow was injected intrahepatically, intramuscularly or subcutaneously.

6359

Osaka Medical Coll. for Women
CONCERNING OTORHINOLARYNGOLOGICAL OBSERVATIONS DIAGNOSED AT THE TIME OF THE EXPLOSION OF THE ATOMIC BOMBS. T. Takahara, Akiko Mori and Shigeo Natsumoto. [nd]. 11p. (NP-313).

6360

Argonne National Lab., Lemont, Ill.
THE EFFECT OF BETA IRRADIATION ON THE RESPIRATION AND MORPHOLOGY OF MELANOPLUS DIFFERENTIALIS EMBRYOS. Theodore N. Tahmsian and Jeanne Gasvoda. p. 154-80 of BIOLOGICAL AND MEDICAL DIVISIONS. QUARTERLY REPORT AUGUST 1948 TO NOVEMBER 1948. Austin M. Brues and Hermann Lisco. Nov. 1, 1948. 210p. (ANL-4227, AECD-2053).

Respiration of grasshopper embryos was increased during exposure to low doses of β radiation and decreased following exposure. Chromosome injury was observed and is considered to be both a direct and an indirect effect of exposure.

6361

THE EFFECT OF ADRENAL CORTICAL EXTRACT ON ADRENAL RESPONSE TO TOTAL BODY X-IRRADIATION. M. N. Swift, H. M. Patt and E. B. Tyree. Federation Proc. 7, 121-2(1948).

6362

THE ACTION OF INFRARED RADIATION ON THE CHROMOSOMES OF TRADESCANTIA. C. P. Swanson and Henry T. Yost, Jr. Genetics 36, 579(1951).

Primary action of infrared radiation was found to be the induction of metastable states in the chromosomes. Such chromosomes react more readily with free radicals released by ionizing radiation in surrounding area and yield a higher frequency of primary breaks per given dose of x-rays. X-rays induce a reservoir of loci which can be acted upon by the infrared and brought to the level of primary breaks, after which they can enter into recombination with the other similarly broken ends. (from abstract).

6363

Univ. of Rochester
RESPONSE OF HEMATOPOIETIC SYSTEM TO X RAYS. G. M. Suter. March 22, 1947. Decl. Apr. 1947. 8p. (MDDC-824).

Hematological studies on dogs, rats, rabbits and monkeys exposed to acute and chronic x irradiation are described.

6364

IRRADIATION EFFECT ON THE VEGETATIVE SYSTEM. O. Strauss and J. Rother. Strahlentherapie 18, 37(1924). (In German).

6365

THE EFFECT OF IONIZING RADIATIONS ON BONE (OTHER THAN MARROW) AND ON STRIATED MUSCLE. M. M. Copeland. Am. Acad. Orthopedic Surgeons Lectures 10, 191-212(1953).

With massive x ray doses, fibres of striated muscle swell and become hyalinized.

6366

A COMPARISON OF SKIN REACTIONS PRODUCED BY 200 Kv AND 1000 Kv RADIATIONS. Robert S. Stone and J. M. Robinson. Am. J. Roentgenol. Radium Therapy 44, 601-9(1940).

6367

THE EFFECT OF A SECOND ACUTE X-RAY EXPOSURE ON THE RECOVERY OF THE CIRCULATING ERYTHROCYTES IN IRRADIATED RATS. S. P. Stearner. (Argonne National Lab., Lemont, Ill.). August 1, 1947. Decl. May 26, 1948. 10p. (AECD-2024-D).

6368

EFFECTS OF X-IRRADIATION ON RENAL FUNCTION IN NEWLY HATCHED CHICKS. S. Phyllis Stearner, E. J. B. Christian and Austin M. Brues. Proc. Soc. Exptl. Biol. Med. 78, 676-9(1951).

6369

Argonne National Lab., Lemont, Ill.
THE EFFECT OF FOLIC ACID ON THE RESPONSE OF THE PERIPHERAL BLOOD OF THE RAT TO STRONTIUM⁸⁹. S. Phyllis Stearner and Leon O. Jacobson. p. 36-48 of BIOLOGY DIVISION QUARTERLY REPORT FEBRUARY 1947 TO MAY 1947. June 1, 1947. 178p. (MDDC-1418).

Folic acid had no effect on the macrocytic anemia that followed the administration of Sr⁸⁹. At least in the case of radioactive strontium, the injury is probably exerted directly on the bone marrow and is not caused indirectly by a damage to the gastro-intestinal tract or to the liver. The action of folic acid has been reported to be similar to that of liver extract and it therefore should correct any deficiency resulting from radiation damage to liver or stomach and subsequent failure to form an anti-anemic factor. Folic acid was equally ineffective in alleviating the effect of irradiating on the number of circulating leucocytes. This failure to affect the leucopenia that followed the administration of Sr⁸⁹ does not substantiate the suggestion by Watson that folic acid may be effective as a treatment for the leucopenia following exposure to radiation. It is concluded that folic acid is ineffective as a treatment for the hematological effects of internal radiations and probably by implication, for those of external radiations as well. Since total body irradiation is more likely to damage visceral organs, however, the latter question is being investigated. Six references.

6370

Oak Ridge National Lab., Tenn.
THE EFFECTS OF FAST NEUTRONS ON THE ABILITY OF MICE TO TAKE FORCED EXERCISE. G. E. Stapleton and H. J. Curtis. Aug. 22, 1946. Decl. Feb. 26, 1948. 18p. (MDDC-696; MON-H-121).

Mice surviving massive doses of fast neutrons showed a continuous loss of ability to do forced work in exercise

wheels ("vitality loss") over a period of 300 days post-exposure.

6371

Oak Ridge National Lab., Tenn.
COMPARATIVE EFFECTIVENESS AND ADDITIVITY OF FISSION NEUTRONS, GAMMA RAYS AND BETA RAYS ON DROSOPHILA EGGS. G. E. Stapleton and R. E. Zirkle. Feb. 1946. 33p. (MDDC-584) (MON-H-120).

Drosophila eggs were irradiated with various dose combinations of fast neutrons, γ rays and β rays. The radiations differed in biological effectiveness but when considered per unit energy absorbed, they were completely additive in their lethal effect on the eggs.

6372

QUESTION OF LEUKEMIA AS RESULT OF EXPOSURE TO ROENTGEN RAYS. H. V. Spindler. Klin. Wochschr. 18, 1211-12(1939).

6373

AN EXPERIMENTAL STUDY WITH THE AID OF CINE-PHOTOGRAPHY OF NUCLEAR CHANGES IN IRRADIATED AND INJURED CELLS IN LIVING FROG TADPOLES. Carl Caskey Spedel. Anat. Record 103, 560(1949).

6374

CERTAIN ASPECTS OF THE ACTION OF RADIATION ON LIVING CELLS. F. G. Spear., ed. Brit. J. Radiol., Suppl. No. 1. (1947).

This is the report of a conference held in London. The introductory paper discusses the distribution of ions resulting from irradiation of cells with β , γ , α x rays and neutrons. Other papers are abstracted individually.

6375

THE ACTION OF NEUTRONS ON BACTERIA. F. G. Spear. Brit. J. Radiol. 17, 348-51(1944).

Survival curves are plotted for *E. coli* and *B. mesentericus* exposed to gradually increasing doses of cyclotron neutrons. These curves are compared with survival curves following exposure to x and γ radiation.

6376

THE ACTION OF NEUTRONS ON THE DEVELOPING RAT RETINA. F. G. Spear and Katharine Tansley. Brit. J. Radiol. 17, 374-9(1944).

6377

BIOLOGICAL EFFECTS OF FAST NEUTRONS. F. G. Spear, L. H. Gray and John Read. Nature 142, 1074-5 (1938).

Chick embryo fibroblasts were irradiated *in vitro* by 2.4 Mev neutrons produced by bombarding 'heavy wax' with ~ 700 microamp. of 300 Kv deuterium ions. This nuclear reaction gives rise to not more than 1 quantum of γ -radiation per 200 neutrons. The effect of neutron on mitosis was calculated and presented graphically.

6378

X-RAY SENSITIVITY OF MEIOTIC AND MICROSPORE CHROMOSOMES OF TRILLIUM. Arnold H. Sparrow. Records Genetics Soc. Amer. 12, 54-5(1943).

6379

A CYTOLOGICAL AND CYTOCHEMICAL APPROACH TO AN UNDERSTANDING OF RADIATION DAMAGE IN DIVIDING CELLS. Arnold H. Sparrow and L. F. Nims. Internat. Congr. Radiol., 6th Congress, London, 1950. p. 47.

Chromosome fragmentation is a fair index of eventual cell lethality and loss of nuclear material is proportional to induced chromosome fragmentation.

6380

REDUCTION OF NEOTERAZOLIUM CHLORIDE BY X-RADIATED ROOT TIP CELLS OF ALLIUM. B. P. Sonnenblick. Biol. Bull. 101, 230(1951).

6381

THEORY OF RADIO-BIOLOGICAL SATURATION EFFECT. K. Sommermeyer. Naturwissenschaften 30, 104-5(1942).

6382

Argonne National Lab., Lemont, Ill., Chicago Univ. Metallurgical Lab.

ACUTE RADIOTOXICITY OF BA-LA¹⁴⁰ FOR RATS AND MICE. PART III. EFFECT ON WEIGHT AND FOOD INTAKE OF ANIMALS TREATED WITH (BA-LA)¹⁴⁰. R. H. Snyder, G. A. Sacher, and J. D. Teresi. June 24, 1947. Decl. Sept. 15, 1947. 23p. (MDDC-1343; CH-3832).

The threshold dose of injected (Ba-La)¹⁴⁰ for weight loss in mice and rats was 2.25 μ c/g and 1.96 μ c/g respectively. These doses are approximately half the LD₅₀ for each species. Other dose-effect relationships are presented in graphs and charts.

6383

Argonne National Lab., Lemont, Ill., Chicago Univ. Metallurgical Lab.

ACUTE RADIOTOXICITY OF (BA-LA)¹⁴⁰ IN RATS AND MICE. PART II. METABOLISM OF (BA-LA)¹⁴⁰. R. H. Snyder, W. E. Kisielewski, D. S. Anthony and R. D. Finkle. June 1946. Decl. Sept. 10, 1947. 17p. (MDDC-1279; CH-3826).

Absorption, excretion and retention of toxic doses of (Ba-La)¹⁴⁰ injected intraperitoneally into mice and rats were studied.

6384

Argonne National Lab., Lemont, Ill. Chicago Univ. Metallurgical Lab.

HISTOPATHOLOGICAL STUDIES OF MICE EXPOSED TO FAST NEUTRON RADIATIONS. R. S. Snider. Dec. 1946. 52p. (MDDC-1278; CH-3730).

6385

INDUCTION BY ROENTGEN RAYS OF HEREDITARY CHANGES IN MICE. George D. Snell. Radiology 36, 189-96 (1941).

Author reviews previously reported experiments on induction of hereditary changes (especially translocations) by irradiation of male mice with x rays or neutrons and of females with x rays

6386

THE PRODUCTION OF STERILITY IN MALE MICE BY IRRADIATION WITH NEUTRONS. G. D. Snell and P. C. Abersold. Proc. Natl. Acad. Sci. U. S. 23, 374-8(1937).

6387

THE RELATION OF OXYGEN CONCENTRATION IN BARLEY SEEDS TO THE BIOLOGICAL EFFECTS OF X-RAY. L. Smith, Louise R. Sieburth and Barbara Norby. Genetics 35, 692(1950)

6388

BODY RETENTION OF CARBON 14 FROM LABELED SODIUM BICARBONATE. Howard E. Skipper, Locke White, Jr. and Carl E. Bryan. Science 110, 306-7(1949).

6389

STUDIES ON THE HAZARD INVOLVED IN USE OF C¹⁴. I. RETENTION OF CARBON FROM LABELED SODIUM BICARBONATE. Howard E. Skipper, Locke White, Jr., and Carl E. Bryan. J. Biol. Chem. 180, 1187-95(1949).

Biological half life of injected C¹⁴ labeled NaHCO₃ was less than 10 min. in mice, most of the excretion being through respiration. There was no profound tissue localization. In pregnant mice, the embryo tissues fixed C¹⁴ more rapidly than did maternal tissues. Retention of C¹⁴ is shown for 9 tissues.

6390

RETENTION AND TURNOVER OF RADIOCALCIUM BY THE SKELETON OF LARGE RATS. Leon Singer and W. D. Armstrong. Proc. Soc. Exptl. Biol. Med. 76, 229-33 (1951).

6391

Argonne National Lab., Lemont, Ill.
THE EFFECTIVENESS OF DRUGS IN PREVENTING OR ALLEVIATING X-RAY DAMAGE. Eric L. Simmons, L. O.

Jacobson, N. Pearlman, and C. L. Prosser. Oct. 1946. Decl. Apr. 16, 1947. 68p. (MDDC-1277; CH-3329).

6392

THE ACTION OF BLOOD AFTER EXPOSURE TO X-RAYS OR ULTRAVIOLET LIGHT. I. Sima. Japan. J. Med. Sci. IV. Pharmacol. 12, 157-65(1940).

In vitro irradiation with x rays or ultraviolet altered the erythrocytes of pigs, cattle and rabbits causing them to release histamine so that when they were injected into the lymph sac of frogs, they induced the liberation of adrenalin into the circulation and resulted in an increased thickness of the pigment layers of the skin.

6393

EFFECT OF X RAYS ON THE BRAIN AND BRAIN STEM AFTER LAMINECTOMY AND CRANIOTOMY IN THE DOG. M. M. Sicard and Bauer. *Rev. neurol.* 15, 903(1907). (In French).

6394

LACK OF AN OXYGEN EFFECT IN THE DISTURBANCE BY X RAYS OF SELECTIVE POTASSIUM ACCUMULATION IN HUMAN ERYTHROCYTES IN VITRO. C. W. Sheppard and M. Stewart. *Federation Proc.* 10, 125(1951).

6395

STUDIES ON THE METABOLISM OF ZINC WITH THE AID OF ITS RADIOACTIVE ISOTOPES. II. THE DISTRIBUTION OF ADMINISTERED RADIOACTIVE ZINC IN THE TISSUES OF MICE AND DOGS. F. E. Sheline, I. L. Chaikoff, H. B. Jones and M. Montgomery. *J. Biol. Chem.* 149, 139(1943).

6396

BEHAVIOR OF RADIUM IN PLANTS AND SOILS. K. Kaundl. *Bodenkultur* 5, 425-36(1951).

Experiments with fertilizer containing Ra showed that the Ra uptake by plant systems is of the order of magnitude of 10^{-13} g/g of dry plant substance and that uptake through the roots is largely independent of the plant type. Plants possess saturation limits for Ra storage which result from general absorption laws. The tolerance limits for human consumption are not exceeded by this storage. NSA 6-3886

6397

Argonne National Lab., Lemont, Ill.
ACUTE TOXICITY OF INHALED 275-DAY Ce^{144} . H. C. Seibert and Richard Abrams. July 25, 1946. Decl. Sept. 6, 1946. 28p. (MDDC-329; CH-3539).

In an attempt to estimate the acute toxicity of insoluble, radioactive material in the lungs, rats were exposed to smokes containing 275-day Ce^{144} . Groups of 200 g rats received the following doses: 3, 2, 14, 39, 50, and 200 μ c/rat. Weight loss was significant only in those exposed to 200 μ c. These had a median survival time of 39 days and were all dead within 120 days. The 39 μ c rats had a median survival time of 282 days, while 90 percent of the 14 μ c animals were still alive after 300 days. As had been demonstrated in tracer experiments, absorption from the lung was slow, and liver and skeleton were the primary sites of deposition of the absorbed material. It was not possible to show any definite effect of dose on distribution. Radiation doses to the various tissues were calculated, but, in general, it was not possible to correlate death with the dose to any single tissue. Preliminary histological examination revealed some tendency for the bronchial epithelium to undergo a squamous proliferation.

6398

CHANGES OF COAGULATION TIME, BLEEDING TIME, AND MORPHOLOGICAL BLOOD COMPOSITION AFTER IRRADIATION WITH X-RAYS OF THE SPLEEN AND HYPOPHYSIS. Mario Segre. *Arch. sci. med.* 65, 255-302(1938).

6399

HISTAMINE OF PATIENTS TREATED WITH X-RAYS. G. Segal. *Compt. rend. soc. biol.* 131, 1079-80(1939).

6400

Argonne National Lab., Lemont, Ill.

STUDIES ON THE INHALATION OF FISSIONABLE MATERIALS AND FISSION PRODUCTS AND THEIR SUBSEQUENT FATE IN RATS AND MAN. K. G. Scott, Dorothy Axelrod, Josephine Crowley, H. C. Lantz, Jr., and J. G. Hamilton. Dec. 31, 1945. Decl. Aug. 28, 1947. 166p. (MDDC-1276; CH-3590)

6401

ON THE INFLUENCE OF RADIUM RAYS ON THE PERIPHERAL NERVES OF THE SKIN. K. Masumoto. *Mitt. med. Akad. Kioto* 12, 305(1934). (In German)

6402

ON THE HISTOLOGICAL PROCESSES OF THE DESTRUCTION OF THE HYPOPHYSIS BY RADON. A. Lacassagne and W. Nyka. *Compt. rend. soc. biol.* 117, 956-8(1934). (In French).

6403

ON THE EFFECT OF IRRADIATION OF THE HYPOPHYSIS (WITH RADON OR X-RAY IRRADIATION) ON THE OVARIES. A. Lacassagne. *Strahlentherapie* 54, 477(1935). (In German).

6404

A LACK OF SENSITIVITY TO X-RAYS ON THE PART OF NEWBORN MICE IN A STATE OF ASPHYXIA. A. Lacassagne. *Compt. rend. acad. sci. U.S.S.R.* 215, 231-2(1942).

Radiosensitivity of newborn mice was decreased by exposure to environmental temperature below 0°, by Nitrogen asphyxia and by CO₂ asphyxia.

6405

THE INFLUENCE OF WAVE-LENGTHS ON CERTAIN LESIONS PRODUCED BY THE IRRADIATION OF MICE. A. Lacassagne. *Proc. Roy. Soc. Med.* 39, 605-12(1946).

Radiation of 3 different wave lengths (1. K radiation of Mo, 2. L radiation of Ag and 3. U-V) was applied over the dorso-lumbar region of mice. A dose of 3000 r (760 ergs/mm²) of 1 produced only epilation, no other skin injury, but produced complete sterilization of the underlying ovaries and destruction of uriniferous tubules. Selective radioepidermitis was produced by 2 and 3. The very soft x rays (2) caused skin destruction as did U-V (3) but the histological picture differed in the two cases.

6406

HUMORAL STUDIES IN THE COURSE OF PERSISTENT VOMITING SECONDARY TO IRRADIATION THERAPY OF CANCERS. TREATMENT OF THESE ACCIDENTS BY A CHLORIDE-GLUCOSE-INSULIN COMBINATION. O. Lambert, J. Drissens and M. Cornillot. *Bull. accos. franc. etude cancer* 32, 274-81(1939).

6407

THE EFFECT OF X-RAY THERAPY ON THE VEGETATIVE NERVOUS SYSTEM. H. Langer. *Strahlentherapie* 53, 473(1935). (In German).

6408

EFFECTS OF MASSIVE, RAPID DOSES OF RADIATION ON MAMMALS. W. Langham. Presented at Radiation Research Society, Cleveland, May 17-19, 1954. *Radiation Research* 1, 502(1954).

Dose-response curves differed quantitatively with respect to the threshold dose for CNS phase of the acute radiation syndrome in mice, rats and monkeys exposed to massive doses of radiation. Four phases of the CNS "hyperacute radiation syndrome" are described.

6409

Argonne National Lab., Lemont, Ill.

THE METABOLISM OF SHORT-LIVED AIR-BORNE FISSION PRODUCTS. H. C. Lanz and J. D. Teresi. May 1945. Decl. May 14, 1947. 39p. (MDDC-954, CH-2844).

A fission recoil apparatus has been constructed in which uranium foil is subjected to neutron bombardment in the pile. Gas passing over the foil picks up the fission recoil atoms and carries them to animal exposure chambers and measuring equipment located outside the pile shield. The time taken for an atom to go from the foil to the exposure chamber (hold-up time) varied from 1.8 to 30 sec. A special ionization chamber was developed to measure the activity, which varied from 17 to 0.5 $\mu\text{C/cc}$. It has been shown that this gas contains not only the noble gas fission products but also all fission products which normally exist in the solid state. Rats and mice exposed to this gas in an exposure chamber suffer damage and die, but no more so than would be expected from the amount of external gamma radiation which they received while in the exposure chamber. A special apparatus was constructed which would allow rats to breathe the gas without receiving external radiation. Rats receiving exposures of 8 hours per day for 5 consecutive days received burns of the mouth and upper respiratory tract. Some of these animals lived but most of them died, apparently from starvation because of failure to eat. Metabolism experiments have shown that of the material that is inhaled, about 25% goes to the skeleton and is excreted very slowly, about 8% stays in the lungs and is excreted slowly; about 6% goes to the liver and is slowly excreted, and the remainder is excreted with moderate rapidity. The highest specific activity is found in the thyroid. A histological study of tissues of animals sacrificed at various times following exposure has shown that the most severe treatment possible with this apparatus has failed to produce any detectable tissue damage which could be attributed to internal deposition of radioactive materials. Radioautographs showed that the activity was deposited uniformly over the bronchial and alveolar surfaces. It was concluded that for short-lived air-borne fission products the hazard is very much greater from external radiations than from internally deposited radioactive materials.

6410

THE EFFECT OF RADIUM RAYS ON THE CARBOHYDRATE CONTENT OF THE TISSUES. A. A. Krutowski. *Klin. Wochschr.* 8, 1578(1929). (In German).

6411

DISTRIBUTION OF RADIATION IN THE ATOMIC BOMBING OF NAGASAKI. John C. Larkin. *Am. J. Roentgenol. Radium Therapy* 55, 525-32(1946).

Clinical records of 95 patients in 3 hospitals in Nagasaki after the A bombing were analyzed and classified according to the patients' distance from the epicenter at the time of the explosion. Clinical characteristics associated with exposure in the various geographical zones are described.

6412

A QUANTITATIVE ANALYSIS OF THE DIRECT AND INDIRECT ACTION OF X-RADIATION ON MALIGNANT CELLS. I. Lasnitzki. *Brit. J. Radiol.* 20, 240-7(1947).

Mouse adenocarcinoma was irradiated in vivo or in vitro and studied, after exposure, in tissue culture. For each culture, 300-500 cells were classified as resting, dividing or degenerated. Effects on the tumors and their vascular supply are also described. Inhibition of mitosis, abnormal mitosis, increased cell size and various degenerative changes were seen in the irradiated tumor cells. A large group of degenerate cells in tumor was related to vascular changes. Effects of irradiation in vitro and in vivo were qualitatively similar. Effects on circulation to the tumor are emphasized as an important aspect of radiation effects on tumor cells per sec.

6413

PROTECTIVE ACTION OF CERTAIN SUBSTANCES AGAINST INACTIVATION OF A BACTERIOPHAGE BY

X-RAYS. R. Latarjet and E. Epharati. *Compt. rend. soc. biol.* 142, 497-9(1948).

Aqueous suspensions of T-2 phage, active on *E. coli*, were studied. Protective effect (in order of decreasing effectiveness) was observed with thioglycolic acid, tryptophan, glutathione, cystine and cysteine and slight protective effect with sucrose, ascorbic acid, phenylalanine, alanine and histidine. Protective action of all the agents was less when phage was irradiated in deoxygenated medium.

6414

CELL CONSTITUENTS IN RELATION TO RADIOSENSITIVITY. R. Latarjet. *Internat. Congr. Radiol.*, 6th Congress, London, 1950. p. 49-50.

The author discusses and illustrates by examples the role of the number of cellular "targets" that must be altered to produce an observed effect of the cell volume in determining cellular radiosensitivity. He also discusses the role of intracellular chemical factors (oxygen, peroxidase, buffers, etc., etc) that affect radiosensitivity and radioresistance. Factors influencing recovery of cells after radiation injury, especially polyploidy, are also considered.

6415

BLOOD CHEMISTRY IN DOGS EXPOSED TO CHRONIC X-RADIATION. Kathryn F. Fink. p. 339-351 of *Biological Effects of External Radiation (NNE VI-2)*. Henry A. Blair, ed. New York, McGraw-Hill Book Co., Inc. 1954.

Concentrations of serum protein, plasma fibrinogen, whole-blood NPN, serum cholesterol, serum chloride, and serum acid and alkaline phosphatase were not significantly altered in dogs subjected to chronic x radiation at 0.1, 0.5, and 10 r/day, 6 days a week. The only obvious changes in dogs given 10r/day were high fibrinogen concentrations. (from author's summary).

6416

EFFECTS OF X-RAYS AND RADIOMIMETIC AGENTS ON NUCLEIC ACIDS AND NUCLEOPROTEIN. CIBA FOUNDATION SYMPOSIUM ON IONIZING RADIATIONS AND CELL METABOLISM. J. A. V. Butler. Little, Brown and Co. Publishers 1956. p. 59-69.

6417

CHRONIC LYMPHATIC LEUKEMIA, A STUDY OF 100 PATIENTS TREATED WITH RADIOACTIVE PHOSPHORUS. John H. Lawrence, B. V. A. Low-Beer and James W. J. Carpender. *J. Am. Med. Assoc.* 140, 585-8(1949).

6418

ROENTGEN IRRADIATION OF THE HYPOPHYSIS. J. H. Lawrence, W. O. Nelson and H. Wilson. *Radiology* 29, 446 (1937).

Female rats, 30-40 days old, were x-irradiated over the pituitary gland. Following 2 doses of 1040r given within a very short period, growth was inhibited, ovarian activity was suppressed and adrenal glands underwent atrophy. The changes were not irreversible. Histological changes in the irradiated hypophyses and in thyroids, adrenals and reproductive organs are described.

6419

THE PRODUCTION OF RADIOACTIVITY IN ANIMAL TISSUES BY HIGH ENERGY X-RAYS. D. A. Layne. *Internat. Congr. Radiol.*, 6th Congress, London, 1950. p. 180.

Oxygen and carbon are the elements mainly responsible for induced radioactivity in rat tissues exposed to the x ray beam from the 30 Mev synchrotron (γ -n reactions). Energy absorption in tissues from the disintegrations are calculated and are shown not to contribute significantly to the dose.

6420

INACTIVATION OF VIRUS BY RADIATION. D. E. Lea. *Brit. J. Radiol.* 19, 205-12(1946).

6421

THE MECHANISM OF THE INDUCTION BY RADIATION OF CHROMOSOME ABERRATIONS IN TRADESCANTIA.

D. E. Lea and D. G. Catcheside. *J. Genet.* 44, 216-45 (1942).

The relative efficiency of x rays and neutrons in producing chromosome aberrations in *Tradescantia* was determined and data were used to develop a theory encompassing quantitative aspects of energy dissipation in production of chromosome lesions.

6422

EXCRETION OF CALCIUM⁴⁵ BY NORMAL RATS. Maurice V. L'Heureux, Wilbur R. Tweedy and Elinor M. Zorn. *Proc. Soc. Exptl. Biol. Med.* 71, 729-32(1949).

6423

EARLY EFFECTS OF IRRADIATION. A. A. Liebow and S. Warren. *Am. J. Pathol.* 23, 888(1947).

Early skin effects observed in atomic bomb casualties are described.

6424

STUDIES ON THE EXCRETION AND DISTRIBUTION OF RADIOACTIVE CALCIUM. R. I. Lienke, George Cullen and Wallace D. Armstrong. *Trans. Conf. Metabolism Interrelat.*, 1st Conf., (1949). p. 73-6.

Absorption, excretion and retention of Ca⁴⁵ after intraperitoneal injection of the chloride into rats was studied.

6425

INVESTIGATION OF X-RAY HAEMOLYSIS BY THE ELECTRON MICROSCOPE. B. Lindemann. *Internat. Congr. Radiol.*, 6th Congress, London, 1950. p. 166.

X ray hemolysis is osmotic and can be measured in terms of the hemoglobin lost per cell as well as by the number of cells affected. The threshold dose of x ray hemolysis is approximately 6000 r and the effect appears not to be a "direct hit" phenomenon. Electron microscope observations of altered red cell membranes are described.

6426

Argonne National Lab., Lemont, Ill.
PROGRESS REPORT ON THE CHRONIC P³² MOUSE EXPERIMENT. H. Lisco, Miriam P. Finkel, and G. Hirsch, 1947. 180p. (AECD-2009-E).

Among radiation effects noted 290 days after a single intraperitoneal injection or monthly injections of P³² were; increased incidence of lymphoma in 10.0-5.0 μ c/g and 1.0-0.5 μ c/g/mo groups, increased incidence of lung tumors in 10.0-5.0 μ c/g and 1.0-0.1 μ c/g/mo groups, growth retardation in 1.0-0.5 μ c/g/mo group.

6427

SUITABILITY OF TUMOR-BEARING MICE FOR PREDICTING RELATIVE USEFULNESS OF ISOTOPES IN BRAIN TUMORS. COMPARATIVE CLINICAL AND LABORATORY STUDY IN LOCALIZATION AND TREATMENT OF BRAIN TUMORS WITH P³², Na²⁴m K⁴², and Sodium Borate. H. B. Locksley, W. F. Sweet, H. J. Powsner and E. Dow. *Arch. Neurol. Psychiat.* 71, 684(1954).

6428

INCREASED YIELD OF NUCLEIC ACID-LIKE SUBSTANCES FROM IRRADIATED YEAST. John R. Loofbourow, Mary Elizabeth Englert and Cecelia Marie Dwyer. *Nature* 148, 113-4(1941).

The yield of crude nucleic acid from irradiated yeast (4.5-8.5 g per 300 g of yeast) was, in each case, greater than that from non-irradiated yeast (3-4 g. m. per 300 g. m. from irradiated yeast was slightly higher than that from nonirradiated yeast, despite the greater yield of the former.

6429

EFFECT OF SHORT WAVE LENGTH RADIATIONS ON HUMAN FINGER RIDGE DETAIL. Roger A. Harvey. p. 352-371 of *Biological Effects of External Radiation*. (NNS

VI-2). Henry A. Blair, ed. New York, McGraw Hill Book Co., Inc. 1954.

An attempt was made to develop a method of detecting short-wave-length radiation injuries in finger ridge detail. Atrophy of ridges was detected in 68 per cent of the radiologists, 55 per cent of the orthopedists who use a fluoroscope, 40 per cent of the dentists who hold films during exposure to x rays, and 1.8 per cent of the controls. (from author's conclusions.)

6430

SOME BIOLOGICAL EFFECTS OF LONG-CONTINUED IRRADIATION. Egon Lorenz. *Am. J. Roentgenol. Radium Therapy* 63, 176-85(1950).

Chronic irradiation is shown to reduce the life span of experimental animals. Of the many factors involved in shortening life span, carcinogenesis appears to be the most important in mice and also in guinea pigs.

6431

Argonne National Lab., Lemont, Ill.
BIOLOGIC EFFECTS OF LONG CONTINUED WHOLE BODY IRRADIATION WITH GAMMA RAYS ON MICE, GUINEA PIGS, AND RABBITS, PART I. PRELIMINARY EXPERIMENTS. Egon Lorenz and Walter E. Heston. Oct. 29, 1946. Decl. Feb. 6, 1947. 19p. (MDDC-653, CH-3652).

Male and female mice of the C3H strain were continuously irradiated with 4.4 r, 1.1 r, 0.11 r and 0.044 r per day. No significant damage to the hematopoietic system as evidenced by blood counts was found although the highest total dose was over 200 r. Mammary tumor incidence was not changed significantly in the animals exposed on the different dose levels. Histologically only the gonad showed radiation damage and mainly in the animals exposed to 4.4 r per day. The damage consisted in the testes in diminished spermatogenesis and was reversible. Irradiation damage to the ovaries was irreversible and progressive and resulted in some cases in tubular downgrowths of the germinal epithelium which progressed to early tumor formation. Breeding experiments indicated that C3H females were permanently sterilized with total doses of 465 r given at the rate of 4.4 r per day. Subsequent generations reared and maintained in exposure fields of 1.1 r and 0.11 per day showed no damage to chromosomes as evidenced by raising of 5 to 6 generations with normal litter size and apparently normal life span.

6432

Argonne National Lab., Lemont, Ill.
BIOLOGIC EFFECTS OF LONG CONTINUED WHOLE BODY IRRADIATION WITH GAMMA RAYS ON MICE, GUINEA PIGS, AND RABBITS, PART II. PHYSICAL SETUP. Egon Lorenz. Oct. 29, 1946. Decl. Feb. 6, 1947. 16p. (MDDC-654, CH-3653).

Experimental arrangements are described for the simultaneous irradiation of considerable numbers of animals with γ rays. Three experimental setups were available. In the first a source of approximately 1 g of radium element was used, with 4 sets of shelves forming part of a sphere surrounding the source. Daily doses at the different shelves were 8.8 r, 4.4 r, 2.2 r and 1.1 r in 8 hours. In the second setup a source of 1000 mg radium element in a lead box with a hinged lid was employed to irradiate one set of shelves. The daily dose at this set of shelves was 0.11 r in 8 hours. In the third setup a source of 250 mg element, also housed in a lead box, was used with 6 sets of shelves. Here the exposure was continuous, the daily doses amounting to 8.8 r, 4.4 r, 2.2 r, 1.1 r, 0.55 r, and 0.11 r in 24 hours. Dose measurements with calibrated 0.25 r, Victoreen ionization chambers, were made in every one of the animal cages which were placed on the different shelves. Errors are discussed which arise mainly from the dimensions of the cages. They are for

mouse and guinea pig cages approximately ± 15 per cent, and for rabbit cages ± 25 per cent. The precautions taken to reduce the residual dose to a minimum are described.

6433

Argonne National Lab., Lemont, Ill.
BIOLOGIC EFFECTS OF LONG CONTINUED WHOLE BODY IRRADIATION WITH GAMMA RAYS ON MICE, GUINEA PIGS, AND RABBITS, PART III. Egon Lorenz, W. E. Heston, L. O. Jacobson, Allen B. Eschenbrenner, Michael Shumkin, Margaret Deringer, and Jane Doniger. Nov. 14, 1946. Decl. Feb. 5, 1947. 118p. (MDDC-655; CH-3698).

Studies concerning the continuous gamma irradiation of mice (LAF hybrids), guinea pigs (hybrids, and inbred strains), and rabbits (hybrids) by means of the experimental arrangements described in Part II make possible the following conclusions. On all daily dose levels, including the 0.11 r level, there was a decrease in the life span of mice. The decrease in life span was pronounced in guinea pigs exposed to 8.8 r, 4.4 r, and 2.2 r per day. The life span of rabbits was decreased in the animals exposed to 8.84 and 4.4 r. Data on the life span of guinea pigs and rabbits exposed on the lower levels are not conclusive as yet since some of the animals are still alive. An increase in weight was found in irradiated animals on the lower exposure levels mounting, in male mice exposed to 1.1 r, to 50 per cent of that of the control animals. The hemopoietic system of rabbits is extremely radio resistant, and changes in the blood picture were found only in the animals exposed to 8.8 r per day. The hemopoietic system of mice is also radioresistant; the main effect of irradiation consisting in a depression of the lymphocyte count. No damage to bone marrow was observed (maximum accumulated dose 5800 r). The hemopoietic system of guinea pigs is very radiosensitive. Anemia and thrombocytopenia, were observed in all animals exposed to 8.8 r and in most animals exposed to 4.4 r and 2.2 r per day. Bone marrow damage of moderate to severe degree was associated with the anemia. The carcinogenic action of irradiation was mainly observed in mice, but some irradiated guinea pigs and rabbits also developed tumors after three years of irradiation. Of special interest were lung tumors of alveolar origin found in two guinea pigs. The most important tumors observed in the mice were; malignant lymphoma (leukemia), lung tumors, ovarian tumors, and tumors of the mammary gland. The induction of malignant lymphoma was roughly dependent upon dose rate and total dose. The greater the dose rate, the earlier the tumors appeared. The genesis of ovarian tumors was different from that of malignant lymphoma and lung tumors. The ovarian tumors rare in control animals but their incidence was increased considerably on the 0.11 r level. Associated with the ovarian tumors, in some cases were sarcomas of the mammary gland. Ovaries of guinea pigs and rabbits were radioresistant. Irradiation injury to testes of mice and guinea pigs was dependent on dose rate and was reversible. Damage to testes was also dependent upon intensity. Testes of mice irradiated six days per week with 8.8 r of X-rays in 1.5 minutes showed considerably greater damage than testes of mice irradiated daily with 8.8 r of gamma rays given in 8 hours (total doses 300 r or 600 r respectively.)

6434

Argonne National Lab., Lemont, Ill.
THE 30-DAY LD-50 AND ACCOMPANYING BLOOD PICTURE OF HYBRID GUINEA PIGS. PRELIMINARY REPORT. Egon Lorenz, Delta Uphoff and Harriet Sutton. p. 57-65 of BIOLOGICAL AND MEDICAL DIVISIONS. QUARTERLY REPORT MAY, JUNE, JULY 1949. Austin M. Brues and Hermann Lisco. (nd). 143p. (ANL-4333)

6435

PACHYMEINGITIS OCCURRING AFTER ROENTGEN

IRRADIATIONS FOR SCALP LESIONS. A. Lorey and G. Schaltenbrand. Strahlentherapie 44, 747-58(1932). (In German).

6436

MODIFICATION OF THE GLYCEMIA PRODUCED BY IRRADIATION OF THE ENTIRE BODY WITH X-RAY. M. Lourau and O. Lartigue. Arch. sci. physiol. 4, 197-208(1950).

Increased blood glucose and decreased glucose tolerance were observed 15-48 hours after irradiation in fasting guinea pigs. Glucose tolerance curves may reflect altered intestinal absorption.

6437

EXTERNAL THERAPEUTIC USE OF RADIOACTIVE PHOSPHORUS. I. ERYTHEMA STUDIES. Bertram V. A. Low-Beer. Radiology 47, 213-22(1946).

Course and histology of the skin reaction to P^{32} applied to the skin of the forearm of 12 healthy persons are described. The erythema produced was monophasic and depth of the skin reaction was approximately 5 mm for erythema producing doses.

6438

RADIOACTIVE PHOSPHORUS AS AN EXTERNAL THERAPEUTIC AGENT IN BASAL CELL CARCINOMA, WARTS, AND HEMANGIOMA. Bertram V. A. Low-Beer. Am. J. Roentgenol. Radium Therapy 58, 4-9(1947).

Threshold erythema dose (man) was found to be $34 \mu\text{C}$ per cm^2 ; dose to produce mild erythema was $620 \mu\text{C}$ per cm^2 and dose to produce severe epidermitis was $4,400 \mu\text{C}$ per cm^2 . Therapeutic doses for various skin lesions varied from 300 to 5000 μC hr per cm^2 .

6439

REDUCTION IN FACET NUMBER IN FULL-EYED (REVERTED BAR) DROSOPHILA BY X-RAYS. W. M. Luce. Genetics 36, 563(1951).

In dosages ranging from 1000 to 3000 r at 500 r per min, x-rays reduced facet number of corneas of eyes by about 0.075 facets per r. X-rays applied before larvae were 54 hours old had no such effect, but prolonged larval development at rate of about 0.011 hrs. per r.

6440

THE RATE OF RECOVERY OF HUMAN SKIN FROM THE EFFECTS OF HARD OR SOFT ROENTGEN RAYS OR GAMMA RAYS. W. S. MacComb and E. H. Qumby. Radiology 27, 196-207(1936).

6441

TIME FACTOR IN IRRADIATION. G. MacKee, A. Mutscheller and A. C. Cipallaro. Arch. Dermatol. and Syphilol. 47, 490-7(1943).

Adjacent areas of skin on the inner surface of the forearm of 29 persons were exposed unfiltered 52kV and 10mA x rays and to 100kV and 5mA x rays. The respective half value layers were 0.5 mm Al and 0.8 mm Al. Distance and exposure time varied. Holthusen's radiation intensity curve was confirmed and a formula for the definition of radiation quantity is suggested, viz., $\log r/m = K (\log [r_t - r_l])$ in which r/m is r/min, r_t is total exposure time and r_l the value for latent radiation.

6442

GENESIS OF CHANGES OF BLOOD CHOLESTEROL AFTER IRRADIATION. S. Malczynski. Nowiny Lek. 51, 161-74 (1939).

6443

THE AREA FACTOR IN ROENTGEN IRRADIATION. G. M. MacKee, A. Mutscheller and A. C. Cipallaro. Arch. Dermatol. and Syphilol. 47, 657-64(1943).

6444

THE PENETRATION OF RADIOACTIVE SODIUM AND PHOSPHORUS INTO THE EXTRA- AND INTRA-CELLULAR PHASES OF TISSUES. J. F. Manery and W. F. Bale. Am. J. Physiol. 132, 221(1941).

Distribution of Na^{24} in rats and rabbits was compared with that of normal Na and Cl throughout the tissues. Penetration of extracellular phases was rapid, of Na-containing intracellular phases slower, in general. Na^{24} slowly entered dog erythrocytes but was not shown to enter rabbit or rat red cells which are low in Na.

6445

THE FATE OF INJECTED RADIOACTIVE CHLORINE. J. F. Manery. *Am. J. Physiol.* 129, 417(1940).

6446

INACTIVATION OF DESOXYRIBONUCLEIC ACID DEPOLYMERASE BY X RAYS. S. E. Manoilov and L. F. Semenov. *Doklady Akad. Nauk. SSSR.* 71, 359-60(1950).

Reductions in relative viscosity of polymerized nucleic acids 60 min. after x-irradiation of the enzyme were measured. After a dose of 11,400 r the ferment activity was reduced by 93.6%, after 3000 r by 80%, after 1000 r by 66%, 750 r by 15%. There was no change following exposure to 250 r.

6447

LEUKEMIA IN RADIOLOGISTS. H. C. March. *Radiology* 43, 275-8(1944).

Data used in this study represented deaths of radiologists as reported in *Am. J. Roentgenol.* and in *Radiology* over the previous 15 years. Radiologists were found to have a statistically significant excess of deaths due to leukemia.

6448

Argonne National Lab., Lemont, Ill.
LACK OF EFFECT OF ADRENALECTOMY ON THE LYMPHOPENIC RESPONSE OF C-57 BLACK MICE TO TOTAL-BODY IRRADIATION AT A LOW DOSAGE LEVEL. Sumner N. Marder, Henry S. Kaplan and Egon Lorenz. p. 21-7 of BIOLOGICAL AND MEDICAL DIVISIONS, QUARTERLY REPORT AUGUST 1948 TO NOVEMBER 1948. Austin M. Brues and Herman Lisco. Nov. 1, 1948. 210p. (ANL-4227; AECD-2053).

6449

DOSAGE DETERMINATION WITH RADIOACTIVE ISOTOPES. L. D. Marinelli. *Am. J. Roentgenol. Radium Therapy* 47, 210-6(1942).

6450

ROENTGEN INJURY AND BLOOD PICTURE. K. Mardersteig. *Strahlentherapie* 64, 311-17(1939).

6451

DOSAGE DETERMINATION IN THE USE OF RADIOACTIVE ISOTOPES. L. D. Marinelli. *J. Clin. Invest.* 28, 1271-80 (1949).

When radioactive isotopes are employed either as tracers or in therapy, it is important to determine radiation dosage. This cannot, in general, be measured, but when the half life, radiation energy, and biological uptake and excretion are known, it can be calculated. Two extensive tables are presented, for beta and gamma rays, giving half life, radiation average energy, fraction disintegrating per day, and specific dosage data, including the safe tracer concentration, for 33 isotope elements. (from author's summary).

6452

CHROMOSOMAL EFFECTS OF LOW X-RAY DOSES ON FIVE DAY TRADESCANTIA MICROSPORES. L. D. Marinelli, B. R. Neble, N. Giles and D. R. Charles. *Am. J. Botany* 29, 866-74(1942).

6453

DOSAGE DETERMINATIONS WITH RADIOACTIVE ISOTOPES. II. PRACTICAL CONSIDERATIONS IN THERAPY AND PROTECTION. L. D. Marinelli, E. H. Quimby and G. H. Hine. *Am. J. Roentgenol. Radium Therapy* 59, 260-78(1948).

6454

PYRUVATE METABOLISM IN NORMAL AND PATHOLOGICAL PREGNANCY IN NARCOSIS AND X-RAY IRRADIATION. S.

Markees, O. Kaser and R. Lanz. *Schweiz. med. Wochschr.* 80, 1079-81(1950).

The increase in blood pyruvate concentrations after x ray therapy paralleled symptoms of radiation sickness.

6455

ON LATE DAMAGES TO THE BRAIN BY X-RAYS. T. Markiewicz. *Z. ges. Neurol. Psychiat.* 152, 548(1935). (In German).

6456

EFFECT OF EXERCISE ON LEUKOPENIA; A STATISTICAL ANALYSIS. Edna K. Marks, George Sacher and Leon O. Jacobson. p. 456-66 of INDUSTRIAL MEDICINE ON THE PLUTONIUM PROJECT. Robert S. Stone. New York, McGraw Hill Book Company, Inc. 1951. 511p. (National Nuclear Energy Series, Division IV, Volume 20, Part B, Paper 6).

The peripheral blood leukocyte picture was studied in 35 men and women employees before and after "standard running exercise". The increased leukocyte count following exercise did not differ in the two groups of employees, the "exposure possible" group and the unexposed group.

6457

EFFECT OF IRRADIATION ON THE COAGULATION TIME OF THE BLOOD IN NORMAL INDIVIDUALS. Vincenzo Masini. *Radiologia (Buenos Aires)* 2, 393-403(1945).

6458

TREATMENT OF RADIATION SICKNESS WITH VITAMIN B₆ (PYRIDOXINE HYDROCHLORIDE). J. R. Maxfield, Jr., A. J. McIlwain and J. E. Robertson. *Radiology* 41, 383-8(1943).

6459

INFLUENCE OF CHRONIC IRRADIATION WITH GAMMA RAYS AT LOW DOSAGES ON MUTATION RATE IN *DROSOPHILA MELANOGASTER*. Ernst Caspari and Curt Stern. p. 373-399 of BIOLOGICAL EFFECTS OF EXTERNAL RADIATION. (NNES VI-2). Henry A. Blair, ed. New York, McGraw-Hill Book Co., Inc. 1954.

The rate of lethal sex-linked mutations in *Drosophila* exposed to gamma rays of 2.5/r day for 21 days was determined. No significant difference between exposed flies and controls was found. It is unlikely that relative inactivity of irradiation is due to wave length, temperature, or glass container. (from authors' summary).

6460

INTRACAVITARY VISCERAL RADIATION; EFFECT ON GASTRIC ACID SECRETION. J. B. R. McKendry. *Proc. Soc. Exptl. Biol. Med.* 75, 25-7(1950).

Achlorhydria was induced in dogs by irradiation from I^{131} introduced into the stomach between the 2 walls of a double walled balloon.

6461

WAVE-LENGTH EFFECT IN THE REACTION OF HUMAN SKIN TO X- AND GAMMA RADIATION. J. S. Mitchell. *Nature* 145, 105-6(1950).

It was found that 0.7-0.8 r unit of x-radiation of effective wave-length 145 x.u. is equivalent, in the production of moist desquamation of normal human skin, to 1 r unit of γ radiation of effective wave-length 15 x.u.

6462

APPLICATIONS OF RECENT ADVANCES IN NUCLEAR PHYSICS TO CANCER RESEARCH. J. S. Mitchell. *Brit. J. Cancer* 1, 1-14(1947).

6463

THE PATHOLOGIC NATURE OF IRRADIATION SICKNESS; A NEW METHOD FOR PRODUCING SHOCK. V. H. Moon, K. Kornblum and D. R. Morgan. *A. M. A. Arch. Pathol.* 29, 723(1940).

Dogs received 1400 to 2800 r in divided doses over different parts of the abdomen. Severe radiation sickness developed within 60-72 hrs. Clinical and histological findings are described.

6464

ROENTGEN RADIATION AND THE SO-CALLED BLOOD-BRAIN BARRIER. B. N. Mogilnitzsky and L. D. Podljaschuk. Fortschr. Gebiete Rontgenstrahlen. 41, 66(1930).

Single x ray doses of 3 1/2-10 1/2 HED proved lethal within a few days to rabbits. Severe acute vascular damage is described.

6465

MAXIMUM PERMISSIBLE LEVELS OF EXPOSURE AGREED ON AT CHALK RIVER CONFERENCE. K. Z. Morgan. Am. Ind. Hyg. Assoc. Quart. 11, 116(1950).

6466

SYMPOSIUM ON PREPARATION AND MEASUREMENT OF ISOTOPES FOR USE IN BIOCHEMISTRY. HAZARDS PRESENTED BY RADIOACTIVE MATERIALS AND HOW TO COPE WITH THEM. K. Z. Morgan. U. S. Naval Med. Bull., Supplement 48, 142-60(1948).

Equations for calculating tolerance concentrations of radioactive materials in the body are presented.

6467

Office of Medical Advisor, ORDO, AEC.

ON THE INCIDENCE OF CANCER IN OAK RIDGE, TENNESSEE. Jack Moshman. July 2, 1948. (TID-77).

6468

RADIATION THROMBOCYTOPENIA. Harry Mossberg. Acta Radiol. 28, 110-14(1947).

Forty patients receiving "ordinary" therapeutic roentgen doses showed thrombocytopenia, 5 of them had hemorrhagic diathesis. Thrombocytopenia was particularly likely to occur when radiation was applied over the thorax and especially over the sternum.

6469

THE BEHAVIOR OF THE THROMBOCYTES DURING AND AFTER LOCAL RADIOTHERAPY. Harry Mossberg. Acta Radiol. 29, 277(1948).

The author studied platelet levels in peripheral blood of patients before and after local radiotherapy with doses of a size generally used in treating malignant tumors. The paper includes a review of literature on effects of radiation on the hematopoietic tissues.

6470

THE RELATIVE RESPONSE OF THE SKIN OF MICE TO X-RADIATION AND GAMMA RADIATION. J. C. Mottram and L. H. Gray. Brit. J. Radiol. 13, 31-4(1940).

6471

EFFECT OF RADIATION FROM RADIOACTIVE ISOTOPES ON THE PROTOPLASM OF SPIROGYRA. R. M. Muri. J. Cellular Comp. Physiol. 19, 244-7(1942).

β radiation from radioactive phosphorus increased the viscosity of protoplasm in Spirogyra when radioactive strength of the solution was 4.0m C./liter or 17.0m C./liter but had no effect when the radioactive strength was 2.1 m C./liter. Total concentration of phosphorus fluctuated in filaments immersed in solutions of radioactive phosphorus, but remained relatively constant for 0.001M and 0.005M solutions of the nonradioactive phosphorus and showed an accumulation for the 0.01M solution. Changes in total phosphorus content may result from permeability effects of β radiation from the radioactive isotope. (from author's summary)

6472

THE ROLE PLAYED BY RADIATION MUTATIONS IN MANKIND. H. J. Muller. Science 93, 438(1941).

The author has calculated the average number of generations to be expected between the production of a recessive genemutation in man and its manifestation in a homozygous individual. The chance of the mutated gene meeting another like it that had originated by an independent mutation depends on the frequency of such mutations, on the survival value of the abnormal type and on the randomness of breeding.

6473

INDUCED MUTATIONS IN DROSOPHILA. H. J. Muller. Cold Spring Harbor Symposia Quant. Biol. 9, 151-65(1941).

The induction of gene mutations is discussed with reference to initiating events at an atomic and molecular level.

6474

Argonne National Lab., Lemont, Ill.

THE PRODUCTION, ACCUMULATION, AND AVOIDANCE OF MUTATION. H. J. Muller. Aug. 14, 1947. 27p. (ANL-4023).

6475

THE SURPRISINGLY HIGH FREQUENCY OF SPONTANEOUS AND INDUCED CHROMOSOMES BREAKAGE IN DROSOPHILA, AND ITS EXPRESSION THROUGH DOMINANT LETHALS. H. J. Muller and G. Pontecorvo. Genetics 27, 157-8(1942).

Dominant lethal effect on irradiated females due to "simple breakage," which in rings must often be followed by formation of dicentrics, occasioned by twisting of chromonema or chromonema-pair before re-union. Over 75 per cent of these sister dicentrics are lethal. Breaks in non-rings are presumably induced by radiations as often as in rings, but here the majority are followed by perfect restitution. Frequency of spontaneous lethal and viable losses of rings is surprisingly high, and may be due to spontaneous breakage. (from abstract)

6476

PARTIAL DOMINANCE IN RELATION TO THE NEED FOR STUDYING INDUCED MUTATIONS INDIVIDUALLY. H. J. Muller. J. Cellular Comp. Physiol., Supple. 1, 35, 205-10(1950).

6477

THE LOCALIZATION OF THE MUTAGENIC ACTION OF NEUTRON-INDUCED IONIZATIONS IN DROSOPHILA. H. J. Muller and J. L. Valencia. Genetics 36, 567-8(1951).

Frequency of translocations induced by fast neutron irradiation of Drosophila spermatozoa varies linearly with dose even at doses sufficient to produce multiple proton tracks per sperm. Broken chromosome ends from different breaks caused by the same track undergo recombination with one another much oftener than with those of different tracks. Breaks caused by same track tend to occur near each other, this proximity favoring union between broken ends. (from abstract)

6478

Canadian Radium and Uranium Corporation, N. Y. STATISTICAL ANALYSIS OF THE EXPERIMENTS ON THE INFLUENCE OF RADIOACTIVE MATERIAL ON THE GROWTH OF CROPS CONDUCTED IN THE U. S. A. IN THE YEARS 1944 TO 1946. Franco Modigliani. (nd). 36p. (NP-332).

6479

NICOTINIC ACID IN TREATMENT OF IRRADIATION SICKNESS. Z. T. Lessa. Rev. paulista med. 28, 135-50 (1945).

6480

ON THE ACCELERATION OF THE LIFE CYCLE AND PREMATURE AGING IN LOWER ORGANISMS UNDER THE INFLUENCE OF X-RAYS AND RADIUM RAYS. G. Nadson. Compt. rend. soc. biol. 93, 1585-6(1925). (In French).

Premature aging due to acceleration of vital processes, previously demonstrated in yeast and bacteria, is affirmed to be a general rule for all living things. This concept is discussed in light of author's previous work and experimental studies by other investigators. (no new experimental data).

6481

THE ACTION OF ROENTGEN RAYS ON THE MINERAL METABOLISM OF UNICELLULAR ORGANISMS WITH THE VIEW OF FINDING AN IRRADIATION RHYTHM WHICH

DESTROYS THE CULTURES OF UNICELLULAR ORGANISMS IN THE SHORTEST POSSIBLE TIME WITH A SMALL TOTAL QUANTITY OF RAYS. F. Berner. *Strahlentherapie* 71, 1-60(1942). (In German)

A favorable irradiation rhythm was found for *Paramecium caudatum*.

6482
RETINAL HAEMORRHAGE AS SEEN IN AN ATOMIC-BOMB CASUALTY. K. B. Benkwith. *Am. J. Ophthalmol.* 29, 799-800(1946).

6483
X-RAY TREATMENT OF MALIGNANT EXOPHTHALMOS: A REPORT OF 28 PATIENTS. W. H. Bierwaltes. *J. Clin. Endocrinol. and Metabolism* 13, 1090(1953).

Thirteen patients showed response in exophthalmometer measurements after treatment of their pituitary glands by x rays. Eye signs of malignant exophthalmos improved when the exophthalmos receded significantly. Data suggest that malignant exophthalmos usually responds to the x-ray therapy if the exophthalmos has been present less than one year. Patients with coexistent thyrotoxicosis and malignant exophthalmos had exophthalmos which was more resistant to treatment than patients without active thyrotoxicosis.

6484
ON THE VARIATIONS IN MANIFESTATION OF LESIONS PRODUCED BY X-RAYS IN SEEDS AS A FUNCTION OF TIME-AFTER IRRADIATION. S. Angel. *Compt. rend. soc. biol.* 93, 1669-70(1925). (In French).

Dry and germinating seeds of beans and wheat were x irradiated and observed to determine seedling root length and general growth and development after exposure. Manifestations of injury were greater with greater time after exposure.

6485
RADIATION THERAPY OF BRAIN TUMORS. A. Beclere. *Strahlentherapie* 31, 42-87(1928). (In German).

6486
A NOTE ON IRRADIATION SICKNESS. William B. Bean, Tom D. Spies and R. W. Vilter. *Am. J. Med. Sci.* 208, 46-54(1944).

There was a rough correlation between the degree of vitamin-B-depletion and the severity of radiation sickness in normal subjects who received a dose of 400 r of 200 Kv x rays over the upper abdomen and spleen. Once the illness was established, large doses of thiamin or nicotinic acid were of relatively little value.

6487
CHROMOSOMAL ABERRATIONS IN ONION ROOTS FROM PLANTS GROWN IN AN ATMOSPHERE CONTAINING $C^{14}O_2$. J. M. Beal and N. J. Scully. *Botan. Gaz.* 112, 232-5(1950).

Changes observed in roots of plants grown in atmosphere containing $C^{14}O_2$ included chromosome and chromatid breaks, chromosome fragments, bridging and micronuclei.

6488
FOCAL AMYLOID DEGENERATION OF THE BRAIN FOLLOWING X-RAY THERAPY. R. C. Basset and K. Lowenberg. *J. Neuropathol. Exptl. Neurol.* 7, 101 (1948).

Authors describe two cases of degeneration of the normal human brain following an overdose of x rays. The dominant histological finding in the two cases was the formation of an amyloid-like substance in the excessively exposed parts of the brains.

6489
BIOCHEMICAL GENETICS OF NEUROSPORA. E. L. Tatum and G. W. Beadle. *Ann. Missouri Bot. Garden* 32, 125-29(1945).

Mutations in this fungus were induced by irradiation and the inheritance of biochemical characteristics was studied. Hereditary characters of the fungus, such as enzymatic abilities, are located in genes and each gene is

potentially responsible for one enzyme. (from abstract)
BA 20-9471

6490
Argonne National Lab., Lemont, Ill.
THE EFFECT OF X RAYS ON THE METABOLISM OF SMALL INTESTINE AND ITS PERMEABILITY TO GLUCOSE. E. S. Guzman Barron, William Wolkowitz, and John Muntz. Feb. 3, 1947. Decl. Dec. 8, 1947. 14p. (MDDC-1241; CH-3725).

6491
Argonne National Lab., Lemont, Ill.
BIOCHEMISTRY AND PHYSIOLOGICAL CHEMISTRY. THE ROLE OF H_2O_2 IN THE BIOLOGICAL EFFECTS OF IONIZING RADIATION. E. S. Guzman Barron and L. Seik. p.101-5 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT AUGUST, SEPTEMBER, OCTOBER 1951. Austin M. Brues, ed. (nd). 133p. (ANL-4713).

The amount of H_2O_2 formed after x irradiation of H_2O was determined. Effects of measured concentrations of H_2O_2 on the metabolism of bacteria and yeast and on the respiration of eggs and sperm of marine organisms in vitro were determined. Authors conclude that H_2O_2 effect is negligible in the biological effects of radiation.

6492
Argonne National Lab., Lemont, Ill.
EFFECT OF RADIATION ON THE RESPIRATION OF SEA URCHIN SPERM. E. S. Guzman Barron, Betty Gasvoda and Veronica Flood. p. 148-63 of BIOLOGY AND MEDICAL DIVISIONS. QUARTERLY REPORT MAY 1948 TO AUGUST 1948. Austin M. Brues and Hermann Lisco. Aug. 1, 1948. 169p. (ANL-4205).

6493
Argonne National Lab., Lemont, Ill.
THE EFFECT OF X-IRRADIATION ON THE METABOLISM OF THE SMALL INTESTINE OF THE RAT. E. S. G. Barron and Veronica Flood. p.157-61 of BIOLOGICAL AND MEDICAL DIVISIONS. QUARTERLY REPORT NOVEMBER 1948 TO FEBRUARY 1, 1949. Austin M. Brues and Hermann Lisco. Feb. 1, 1948. 183p. (ANL-4253).

The oxygen consumption of strips of small intestine of rats was measured in vitro after the rats had received whole body exposure to x ray doses ranging from 50 r-500 r. Soon after irradiation, O_2 uptake was below normal. Return to normal values within 5 hours occurred after a dose of 50 r.

6494
RESEARCH ON THE INDICATION AND SUCCESS OF WEAK IRRADIATION WITH ROENTGEN RAYS AND TEMPORARY STERILITY. D. Jost. *Strahlentherapie* 46, 601(1938). (In German).

Among 141 women treated for various pelvic abnormalities there were 63 pregnancies, 14 women aborted, 41 children were born alive, and all but one of these were normal physically and mentally.

6495
Argonne National Lab., Lemont, Ill. Chicago Univ. Metallurgical Labs.
THE EFFECT OF PLUTONIUM ON TISSUE METABOLISM OF RATS. E. S. G. Barron, R. Abrams, R. D. Finkle and R. P. Rhodes. June 1946. Decl. Jan. 23, 1948. 29p. (MDDC-1653, CH-3849).

Detailed information is given on metabolic changes in the various tissues after introduction of Pu into the body by injection and after intratracheal installation. Effects on QO_2 , QO_2 succinate, anaerobic glycolysis, QO_2 pyruvate, Q pyruvate, Q and QO_2 butyrate, acetoacetate formation, phospholipid synthesis and removal are discussed. Various organs and tissues, e.g. kidney, liver, thymus, adrenals, submaxillaries, blood, lungs and small intestine are considered specifically.

6496

Brookhaven National Lab., Upton, N. Y.
THE EFFECT OF IONIZING RADIATION ON THE ACTIVITY OF ENZYMES. E. S. Guzman Barron. p.10-16 of CONFERENCE ON BIOLOGICAL APPLICATIONS OF NUCLEAR PHYSICS; JULY 12-27, 1948. July 1948. 154p. (BNL-C-4).

The action of ionizing radiation is due mainly to the products of irradiation of water. In small doses, the effect may be limited to oxidation of sulfhydryl groups and inhibition of sulfhydryl enzymes. With larger doses, protein denaturation may result. Only effects of smaller doses are reversible.

6497

PROTHROMBIN FORMATION FOLLOWING INJURY OF BONE MARROW BY ROENTGEN RAYS. W. A. Barnes. Am. J. Roentgenol. Radium Therapy 46, 356-61(1941).

Mice, rats, rabbits and dogs showed no change in prothrombin levels even after long continued irradiation (total doses up to 6400 r) with 200 Kv x rays although severe marrow damage occurred.

6498

A NOTE ON THE DEPRESSION OF BLOOD CHOLINESTERASE LEVEL FOLLOWING X-RAY THERAPY AND ITS BEARING ON THE MECHANISM OF RADIATION SICKNESS. R. D. Barnard. Med. Record 161, 350-2(1948).

Radiation therapy reduces the blood cholinesterase concentration and it is suggested that this may account for the cholinergic symptoms of radiation sickness.

6499

THE EFFECT OF X-RAYS UPON THE METABOLISM OF TUMOR TISSUE. George H. Bancroft and Victor E. Kinsey. Biochem. J. 31, 974-9(1937).

The respiratory quotient (R.Q.) of rat sarcoma *in vivo* was depressed by x radiation. Aerobic acid production (mostly lactic acid) was increased, indicating that the lowered R.Q. was not due to incomplete oxidation with formation of acids other than lactic. Under the same conditions, x rays did not alter metabolism of rat kidney slices. It appears that x rays attack carbohydrate oxidation before the pyruvic acid stage

6500

FURTHER STUDIES ON MINERAL METABOLISM AFTER ROENTGEN RADIATION. Karl Adler. Strahlentherapie 45, 563-70(1932).

Ca, Mg, K and Na determinations were made on serum of irradiated rabbits.

6501

ROENTGEN RADIATION AND THE ENDOCELLULAR NEUROFIBRILLAR RATE IN MATURE MAMMALS. H. Balli. Strahlentherapie 6, 443-6(1951). (In German).

6502

ACTION OF X-RAYS AND SHORT WAVES ON THE URICASE OF PIG LIVER. Mario Baldini. Atti. accad. Fisocrit. Siena, Sez. med.-fis. 18, 202-11(1950).

6503

THE BLOOD-BRAIN BARRIER WITH SPECIAL REGARD TO THE USE OF RADIOACTIVE ISOTOPES. 154p. (American Lecture Series, publication no. 278). THE BANNERSTONE DIVISION OF AMERICAN LECTURES IN SURGERY, NEUROLOGICAL DIVISION.

6504

RESULTS OF X IRRADIATION OF BRAIN GLIOMAS. P. Bailey and A. Brunschwig. Z. ges. Neurol. Psychiat. 161, 138(1938). (In German).

Authors describe histological changes in brain and tumor following therapeutic x irradiation of human medulloblastomas, astrocytomas and oligodendromas.

6505

EFFECT OF RADIUM EMANATION ON THE ADULT MAMMALIAN BRAIN. H. J. Bagge. Am. J. Roentgenol. 8, 536(1921).

6506

CHANGES IN CUTANEOUS SENSITIVITY TO X-RAYS DURING EXPERIMENTAL HYPERGLYCEMIA IN RABBITS. F. Baclesse and J. Loiseleur. Compt. rend. soc. biol. 141, 743-5(1947).

Intramuscular injection of a near-lethal dose of glucose 45 min. prior to x irradiation reduced the sensitivity of the skin to x rays.

6507

THE ACTION OF X-RAYS ON SURFACE TENSION OF PLASMA. R. Auvergnat, L. Bugnard and A. Legris. Acta Unio Intern. contra Cancrum 3, 304-12(1938).

6508

INDUCTION OF GENETICAL CHANGE BY CHEMICAL AGENTS. Charlotte Auerbach. Internat. Congr. Radiol., 6th Congress, London, 1950. p. 44-5.

The author described the search for radiomimetic substances in order (1) to test the validity of certain theories about the production of mutations and chromosome breaks and (2) to find chemical properties common to radiomimetic agents which might indicate the essential factor for producing such nuclear effects.

6509

Brookhaven National Lab., Upton, N. Y.
RADIATION INDUCED MUTATIONS IN MICROORGANISMS. K. C. Atwood. p.17-20 of CONFERENCE ON BIOLOGICAL APPLICATIONS OF NUCLEAR PHYSICS, JULY 12-27, 1948. 154p. (BNL-C-4).

6510

ON THE INTERPRETATION OF MULTI-HIT SURVIVAL CURVES. K. C. Atwood and A. Morman. Proc. Natl. Acad. Sci. U. S. 35, 696(1949)

It is proposed that sigmoid survival curves can be interpreted profitably on a multi-unit, single hit per unit hypothesis and some consequences of this hypothesis are examined. Reasons are given for preferring the multi-unit hypothesis to the usual multi-hit hypothesis. Some data on the ultra-violet radiation of *Neurospora crassa* conidia are analyzed. (author's summary).

6511

THE PROTECTIVE ACTION OF FLAVONOIDS AGAINST RADIATION. I. Arons, S. Weintraub, I. Wright, B. Sokoloff and R. Dutcher. Internat. Congr. Radiol., 6th Congress, London, 1950. p. 170.

The authors present data from experiments demonstrating the efficacious effect of a vitamin P compound in rats and rabbits receiving large doses of x radiation. The vitamin P compound decreased mortality and minimized the hemorrhagic lesions. It appeared to have a specific effect on the intracellular cement of capillary walls, strengthening it and conferring protection against total body, near lethal x ray doses.

6512

THE USE OF AUREOMYCIN AS AN ANTIDOTE IN RADIATION SICKNESS. Isidore Arons and J. W. Freeman. Harlem Hosp. Bull. 3, 123-6(1950-1).

Five patients with radiation sickness that was not alleviated by pyridoxine or by a combination of penicillin and sulfathiazidine showed favorable responses to aureomycin administration.

6513

EXCRETION AND DISTRIBUTION OF CARBON 14 DURING AND FOLLOWING CONTINUOUS INTRAPERITONEAL INJECTION OF CARBON 14 AS SODIUM CARBONATE. Wallace D. Armstrong and S. H. Zbarsky. Trans. Conf. Metabolic Interrelat. 1st Conf., 1949. p.67-71.

6514

Argonne National Lab., Lemont, Ill.
ACUTE RADIOTOXICITY OF INJECTED CERIU¹⁴¹ IN THE RAT. D. S. Anthony and K. A. Latarop. June

26, 1947. Decl. Sept. 19, 1947. 25p. (MDDC-1326; CH-3824).

Effects of intravenously injected doses of 10, 7, 5, 3 and 2 μ c of (Ce-P₁)¹⁴⁴ per gram of body weight in rats were studied with respect to clinical condition, survival time and weight. Excretion and distribution of cesium were observed throughout the lifetime of the rats. Histological studies on rats that died are described. A few osteogenic sarcomas were found. The 30 day LD₅₀ for rats was about 3 μ c/g of body weight.

6515

PERSONAL COMMUNICATION TO THE AUTHOR OF THE REPORT. H. L. Andrews, et al. Referred to in "EFFECTS OF IRRADIATION OF THE NERVOUS SYSTEM," W. Haymaker. Armed Forces Institute of Pathology, Washington, D. C. Submitted to S. Warren, Chairman, Panel on Pathological Effects of Atomic Radiation National Academy of Sciences-National Research Council, on March 28, 1956.

6516

CHANGES IN PERIPHERAL BLOOD AFTER SINGLE DOSES OF EXTERNAL BETA RADIATION. Elizabeth Anderson Barnes. p. 185-92 of EFFECTS OF EXTERNAL BETA RADIATION. Raymond E. Zirkle. New York, McGraw Hill Book Company, Inc. 1951. 242p. (National Nuclear Energy Series. Division IV, Volume 22B paper 11.

6517

PREVENTION OF D-ALPHA TOCOPHEROL OF INCREASED CAPILLARY FRAGILITY IN RATS FOLLOWING IRRADIATION. Stanley R. Ames, J. G. Baxter and J. Q. Griffith, Jr. Intern. Z. Vitaminforsch 22, 401-7(1951).

Preparations of α -tocopherol concentrate offered significant protection against the increased capillary fragility that developed in rats injected intraperitoneally with 200 μ c of Rn ointment.

6518

ACTION OF X-RAYS ON BLOOD PROTHROMBIN CONTENT. F. Ambrosi. Boll. soc. ital. biol. sper. 164, 78-80(1941).

In vitro irradiation of blood did not alter the prothrombin content.

6519

PROTHROMBIN STUDY IN RADIOTHERAPY-TREATED PATIENTS WITH NEOPLASMS. G. Amanera and B. Bertiglia. Giorn. clin. med. (Parma) 31, 312-24(1950).

Prothrombin content increased in 75%, showed no change in 21% and decreased slightly in 4% of patients receiving therapeutic irradiation for neoplasms.

6520

THE RELATIVE EFFECTS PRODUCED BY 200 KV ROENTGEN RAYS, 700 KV ROENTGEN RAYS, AND GAMMA RAYS, SYMPOSIUM HELD ON THE 33RD ANNUAL MEETING OF THE ANNUAL ROENTGEN RAY SOCIETY, DETROIT, MICH. Am. J. Roentgenol. Radium Therapy 29(3), 293-367(1933).

6521

THE EFFECT OF IRRADIATION ON NORMAL AND NEOPLASTIC BRAIN TISSUE. B. J. Alpers and M. K. Pancoast. Am. J. Cancer 17, 7(1933).

6522

EFFECT OF IRRADIATION, IMMUNITY AND OTHER FACTORS ON VACCINAL INFECTION. A REVIEW ILLUSTRATED BY THE REPORT OF A SECONDARY OCULAR INFECTION TREATED WITH ROENTGEN RAYS. H. W. Pittman, L. B. Holt and G. T. Harrell. A. M. A. Arch. Int. Med. 80, 61(1947).

6523

DO EQUAL DOSES OF X-RAYS OF DIFFERENT WAVE LENGTHS HAVE THE SAME BIOLOGICAL EFFECT? A. Gunsett, S. Angel, and C. H. Spack. Compt. rend. soc. biol. 99, 850-1(1928).

6524

ACTION OF X-RAYS ON NUCLEIC ACID METABOLISM

IN RAT ORGANS. Lucie H. Ahlstrom, Hans v. Euler and Georg v. Hevesy. Arkiv. Lemn. Mineral. Geol. A19, No. 9 (1944).

Nucleic acid metabolism was inhibited by 1/3 to 1/2 in the liver, spleen and intestinal mucosa of adult rats during the 2 hrs. following exposure to 1500-3000 r. Similar observations had been made on Jensen sarcoma. The percentage decrease of nucleic acid metabolism in organs of x irradiated rats 3-4 days old (normally producing nucleic acids very rapidly) was about the same as that in adults. The inhibitory effect of irradiation was enhanced by administering the dose over a 2 hr. period.

6525

FAST NEUTRON ENERGY ABSORPTION IN GASES, WALLS AND TISSUES. P. C. Aebersold and G. A. Anslow. Physical Revs. 69, 1-21(1946). NSA 5-5420

6526

Rochester, N. Y. Univ.

THE PRODUCTION OF LEUKOPENIA BY CHRONIC IRRADIATION OF THE ABDOMINAL VISCERA OF THE CAT. W. S. Adams and John S. Lawrence. Apr. 30, 1948. Decl. May 24, 1948. 14p. (AEC-D-2006; UR-25).

Cats receiving 100 r doses of x rays to the abdomen 6 days a week for a total dose of 3200 r developed severe leukopenia. Possible mechanisms by which the leukopenia was produced are discussed.

6527

BEHAVIOR OF THE PROTHROMBIN LEVEL OF FEMALE RABBITS BEFORE AND AFTER ROENTGEN IRRADIATION. W. Adams. Strahlentherapie 71, 114-20(1942).

There was no definite change in prothrombin levels of the blood of female rabbits exposed to repeated doses of 60 r of x rays (total doses up to 600 r).

6528

Argonne National Lab., Lemont, Ill. METABOLISM OF INHALED FISSION PRODUCT AEROSOLS. R. Abrams, H. C. Seibert, A. M. Potts, W. Lohr, and S. Postel. Apr. 16, 1946. Decl. Aug. 28, 1946. 114p. (MDDC-248; CH -3485)

This paper deals with the metabolism, in rats, of air-borne fission products. Four different isotopes were used, selected for their long lives and as representatives of the various chemical species occurring in fission. There were Sr⁸⁸ (55 days), Zr⁹⁵ (65 days), Y⁹¹ (57 days), and Ce¹⁴⁴ (275 days). Aerosols of these materials were produced by atomizing aqueous solutions and by burning dried residues in a carbon arc. Strontium differs from the other elements investigated in the ease with which it is absorbed from the lungs. Over 50 percent left the lungs within a matter of minutes, and 95 percent was gone within 1 hour. Of the Sr⁸⁸ originally in the lung, 60 percent was deposited in the skeleton in less than 4 hours, and after 12 hours the total radiation dose to the skeleton exceeded that to the lungs. These results indicated that inhalation was as effective a means of administration as intravenous injection, and that lung damage as a result of inhalation of Sr⁸⁸ would be of less importance than bone marrow damage. The other three elements, Y, Zr, and Ce, may be grouped together insofar as they differ from Sr. They were all eliminated from the lungs much more slowly than was Sr. Thus the times required for 90 percent elimination were: Y⁹¹, 12 days; Zr⁹⁵, 25 days, and Ce¹⁴⁴, 45 days. In all cases the skeleton was the major site of deposition and eventually contained between 15 and 30 percent of the initial lung deposit. In no case, in periods ranging up to 200 days, did the total radiation dose to the bone exceed that to the lung, as it did within 12 hours with Sr. With all three elements the probability of radiation damage to the lung is great. Very little deposition occurred in the soft tissues. The kidney, contained about

0.5 percent of the dose with all the elements. Concentration in the liver was lower than in the kidney with all isotopes except Ce^{144} . This element showed a very high initial liver deposition, but this was gradually eliminated so that after 2 months the liver concentration fell below that in the kidney.

6529

THE EFFECT OF SHIELDING ON MORTALITY FOLLOWING IRRADIATION. Herbert L. Abrams and Henry S. Kaplan. *Stanford Med. Bull.* 9, 165-6(1951).

Lead shields placed over the head, chest, abdomen, or thighs during irradiation conferred a significant degree of protection on mice of all four groups as compared with unshielded controls. Protection was most striking when the abdomen was shielded. NSA 5-6094

6530

EXPERIMENTS ON RHYTHMIC IRRADIATION OF THE EGGS OF DROSOPHILA MELANOGASTER MEIG. Adolph Abele. *Strahlentherapie* 67, 293-306(1940).

Author described effects of the same total dose of x rays administered at 95, 47.6 or 23.7 r/min. as continuous and rhythmically interrupted irradiation using intervals of 1/13 to 1/200 sec. for rhythmical exposures.

6531

FURTHER STUDIES ON THE APPEARANCE OF KNOWN ORGANIC SPECIFIC PROTEINASES IN URINE. R. Abderhalden. *Fermentforschung* 16, 215-20(1939).

6532

TOTAL-HEAD (BRAIN) X IRRADIATION OF MICE AND PRIMARY FACTORS INVOLVED. Herman C. Mason, Beryl T. Mason and Walter S. Moos. *Brit. J. Radiol.* 28, 495-507(1955).

Swiss (CFW) mouse $\text{LD}_{50/30}$ for total-head betatron x irradiation was found to be 1600-1650 r, for total-head 200 kvp x rays, 1250 r. Betatron irradiation was 75-78% as effective as 200 kvp x rays to whole head. Data indicate that degree of injury in this species is a function of dose. NSA 9-6836

6533

THE EFFECTS OF ROENTGEN RADIATION AND PROLAN UPON THE TESTES OF IMMATURE RATS. A. H. Heald, C. Beard and W. R. Lyons. *Am. J. Roentgenol. Radium Therapy* 41, 448-52(1939).

6534

SURVIVAL RATES OF HABROBRACON EGGS TREATED IN FIRST MEIOTIC METAPHASE WITH LOW AND HIGH VOLTAGE X-RADIATION. Gertrude Heidenthal and Leonard Clark. *Genetics* 36, 554(1951).

6535

INDIRECT EFFECTS OF RADIATION ON SEA URCHIN EGGS. L. V. Heilbrunn and R. A. Young. *Biol. Bull.* 69, 274-8(1935). NSA 5-5240

6536

ON THE EFFECT OF X-RAYS ON ANIMALS. H. Heinecke. *Munich. med. Wochschr.* 51, 2050(1903), 51, 785(1904). (In German). NSA 12-4040

6537

THE CONNECTION BETWEEN ROENTGEN RAY RISKS FOR WORKERS AND CHANGES IN THEIR BLOOD PICTURES. Matts Helde. *Acta Radiol.* 27, 308-15(1946).

6538

Naval Radiological Defense Lab., San Francisco. THE INABILITY OF CYSTEINE TO PROTECT ERYTHROPOIETIC BONE MARROW AGAINST IRRADIATION INJURY AT A DOSE LEVEL OF 800 r. Thomas G. Hennessy and Fleming B. Folsom. Nov. 6, 1950. 9p. (AD-266(b)).

Using Fe^{59} incorporation into red cells as a measure of erythropoiesis, the authors found that cysteine administered before x irradiation failed to protect rats against the depressing effect of 800 r on erythropoiesis.

6539

THE ACTION OF X-RAYS ON NUCLEATED AND NON-NUCLEATED EGG FRAGMENTS. Paul S. Henshaw. *Am. J. Cancer* 33, 258-64(1938).

A given dose of radiation delayed cleavage to about the same extent in nucleated eggs and nonnucleated fragments. These and related observations show that the slowing of cell division in irradiated *Arbacia* eggs is due to the effect of the radiation on the cell nucleus.

6540

Oak Ridge National Lab., Tenn. Clinton Laboratories COMPARATIVE LATE EFFECTS OF PERIODIC DOSES OF FISSION NEUTRONS AND OF GAMMA RAYS. P. S. Henshaw. June 1946. Decl. Apr. 21, 1947. 90p. (MDDC-1253; MonH-115).

This study was undertaken to obtain information on occupational hazards associated with fast neutrons and gamma rays. Four strains of mice, picked for special characteristics, were used as test material. The all-purpose albino strain CF-1 was used for the large scale tests because of its sturdiness and availability. Colored ABC animals were used to check the CF-1, C58, and A-Strain mice were employed, respectively, because they normally show a high spontaneous incidence of leukemia and pulmonary tumors. Regarding the latter it was presumed that such animals would furnish the most fertile soil for blood and lung neoplasias and accordingly would provide the most sensitive test material for such effects. Small daily doses of fast neutrons 0.115 to 13.0 n) and gamma rays (1 to 17.2 r) were administered 6 times weekly to the whole bodies of treated animals. As a rule, each experimental group consisted of approximately 100 animals. Both general and specific control groups were maintained in equally large numbers. All animals were weighed and examined periodically. Records were kept of the time of death and regular sacrifices were made and tissues saved for histological examination. Autopsies were performed on all moribund or dead animals and the cause of death determined when possible. Most of the animals died either in a state of atrophy or with leukemia (mediastinal lymphomatosis). The time of death after treatment began, followed a regular pattern and furnished a means of quantitatively comparing the effectiveness of the different treatments and methods of exposure. The fast neutron doses measured in "n" were found to be from 8 to 35 times more effective than gamma rays measured in "r". The threshold value for this radiation was found to be below 0.115 n of fast neutrons per day and about 1 r of gamma rays. In CF-1 mice about 10 times as much radiation per day was required to produce a threshold change as was required to shorten the life span detectably. Some differences were noted in the responses of different strains of animals to radiation but these were more a matter of degree than of type, no fundamental differences were seen in the different sexes. The quantitative results based on survival time indicate that the degree of biologic effect varies not only with dose, but also the density of ionisation produced. Although the incidence of leukemia was significantly increased in CF-1 animals, the occurrence of lung tumors was only slightly, if any, modified by the treatment given. Only questionable evidence of increased lung tumor incidence was observed in animals which normally show a high spontaneous lung tumor incidence.

6541

Oak Ridge National Lab., Tenn. EFFECTS OF PERIODIC DOSES OF SLOW NEUTRONS ON MICE, PROGRESS REPORT FOR THE PERIOD BETWEEN FEBRUARY 1945 THROUGH MARCH 1946. P. S. Henshaw, R. S. Snider, E. F. Riley, G. E. Stapleton, and R. E.

Zirkle. Aug. 27, 1946. Decl. Feb. 28, 1947. 12p. (MDDC-754; MonH-118).

Periodic doses of a radiation designated as "slow neutron" were given to two groups of 100 CF-1 female mice. Each arbitrary unit of dose, expressed in $\bar{a}$, was composed of slow neutrons considerably contaminated with fast neutrons. The mice were exposed in a manner similar to that used for fast neutron exposures, but in the cart designed specifically for "slow neutron" irradiation. The results are very similar to those observed as a consequence of periodic fast neutron treatments. A comparison of the shortening of life induced by each radiation indicates that 1 n is as effective as 7.5 $\bar{a}$, a ratio roughly equivalent to that observed after single doses. A dose of 10 $\bar{a}$ per day depressed the leukocyte level to a range between 2000 and 3000 cells/mm³ more pronounced blood changes probably would have been noted had other strains been used. The terminal pathological condition of the experimental mice was essentially like that observed after periodic fast neutron or gamma ray irradiation.

6542

REVIEW OF INFORMATION BEARING ON THE TUMOR INDUCING ACTION OF SUPERFICIAL RADIATIONS. P. S. Henshaw and R. S. Snyder. Chap. 16 of BIOLOGICAL EFFECTS OF EXTERNAL BETA RADIATION. Raymond E. Zirkle. New York, McGraw-Hill Book Company, Inc. 1951. 242p. (National Nuclear Energy Series, Division IV, Volume 22E).

6543

THE CARCINOGENIC EFFECT OF PILE RADIATIONS. P. S. Henshaw, E. F. Riley and G. E. Stapleton. Cancer Research 7, 48(1947)

6544

Argonne National Lab., Lemont, Ill.
COMPARATIVE LATE EFFECTS OF SINGLE DOSES OF FISSION NEUTRONS AND OF GAMMA RAYS. E. F. Riley and P. S. Henshaw. June 1946. Decl. Sept. 8, 1947. 51p. (MDDC-1254; MonH-116).

Having obtained information about the late effects of small daily doses of fast neutrons and gamma rays (MDDC-1253), the authors now present the results of a study of the late effects caused by the same radiations when single large doses are administered.

Experiments were carried out using CF-1 and ABC mice. As a rule more than 100 mice were used for each experimental sample. Single neutron doses of 26, 50, 78 and 90 n and single gamma ray doses of 500 and 700 r were given. Other special experiments to investigate the influence of dosage-rate and of massive doses were also carried out. Acute illness consisting of emaciation and weight loss, lymphopenia and histologic damage to germinal tissues occurred at four days to two weeks. Recovery was rapid in the animals that survived and at three weeks it was difficult to distinguish the experimental from control animals. Such treated animals nevertheless died prematurely more or less in accord with the amount of radiation delivered. Evidence was obtained suggesting that the length of life varied exponentially with dose. It has been noted that 1 n is consistently more effective than 1 r in causing biological injury, the superiority of a fast neutron unit is greater when judged by late effects than when judged by acute lethal action. The incidence of leukemia (mediastinal lymphomatosis) was greatly increased- from 15 per cent in the controls to more than 60 per cent in the case of gamma rays (incomplete results). The findings further substantiate the idea that the higher the concentration of ions the lower the dose of radiation required to produce a particular effect. Other evidence was obtained indicating that a single application of irradiation exposure is sufficient to induce malignant disease.

6545

PRIMARY SITES OF ENERGY DEPOSITIONS ASSOCIATED WITH RADIOBIOLOGICAL LESIONS. L. H. Gray. Ciba Foundation Symposium on Ionizing Radiations and Cell Metabolism. Little, Brown and Co. Publishers 1958. p. 255-270.

6546

Oak Ridge National Lab., Tenn.
CORRELATION OF TISSUE RESPONSES FOLLOWING EXPOSURE TO PENETRATING RADIATIONS. P. S. Henshaw and R. S. Snider. July 1946. Decl. Dec. 16, 1946. 19p. (MDDC-569; MonH-144).

A review has been made of the available information concerning tumor formation and the accompanying changes in mammalian forms that take place following exposures to penetrating radiations. The tissues in the order of increasing resistance to radiation may be listed as follows: lymph nodes (small lymphocytes), germinal epithelium of the testis, erythrocytes and myeloblast gastrointestinal epithelium, ovary, skin, connective tissue, bone, liver, pancreas, kidney, nerve, brain, and muscle. It was pointed out that the most radiosensitive tissues are of the generative type - that is, those which in life are continually proliferating new cells which undergo maturation, serve a useful function for a limited period and then die. The skin, testis, hemopoietic organs, gastro-intestinal epithelium and perhaps other tissue series show a parallel type of differentiation with these features in common. In all cases, certain parent cells (but not the most primitive types), were found to be the most susceptible to radiation. It is plain that partial damage to a particular tissue series results in a limited period during which mature cells are being formed, whereas complete damage results in sterilization. Stress was laid on the fact that recovery to an apparently normal condition takes place even when the acute histologic destruction has been almost complete.

6547

ON THE QUANTITATIVE EFFECT OF BETA RAYS. F. Hercik. Strahlentherapie 68, 63-73(1940). (In German).

The author describes experiments carried out to determine the relative biological effectiveness of β rays on *Allium cepa* epidermis using as the staining of cells by erythrosin as a criterion of damage. Results are interpreted in light of the target theory. NSA 5-5240

6548

CHEMICAL MODIFICATION OF THE LETHAL EFFECT OF X-RADIATION AND THE MECHANISM OF THE ACTION. Andre Herve, Z. M. Bacq and H. Betz. Internat. Congr. Radiol., 6th Congress, London, 1950. p. 169-70.

Injection of 0.1 mg of NaCN immediately before irradiation with an x ray dose of 700 r reduced the mortality of mice from 100% to 30%. The same dose given immediately after, rather than before, irradiation merely retarded death by 4 days and if given 15 min after exposure had no protective effect. Histological changes were not less severe in the "protected" animals but indications of "shock" were much less.

6549

EFFECT OF X-RAYS ON THE RATE OF TURNOVER OF PHOSPHATIDES. George von Hevesy. Nature 158, 268(1946).

The rate of turnover of the phosphatides in the nuclei of Jensen sarcoma and rat liver is markedly diminished under the effect of x-rays and that in the cytoplasm is also diminished. (the greater part of the phosphatides of the tissue is present in the cytoplasm). While irradiation of the sarcoma diminishes the rate of turnover of the total phosphorous of the tissue by 10

per cent only, the corresponding value for the sarcoma nuclei is reduced to a third of its normal value.

6550

EFFECT OF X-RAYS ON THE INCORPORATION OF C^{14} INTO ANIMAL TISSUE. George von Hevesy. *Nature* 164, 269(1949).

In x irradiated rapidly growing rats, the BMR is decreased but incorporation of C^{14} into body tissues is increased, probably due to increased incorporation into organic processes, not to a respiratory effect.

6551

RADIOACTIVE INDICATORS. THEIR APPLICATION IN BIOCHEMISTRY, ANIMAL PHYSIOLOGY AND PATHOLOGY. G. Hevesy. New York: Interscience Publishers (1948).

6552

VARIATION OF PATHOLOGICAL RESPONSES TO RADIATION WITH TIME-INTENSITY FACTORS. S. P. Hicks and K. A. Wright. *Am. J. Clin. Pathol.* 24, Suppl., 7(1954).

6553

Argonne National Lab., Lemont, Ill.
THE EFFECT OF X RAYS ON UPTAKE AND LOSS OF IONS BY DISCS OF POTATO TUBER TISSUE. Noe Higginbotham, Edward S. Mika and Robert B. Withrew p. 111-14 of QUARTERLY REPORT FOR FEBRUARY 1948; BIOLOGY AND MEDICAL DIVISIONS. Austin M. Brues and Hermann Lisco. May 1, 1948. 169p. (ANL-4163).

6554

PHYSICAL AND CHEMICAL FACTORS MODIFYING THE SENSITIVITY OF CELLS TO HIGH ENERGY AND ULTRA-VIOLET RADIATION. Alexander Hollaender. *Internat. Congr. Radiol.*, 6th Congress, London, 1950. p. 49.

The effect on the sensitivity of various organisms (bacteria, fungi, algae, etc.), to radiation death or chromosomal rearrangements, of exposure before or after irradiation to heat or to visible, ultraviolet, or infrared light, of water content, and of oxygen content is discussed. It may be possible to vary the number of "targets" at will, by means of adjustment of growth conditions or physical conditions during irradiation. NSA 5-1157

6555

INDUCED MUTATIONS AND SPECIATION IN FUNGI. Alexander Hollaender and C. W. Emmons. *Cold Spring Harbor Symposia Quant. Biol.* 11, 78-84(1946).

The production of mutations in *Trichophyton mentagrophytes* can be brought about by about one hour's exposure to bright sunlight (U-V), the mutations being permanent and the resultant mutants sufficiently different from the parent stock to be classified as new species in many instances. The significance of the observation to the general problem of speciation is discussed. Similar changes may be induced by x rays.

6556

SYSTEMIC EFFECTS IN THE IRRADIATION TREATMENT OF A TRANSPLANTED MOUSE LYMPHOSARCOMA. Joanne Hollcroft and Egon Lorenz. *Internat. Congr. Radiol.*, 6th Congress, London, 1950. p. 173.

Mice bearing transplanted lymphosarcoma received whole body exposure or tumor-localized exposure to 400 r of x rays or an equivalent dose (in rep) of radon by injection. Whole body exposure to x rays or radon injection caused tumor regression, but an equivalent x ray dose localized to the tumor did not, although a tumor dose of 1000 r followed by a whole body exposure to 100 r did produce regression if the 100 r whole body exposure was given within a few hours after the larger tumor dose. It appears that a systemic effect is involved in radiation-induced tumor regression.

6557

SERUM CHOLINESTERASE ACTIVITY DURING INFLAMMATION

AND X-IRRADIATION. Fritz Holle. *Z. ges. exptl. Med.* 115, 107-26(1949).

6558

SERUM CHOLESTEROL AND IRRADIATION SICKNESS. B. E. Holmes. *Brit. Med. J.* 1, 314(1941).

Serum cholesterol studies representing 11 patients receiving x ray therapy are reported. Patients developing symptoms ("radiation sickness") during therapy had no concomitant rise in serum cholesterol whereas asymptomatic patients did. Administration of cholesterol as a therapeutic agent for gastrointestinal symptoms developing during radiation therapy has been tried by other investigators and found to be therapeutically effective.

6559

PHYSICAL, BIOCHEMICAL AND THERAPEUTIC ASPECTS OF VOLUME DOSE. III. BIOCHEMICAL ASPECTS OF VOLUME DOSE. B. E. Holmes. *Brit. J. Radiol.* 18, 238-40(1945).

Author discusses therapeutic aspects of volume dose in patients receiving radiation therapy, and includes a discussion of certain biochemical changes observed during therapy, e.g. changes in serum cholesterol levels, liberation of histamine, etc., etc.

6560

FAST-NEUTRON-IRRADIATION PROCEDURE. Ellice McDonald. p. 403-418 of BIOLOGICAL EFFECTS ON EXTERNAL RADIATION. (NNS VI-2). Henry A. Blair, ed. New York, McGraw Book Co., Inc. 1954.

Rats, rabbits and dogs were irradiated 6 days per week for 1 year. Those animals which survived were killed and autopsied. This is an introductory chapter.

6561

THE ITALIAN CONTRIBUTION TO PROGRESS IN RADIATION THERAPY. G. Giordana. *Strahlentherapie* 65, 679-715 (1939). (In German). NSA 5-5240

6562

THE EFFECT OF ROENTGEN RAYS ON ANIMAL ORGANS. F. Gabriel. *Strahlentherapie* 22, 107-24(1926). (In German)

Changes in skin, kidneys, and livers of rats exposed to large doses of x rays are described. Skin showed altered tonus and capillary circulation; livers examined histologically showed changes characteristic of epinephrine cachexia. Kidneys showed one of two types of vascular ("tonus") reactions, contraction or dilatation, depending upon the dose and quality of radiation.

6563

CHARACTERISTIC DIFFERENCES IN THE PRODUCTION OF CHROMOSOME STRUCTURAL CHANGES BY NITROGEN MUSTARD TREATMENT AND BY IONIZING RADIATIONS. C. E. Ford. *Internat. Congr. Radiol.*, 6th Congress, London, 1950. p. 46-7.

Nitrogen mustard and γ rays differ with respect to the relative frequencies of the types of chromosome aberrations they produce. For example, nitrogen mustard yields lower proportion of simple chromatid breaks and a higher proportion of minute fragments. Chromosome lesions occur sooner after irradiation than after nitrogen mustard. The two agents also differ with respect to the influence of low temperature on production of chromosome lesions. These and other observations are discussed and analyzed in terms of their implications about how the effects on chromosomes are produced.

6564

THE BEARING OF RADIATION CHEMISTRY ON THE MODE OF ACTION OF RADIATION. Arne Forssberg. *Internat. Congr. Radiol.*, 6th Congress, London, 1950. p. 48.

6565

INCREASING THE MUTANT-FORMING EFFECT OF X-RAYS BY INTRODUCTION OF THE SALTS OF MERCURY

ELEMENTS INTO ORGANISMS. W. Buchmann and K. G. Zimmer. Arb. Reichgesundh. 74, 411-17(1941). (In German)

This is one of a series of studies of the effects of feeding salts of various metals to *Drosophila* prior to irradiation. The increase in mutations produced in metal-fed flies is evaluated with respect to results expected on the basis of the mass absorption coefficients of the metals. CA 37-6350

6566
SOME EFFECTS ON EMBRYO AND YOUNG RAINBOW TROUT (*SALMO GAIARDNERII* RICHARDSON) FROM EXPOSING THE PARENT FISH TO X-RAYS. R. F. Foster, L. R. Donaldson, A. D. Welander, K. Bonham and A. H. Seymour. Growth 13, 119-42(1949).

This document is a thesis. One hundred and forty-eight rainbow trout approximately twenty months old and approaching sexual maturity were divided into a control group and seven irradiated groups. Total body irradiation doses of 50 r, 100 r, 500 r, 750 r, 1000 r, 1500 r, and 2500 r were administered at a distance of 48 inches from the target of the x-ray tube, using 200 kilovolts and 20 milliamperes and filters of 0.5 millimeter of copper and 1.0 millimeter of aluminum. The average radiation intensity received by the fish was 8.25 r per minute. When the fish became mature about three months after irradiation, they were spawned and a total of 115,454 eggs were obtained from 67 females. The gametogenesis, egg development, abnormalities, fry mortality, early fingerling mortality, and growth of the fish are discussed at length and the results are tabulated.

Photographs of apparatus used and development stages are furnished. Included are a series of photographs showing: the stages of development of the rainbow trout eggs, the abnormal trout eggs from parents exposed to various doses of X-radiation, abnormal rainbow trout embryos reaching various stages of development, and common types of abnormal fry found among rainbow trout fry. 38 references. NSA 1-230

6567
TISSUE CHANGES IN HUMAN SKIN DUE TO FAST ELECTRONS. F. Nodl. Strahlentherapie 92, 576-89(1953).

This paper describes the tissue changes of human skin that are brought about by a single exposure to fast electrons. The author describes the tissue alterations that develop with particular reference to late damage. He stresses the preliminary character of his observations, some of which are presented with certain reservations.

6568
EFFECTS OF IRRADIATION ON GLIOMAS. C. H. Frazier and B. J. Alpers. Assoc. Research Nervous Mental Disease, Proc. 16, 68(1937).

6569
STUDY ON REGENERATION AND ON -SH GROUPS IN X-RAYED GUINEA PIG SKIN. INCLUDING CHANGES SEEN IN TISSUES OUTSIDE THE FIELD OF DIRECT RADIATION. J. Frederic. Internat. Congr. Radiol., 6th Congress, London, 1950. p. 39.

6570
Argonne National Lab., Lemont, Ill.
THE EFFECT OF X RAYS UPON ANTIBODIES. A STUDY OF HEMOLYSIN TITRATIONS IN SENSITIZED IRRADIATED RABBITS. H. Fredell. August 1, 1947. Decl. May 26, 1949. 24p. (AECD-2024-J).

Experiments were conducted using the rabbit as a test animal and measuring the antibody production in terms of hemolysins produced by sheep cell antigen. A group of sixteen rabbits was sub-divided into four groups of four animals each. The first group served as control, the second group was irradiated at the peak of the antibody response,

approximately 10 days after antigen administration, the third group was irradiated on the day of antigen administration, and the fourth group was irradiated on the day of antigen administration and re-irradiated at the peak of antibody response. All irradiated animals received about 550 r at dosage rates of 16 to 17.7 r per minute, using 0.5 mm Cu and 1.0 mm Al filters. In addition, the animals in group four received a second dose of 550 r. A single dose of 550 r total-body X-radiation depressed sheep cell antibody production in rabbits. When 550 r was administered at the time of sensitization, antibody production 10 days later was, for all practical purposes, completely inhibited within the period of study. NSA 1-40J

6571
Florida. Univ., Gainesville.
SOME EFFECTS OF RADIATION INJURY ON PLANTS AND ANIMALS. FINAL REPORT. Work Period from August 19, 1949 to December 31, 1952. 162p. (ORO-153).

Data are presented from a study on the bioelectric potentials of plants and animals as a function of radiation injury. Possible applications in the diagnosis of radiation injury are discussed. NSA 10-7397

6572
THE RELATION OF TISSUE RECOVERY AND THE HEALING PROCESS TO THE PERIODICITY OF RADIATION EFFECTS. Milton Friedman. Radiology 33, 633-43(1939).

6573
THE ANTIBODY RESPONSE OF ANIMALS EXPOSED TO X-RADIATION. III. THE PROTECTIVE EFFECT OF CHEMOTHERAPEUTIC AGENTS ON A SPECIFIC IMMUNE STATUS OF X-RADIATED MICE. John D. Fulton, Anna C. Arnold, Roland B. Mitchell. USAF School of Aviation Med., Randolph Field, Texas. Project no. 21-47-002, Report No. 3.

Adrenal cortical extract, thiourea, glutathione, reticulose and chloromycetin were tested for their ability to prolong the survival of mice that had been immunized against *S. typhimurium* and were challenged after irradiation with the live virulent organism. Only glutathione given pre-radiation and chloromycetin given post-radiation increased the survival time. The two agents used together gave the best results.

6574
NEOPLASTIC DISEASES PRODUCED IN MICE BY GENERAL IRRADIATION WITH X-RAYS. I. INCIDENCE AND TYPES OF NEOPLASMA. J. Furth and O. B. Furth. Am. J. Cancer. 28, 54-65(1936).

Mice exposed to single or repeated x ray doses at age 5-12 weeks subsequently showed marked increases in the frequency of occurrence of ovarian tumors, myelosis and lymphosarcoma and less marked increases for other tumors. Incidence of breast tumors decreased by half (breast cancer being conditioned by ovarian hormone levels which are lowered after irradiation but increased in the presence of ovarian tumors). Breast cancer and ovarian neoplasms tended to occur together. Radiation-induced tumors were indistinguishable from spontaneously occurring ones but tended to occur earlier.

6575
QUANTITATIVE STUDIES ON THE EFFECT OF X-RAYS ON MAMMALIAN CELLS, AND ON THE MODE OF X-RAY ACTION. J. Furth. Biol. Bull. 75, 346-7(1938).

6576
A STATISTICAL STUDY OF THE EFFECT OF ROENTGEN RAYS ON WOUND HEALING. W. H. H. Dobbs. Am. J. Roentgenol., Radium Therapy 41, 625-32(1939).

Tensile strength was measured and histological studies were carried on control and irradiated wounds of adult male albino rats 4, 5, 6, 8, 10, 20 and 50 days after operation. Irradiation of wounds was completed

immediately after operation (300 r, 1020 r or 1800 r), 24 hrs after irradiation (1800 r) or 1 and 3 wks before operation (1800 r).

6577
BIOLOGICAL ACTION OF MONOCHROMATIC X-RAYS OF DIFFERENT WAVE LENGTHS ON ASCARIS EGGS. A. Dognon. Compt. rend. 194, 2336-38(1932). (In French).

6578
USAF SCHOOL OF AVIATION MEDICINE REPT. NO. 1. THE BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION. I. THE EFFECT OF X-RADIATION ON THE POTENTIAL DIFFERENCE ACROSS ISOLATED FROG'S SKIN. Herbert B. Gerstner and Oskar L. Ritter.

An x ray exposure (10,000 r per min.) affected skin potential without delay and destroyed the processes essential for maintenance of the potential.

6579
SEQUELAE AFTER APPLICATION OF HIGH-INTENSITY X-RADIATION TO THE HEAD OF RABBITS. H. B. Gerstner, J. E. Pickering and A. J. Dugi. Proj. no. 21-3501-005. Rep. no. 15. Air Univ. USAF School of Aviation Med., Randolph Field, Tex. 1954. Radiation Research 2, 219(1955).

Total dose delivered to brain of rabbits was $12,500 \text{ r}$ (12.5 Kr) $\pm 1500 \text{ r}$. Sequelae occurred in several phases: latent or prodromal period, convulsive phase, somnolent phase, ataxic phase, and death. The most outstanding features of the convulsive phase were repeated epileptoid seizures. The characteristic symptoms of the ataxic phase were severe disturbances of posture, equilibrium, and movements. (from authors' summary).

6580
INDUCED REVERSIONS OF INOSITOL-REQUIRING MUTANTS IN *NEUROSPORA CRASSA*. Norman H. Giles, Jr., Anne E. Flynn and Dorothy L. Giles. Records Genet. Soc. Amer. 17, 38-9(1948).

6581
DIFFERENTIAL SUSCEPTIBILITY OF THE SEXES OF *DROSOPHILA* TO THE EFFECT OF X-RAYS IN PRODUCING CHROMOSOME ABERRATIONS. H. Bentley Glass. Genetics 25, 117(1940).

Offspring from eggs of *D. melanogaster* following x-ray treatment yielded approximately equal frequencies of lethal mutations in σ and f germ cells. All of the 55 translocations found were produced in σ germ cells. Inversions were obtained from both σ and f germ cells. They were more frequent in the former, but the significance of the difference was not established.

6582
PHYSICAL FOUNDATIONS OF RADIOLOGY. O. Glasser, E. H. Quimby, L. S. Taylor and J. L. Weatherwax, Editors. Paul B. Hoeber, Inc., New York and London (1950).

6583
THE EFFECTS OF ATOMIC WEAPONS. Samuel Glasstone, ed. U. S. Government Printing Office, Washington, D. C. (1950).

6584
FURTHER STUDIES ON THE INFLUENCE OF X-RAYS ON THE PHAGOCYTIC INDICES OF HEALTHY RABBITS. John C. Glenn, Jr. J. Immunol. 53, 95-100(1946).

The phagocytic index of healthy rabbits, as tested in an *in vitro* system using *Staphylococcus aureus*, can be effectively increased by total body exposure of the rabbit to an x ray dose of 100 r. The increase is maximal 48 hr. after exposure.

6585
ON THE EFFECT OF X RAYS OF VARIOUS WAVELENGTHS ON BIOLOGICAL SPECIMENS. R. Glocker and A. Reuss. Strahlentherapie 47, 28-34(1933).

Observations on effects of various wavelengths on plants, bacteria, yeast and algae are interpreted in light of the target theory. CA 32-5977

6586
QUANTUM PHYSICS OF THE BIOLOGICAL EFFECT OF X-RAYS. R. Glocker. Z. Physik 77, 653-75(1932). (In German).

6587
THE EFFECT OF VARIATIONS IN THE DOSE-RATE OF GAMMA RADIATION ON CELL DEGENERATION IN THE FROG TADPOLE. A. Glucksmann, K. Tansley and C. W. Wilson. Brit. J. Radiol. 18, 158-64(1945).

Effects of a dose of 336 r of γ rays given at 5 different dose rates (5-20r/min) was studied in tadpoles. The criteria of effect were the numbers of mitotic and degenerate cells in brain and eye. Number of degenerate cells increased with increasing dose rate as did the time for maximum number of degenerate cells to appear. On an absolute basis, degeneration was maximal at a dose rate of 15 r/min. The observations are discussed with respect to interactions of the various biological processes involved.

6588
PATHOLOGICAL STUDY OF EIGHT PATIENTS WITH GLIOBLASTOMA MULTIFORME TREATED BY NEUTRON CAPTURE THERAPY USING BORON¹⁰. J. T. Godwin, L. E. Farr, W. H. Sweet and J. S. Robertson. Cancer 8, 601(1955).

6589
FURTHER STUDIES ON THE RADIOSENSITIVITY OF THE ANALOGOUS MOUSE MAMMARY TUMORS dbrB AND C3H. Anna Goldfeder. Radiology 47, 845-63(1951).

The growth rates of mammary adenocarcinomas of mice were studied before and after irradiation. Chalkley's method (J. Nat. Cancer Inst. 4, 47-53(1943-44)) was applied for quantitative evaluation of growth activity of the tumors, taking the mitotic index as the criterion. A depression in mitotic activity in the irradiated tumors was noted, the extent of which depended upon the dose of radiation applied and the lapse of time between exposure and removal of the tumors for analysis. An earlier and more pronounced return of mitotic activity was noted in the faster-growing dbrB type tumors following sublethal doses of radiation, as compared with the slower-growing C3H type. The levels of the phosphorylated intermediates in the glycolytic cycle for the two mouse mammary adenocarcinomas were determined. The more rapidly growing mammary tumor (dbrB) shows significantly higher levels of glucose-1-phosphate, adenosine triphosphate, and possibly glycogen, and a lower level of inorganic phosphorus than the slower-growing C3H tumor. These findings strongly suggest that a higher level of energy is available for vital function in the dbrB tumor. Some of the compounds encountered in the phosphorylated glycolytic cycle, particularly adenosine triphosphate, may be more readily affected by irradiation in the C3H tumor than in the dbrB tumor. The metabolic processes were operative even after such large doses as 30,000 r for the dbrB tumor and 12,000 r for the C3H, although these doses proved to be lethal for their respective growth activities. Successful application in radiotherapy and advantages of applying large doses of x rays through small portals exposing only the tumor is discussed. NSA 6-1091

6590
IMMEDIATE EFFECT OF X-RAYS ON THE MOVEMENTS OF LARVAE AND PUPAE OF MOSQUITOES. F. Goldhaber and B. Feldman-Muhsam. Nature 153, 528(1944).

During x-ray experiments with larvae and pupae of mosquitoes, irradiated specimens were observed to accelerate their movements immediately after the onset of irradiation. When the irradiation was interrupted, they

returned at once to normal behavior. This phenomenon was studied in detail, with a radiation intensity of 38,000 r/min. Results are presented graphically. Activity is increased during irradiation by 20-60 movements per minute.

6591
EFFECT OF INTRA-UTERINE RADIUM THERAPY ON OVARIAN FUNCTION. G. Goldscheider. *Lancet* 1, 521-3 (1949).

The dose of intra-uterine radium given for benign menorrhagia did not produce an artificial menopause except in women of menopausal age, where a small dose might influence ovarian function. Radiation of the ovaries with x rays results in menopause. (from author's summary).

6592
STRAHLENDOSIS AND STRAHLENWIRKUNG. B. Rajewsky. (George Thieme Verlag, Stuttgart, Germany, 184pp., 1954).

6593
EXPERIMENTS ON THE ACTION OF X-RAYS ON THE RETICULO-ENDOTHELIAL SYSTEM. I. Gounaris. *Internat. Congr. Radiol.*, 6th Congress, London, 1950. p. 173.

The effects of large and small doses of x-irradiation on the metabolism of alcohol by the reticulo-endothelial system were studied in dogs and sheep.

6594
RATE OF ELIMINATION OF C^{14} ADMINISTERED AS $BAC^{14}O_3$. J. Govaerts. *Science* 111, 467-9 (1950).

After a brief review of previous work, experiments are described in which nine mice received intravenous injections of a fine suspension of $BAC^{14}O_3$ in isotonic glucose in order to deposit the barium carbonate in the lungs in a time determined by preliminary experiments. The animals were placed in metabolic cages for the duration of the experiments. Expired CO_2 , urine, and feces were collected and analyzed for counts. After the animals were sacrificed, the lungs, kidney, liver, and spleen were removed and prepared for assay using the Van Slyke-Foche method. The data are presented graphically and discussed; the author concludes that most of the C^{14} absorbed by the organism as barium carbonate is expired by the lung as $C^{14}O_2$, and that the dangers to those who work with C^{14} are not so great as expected. NSA 4-4541

6595
Brookhaven National Lab., Upton, N. Y.
MODIFYING DISEASE RESISTANCE THROUGH RADIATION. John W. Gowen. p. 55-8 of CONFERENCE ON BIOLOGICAL APPLICATIONS OF NUCLEAR PHYSICS: JULY 12-27, 1948. July 1948. 154p. (BNL-C-4).

6596
MUTATION IN DROSOPHILA, BACTERIA, AND VIRUSES. John W. Gowen. Cold Spring Harbor Symposia Quant. Biol. 9, 187-93 (1941).

The spontaneous frequency of mutations in viruses, bacteria and *Drosophila* is small but may be increased in all three types of organisms by comparable amounts following comparable doses of x rays. This indicates a common basic structure for inheritance among the organisms.

6597
THE USE OF ANTIHISTAMINE OINTMENT IN CONJUNCTION WITH DEEP X-RAY THERAPY. Louis J. Gelber. N. Y. Physician 34, 22, 24, 46, 48 (1950).

Five case reports are presented to demonstrate the efficacy of anti-histamine ointments in reducing undesirable skin reactions during radiation therapy.

6598
Tennessee Univ., Knoxville
AGRICULTURAL RESEARCH PROGRAM, SEMI-ANNUAL PROGRESS REPORT FOR JANUARY 1, 1956 TO JUNE 30, 1956. 65p. Contract AT-40-1-Gen-242. (ORO-160).

Includes reports on: factors influencing the excretory pattern of Cs^{134} and K^{42} in swine; and effects of irradiation on swine and burros. (For preceding period see ORO-150). NSA 11-5134

6599
EXPERIMENTS ON THE IRRADIATION OF LIVING PROTOPLASM OF THE CELL: X-RAY EFFECTS ON EXTRANUCLEAR CELL CONSTITUENTS. E. H. Graul. *Internat. Congr. Radiol.*, 6th Congress, London, 1950. p. 172.

6600
THE EFFECT OF IONIZING RADIATIONS ON THE BROAD BEAN ROOT. V. THE LETHAL ACTION OF RADIATIONS. L. H. Gray, John Read and M. Paynter. *Brit. J. Radiol.* 16, 125-8 (1943).

The relative efficiencies of x rays, γ rays, neutron and α particles in terms of the lethal effects on bean roots (mean lethal dose) were determined. Implications of the observed results for therapeutic applications of radiation are discussed.

6601
THE INFLUENCE OF RADIATION QUALITY ON RADIO-BIOLOGICAL RESPONSE. L. H. Gray. p. 48-9 of *Internat. Congr. Radiol.*, 6th Congress, London, 1950.

6602
THE POSITION EFFECTS BAR, WHITE-MOTTLED AND CUBITUS INTERRUPTUS IN *DROSOPHILA MELANOGASTER*. A. B. Griffen, Mary Warters and James D. Mohler. *Genetics* 35, 112 (1950).

Comparisons of x ray induced reversals of position effects of Bar, white and ci loci indicate that each locus may revert to wild type action either by mutation or by new chromosome associations resulting from chromosome rearrangements. In the case of B^S , mutation accounts for about one third of the phenotypic changes from B^S to wild type. (from authors' summary).

6603
PRELIMINARY YIELD EXPERIMENTS WITH TEN INDUCED MUTATIONS IN BARLEY. Ake Gustafsson. *Hereditas* 27, 337-59 (1941).

Ten fertile mutations obtained from x raying Golden barley were compared with Golden and Maja varieties for yield and other characteristics. Seven mutant forms yielded less, but three equalled or surpassed the mother strain. Other characteristics which were changed in both directions from Golden were grain size and weight, number of ripe kernels, germination ripeness and protein and starch content. BA 16-3568

6604
Chicago. Univ. Metallurgical Lab.
EFFECTS OF TOTAL BODY X IRRADIATION ON RATS. PART I. LETHAL ACTION OF SINGLE, PAIRED, AND PERIODIC DOSES. Charles W. Hagen, Jr. and Eric L. Simmons. June 17, 1947. Decl. Aug. 18, 1947. 36p. (MDDC-1210, CH-3815).

Part I of this report was issued as NNEs-IV-22B. Data are presented from a number of studies on the biological effects of various doses of external x and γ radiation on laboratory animals. Data are included on the physiological effects of ionizing radiation in animals, studies in porphyrin metabolism, the effects of total-body irradiation on growth, organ weight, susceptibility to parasites, blood picture, liver function, and body water content; the effects of age on radiosensitivity; and the effects of rate of exposure on radiosensitivity. Related studies reported include the preparation of samples of morphologically intact leukocytes from peripheral blood and the use of ion exchange resins for the purification of urinary purines, kynurenic acid, and coproporphyrin. Numerous references, and author and subject indexes are included.

6605

Argonne National Lab. Lemont, Ill.
EFFECTS OF X RAYS ON RABBITS. PART I. MORTALITY AFTER SINGLE AND PAIRED DOSES. C. Hagen and G. Sacher. December 9, 1946. Decl. Aug. 29, 1947. 35p. (MDDC-1252, CH-3754).

Analysis of mortality statistics for 227 young adult rabbits receiving single x ray exposures shows that there were 3 distinct modal times of death in the first days after exposure and that males and females differed with respect to their contributions to the three. The LD₅₀ for the entire group (males and females) was 800 r. Other conclusions based on statistical analysis are also presented and discussed.

6606

RADIOBIOLOGICAL STUDY ON TISSUE CULTURES. L. Halberstaedter and L. Doljanski Arch. exptl. Zellforsch. Gewebezücht. 19, 475-97(1937).

Tissue cultures of the heart of 8 day chick embryos were exposed to β and γ radiation *in vitro*. Effects on amount and pattern of growth and lethal effects on the cells are described. NSA 5-5240

6607

INFLUENCE OF COLCHICINE ALONE AND COMBINED WITH X RAYS ON PARAMECIUM. L. Halberstaedter and A. Back. Nature 152, 275-6(1943).

The immediate lethal dose was approximately 50% smaller for Paramecia that had been maintained for 48 hours in solutions of colchicine prior to exposure than for Paramecia in standard culture medium without colchicine.

6608

THE METABOLISM OF THE RADIOACTIVE ELEMENTS CREATED BY NUCLEAR FISSION. Joseph G. Hamilton. New Engl. J. Med. 240, 863-70(1949).

6609

California. Univ., Berkeley. Radiation Lab.
MEDICAL AND HEALTH DIVISIONS QUARTERLY REPORT, JANUARY, FEBRUARY, MARCH 1949. PART I. PROGRESS REPORTED ON TRACER STUDIES CONCERNED WITH METABOLISM ON ND¹⁴⁷, PR¹⁴³, Sr¹⁶³, AND GA⁶⁷. PART II. BIOLOGICAL STUDIES OF RADIATION EFFECTS. J. G. Hamilton. (nd). 88p. (UCRL-332).

Includes reports on: tissue distribution studies for Nd¹⁴⁷, Sr⁸⁹⁻⁹⁰, Sn¹¹³, Ga⁶⁷, metabolic effects of Zr⁹⁵, efficacious effects of radioisotope therapy with respect to blood clotting defects in leukemia and polycythemia, effects of total body x-irradiation and of I¹³¹ therapy.

6610

STUDIES ON THE EFFECTS OF X-RADIATION ON MORPHOGENESIS OF AMBLYSTOMA PUNCTATUM. S. W. Handford. Anat. Record 103, 540(1949).

Embryos at various stages of development were x irradiated with 264 r of 260 kv x rays (air dose). The earlier the stage, the greater and more generalized were the developmental defects and the shorter the survival time. Types of defects characteristic of the various developmental stages at the time of exposure are listed.

6611

Rochester, N. Y. Univ.
THE EFFECT OF SHORT WAVELENGTH RADIATIONS ON HUMAN FINGER RIDGE DETAIL. R. A. Harvey. nd. Decl. Aug. 27, 1946. 33p. (MDDC-216).

Atrophy of finger print ridges were found in 68% of radiologists, 55% of orthopedists using fluoroscopes; 40% of dentists who held film routinely when x raying teeth and 1.8% of controls Personnel of the Manhattan project were also studies. Implications of the findings for employee safety programs are stressed.

6612

Rochester, N. Y. Univ.
THE EFFECT OF ACUTE AND CHRONIC DOSES OF

ROENTGEN RAYS ON MONKEY FINGER RIDGE DETAIL. R. A. Harvey. n.d. Decl. Aug. 12, 1946. 16p. (MDDC-215).

Within the time limits of these experiments: 1. Acute roentgen exposures up to 800 r cause no detectable gross changes in finger ridge details of monkeys. Acute doses of 800 r to 1,100 r result in temporary atrophy of ridges. Acute doses above this level cause more severe atrophy, slower regeneration, less complete regeneration and some tendency to secondary weakening of detail. 2. Chronic roentgen exposures of 10 r per day for 50 treatments cause no change in ridge detail. Chronic exposures of 20 r or more per exposure for 50 exposures cause detectable weakening which like that following acute exposures is more severe with increasing dosage, shows a slower tendency to regenerate, less complete regeneration and more secondary weakening. 3. Similar total doses of acute and chronic roentgen exposure yield more severe initial changes in ridge details with acute than chronic exposure, less complete regeneration with chronic than acute exposure, and slightly more secondary weakening of ridge detail with chronic than acute exposure. The results of these experiments are similar to those observed in humans, but the dose of roentgen rays necessary to produce minimal changes in monkeys and man may not be very close, for the skin on the volar surface of a monkey's finger is much tougher than that of a human.

6613

EFFECTS OF HIGH ENERGY TOTAL-BODY GAMMA IRRADIATION OF THE BRAIN AND PITUITARY GLAND OF MONKEYS. W. Haymaker, F. S. Vogel, J. Cammermeyer and W. J. H. Nauta. Am. J. Clin. Pathol. 24, Suppl., 70(1954).

Author describes lethality and histological changes in brains and pituitary glands of young adult male monkeys exposed to 1000-30,000 r (air dose).

6614

EFFECTS OF IRRADIATION OF THE NERVOUS SYSTEM. FINAL REPORT, PREPARED FOR THE COMMITTEE ON PATHOLOGICAL EFFECTS OF ATOMIC RADIATION, NATIONAL ACADEMY OF SCIENCES NATIONAL RESEARCH COUNCIL. Webb Haymaker. Armed Forces Institute of Pathology, Washington, D. C. (1956).

Reports pathological changes occurring in the nervous system following exposure to various forms of radiation and dose levels at which they occur.

6615

LATE RADIATION DAMAGE OF THE SKIN AND NERVE ENDINGS. F. John. Strahlentherapie 76, 271-306(1946). (In German).

Degeneration of myelin and axis cylinders in cutaneous nerves of the axillary region were observed 17 years after therapeutic irradiation of the axilla.

6616

INFLUENCE OF RADIOACTIVE MATERIALS ON THE NERVOUS SYSTEM. L. van der Horst. Deut. Z. Nervenheilk. 151, 63(1940). (In German).

"Cats and rats given radioactive water to drink have developed, after a few weeks, changes not unlike those in chronic lead poisoning, which is understandable from the decay of the water into stable lead." (Quotation of report of this reference is from Haymaker, W., page 19 in: Effects of Irradiation of the Nervous System, reference number 6614 in this bibliography.)

6617

ACTION OF FILTERED RADIUM RAYS WHEN APPLIED DIRECTLY TO THE BRAIN. V. Horsley and N. S. Finzi. Brit. Med. J. Volume 898(1910/11).

6618

SEMICARBAZONE OF ADRENOCHROME AND X-RAYS. A. Herve. Arch. intern. pharmacodynamie 85, 242-4 (1951).

Oral administration of the semicarbazone of adrenochrome to mice reduced the purpura produced by x rays, did not prolong survival.

6619

THE INFLUENCE OF X-RAYS ON HYDROGEN ION CONCENTRATION IN TISSUES UNDER VARIOUS EXPERIMENTAL CONDITIONS. T. Hornykiewytch. Intern. Congr. Radiology, 6th Congress London, 1950. p. 166-7.

Author measured pH in subcutaneous tissues of rat's thigh after single dose of 4000 r (x rays) and observed: initial acidity followed by alkalinity for about 3 days subsequently followed by 4 further alkaline "waves" at intervals of 5-6 days. Alkaline waves are not apparently related to erythema. The author also studied changes in pH following total body exposure to 200 r of x rays. Physicochemical changes are discussed and observed changes are compared with those following ultrasonic treatment

6620

Rochester, N. Y. Univ.

THE EFFECTS OF IRRADIATION FROM THE ATOMIC BOMB ON THE JAPANESE. J. W. Howland and S. L. Warren. (nd). Decl. Sept. 15, 1947. 21p. (MDDC-1301, Cancer Research 6, 449(1946)).

A brief description is given of the medical effects following the atomic explosions at Hiroshima and Nagasaki. A discussion of the immediate clinical human pathology resulting from blast and burns is included. The effects of acute whole body irradiation on the human are considered in detail as well as pertinent observations on living individuals observed one year later. The comparative clinical and pathological effects of whole body irradiation on animals are given briefly. The pathological findings on tissues sensitive to irradiation namely lymphatic system, bone marrow, gastrointestinal canal and gonads are discussed. Photographs are included.

6621

EFFECT OF NICOTINAMIDE ON LOCAL TOLERANCE OF THE SKIN AND DEEP TISSUES TO X-RAYS. E. Huant. Gaz. hopitauz (Paris) 120, 313-14(1947).

Administration of nicotinamide during x ray therapy increased skin tolerance by 50-75% in 70% of 110 patients.

6622

THE DEPENDENCE OF X-RAY ERYTHEMA ON WAVE LENGTH. J. C. Hudson. Radiology 29, 95-8(1937).

The erythema dose of x rays varying between 200 kv, 0.5 mm Cu filter and 100 kv, unfiltered is shown to depend chiefly on absorption of the x rays of varying wave lengths by tissue.

6623

OCCUPATIONAL TUMORS AND ALLIED DISEASES. W. C. Heeper and Charles C. Thomas, Springfield, Illinois (1942).

6624

BETA IRRADIATION OF THE EYE. W. F. Hughes, Jr. and C. E. Illiff. Am. J. Ophthalmol. 32, 351-60(1949).

Beta particles of radon represent a concentrated source of irradiation which is largely absorbed within the first 2 mm of tissue and is therefore useful in the treatment of superficial conditions of the lid, the conjunctiva, cornea, and sclera. The effective use of β -irradiation in ophthalmology depends upon an exact knowledge of the differential between the sensitivity of normal tissues and the pathologic tissues to be destroyed. In general, lymphoid tissues (the follicles in vernal conjunctivitis), epithelial growths (papillomas), and vascular endothelium (in corneal vascularization) form the most sensitive tissues which can be destroyed by β -irradiation without undue injury to the normal ocular structures. Because of the great sensitivity of the corneal epithelium and stoma cells, direct irradiation over the

cornea should be used with caution. Corneal vascularization is best obliterated by irradiation over the scleral portion of the limbus. An ocular condition associated with great cellular destruction or pyogenic infection may respond poorly to β -irradiation. NSA 2-1696

6625

THE EFFECT OF BETA IRRADIATION ON THE RABBIT'S EYE. W. F. Hughes, Jr. and C. E. Illiff. Am. J. Roentgenol., Radium Therapy 56, 502-12(1946).

Low doses of β radiation affect primarily the epithelium; larger doses all of the conjunctiva and cornea, but not the iris or lens. An initial latent period, which varies inversely with dose, is followed by disorganization of corneal epithelium, loss of epithelial cell cytoplasm, altered chromatin, loss of stomal cells, desquamation of corneal endothelium and edema of the stroma, relatively little inflammatory response, secondary iritis and late regenerative changes. Effects of repeated doses are cumulative.

6626

SULFUR-35 AS A MUTAGENIC AGENT. F. P. Hungate and T. Mannell. Genetics 36, 555-6(1951).

Neurospora crassa was grown on Fries Medium in which sulfur-35 was substituted for normal sulfur. When radioactive sulfur was undiluted with non-radioactive sulfur, a recovery of more than 10% biochemical mutants was obtained even when radiation was less than 10,000 reps. When non-radioactive sulfur was present, the mutation rate was reduced, suggesting that mutations may be induced not only by ionizing beta particle but also by transmutation itself.

6627

Rochester, N. Y. Univ.

REPORT OF INDUSTRIAL TOLERANCE CONFERENCE JANUARY 23-24, 1945. Decl. April 28, 1950. 95p. (AECD-2832).

The main purpose of this conference was to consider the validity and usefulness of the currently accepted human tolerance dosages for x- and γ -radiation, namely, 0.1 r/day for an unlimited length of exposure. Papers were presented on the following subjects: chronic experiments correlating near-tolerance dosages with survival, blood changes, aging, genetic mutations, and skin changes, the mechanism of radiation effects, and the human tolerance dose. NSA 4-3579

6628

VITAMIN B₁ IN IRRADIATION SICKNESS. A. E. Imler and H. Wammock. Am. J. Roentgenol. Radium Therapy 43, 243-8(1940)

Symptoms of irradiation sickness were alleviated in most of 21 patients treated with daily injections of 3000 IU of vitamin B₁. Response to oral administration was slower than response to subcutaneously injected vitamin.

6629

California. Univ., Berkeley Radiation Lab.

THE UPTAKE BY PLANTS OF PLUTONIUM AND SOME PRODUCTS OF NUCLEAR FISSION ADSORBED ON SOIL COLLOIDS. L. Jacobson and R. Overstreet. [nd]. Decl. June 5, 1947. 8p. (MDDC-1006). Soil Sci. 65, 128-34 (1948).

Barley and pea plants take up the fission elements Y, Ce, Zr + Nb, Te, Sr and the three valence states of Pu, even when these elements are present in trace amounts on surfaces of clay or soil particles. Greatest fixation is in or on roots. With exception of Sr, translocation occurs only to a limited extent. Activity levels of 0.1 microcurie per gram soil are sufficient to cause very pronounced injury over a three-month period.

6630

Argonne National Lab. Lemont, Ill. Chicago University Metallurgical Lab.

EFFECTS OF X RAYS ON RABBITS. PART III. THE HEMATOLOGICAL EFFECTS OF TOTAL BODY X IRRADIATION IN THE RABBIT. L. O. Jacobson, et al. July 1946. 46p. (MDDC-1174; CH-3798).

The hematological constituents of the peripheral blood have been studied in Swift snuffle-free rabbits before and after the administration of acute total body X-irradiation. Doses of 25 r to 800 r were administered and studies made through 96 days in many experiments. From the observations made, the conclusions derived are: A significant non-mochromic anemia develops in groups of rabbits exposed to 500 and 800 r. A significant anemia develops only in individual animals within a group with doses below 500 r. Reticulocyte reduction is significant with doses of 100 r and above. An initial leucocytosis, significantly greater than controls, occurs within the first 24 hours after doses of 500 r. After 500 r and 800 r, a sharp rise in leucocytes occurs by 12 hours, followed by a decline and another peak of leucocytes at 24 hours. The leucocytosis during this period is due exclusively to an increase in heterophils. Lymphocytes decrease significantly within 24 hours after exposure to 25 r and above. Reduction is apparent 3 hours after irradiation with 100 r and above, with a minimum value at from 24 to 48 hours. Recovery proceeds slowly. Supravital staining (Janus green and neutral red) reveals an increase in neutral red granules after 200 r and above. Mitochondrial changes are variable. Monocytes decrease initially but return to normal limits or are increased by 4 to 6 days after 200 r and above. Heterophil values increase initially after 500 and above. No significant reduction was observed with doses of 300 r and below. Doses of 500 r to 800 r inclusive produce a significant depression within 96 hours, with recovery by 23 days or less. Platelet values are reduced in a manner paralleling the granulocytes. An "abortive rise" in lymphocytes and heterophils between the 4th and 11th day after X-irradiation characteristically precedes recovery with doses of 200 r and above, respectively. Morphological changes in erythrocytes, leucocytes, and platelets occur after doses of 100 r and above. The lymphocyte values of the peripheral blood are the most sensitive known indicator of effect of acute total body X-irradiation. A bibliography of 59 references is included.

6631

THE EFFECT OF TOTAL BODY X-IRRADIATION ON A PRE-EXISTING ANEMIA. Leon O. Jacobson, Edna K. Marks and E. L. Simmons. J. Lab. Clin. Med. 32, 341(1947).

6632

Argonne National Lab., Lemont, Ill. Chicago University Metallurgical Lab.
COMPARATIVE ACTION OF CYCLOTRON FAST NEUTRONS AND X RAYS. II. HEMATOLOGICAL EFFECTS PRODUCED IN THE RABBIT BY FAST NEUTRONS. L. O. Jacobson and E. K. Marks. June 1946. Decl. Oct. 8, 1947. 35p. (MDDC-1372, CH-3839).

Methods of preparing anhydrous uranium trichloride, uranium tetrachloride, uranium hexachloride, and uranyl chloride are described which use uranium metal as the starting material. Uranium trichloride has been prepared by the action of hydrogen chloride on uranium hydride or powdered uranium metal at 250°C. The tetrachloride has been made by reaction of chloride with the trichloride and by direct reaction of chloride (diluted by an inert gas) on uranium hydride. The hexachloride has been prepared only by disproportionation of chlorides having a chlorine to uranium ratio of around 5.5. Uranyl chloride was found to be most satisfactorily made by the reaction of uranium tetrachloride and oxygen at 300°C. The densities of these compounds and of the pentachloride have been

measured by the liquid displacement method and also determined from X-ray diffraction data. The densities in g/cm³ obtained by liquid displacement method are 5.35 for uranium trichloride, 4.88 for the tetrachloride, 3.81 for the pentachloride, 1.56 for the hexachloride, and 5.38 for uranyl chloride, all at 25°C. The densities based on X-ray measurements are 5.51 for the trichloride, 4.87 for the tetrachloride, and 5.43 for uranyl chloride. Vapor pressure measurements have been made for uranium tetrachloride and uranium hexachloride by the transpiration method. The vapor pressure of the tetrachloride is 0.9 mm at 450°C and 100 mm at 675°C; that of the hexachloride is 0.06 mm at 75.5°C and 1.75 mm at 138°C. Uranium tetrachloride melts at 590°C and boils at 802°C under 740 mm pressure. There is X-ray and thermal evidence for a crystal transformation in uranium tetrachloride at 545°C. The reaction between chlorine and uranium tetrachloride or uranium trichloride has been shown to produce higher uranium chlorides in which the chlorine to uranium ratio varies with the reaction temperature. Corrosion studies have been made on nickel and stainless steel and some refractory materials at 600°C. A bibliography of 39 references is included.

6633

Argonne National Lab., Lemont, Ill.
THE EFFECT OF TOTAL BODY X IRRADIATION AND P³² ON THE PERIPHERAL BLOOD OF NORMAL RATS AND RATS WITH COBALT INDUCED POLYCYTHEMIA. L. O. Jacobson, et al. Mar. 1948. Decl. Apr. 20, 1948. 2p. (AEC-2014, ANL-HDY-472).

6634

EFFECT OF ROENTGEN RAYS ON THE PERIPHERAL NERVE OF THE RAT. A. H. Janzen and S. Warren. Radiology 38, 333-7(1942).

6635

IRRADIATION SICKNESS IN RATS. C. G. Johnson, C. F. Vilter and T. D. Spies. Am. J. Roentgenol. Radium Therapy 56, 631-9(1946).

6636

X-RAY SKIN REACTIONS AND THE PROTECTIVE ROLE OF NORMAL TISSUES. Benjamin Jolles. Brit. J. Radiol. 14, 110-12(1941).

Rat skin was x irradiated with all factors kept constant except the size of the field exposed. This variable was found to have profound influence on the reaction severity of damage increasing with increasing field size even though the dose per unit area remained constant.

6637

EFFECTS OF PARTIAL TELEROENTGENTHERAPY ON THE HEMATOLOGIC PICTURE. J. Jovin and N. Gingold. Bull. Acad. Med. Roumaine 4, 279-83(1939).

6638

APPLICATION OF RADIOACTIVE ISOTOPES TO THE STUDY OF RADIATION EFFECTS IN CELLS. M. D. Kamen. Radiology 49, 223-30(1947).

6639

LOCAL IRRADIATION AND THE INDUCTION OF LYMPHOID TUMORS IN MICE. Henry S. Kaplan. Cancer Research 9, 621(1949).

Strain A mice and strain C57 black mice were studied following exposure of anterior or posterior half of the body to radiation. Lymphoid tumors developed in only 2 to 55 strain 57 black mice 17 months after treatment over the anterior or posterior half of the body with daily doses of 100 r for 10 days. Larger doses localized to mediastinum or upper abdomen produced no lymphoid tumors in either strain, and mice of strain A were completely refractory to local treatment over skull or lower abdomen.

6640

INDUCED CHROMOSOMAL BREAKS IN DROSOPHILA. Berwind P. Kaufmann. Cold Spring Harbor Symposia Quant Biol. 9, 82-92(1941).

6641

Brookhaven National Lab., Upton, N. Y.
RADIATION INDUCED CHROMOSOME ABERRATIONS. Berwind P. Kaufmann. p. 27-36 of CONFERENCE ON BIOLOGICAL APPLICATIONS OF NUCLEAR PHYSICS; JULY 12-27, 1948. July 1948. 154p. (BNL-C-4).

This report considers the problem of inducing structural rearrangements in Drosophila chromosomes, especially the susceptibility of various regions of the chromosomes to the effects of various types of radiation. The importance of near-infrared radiation in studies of breakage and recombination is stressed. This radiation modifies processes that lead to structural rearrangements but not processes responsible for gene mutation.

6642

INFLUENCE OF TEMPERATURE ON CHROMOSOME RECOMBINATION FOLLOWING X-RAY-INDUCED BREAKAGE. Berwind P. Kaufmann. Records Genetics Soc. Am. 12, 50(1943).

Increased temperature during chromosome recombination following x ray-induced breaks facilitates movements that result in reunion of broken ends. (Chromosomes of Drosophila sperm.)

6643

THE INFLUENCE OF ROENTGEN RAYS ON THE GLUCEMIC AND CHOLESTEROLEMIC EQUILIBRIUM. E. Liverani. Arch. farmacol. sper. 52, 55-66(1931). (In Italian).

In rabbits, irradiation in any region resulted in increased blood sugar and blood lipids. Increase was more pronounced and more lasting when irradiation was over liver region.

6644

THE INDUCTION AND INHERITANCE OF MUTATIONS IN PARAMECIUM AURELIA. R. F. Kimball. Genetics 33, 616(1948).

6645

EFFECT OF EXERCISE UPON THE LETHALITY OF ROENTGEN RAYS FOR RATS. D. J. Kimeldorf, D. C. Jones and M. C. Fishler. Science 112, 175-6(1950).

Lethality of roentgen rays at 600 r, 700 r and 860 r was increased by the repeated performance of vigorous exercise following irradiation. Authors suggest that increased mortality observed with animals exercised after irradiation provides additional evidence of the relation between radiosensitivity and metabolic level.

6646

THE EFFECT OF LOW TEMPERATURE UPON THE FREQUENCY OF X-RAY INDUCED MUTATIONS. Edward D. King. Genetics 32, 161-4(1947).

The frequency of lethal mutations induced in Drosophila by x ray doses of 600-3000 r was higher when irradiation was carried out at room temperature than when exposure was at 0.5°C. Average increment with the higher temperature was 2.3X. At both temperatures, the dose-effect curves were linear.

6647

GENETIC CHANGES ACCOMPANYING THE UPTAKE OF P^{32} BY DROSOPHILA MELANOGASTER. R. C. King. Genetics 35, 118-19(1950).

6648

TISSUE DISTRIBUTION OF PETEOSTHOR AND ITS COMPONENTS THORIUM X AND PLATINUM IN THE GROWING ORGANISM AND THE INFLUENCE OF THORIUM X ON EPIPHYSEAL PLATE GROWTH IN THE YOUNG RABBIT. Wilhelm Koch. Strahlentherapie 85, 253-89 (1951).

6649

THE HISTOLOGICAL STUDY OF THE EFFECT OF X-RAYS ON THE CENTRAL NERVOUS SYSTEM OF RABBITS. R. Koidumi. Zentr. Radiol. 24, 661(1937). (In German).

6650

THE EFFECTS OF RADIATION ON REPRODUCTIVE ORGANS. A. Glucksmann. Brit. J. Radiol. Suppl. 1-3, 101(1947-50).

The effects of ionizing radiation on fertility in mice, rats, insects and man are reviewed in light of the physiology of reproduction in the various species. Effects on sperm and ova at various stages of development, permanent vs. temporary sterility and the question of germinal selection are discussed.

6651

TREATMENT OF FUNCTIONAL DISORDERS OF THE FEMALE BY RADIATION OF THE PITUITARY GLAND. J. Kotz and E. Parker. Southern Med. J. 33, 832-9 (1940).

6652

EXPERIMENTAL INVESTIGATION OF THE EFFECT OF X-RAYS ON ANIMAL TISSUES. P. Krause and K. Ziegler. Fortschr. Roentgenstrahlen 10, 126(1906). (In German).

Authors describe their clinical and histological observations on an extensive series of experimentally x irradiated mice, rats, guinea pigs, rabbits and dogs.

6653

Argonne National Lab., Lemont, Ill. Univ. of Chicago
THE EFFECT OF LETHAL DOSE OF TOTAL BODY X-RAY ON URIC ACID AND ALLANTOIN EXCRETION IN DOGS. H. Krizek, I. Silverbach and S. Schwartz. June 15, 1946. Decl. Jan. 15, 1948. 28p. (MDDC-1647, CH-3851).

6654

Argonne National Lab., Lemont, Ill.
ACUTE HEMATOLOGIC RADIATION RESPONSE OF THE GUINEA PIG AS A FUNCTION OF LETHALITY. Austin M. Brues and Leola Reitz. p. 188-9 of BIOLOGICAL AND MEDICAL DIVISIONS. QUARTERLY REPORT AUGUST 1948 to NOVEMBER 1948. Austin M. Brues and Hermann Lisco. Nov. 1, 1948. 210p. (ANL-4227).

6655

EFFECT OF COLCHICINE PRETREATMENT ON THE FREQUENCY OF CHROMOSOMAL ABERRATIONS INDUCED BY X-RADIATION. Robert T. Brumfield. Proc. Natl. Acad. Sci. U. S. 29, 190-3(1943).

Treatment of onion roots for 45 minutes with a 0.05% solution of colchicine prior to x radiation resulted in less than one-third as many chromatid aberrations as found in non-colchicine treated controls. The frequency of x ray induced chromosome effects was about the same in pretreated roots and controls. Colchicine pretreatment presumably reduces amount of chromosome movement in prophase where chromatid effects are induced, thus resulting in less opportunity for fusion of broken ends into new combinations. (from author's summary).

6656

THE EFFECT OF X-RAY IRRADIATION UPON THE LUMBOSACRAL REGION OF THE AXOLOTL (SIREDON MEXICANUM). V. V. Brunst. Anat. Record 103, 430-1(1949).

6657

PROBLEMS RELATIVE TO POSSIBLE PHYSIOLOGICAL EFFECTS CAUSED BY RADIATION. Fred A. Bryan. Ind. Med. 17, 367-71(1948).

The author discusses problems related to the use and manufacture of radioactive materials.

6658

ADDITIONAL INFORMATION ON THE BLOOD VESSEL CHANGES IN THE ROENTGEN IRRADIATED TISSUE. F. Windholz. Strahlentherapie 59, 662-70(1937). (In German).

6659

Argonne National Lab., Lemont, Ill.

ELIMINATION OF INTRAVENOUS CARBON¹⁴BICARBONATE BY MAN. Donald L. Buchanan. Feb. 1951. 1p. (AECU-1262, UAC-359). J. Clin. Invest **30**, 630-1(1951).

Following intravenous injection of tracer doses of NaHC¹⁴O₃ (or inhalation of comparable doses) normal humans at rest exhaled 75% of the dose during the first hour, 90% within 2 hours and 95% within 3 hours.

6660

RESISTANCE OF COENZYME A TO RADIATION. J. W. Gardella and E. J. Lichtler. Federation Proc. **15**, 70(1956).

Studies on the effects of radiation on coenzyme A were carried out on pigeon liver and Yoshida ascites tumor cells (*in vitro*) and on tissues from rats, mice and ducklings subjected to total body irradiation.

6661

THE EFFECT OF HEAVY METAL SALTS ON X-RAY INDUCED MUTATIONS IN DROSOPHILA MELANOGASTER. EXPERIMENTS USING URANYL ACETATE. W. Buchmann and G. Sydow. Biol. Zentr. **60**, 137-42(1940).

Mutation rate and lethality induced by 3000 r x ray dose were greater in *Drosophila* fed with medium containing 1% uranylacetate than in *Drosophila* fed on standard medium.

6662

INCREASE OF X-RAY INDUCED MUTATION RATE AS AFFECTED BY HEAVY ATOM SALTS INTRODUCED INTO THE ORGANISM. Walter Buchmann and Karl G. Zimmer. Z. Induktive Abstammungs- u. Vererbungslehre **79**, 192-8 (1941).

The rate of induction of lethal mutations in *Drosophila* is increased by feeding the flies Pb acetate before irradiation. The increase varies with x ray wave length in accordance with the mass absorption coefficient of Pb. In contrast, feeding Fe to the flies produces an increased incidence of mutations that does not conform to results expected on the basis of the mass absorption coefficient of Fe, indicating that the effect of Fe feeding cannot be accounted for simply on the basis of increased physical absorption of energy.

6663

Washington Univ., St. Louis. School of Medicine. METABOLISM OF ANTIGENIC I* PROTEINS, EFFECT OF ANTIGEN AND HOST ALTERATION. S. C. Bukantz, F. J. Dixon, G. J. Dammin, and D. W. Talmage. nd. 2p. (AECU-1239).

X ray doses of 300 r or more did not alter the nonimmune rate of elimination of labeled antigen by rabbits although the immune response was suppressed. Other observations are also described.

6664

A NOTE ON TUMORS IN MICE. H. Burrows and W. V. Mayneord. Am. J. Cancer **31**, 484-5(1937).

Spindle cell sarcomata were induced in mice injected subcutaneously with cholesterol which had been irradiated with x rays in doses of 2000-110,000 r.

6665

THE INTEGRAL DOSE RECEIVED FROM A UNIFORMLY DISTRIBUTED RADIOACTIVE ISOTOPE. F. Bush. Brit. J. Radiol. **22**, 96-105(1949).

Methods of calculation of the integral dose received in simple geometrical bodies containing a uniformly distributed γ -ray emitting radioactive isotope are described, and a general relation between this dose and the volume, and the elongation of the body, deduced. These calculations have been extended to the case of a "patient", composed of cylinders and elliptical cylinders. A table is given, showing the integral dosage-rates in patients of different heights and weights from a uniformly distributed γ -ray emitter. The effect of variation in the quantum energy of

the emitted radiation on the integral dose is examined. An expression is found which gives the fraction of the energy due to β -particle emission which is lost from the surface of the patient or animal. This loss may be important in the case of small animals. NSA 2-1280

6666

CHROMOSOME ABERRATIONS INDUCED IN ANIMAL CELLS BY IONIZING RADIATIONS. Berwind P. Kaufmann. page 627 in: RADIATION BIOLOGY, VOL. 1. (Hollaender, Alexander, Editor) McGraw-Hill Book Co., Inc., New York (1954).

Major subtopics are: nature of induced rearrangements, methods of diagnosis, process of structural rearrangement, breakage process, effect of ploidy, relative sensitivity of chromosomes in different types of cells of the same species, changes in sensitivity of chromosomes in cells of the same type, chemical and cytochemical studies.

6667

SOME RECENT STUDIES ON THE PRODUCTION AND GROWTH CHARACTERISTICS OF ASCITES TUMORS. G. Klein. Z. Krebsforsch. **61**, 99-119(1956).

This is a review article describing origin, characteristics and responses of ascites tumors as influenced by irradiation.

6668

OBSERVATIONS ON THE HISTOGENESIS OF OVARIAN TUMORS PRODUCED IN MICE BY X-RAYS. J. S. Butterworth. Am. J. Cancer **31**, 85-99(1937).

6669

THE INFLUENCE OF HEAT TREATMENTS ON THE INJURY AND CYTO-GENETIC EFFECTS OF X-RAYS ON BARLEY. Richard S. Caldecott and Luther Smith. Genetics **36**, 546(1951).

Heat treatments alone had no influence on injury, chromosomal aberrations or mutations. Heat treatments before x-radiation (15,000 r) reduced injury. Effect on injury was more variable if x-radiation was followed by heat. In some cases injury was more and in others less than that resulting from x-radiations alone. Combination treatments resulted in a decrease in chromosomal aberrations and an increase in mutations.

6670

Argonne National Lab., Lemont, Ill.

THE EFFECTS OF IRRADIATION ON THE BLOOD AND BLOOD FORMING TISSUES. S. T. Cantril, L. Jacobson and J. J. Nickson. Jan. 11, 1943. Decl. Apr. 6, 1946. 33p. (MDDC-991, CH-410).

6671

RADIATION-INDUCED MUTATIONS IN MAMMALIAN TISSUES: THE EFFECT OF CHRONIC LOW-DOSE-RATE GAMMA-IRRADIATION ON THE MUTATION RATE OF VISIBLE MUTANTS IN MALE MICE. T. C. Carter. Internat. Congr. Radiol., 6th Congress, London, 1950. p. 46.

6672

THE MODIFICATION OF THE BIOLOGICAL REACTION OF LIVING TISSUE TO X-RADIATION BY PHYSICAL AND CHEMICAL AGENTS. J. R. Carty. Radiology **15**, 353-9 (1930). NSA 5-5240

6673

TYPES OF CHROMOSOME STRUCTURAL CHANGE INDUCED BY THE IRRADIATION OF TRADESCANTIA MICROSPORES. D. G. Catcheside, D. E. Lea and J. M. Thoday. J. Genetics **47**, 113-36(1946).

6674

THE PRODUCTION OF CHROMOSOME STRUCTURAL CHANGES IN TRADESCANTIA MICROSPORES IN RELATION TO DOSAGE, INTENSITY AND TEMPERATURE. D. G. Catcheside, D. E. Lea and J. M. Thoday. J. Genetics **47**, 137-49(1946).

6675

Brookhaven National Lab., Upton, N. Y.
PRODUCTION OF MUTATIONS BY IONIZING RADIATIONS.
Ernst Caspari. p. 21-6 of CONFERENCE ON BIOLOGICAL
APPLICATIONS OF NUCLEAR PHYSICS, JULY 12-27,
1948. July 1948. 154p. (BNL-C-4).

6676

SUPP. TO HEREDITAS BACTERIAL MUTATIONS FOR
RESISTANCE TO RADIATIONS AND TO NITROGEN MUSTARD.
L. L. Cavalli, and N. Visconti di Modrone. Proc. Intern.
Congr. Genetics, 8th Congress, Stockholm, 1948. p. 550-1
(1949).

6677

TREATMENT OF GRAVES' DISEASE WITH RADIOACTIVE
IODINE. E. M. Chapman. Western J. Surg. Obstet.
Gynecol. 56, 47-51(1948).

6678

BIOLOGICAL EVALUATION OF 20 MILLION VOLT
ROENTGEN RAYS. II. DECOLORATION OF HAIR IN MICE.
H. B. Chase, Henry Quastler and L. S. Skaggs. Am. J.
Roentgenol. Radium Therapy 57, 359-61(1947).

6679

THE BIOLOGICAL ACTION OF RADIATIONS IN RELATION
WITH CERTAIN PROBLEMS OF EXPERIMENTAL PATHOLOGY.
E. Ciaranfi. Quaderni sez. perugina soc. ital. biol. sper.
2(1949).

This is a review article, including discussion of the
mechanism of radiation effects on single celled plants
and animals as well as on complex multicellular organisms.
Cellular effects in multicellular organisms and genetic
effects are also included.

6680

A SURVEY OF THE BIOLOGICAL EFFECTS OF X-
RADIATION. George L. Clark. Radiology 26, 295-312
(1936).

This is a review article.

6681

RADIOSENSITIVITY OF HAPLOIDS AND DIPLOIDS OF
HABROBRACON. A. M. Clark and C. J. Mitchell. Genetics
36, 547(1951).

Dosage-eclosion curves show that diploids are more
resistant to x rays than haploids at all stages of pupal
development. Data are presented to show that a correlation
exists between the genome number and radiosensitivity,
suggesting that the deleterious action of radiation upon
somatic tissues may be due to injury to the genetic
mechanism.

6682

THE BIOLOGICAL EFFECTS OF RADIATION. Janet
Howell Clark. Ann. Rev. Physiol. 1, 21-40(1939).

A review, chiefly of work published between January
1936 and July 1938. 94 references.

6683

PATHOLOGICAL CHANGES IN NEURONS, NEUROGLIA
AND BLOOD-BRAIN BARRIER INDUCED BY X-IRRADIATION
OF HEADS OF MONKEYS. C. D. Clemente and E. A.
Holst. Arch. Neurol. Psychiat. 71, 66(1954).

6684

Argonne National Lab., Lemont, Ill.
PROGRESS REPORT (HISTOPATHOLOGY). Arthur M.
Cloudman, S. Phyllis Stearner, Katherine Hamilton, John
Sackis and Dorothy Vining. p. 102-115 of BIOLOGICAL AND
MEDICAL DIVISIONS QUARTERLY REPORT NOVEMBER
1948 TO FEBRUARY 1949. Austin M. Brues and Hermann
Lisco. Feb. 1, 1949. 183p. (ANL-4253).

Includes reports on; simultaneous exposure of mice
to methylcholanthrene and a β emitter (with respect to
tumor induction), histopathological studies on mice treated
with fractionated and duration-of-life exposure to x rays,

effect of dosage rate on survival following exposure to
large x ray doses.

6685

ACUTE TOXICITY OF ZIRCONIUM, COLUMBIUM,
STRONTIUM, LANTHANUM, CESIUM, TANTALUM AND
YTTRIUM. Kenneth W. Cochran, John Doull, Marcella
Mazur and Kenneth P. DuBois. Arch. Ind. Hyg. Occupational
Med. 1, 637-50(1950).

Aqueous solutions or suspensions of compounds of
Zr, Nb, Sr, La, Cs, Ta, and Y were administered in
single doses by intraperitoneal injection or orally by stomach
tube to male and female rats. Observation was made for
10 days, since the animals either recovered or succumbed
during this period. The LD₅₀ values are given for the
various compounds used. Differences in these values
are pointed out for the several compounds of each element
studied, and the dependence of these values on the route
of administration (oral or injection) is discussed. 28
references. NSA 4-4504

6686

MINIMAL AMOUNT OF X-RAY EXPOSURE CAUSING LENS
OPACITIES IN THE HUMAN EYE. G. D. Cogan and K. K.
Dreisler. A. M. A. Arch. Ophthalmol. 50, 30(1953).

6687

A NOTE ON THE ACTION OF GAMMA RAYS ON THE
NERVE CELLS OF AUERBACH'S AND MEISSNER'S
PLEXUS. H. A. Colwell and R. J. Gladstone. Brit. J.
Radiol. 9, 620(1936).

Degenerative and destructive changes were observed
in the ganglion cells of Meissner's plexus a few days
after exposure to radiation from 246 mg radium.

6688

RADIUM, X-RAYS AND THE LIVING CELL. H. A. Colwell
and S. Russ. G. Bell and Sons, London, England (1924).

6689

X-RAYS AND RADIUM INJURIES: PREVENTION AND
TREATMENT. H. W. Colwell and S. Russ. London, Oxford
Univ. Press (1934).

6690

COBALT METABOLISM STUDIES. II. PARTITION OF
RADIOACTIVE COBALT BY A RUMEN FISTULA COW.
C. L. Comar, George K. Davis, Ruth F. Taylor, C. F.
Huffman and Ray E. Ely. J. Nutrition 32, 61-8(1946).

6691

COBALT METABOLISM STUDIES. I. RADIOACTIVE COBALT
PROCEDURES WITH RATS AND CATTLE. C. L. Comar,
George K. Davis and Ruth F. Taylor. Arch. Biochem. 9,
149-58(1946).

6692

COBALT METABOLISM STUDIES. IV. TISSUE DISTRIBUTION
OF RADIOACTIVE COBALT ADMINISTERED TO RABBITS,
SWINE AND YOUNG CALVES. C. L. Comar and George K.
Davis. J. Biol. Chem. 170, 377-89(1947)

6693

COBALT METABOLISM STUDIES. III. EXCRETION AND
TISSUE DISTRIBUTION OF RADIOACTIVE COBALT AS
ADMINISTERED TO CATTLE. C. L. Comar and George
K. Davis. Arch. Biochem. 12, 257-66(1947).

6694

EFFECT OF RADIUM ON THE MITOCHONDRIA OF PLANT
CELLS. P. F. Milovidov. Compt. rend. soc. biol. 101,
676-8(1929). (In French)

Seedling roots of *Pisum sativum* were studied in an
apparatus permitting measurement of micrometric displacement.
The roots, in a moist atmosphere, were placed next to or
in contact with a tube of RaCl for 1, 2 or 5 hours. In
stained sections of exposed roots there were no mitoses
after 5 hr exposure, mitochondrial structure was altered
and vesicular changes were observed. Other changes

included atypical mitoses, abnormal chromosomes and abnormal chromosome distribution. Mitochondria appeared to be less sensitive than the nucleus to β and γ rays in contrast to their greater sensitivity to pressure, heat and many chemicals.

6695

Chicago. Univ. Toxicity Laboratory.
QUARTERLY PROGRESS REPORT NO. 4 ON RADIO-BIOLOGY. Julius M. Coon. Jan. 15, 1950. 88p. (TID-364).

This report is composed of sections entitled as follows: Continuous Exposure of Animals to Gamma Radiation, The Toxicity of Gamma Radiation to Mice Exposed at Varying Dose Rates, Changes in the Distribution of Phosphorus in Irradiated Rabbit Bone Marrow, Studies on the Metabolism and Toxicity of Radioactive Metals, Studies on the Mechanism of Acute Beryllium Poisoning. III-The Effects of Beryllium on Phosphatases and on Intermediary Carbohydrate Metabolism, Studies on the Carbohydrate Metabolism of the Rabbit Ileum, The Effect of Beryllium Chloride in Locke-Ringer Solution upon the Isolated Rabbit Ileum and Heart, Effect of X-Radiation on Intestinal Cathepsins, Effect of Vitamin B 12 on X-Ray Toxicity to Mice, Further Studies on the Action of Beryllium Chloride, Some Notes on the Sampling of Aerosols by Impaction Methods. NSA 4-3842

6696

California. Univ., Berkeley, Radiation Lab.
THE EFFECT OF AGE AND LOW PHOSPHORUS RICKETS ON CALCIFICATION AND THE DEPOSITION OF CERTAIN RADIOACTIVE METALS IN BONE. D. H. Copp, J. G. Hamilton, D. C. Jones, D. M. Thomson, and C. Cramer. Sept. 1951. 31p. (UCRL-1464).

The effect of age and low-P rickets on the retention of Ca^{45} , $\text{Sr}^{89, 90}$, Ba^{140} , Y^{88} , and Ce^{144} in bone was investigated. The radioactive metals were injected into young growing rats in which there was active growth of new bone, young rats with low-P rickets in which new osteoid matrix was forming but deposition of bone salt did not take place, and mature adult rats in which bone growth had practically ceased. Urine and feces were collected separately and the animals were sacrificed after 8 days. Excreta and tissues were analyzed for radioisotope and radioautographs prepared for thin undecalcified sections of bone. Data indicate the metabolism of Ca, Sr, and Ba was markedly affected by age and low-P rickets, while metabolism of other heavy metals such as Y and Ce was not affected. Radioautographs of rachitic femur show that $\text{Sr}^{89, 90}$ and Ca^{45} were deposited only in the presence of bone salt, while Y^{88} and Ce^{144} and other heavy metals were also laid down in uncalcified osteoid matrix. Kinetic studies of skeletal uptake and excretion of radiocalcium and radiostrontium showed considerable mineral exchange, even in adult rats. Skeletal uptake was more rapid and greater in growing animals, and the radioactive isotopes remained fixed in the new bone salt. In rachitic rats the initial uptake by bone was rapid, but Ca^{45} or $\text{Sr}^{89, 90}$ was then rapidly lost from the skeleton and excreted in urine. When normal animals were injected with Ca^{45} or $\text{Sr}^{89, 90}$, and then fed a diet low in P, the excretion of the radioactive isotopes in urine was increased, and removal from the skeleton was accelerated. NSA 5-6951

6697

THE DEPOSITION OF RADIOACTIVE METALS IN BONE AS A POTENTIAL HEALTH HAZARD. D. H. Copp, D. J. Axelrod and J. G. Hamilton. Am. J. Roentgenol. Radium Therapy 58, 10-16 (1947).

6698

SUBACUTE TOXICITY OF RADIOACTIVE PHOSPHORUS AS RELATED TO THE COMPOSITION OF THE DIET. W. E. Cornatzer, George T. Harrell, Jr., David Cayer and Camillo Artom. Proc. Soc. Exptl. Biol. Med. 73, 492-5 (1950).

In the present investigation the subacute toxicity of P^{32} given parenterally to mice (in one dose in the form of Na_2HPO_4) was studied in relation to the possibility that changes in the composition of the diet might modify the action. It was found that in mice maintained on a 10% casein, 32% fat diet, the LD_{50} dose at the 21st day was 4 to 6 μc of P^{32} /g of body weight, neither the fatty infiltration of the liver or its prevention (by supplementing the diet with choline) changed the survival figures. The survival time of the mice was highest when they were maintained on a diet low in fat and protein and was significantly decreased when the level of either the fat or the protein or both was increased in the diet. Enrichment of the diets with inorganic phosphate seems to afford a moderate degree of protection against the injurious action of P^{32} . NSA 4-3357

6699

THE INFLUENCE OF THE COMBINED ACTION OF LIGHT AND X-RAYS ON THE ROOT GROWTH OF VICIA FABA VULGARIS. P. Cotter and W. Minder. Schweiz. med. Wochschr. 77, 195-7 (1947).

6700

THE DIFFERENTIAL EFFECT OF RADIUM RADIATION ON THE CARBOHYDRATE METABOLISM OF NORMAL AND TUMOR TISSUES IRRADIATED AT LOW TEMPERATURES. H. G. Crabtree. Biochem. J. 29, 2334-43 (1935).

6701

THE INFLUENCE OF WAVE LENGTH ON THE BIOLOGICAL EFFECTIVENESS OF RADIATION. Herbert G. Crabtree and L. H. Gray. Brit. J. Radiol. 12, 39-53 (1939).

Authors studied the rate of aerobic glycolysis (at 3-8°C) in rat retinas exposed to β , γ and x rays. Since the tissue consists of non-dividing cells, the observed effects were not secondary to effects on mitosis. There was no difference in effects of equal doses of the various radiations. BA 13-5470

6702

Naval Medical Research Inst., Bethesda, Md.
THE DIAGNOSIS OF IONIZING RADIATION INJURY BY PHYSICAL EXAMINATION AND CLINICAL LABORATORY PROCEDURES. REPORT NO. 8. Eugene P. Cronkite. April 8, 1948. 15p. (NP-573).

6703

Naval Medical Research Inst., Bethesda, Md.
RADIOLOGY AND RADIOACTIVITY EFFECTS OF WHOLE BODY IRRADIATION. E. P. Cronkite and George Brecher. Nov. 15, 1951. 25p. (NP-3796; Lecture and Review Series 51-11; R6317). NSA 6-5549

Biological effects of whole-body irradiation are reviewed. Topics covered include dose measurements and lethal dose, survival time and clinical syndromes, intestinal injury, bone marrow injury, anemia, hemorrhage, infection, late effects, modification of response, and mechanics of protective action. A brief discussion of the medical aspects of atomic warfare is included. 165 references.

6704

California. Univ., Berkeley. Radiation Lab.
THE METABOLISM OF CARRIER-FREE Be^7 IN THE RAT. Josephine F. Crowley, Joseph G. Hamilton and Kenneth G. Scott. July 15, 1948. Decl. Sept. 3, 1948. (AECD-2254, UCRL-148).

Recent studies have shown that the soluble Be compounds are toxic, and the toxicity is a function of both Be and the anionic part of the molecule. Acute beryllium poisoning manifests itself in at least three organ systems of the body, midzonal necrosis of the liver, necrosis of the distal third of the proximal convoluted tubule of the kidney, and poisoning of the hemopoietic system leading to anemia and leucocytosis. Owing to the necessity of using at least micrograms of material when studies are made with stable isotopes of beryllium, it is difficult to measure the normal

metabolism of beryllium because of its toxicity. When a radioactive isotope of this element is used the actual number of beryllium atoms which can be traced is reduced by a factor of at least 10^6 . For this reason it is possible to ascertain the manner in which the normal animal handles extremely minute amounts of beryllium which are far below the possible levels of chemical toxicity. The metabolism of beryllium in the rat has been investigated with tracer amounts of carrier-free Be^7 . About one half microcurie of Be^7 in an isotonic solution was administered to each rat via intramuscular injection. Within 24 hours 40% of the Be^7 had been absorbed from the injection site and 53% of the absorbed Be^7 had been eliminated from the body, mainly in the urine. By the 64th day after injection, a total of 80% had been absorbed from the injection site and 70% had been eliminated from the body. Of the absorbed Be^7 which remained in the body, the major portion was taken up by bone. Within 24 hours after injection, the bone had accumulated 29.4% of the absorbed Be^7 and maintained this level to the 64th day, when the bone contained 26.9% of the absorbed material. Many of the soft tissues of the body demonstrated a small initial uptake followed by a ten fold decrease in Be^7 content by the 64th day. The radioberyllium content of the spleen and muscle remained relatively constant throughout the interval of the experiments. Less than 0.1% of the Be^7 administered orally was absorbed from the intestinal tract. NSA 1-1092

6705

DISTRIBUTION OF RADIOACTIVE COBALT IN THE RAT. W. F. J. Cuthberston, Audrey A. Free and Doreen M. Thornton. *Brit. J. Nutrition* 4, 42-8 (1950)

6706

THE BIOLOGICAL EFFECTS OF RADIATION. Howard J. Curtis. *Ann. Rev. Physiol.* 13, 41-56 (1951).

Review with 142 references.

6707

LOCATION OF BREAKS INDUCED BY X-RAYS IN CHROMOSOME OF TRITICUM. A. Da Camara, M. Wagner, and A. Garde. *Proc. Intern. Congr. Genetics*, 8th Congr., Stockholm, 1948. p. 555 (1949).

6708

STUDIES ON X RAY SENSITIZATION. S. A. Nikitin. *Zhur. Eksptl. Biol. i med.* 11, 28-33 (1929). (In Russian)

Free living protozoa are not sensitive to x rays.

CA 24-1876

6709

PHENOMIC DELAY IN RADIATION-INDUCED REVERSION OF *E. COLI* AUXOTROPHS TO NUTRITIONAL INDEPENDENCE. B. D. Davis. *Genetics* 35, 661-2 (1950).

Tryp-strain 19-2 irradiated in washed suspension and plated on minimal medium, shows little induced reversion. A trace of tryptophan produces up to 300-fold increases in revision rate with irradiated inocula. Similar delay is encountered with x-irradiation, but does not produce a photochemically reversible mutagen. Other observations are also presented.

6710

LEUKOPENIA DUE TO X-RAYS. PROPHYLAXIS AND THERAPY WITH VITAMIN C (ASCORBIN). R. deCarlos. *Gazz. sanit.* 18, 92-7 (1947).

Author describes results of therapeutic trial of vitamin C in 30 patients receiving treatment for cancer of various organs. Daily doses of 50 mg were administered

6711

CHANGES IN THE PROTEIN CONTENT OF BLOOD AS A RESULT OF IRRADIATION OF THE SKELETON WITH X-RAYS. G. G. Deho. *Rass. fisiopatol. Clin. e terap.* (Pisa) 21, 817-28 (1949).

Ten of 14 patients with dorsolumbar arthrosis irradiated with low doses of x rays showed increased

total protein of serum. Increase was most remarked in the globulin fraction. The total protein levels before irradiation were relatively high (6.0 8-9.29 gm%).

6712

RADIOBIOLOGICAL OBSERVATIONS. G. Dell'Acqua. *Strahlentherapie* 65, 189-92 (1939).

Authors studied effects of radium and Roentgen irradiation on carbohydrate metabolism in healthy and diabetic subjects. Data are presented on blood levels of glucose, Na, Cl, cholesterol and uric acid.

6713

A COMPARISON BETWEEN THE X-RAY INDUCED AND THE SPONTANEOUS NOTCHES. M. Demerec. *Genetics* 25, 115-16 (1940).

Cytogenetic studies were carried out on salivary gland chromosomes of *Drosophila* with x ray induced and spontaneous Notch abnormalities.

6714

EFFECTS OF P^{32} ON REGENERATING AMPHIBIAN TISSUES. J. N. Dent. *Anat. Record* 103, 439 (1949).

An abstract.

6715

THE EFFECT OF FAST ELECTRONS FROM A 6 MEV-BETATRON ON HUMAN SKIN. Richard Kurt Depp. *Internat. Congr. Radiol.*, 6th Congress, London, 1950. p. 165.

6716

Argonne National Lab., Lemont, Ill.
BIOLOGICAL EFFECTS OF LONG CONTINUED WHOLE BODY IRRADIATION WITH GAMMA RAYS ON MICE, GUINEA PIGS, AND RABBITS, PART IV. BIOLOGIC ACTION OF GAMMA RADIATION ON THE BREEDING BEHAVIOR OF MICE. M. K. Deringer, W. B. Heston, and E. Lorenz. Oct. 25, 1947. *Decl. Aug.* 4, 1947. 30p. (MDDC-1247, CH-3729).

These experiments were designed to study the effects of continuous exposure to gamma radiation of low intensity on LAF_1 hybrid mice with respect to: (1) sterility (2) dominant mutations, particularly dominant lethals as evidence by reduced size of the litters of irradiated mice and (3) genetic changes (translocations) in the progeny of the irradiated mice. Female mice exposed to total doses of 770 r and 880 r on the 8.8 r and on the 4.4 r per 24 hours per day, and on the 8.8 r per 8 hours per day levels showed sterility effects, some producing litters of reduced size and others being sterile. Females exposed to a total dose of 550 r on the 4.4 r per 8 hours per day level bred but with reduced litter size. Male mice receiving a total dose of 1,760 r at a rate of 8.8 r per 8 hours per day were sterile on removal from the field but regained fertility in two months. Males receiving total dose of 880 r and 1,100 r on the 8.8 r per 8 hours per day level bred normal size. Males receiving total doses up to 1,100 r on the 4.4 r per 8 hours per day and on the 4.4 r per 24 hours per day levels bred comparably to the controls. Breeding results obtained for female mice on 1 hour, 8 hour, and 24 hour exposures do not differ significantly and failed to demonstrate any effect of the rate of administration of the dose. Female mice exposed to a single dose of 300 r whole body X radiation at the rate of 41 r per minute produced one litter of reduced size and were sterile thereafter. The sterilized females did not recover their fertility but the males did. Breeding results for female mice exposed to a total dose of 440 r at the rate of 4.4 r per 24 hours per age failed to show any age effects. No evidence for the production of genetic changes was obtained in mice receiving chronic exposures, or for the production of translocations in the offspring of male mice receiving a total dose of 1,100 r at the rate of 8.8 r per 8 hours per day or of female mice receiving a total dose of 770 r at the rate of 8.8 r per 24 hours per day.

6717

RADIOACTIVE GOLD Au^{198} AND ARTICULATIONS. P. Desai and J. Closon. *J. belge Radiol.* 24, 438-44(1951).

6718

GENERAL DISCUSSION. CIBA FOUNDATION SYMPOSIUM ON IONIZING RADIATIONS AND CELL METABOLISM. G. DeHevesy, A. Hollaender, P. Alexander, A. Haddow, W. M. Dale, B. E. Holmes, G. Popjak, H. Laser, R. Latarjet and J. S. Mitchell. p.300-308. Little, Brown and Co. Publisher 1956.

6719

QUANTUM PHYSICS OF THE BIOLOGICAL ACTION OF X-RAYS. F. Dessauer. *Z. Physik.* 84, 218-21(1933). *Nucleonics* 8, 54(1951).

6720

THE PRODUCTION OF GIANT SPERMATOCYTES IN *PHILOSAMIS CYNTHIA* BY MEANS OF X-RAYS. P. H. Diderer. *J. Morphol.* 67, 159-73(1940).

Pupae were removed from cocoons and irradiated with 2000, 5000 or 8000 r x ray doses, then fixed and studied 5-10 weeks after exposure. The major effect was the production of giant spermatids, the number produced being directly proportional to dose. Giant spermatocytes were mono-, bi- or multi-nucleate.

6721

X-RAY INDUCED MUTATIONS IN DRIED BACTERIA. P. Devi, G. Pontecorvo and C. Higginbottom. *Nature* 160, 503-4(1947)

6722

SEPARATION, CONCENTRATION AND TRANSFUSION OF PLATELETS. G.H.L. Dillard, G. Brecher, and E. P. Cronkite. *Proc. Soc. Exptl. Biol. Med.* 78, 796-9(1951).

A method for obtaining concentrated preparations of viable platelets is given, and the therapeutic administration of such preparations to irradiated dogs is described.

6723

Oak Ridge National Lab., Tenn
PROTECTION OF ALPHA-CHYMOTRYPSIN AGAINST GAMMA RADIATION. David G. Doherty. [nd]. 1p.

6724

TISSUE DEGENERATIONS (PHYTOCARCINOMA) PRODUCED BY RADIUM IN ANTIRRHINUM AND THEIR HEREDITY. E. Stein. *Biol. Zentr* 50, 129-58(1930).

Further information about tissue degeneration induced through radium irradiation in Antirrhinum (phytocarcinoma) and its inheritance is presented.

6725

ACTION OF ULTRAVIOLET RAYS ALONE OR WITH X-RAYS ON GERMINATION. J. Cluzet and Kolman. *Compt. rend. soc. biol.* 101, 820-1(1929). (In French).

6726

THE EFFECT OF X RAYS ON THE PROCESS OF ENZYME FORMATION IN THE ISOLATED CELLS OF THE PANCREAS. A. I. Bogayevskii and B. Goldstein. *Zhur. Eksptl. Biol. i Med.* 9, 328-34(1928). (In German).

X irradiation of perfused pancreas resulted in increased amylase and lipase in perfusate, larger doses decreased activity of the glands.

6727

EFFECT OF SOFT X-RAYS ON YEAST. F. Holweck and Lacassagne. *Compt. rend. soc. biol.* 103, 60-2(1930).

6728

ACTION OF X-RAYS UPON THE BLOOD AND THE HEMATOPOIETIC ORGANS AFTER REPEATED TOTAL-BODY IRRADIATIONS (EXPERIMENTAL STUDY). J. Ducuing, P. Marques and O. Miletzky. *J. radiol. electrol* 31, 666-71(1950).

6729

THE USE OF AUTORADIOGRAPHS IN THE QUANTITATIVE DETERMINATION OF RADIATION DOSAGE FROM Ca^{45} IN BONE. R. A. Dudley and B. M. Dobyns. *Science* 109, 327-8(1949).

An autoradiographic technique capable of quantitatively measuring local dosage rates in tissue, currently being applied to the study of radioactive Ca^{45} dosages in bone, is described. The technique is similar to that described by Axelrod and Hamilton [*Amer J Path* 23 389 (1947)] in their radioactive sulfur and arsenic studies of mustard gas and lewisite concentration in the skin and eye tissues. It consists of making an autoradiograph of the tissue being studied, producing calibration exposures from radioactive sources of known activity on the same film, developing the tissue and calibration exposures simultaneously, and comparing their blackening microphotometrically. The application of the technique to studies on the Ca^{45} bone-uptake in the dog is discussed and autoradiographs and a microphotometer record obtained in such experiments are given. It is noted that, if the same dilution that exists in dogs also exists in humans, the maximum local dosage rate would be a permissible 0.034 reps/day. NSA 2-2040

6730

ASPECTS OF THE RADIOSENSITIVITY OF SEEDS PRIOR TO THE APPEARANCE OF MORPHOLOGICAL CHANGES. J. Lambert. *Compt. rend. soc. biol.* 110, 583-6(1932). (In French).

Pea seedlings were irradiated either in the dry state or after hydration and the length of the seedling roots was measured 12 days after germination. Hydrated seeds were more radiosensitive than were dry ones. Chemical composition did not change after hydration, except for the hydration per se. Author attributes the increased radiosensitivity associated with hydration to altered metabolic state ("dynamic processes") of the seeds and sites studied in other laboratories demonstrating the parallelism between catalysis of oxidation-reduction systems and water inhibition in support of his thesis.

6731

THE EFFECT OF RADIOACTIVITY ON CHLOROPHYLL-CONTAINING THE NON-CHLOROPHYLL CONTAINING CELLS. J. Stoklass, J. Penkava, and J. Bares. *Sbornik Ceskoslov. akad. zemedelske* 2, 57-104(1928).

The authors demonstrated that all enzymic processes were stimulated by the α rays of radon when it was released from the soil in sufficient amounts and in the presence of sufficient oxygen. Under the proper conditions, the intensity of respiration by chlorophyll-containing and non-chlorophyll-containing plants was found to be stimulated. The β and γ rays were found to activate primarily the glycolytic enzyme and to account for the intensive respiration of organisms having a high K content. They were also found to be, in some respects, antagonistic to α rays in their action. The β rays effect (at the cell surface) was the promotion of synthetic processes, α rays promoted decomposition of organic complexes and probably promoted oxidation by releasing Fe in the process (from abstract in CA). CA 22-4580

6732

THE BIOLOGICAL BASIS OF RADIATION THERAPY. F. Ellinger. Berlin, Germany, and Vienna, Austria, Urgan and Schwarzenberg (Strahlentherapie, Sonderband 20) (1935). (In German). Elsevier Publishing Co., N. Y. (1941). (English).

6733

DIRECT OR INDIRECT ACTION OF ROENTGEN RAYS ON THE BRAIN? F. Ellinger. *Am. J. Roentgenol.* 47, 775 (1942).

6734

SYSTEMS. E. L. Powers. (Argonne National Lab., Lemont, Ill.). p.17-29 of A CONFERENCE ON RADIOACTIVE ISOTOPES IN AGRICULTURE HELD AT MICHIGAN STATE UNIVERSITY ON JANUARY 12, 13, AND 14, 1956. Jan. 1956. 420p. (TID-7512).

Literature pertaining to effects of radioactive decay in cell systems is reviewed and results of experiments with *Paramecium aurelia* are described. Evidence is presented to show that P^{32} incorporation into animal protoplasm is much more efficient in bringing about post-autogamous death than is Sr^{89} - Sr^{90} mixture at similar dose levels. Unlike P^{32} , Sr^{89} - Sr^{90} is not incorporated into protoplasm at critically important sites and differences in biological effectiveness of the isotopes are probably due to differences in their intracellular localization.

6735

THE EFFECT OF ROENTGEN RAYS ON THE STOMACH IN RABBITS. R. B. Engelstad. Am. J. Roentgenol. Radium Therapy 49, 243-63(1938).

Doses of 125-4500 r were delivered to the stomachs of rabbits. Doses of 2000 r or more caused a high mortality. Reaction in the first 24 hr was characterized by degeneration of lymphoid follicles and hyperemia. This was followed by a latent period and then by severe degenerative and inflammatory changes.

6736

EXPERIMENTAL INVESTIGATIONS ON THE EFFECTS OF ROENTGEN RAYS ON THE SUPRARENAL GLANDS IN RABBITS. R. B. Engelstad and O. Torgersen. Acta Radiol. 18, 671-87(1937).

Histological changes in the adrenals of 41 rabbits examined 4 hr - 6 mo after (localized) exposure to single x ray doses of 2000-2500 r are described in detail.

6737

MECHANISM OF THE EFFECT OF X-RAYS ON BACTERIAL TOXINS. Erela Ephratl. Biochem. J. 42, 383-9(1948).

Staph. hemolysin is more x ray sensitive than is tetanus toxin and purified toxin is more sensitive than unpurified. Antigenicity and toxicity are destroyed simultaneously. The x ray effect is indirect, through ionization, leading to oxidation or reduction. Various proteins are effective as protective agents.

6738

IN VITRO AND IN SITU ACTION OF IONIZING RADIATIONS ON NUCLEA-PROTEINS OF THE CELL NUCLEUS. M. Errera. Cold Spring Harbor Symposia Quant. Biol. 12, 60(1947).

6739

Argonne National Lab., Lemont, Ill.
BIOLOGICAL EFFECTS OF LONG CONTINUED WHOLE BODY IRRADIATION WITH GAMMA RAYS ON MICE, GUINEA PIGS, AND RABBITS, PART V. A. B. Eschenbrenner. Sept. 17, 1946. Decl. Jan. 24, 1947. 46p. (MDDC-642; CH-3644).

Histologic observations in animals exposed to long continued irradiation with γ rays were the following. Mice: -The lymphoid tissue was only affected in the 2.2 r, 4.4 r, and 8.8 r levels but changes observed initially did not progress with increasing total dose. Malignant lymphoma (leukemia), which was associated in only a small number of cases with a lymphomatosis in the circulating blood, involved all lymphoid tissues frequently with local invasiveness and metastases of many organs. The interstitia tissue of the testes appeared unaffected for the highest accumulated doses (approx. 5000 r). Damage to the testes was restricted to the tubules and the various spermatogenic elements, but even at the highest total doses occasional spermatogonia or spermatocytes, but no spermatozoa, were found. Damage to testes is dependent upon dose

rate rather than total dose. Damage to the ovaries is dependent upon total dose and is irreversible. It consists of diminution in the number of follicles and final disappearance of these structures followed by tubular down-growth of the germinal epithelium, and finally the development of several types of ovarian tumors. In a few cases of sarcoma at the site of the mammary gland was associated with the ovarian tumors. Guinea pigs: -The most important changes were observed in the blood forming organs. All animals of the 8.8 r and most of the animals of the 4.4 r and 2.2 r levels died of anemia and thrombocytopenia. Bone marrow in these animals was aplastic to varying degree. The testes were as radiosensitive as those of mice and showed a similar picture of damage. Ovaries were not affected and showed numerous developing follicles even for total doses as high as 4000 r. Lung tumors were observed in two animals that were exposed to total doses of 4000 r. These tumors were of alveolar origin.

6740

Argonne National Lab., Lemont, Ill.
FURTHER STUDIES OF THE EFFECT OF TOTAL-BODY IRRADIATION ON THE TESTES OF MICE. Allen B. Eschenbrenner. p. 28-35 of EXPERIMENTAL NUCLEAR PHYSICS DIVISION REPORT FOR JANUARY, FEBRUARY AND MARCH 1949. Apr. 4, 1949. Decl. Dec. 13, 1955. 82p. (ANL-4277).

6741

ACTION OF X-RAYS ON NUCLEIC ACID METABOLISM IN JENSEN SARCOMA. Hans von Euler and Georg V. Hevesy. Arkiv. Kemi, Mineral. Geol. 17A(1944).

6742

THE ACTION OF RADIUM EMANATION ON BACTERIA. H. Schroetter. Centr. Bakteriell Parasitenk. I. Abt. Orig. 104, 205-10(1927). (In German)

Ra emanation causes hyperthrophy of bacterial cells.

6743

TOXICITY OF ALPHA AND FAST NEUTRON RADIATION. R. D. Evans. Nature 146, 621(1940)

Results of experiments on neutron tolerance in animals cannot be accurately extrapolated to man because the relative radiation sensitivities are not known for small doses. The average specific ionization of the neutron recoil rays is closer to that of alpha rays than to any other radiation studied extensively in biological systems.

6744

TISSUE DOSAGE IN RADIO-ISOTOPE THERAPY. R. D. Evans. Am. J. Roentgenol. Radium Therapy 58, 754-6(1947).

6745

THE EFFECT OF X RAYS AND RADIUM ON THE BLOOD FORMATION DURING INCUBATION OF CHICK EGGS. M. M. Fomenko. Zhur. Eksptl. Biol i Med. 8, 354-9 (1928). (In German)

X-rays and Ra inhibit development of chick eggs, especially the development of erythrocytes. The younger the cell, the more sensitive it seems to be.

6746

RELATION BETWEEN THE ACTION OF COLD AND OF NITROGEN IN DECREASING THE FREQUENCY OF CHROMOSOME ABERRATIONS. A. C. Faberge. Genetics 35, 663(1950).

The frequency of chromosome breaks in x irradiated *Tradescantia* can be reduced by irradiating at very low temperatures or in the absence of O_2 . The author discusses the mechanism of modification of x ray effects by the two procedures, pointing out that the data available suggest an indirect effect of radiation, e.g. spread of effect around an ion cluster. The target theory is not compatible with those views.

6747

A THEORY OF THE BIOLOGICAL ACTION OF IONIZING RADIATIONS. G. Failla. in: SOME FUNDAMENTAL ASPECTS

OF THE CANCER PROBLEM. Publ. Am. Assoc. Adv. Sci. 4, 202-14(Suppl. Science, 85(1937)).

Author presents his theory of a mechanism which accounts for initial swelling of cells and nuclei and predicts the influence such a mechanism would have on normal physiological processes. According to the theory, radiation would be expected to exert its greatest effect on nuclei. Direct "hits" are important in damaging a very small entity in the cell and may cause localized damage of the cell membrane. Diffusion of chemical products of the breakdown of organic molecules is facilitated by thermal agitation and also by biological activity during which there is increased motion of fluids in protoplasm ("fluid flow" theory of biological action of ionizing radiations).

6748

BIOLOGICAL EFFECTS OF IONIZING RADIATIONS.

G. Failla. J. Applied Phys. 12, 279-95(1941).

6749

A CONVENIENT DOSAGE UNIT FOR RADIOACTIVE ISOTOPES INTERNALLY ADMINISTERED. G. Failla. Phys. Rev. 69, 691(1946).

6750

Rochester, N. Y. Univ.

CALCIUM EXCHANGE AS THE MECHANISM FOR ADSORPTION OF THE RADIOACTIVE ISOTOPE BY BONE. Marlene Falkenheim, Elizabeth E. Underwood and Harold C. Hodge. Dec. 1, 1948. 20p. (AECU-95) J. Biol. Chem. 188, 805-17(1951).

6751

MEASUREMENTS OF THE FREQUENCY OF DOMINANT LETHALS INDUCED IN SPERM OF DROSOPHILA MELANOGASTER BY X-RAYS. U. Fano and M. Demerec. Genetics 26, 151(1941).

The fraction of eggs which after fertilization by x rayed sperms fail to give rise to adult flies has been taken as an indicator of dominant lethals. Production of dominant lethals is proportional to x ray dose for small dose and for high dose. Dose-effect curve does not fit the "single hit" type of curve. Percentage of dominant lethals produced by 1000 roentgens is too large to be accounted for by production of inviable chromosome aberrations.

6752

NEUTRON CAPTURE THERAPY WITH BORON IN THE TREATMENT OF GLIOBLASTOMA MULTIFORME.

L. E. Farr, W. H. Sweet, J. S. Robertson, C. G. Foster, H. B. Locksley, D. L. Sutherland, M. L. Mendelsohn and E. E. Stickley. Am. J. Roentgenol., Radium Therapy Nuclear Med. 71, 279(1954).

6753

NEUTRON CAPTURE THERAPY OF GLIOMAS USING BORON¹⁰. L. E. Farr, W. H. Sweet, H. B. Locksley and J. S. Robertson. Trans. Am. Neurol. Assoc. 79, 110-13(1954).

6754

PHYSICS AND PHYSIOLOGY OF NEUTRON-CAPTURE THERAPY. L. E. Farr, J. S. Robertson and E. Stickley. Proc. Natl. Acad. Sci. 40, 1093(1954).

6755

Rochester, N. Y. University

A PROPHYLACTIC APPROACH TO THE ANAPHYLACTIC FACTORS IN IRRADIATION DISEASE. John B. Field and Paul E. Rekers. Jan. 17, 1948. Decl. Jan. 29, 1948. 13p. (MDDC-1658; M-2009).

Authors describe trials of benadryl, pyribenzamine and ethylene disulfonate as prophylactic agents against anaphylactic factors in the acute radiation syndrome in dogs, rats and rabbits.

6756

OXYGEN PROTECTION OF BACTERIOPHAGE T1 AGAINST

IONIZING RADIATIONS. C. S. Bachoter and M. A. Pottinger. J. Gen. Physiol. 40, 289(1956).

6757

PARTIAL DESTRUCTION OF RAT THYROID BY LARGE DOSES OF RADIOIODINE. D. Findlay and C. P. Leblond. Am. J. Roentgenol. Radium Therapy 59, 387-95(1948).

6758

Argonne National Lab., Lemont, Ill. Chicago Univ. Metallurgical Lab.

ACUTE RADIOTOXICITY OF (BA-LA)¹⁴⁰ IN RATS AND MICE. PART IV. LETHAL ACTION AND CLINICAL SYMPTOMS. R. D. Finkle, R. H. Snyder and W. E. Kisielewski. June 1947. 6p. (MDDC-1207; CH-3825).

In the (Ba-La)¹⁴⁰ experiments, rats and mice were injected intraperitoneally with toxic doses of radiobarium. The dose of (Ba-La)¹⁴⁰ necessary to kill 50 per cent of the injected mice in one month was about 3 to 5 μ c/g. The dose required to kill half of the injected rats in 90 days was about 4 μ c/g. The mice that died and some of those that recovered showed outward symptoms of injury. They were lethargic, and there was usually some loss of hair. Before death, the eyes became watery and the lids encrusted, and finally, the eyes were sunken and nearly closed. The eye symptoms and lethargy noticed in the mice were also apparent in the rats. The animals were usually nervous and irritable when disturbed. Large quantities of inert barium chloride were injected subcutaneously into mice. A similar experiment with inert lanthanum was performed. The experiment designed to test chemical toxicity of barium and to test another route of administration was unsatisfactory.

6759

MANAGEMENT OF X-RAY REACTIONS. N. S. Finzi. Brit. J. Radiol. 15, 192-3(1942).

Undesirable reactions to radiation therapy and medications to relieve them are described for local reactions of the skin, mucous membrane, bone, intestine, eye, and lungs.

6760

REDUCED GLUTATHIONE CONTENT OF THE BLOOD AND TISSUES AFTER TOTAL-BODY IRRADIATION WITH LETHAL DOSES OF X-RAYS. P. Fischer, L. de Landscheer and J. Lecomte. Bull. soc. chim. biol. 32, 1009-11 (1950).

Mice and guinea pigs showed no change in reduced glutathione of blood, liver, kidney, heart or muscle after fatal x ray dose. Parenteral administration of H₂O₂ to unirradiated animals caused a decrease in reduced glutathione in the kidney only.

6761

ON THE EFFECT OF ROENTGEN RAYS ON THE BRAIN. H. Brunner. Arch. klin. Chir., Langenbecks 114, 332 (1920).

In dogs and cats a few days old, granule cells of cerebellum were found to be highly radiosensitive, as little as 4 HED causing destruction in several days.

6762

THE EFFECT OF ROENTGEN RAYS ON THE DEVELOPING BRAIN IN EXPERIMENTAL ANIMALS. R. Demel. Zentra. Chir. 56, 1176(1929). (In German).

6763

THE EFFECT OF ROENTGEN RAYS ON THE HUMAN BRAIN. I. Chukru-Aksel. Compt. rend. congr. med., Alien. et Neurol. (Bruxelles) (1935). (In French).

The author describes brain damage and thickened meninges following therapeutic radiation for intracranial tumor.

6764

ROENTGEN IRRADIATION OF THE CEREBRUM OF EXPERIMENTAL ANIMALS. R. Demel. Strahlentherapie 22, 333(1926). (In German).

Irradiation of very young animals produced profound cerebral atrophy with disappearance of numerous nerve cells and proliferative changes in blood vessels.

6765

EFFECT OF ROENTGEN RAYS ON THE MATURE BRAIN. H. Brunner and G. Schwartz. *Wien. klin. Wochschr.* 31, 587(1918). (In German).

6766

THE EFFECT OF ROENTGEN RAYS ON THE REGENERATION PROCESS IN THE BRAIN WITH SPECIAL CONSIDERATION OF THE NEUROGLIA. H. Brunner. *Arch. klin. Chir.*, *Langenbecks* 116, 489(1921). (In German).

6767

California. Univ., Berkeley. Radiation Lab. MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT FOR JULY, AUGUST, SEPTEMBER 1955. Oct. 28, 1955 32p. Contract W-7405-eng-48. (UCRL-3208).

Includes report on: excretion of injected Sr^{90} in monkeys and their offspring; metabolism of At^{211} and I^{131} in salivaryectomized and thyroidectomized rats, effects of radiation on protein systems. NSA 10-1696

6768

Naval Radiological Defense Lab., San Francisco. MODIFICATION OF ACUTE INTESTINAL RADIATION SYNDROME THROUGH SHIELDING. M. N. Swift and S. T. Taketa. Sept. 22, 1955. 18p. Project NM 006 015. (USNRDL-TR-66). *Am. J. Physiol.* 185, 85-91(1956).

Mortality from intestinal injury in rats 3-5 days after 1000 r of x rays was significantly decreased by shielding small exteriorized section of duodenum or ileum during exposure. Recovery from radiation-induced small intestine weight loss began 4 days postexposure in shielded groups, no such recovery was observed in unshielded controls. Similar experiments with 875 r and 5000 r are described. NSA 10-1697

6769

PULMONARY EFFECTS FROM RADIOACTIVE BARIUM SULFATE DUST. H. Cember, T. F. Hatch, J. A. Watson and T. Grucci. *A. M. A. Arch. Ind. Health* 12, 628-34 (1955).

Rats were exposed by intratracheal insufflation to radioactive barium sulfate particles at levels of 4.5 mc, 45 μc and 4.5 μc radiosulfur and were serially killed over 9 mo. period. Results suggest intense radiation dose delivered to small volume of lung tissue in immediate vicinity of barium sulfate particles may not be as hazardous as expected, or that latent period for production of serious radiation injury is longer than 9 mo period over which these animals were observed. NSA 10-1698

6770

ROLE OF THE KIDNEY IN DEVELOPMENT OF VASCULAR HYPERSENSITIVITY FOLLOWING WHOLE BODY IRRADIATION. David F. Bohr, P. A. Rondell, L. E. Palmer, B. L. Baker and F. H. Bethell. *Am. J. Physiol.* 183, 331-4(1955).

Kidney shielding reduced the incidence of increased vascular sensitivity in irradiated rats in 2nd week post-irradiation. Kidney-shielded animals were in better general condition than controls. Vascular hypersensitivity during this period may parallel incidence of general debility rather than reflect presence of renal vasoexcitator material. No histologic change was detected in irradiated kidney. NSA 10-1699

6771

EFFECT OF MORPHINE AND N-ALLYLNORMOPHINE ON RADIATION MORTALITY. Howard L. Andrews and Ervin G. Liljegren. *Am. J. Physiol.* 183, 322-4(1955).

Either morphine or nalorphine, given alone prior to x-irradiation, produces significant decrease in 28-day mortality, despite essentially antagonistic actions of the

two drugs. Mixtures of the two have little effect on mortality statistics. NSA 10-1705

6772

THE APPLICATION OF EXTERNAL AND INTERNAL RADIATION EXPOSURE LIMITS. Karl Z. Morgan. *Am. Ind. Hyg. Assoc. Quart.* 16, 307-23(1955).

Units of measurement used for ionizing radiation are defined. Basic criteria for permissible exposures, types of experimental data needed to establish reliable maximum permissible exposure values, and administrative problems in applying maximum permissible exposure values are reviewed. 23 references. NSA 10-1706

6773

RADIATION EXPOSURE OF STAFF IN DIAGNOSTIC PROCEDURES. I. BLOOD COUNTS-RESEARCH OR ROUTINE? J. F. Loutit. *Brit. J. Radiol.* 28, 647-50(1955).

Biological system of monitoring through blood counts, and radiation damage in workers occupationally exposed to ionizing radiation are reviewed. Results obtained with physical methods of measuring dose are compared with results with biological methods. Author concludes that leukocytic pattern is not a reliable indicator of biological damage. NSA 10-1707

6774

A HISTOPATHOLOGICAL STUDY OF LYMPH NODES IRRADIATED WITH COLLOIDAL Au^{198} . William M. Christopherson and Harold F. Berg. *Cancer* 8, 1261-9 (1955).

Authors describe findings in their histopathological study of 377 lymph nodes irradiated by injecting radiogold into afferent lymphatics. Intranodal changes varied considerably and depended on length of exposure, magnitude of exposure and proximity of injection site to lymph nodes. NSA 10-1719

6775

THE UNIT OF X-RAY DOSE AND ITS REALIZATION. II. THE PATIENT AND THE RONTGEN. Geoffrey Boden. *Brit. J. Radiol.* 28, 677-82(1955).

Factors affecting patient reactions to radiation are discussed. Problems associated with obtaining uniformity in radiation dose are reviewed. NSA 10-1882

6776

CINEMICROGRAPHIC OBSERVATIONS AND THEORETICAL CONSIDERATIONS ON REACTIONS OF LYMPHOCYTES TO X-RAYS. Robert Schrek. *Radiology* 65, 912-19(1955).

Author described degenerative changes in lymphocytes of rabbit thymus suspension after irradiation, and compares changes to those in nonirradiated cells. Hypothesis is proposed to explain radiation effects in radiosensitive cells. NSA 10-1701

6777

CONCERNING THE QUESTION OF THE INJURIOUS ACTION OF P^{32} ON OVARIAN TISSUE. K. H. Reiher and G. Lang. *Strahlentherapie* 98, 453-63(1955). (In German).

Groups of albino rats received injection of 0.3 $\mu\text{c/g}$, 0.6 $\mu\text{c/g}$, or 1.2 $\mu\text{c/g}$ of radiophosphorus. Morphological changes were investigated 36 hr, 3, 6, 12, and 30 days later. Definite morphological changes occurred following dose of 1.2 $\mu\text{c/g}$. NSA 10-1702

6778

FERTILITY AND TUMOR DEVELOPMENT IN (C57 L X A) F_1 HYBRID MICE RECEIVING X RADIATION TO OVARIES ONLY, TO WHOLE BODY, AND TO WHOLE BODY WITH OVARIES SHIELDED. Margaret K. Deringer, Egon Lorenz and Delta E. Uphoff. *J. Natl. Cancer Inst.* 15, 931-41(1955). NSA 9-2557

6779

NUCLEIC ACID CONTENT OF THE THYMIC CELLS OF NORMAL AND IRRADIATED C57BL MICE. Patricia P. Weymouth, Norman E. Delfel, Ruth J. Doell, Helene L.

Steinbock and Henry S. Kaplan. J. Natl. Cancer Inst. 15, 981-90(1955). NSA 9-2558

6780

SPONTANEOUS AND RADIATION-INDUCED PITUITARY ADENOMAS OF MICE. Arthur C. Upton and Jacob Furth. J. Natl. Cancer Inst. 15, 1005-21(1955).

Tumor incidence was increased by one whole-body exposure to ionizing radiation and tumor formation was hastened in proportion to dose. Neoplasms were 4-5 times more common in females than in males. NSA 9-2559

6781

EFFECT OF LOCAL ROENTGEN IRRADIATION ON THE FORMATION OF NEW CAPILLARIES AFTER INJURY. Ruth M. Merwin and Elizabeth L. Hill. J. Natl. Cancer Inst. 15, 1031-7(1955).

Within 6 hrs after an x ray dose of 400 - 1500 r, the skin of mice was injected by small burn or by insertion of wire stitch. As dose increased from 500-1500 r, revascularization of burned areas decreased; interval before capillaries began to invade coating around wires increased. New network of vessels in both injuries was sparser when dose exceeded 700 r. NSA 9-2561

6782

STUDY OF RECOVERY AT LOW TEMPERATURE OF X-IRRADIATED *E. COLI* CELLS. A. W. Pratt, W. S. Moos and M. Eden. J. Natl. Cancer Inst. 15, 1039-47 (1955).

Recovery was studied as function of time bacteria were stored in cold distilled water, citrate or broth suspensions. Some degree of recovery was observed in all suspensions, indicating mechanism of recovery is intrinsic to cell. NSA 9-2562

6783

LONG-TERM EFFECTS OF ACUTE AND CHRONIC IRRADIATION IN MICE. I. SURVIVAL AND TUMOR INCIDENCE FOLLOWING CHRONIC IRRADIATION OF 0.11 R PER DAY. Egon Lorenz, Joanne Weikel Hollcroft, Eliza Miller, Charles C. Congdon and Robert Schweisthal. J. Natl. Cancer Inst. 15, 1049-58(1955).

Survival time of LAF₁ male, but not female, mice exposed to Ra γ rays (0.11 r/8 hr day) from age 1 mo until death was significantly increased. Incidence of lymphosarcomas and other reticular tissue tumors was greater in both males and females postexposure. NSA 9-2563

6784

EFFECTS OF COMBINED LOCAL TREATMENT WITH RADIOACTIVE AND CHEMICAL CARCINOGENS. Arthur M. Cloudman, Katherine A. Hamilton, Ralph S. Clayton and Austin M. Brues. J. Natl. Cancer Inst. 15, 1077-83 (1955).

Methylcholanthrene and/or β -ray sources were applied to skin or subcutaneous tissues of mice. Carcinogenic effects on skin were approximately additive; possibly synergistic in producing papillomas. Agents were somewhat less than additive when given by subcutaneous pellet. Methylcholanthrene painted on skin reduced survival by 1/3. NSA 9-2565

6785

AMINOACIDURIA FOLLOWING TOTAL-BODY IRRADIATION IN THE HUMAN. Elaine J. Katz and Robert J. Hasterlik. J. Natl. Cancer Inst. 15, 1085-1107(1955).

After exposure of 4 workers to total-body irradiation with γ rays and neutrons of 25-180 rep, total daily urinary amino-acid excretion increased to as high as 10 times normal values. Amino aciduria is considered to be a sensitive and early (within 12 hr) indicator of relatively low levels of radiation exposure. NSA 9-2566

6786

LEVEL OF PROTEIN INTAKE AND NITROGEN EXCRETION IN RATS FOLLOWING TOTAL-BODY X IRRADIATION.

Julius White, Bernard E. Burr, Harriett T. Cool, Philip W. David and Mona S. Ally. J. Natl. Cancer Inst. 15, 1145-54(1955).

Rats fed low protein diet showed marked increase in nitrogen excretion; those fed 15- or 20-per cent casein diet showed much lower increase when both groups were given 450-500 r total-body x rays. Spleen shielding gave partial protection against increased N excretion post irradiation. NSA 9-2568

6787

CIRRHOSIS OF THE LIVER IN RATS FOLLOWING TOTAL-BODY X IRRADIATION. Julius White, Charles C. Congdon, Philip W. David and Mona S. Ally. J. Natl. Cancer Inst. 15, 1155-63(1955).

Cirrhosis of liver developed in 53% of rats fed low protein diet and surviving 450 or 500 r of total-body x rays. Those fed 15% or 20% casein diet, or diet in which 15% casein was replaced by amino acids for 30 days, showed no cirrhosis for 400 days after 450 or 500 r. Pulmonary infection was a prominent cause of death in most groups of irradiated rats. NSA 9-2569

6788

A COMPARATIVE ANALYSIS OF RADIATION LETHALITY IN MAMMALS EXPOSED AT CONSTANT AVERAGE INTENSITY FOR THE DURATION OF LIFE. George A. Sacher. J. Natl. Cancer Inst. 15, 1125-44(1955).

Data on radiation lethality in mice, rats, rabbits, dogs, guinea pigs, monkeys and burros are reviewed and analyzed and are tabulated according to species, strain, sex, radiation quality, length of exposure, daily dosages and treatment pattern. Relation between survival time and underlying injury process is analyzed. NSA 9-2567

6789

THE EFFECT OF LOW VOLTAGE ELECTRONS ON THE LATENT PERIOD OF T1 BACTERIOPHAGE. Marguerite Davis and Ernest Pollard. Radiation Research 2, 47-9(1955).

Low-voltage electron bombardment of T1 bacteriophage shows the property concerned with the length of the latent period is situated deep in the virus, probably at a depth exceeding 100 A. NSA 9-2570

6790

INFLUENCE OF EXTENDED TEMPERATURE TREATMENTS ON RECOVERY OF X-IRRADIATED ASCARIS EGGS. C. S. Bachofer and George Pahl. Radiation Research 2, 50-63 (1955).

Storage of x-rayed *Ascaris lumbricoides* suum in 0° and 5°C temperatures for up to 35 wk after exposure only served to decrease survival time. For maximum post irradiation survival, temperature should approximate that for maximum biological activity, thus a flowing replacement of constituents and removal of toxic elements. NSA 9-2571

6791

CHANGES IN RESPIRATORY GASES OF BURROS AFTER PROLONGED FRACTIONATED TOTAL-BODY γ -IRRADIATION. John J. Lane, James L. Wilding, John H. Rust, Bernard F. Trum and Joseph C. Schoolar. Radiation Research 2, 64-70(1955).

Metabolic studies have been carried out with total-body irradiated and with fasted nonirradiated burros. It was found that the R. Q. of the irradiated and fasted nonirradiated animals decreased, but that the R. Q. decreased much more drastically in animals irradiated with 200 r/day of total-body cobalt-60 γ -irradiation than with 25-r/day group. With the 25-r/day group and in the fasted nonirradiated animals the decrease was similar although the food consumption of the irradiated animals did not change. Oxygen consumption was reduced in both fasted and 200-r/day groups but not in the 25-r/day group. The carbon dioxide expired was reduced significantly in

both dose groups. Weight loss of the irradiated and fasted controls was very similar. The blood pyruvate level was increased on the twentieth day of irradiation and remained high until death. NSA 9-2572

6792
ANDROGENESIS AS EVIDENCE FOR THE NATURE OF X-RAY-INDUCED INJURY. Anna R. Whiting. Radiation Research 2, 71-8(1955).

Irradiated cytoplasm of *Habrobracon* eggs functioned normally after exposure to x ray dose many times greater than that lethal to nucleus. High doses prevented normal function, even in combination with an uninjured nucleus. Phenomenon of androgenesis is used as evidence. NSA 9-2573

6793
RESISTANCE OF COENZYME A TO X-IRRADIATION. Kenneth P. DuBois, Gladys J. Cotter and Donald F. Petersen. Radiation Research 2, 79-83(1955).

X ray doses of 400, 600, 800, and 1200 r in rats, and 400 and 800 r in guinea pigs failed to alter acetylation of sulfanilamide, indicating that x rays do not significantly change functional activity of coenzyme A of the liver *in vivo*. NSA 9-2574

6794
X-RAY-INDUCED "STICKINESS" OF THE CHROMOSOMES OF THE CHORTOPHAGA NEUROBLAST IN RELATION TO DOSE AND MITOTIC STAGE AT TREATMENT. J. Gordon Carlson and Nyra G. Harrington. Radiation Research 2, 84-90(1955).

Studies of x-rayed hanging drop preparations of grasshopper neuroblasts in artificial medium at short intervals immediately after treatment demonstrate that the earlier the mitotic stage the greater the effect for a given dose. NSA 9-2575

6795
THE EFFECT OF IONIZING RADIATION ON THE PHAGOCYTOSIS AND THE BACTERICIDAL POWER OF THE BLOOD. I. THE EFFECT OF RADIATION ON MIGRATION OF LEUCOCYTES. I. L. Shechmeister and M. Pishman. J. Exptl. Med. 101, 259-74(1955).

Rate or extent of migration of leucocytes was affected in rats by 600 r, in rabbits by 500 or 800 r. Effect of radiation on total and differential leucocyte counts and relation of this effect to migration is discussed. NSA 9-2577

6796
THE EFFECT OF IONIZING RADIATION ON PHAGOCYTOSIS AND THE BACTERICIDAL POWER OF THE BLOOD. II. THE EFFECT OF RADIATION ON INGESTION AND DIGESTION OF BACTERIA. M. Fishman and I. L. Shechmeister. J. Exptl. Med. 101, 275-90(1955).

Indices of opsonophagic and surface phagocytosis in x-rayed (600 r) rats are described. Increased susceptibility of irradiated rats to infection with *M. aureus* is attributed to granulopenia and abnormal granulocyte function. NSA 9-2578

6797
THE EFFECT OF IONIZING RADIATION ON DEOXYRIBONUCLEASE ACTIVITIES OF BODY FLUIDS. II. THE PLASMA DNASES AFTER TOTAL BODY IRRADIATION. O. D. Kowlessar, K. I. Altman and L. H. Hempelmann. Arch. Biochem. Biophys. 54, 355-8(1955).

Activity of DNase I and DNase II was markedly elevated in plasma of irradiated rats. Maximum activity of DNase I occurred 6 days postexposure; peak of DNase II activity occurred 1 day postexposure. NSA 9-2579

6798
DECREASE IN UPTAKE OF IRON BY DUCK ERYTHROCYTES IN VITRO FOLLOWING WHOLE-BODY X-IRRADIATION. J. Raymond Klein. Arch. Biochem. Biophys. 54, 556-7(1955). NSA 9-2580

6799
EFFECT OF CO⁶⁰ GAMMA RADIATION ON THE PROCESS OF OVULATION, FERTILIZATION, AND EMBRYONIC DEVELOPMENT OF THE FROG. A. V. Voino-Yasenetski. Doklady Akad. Nauk. S. S. S. R. 100, 389-91(1955). (In Russian). NSA 9-2581

6800
EFFECT OF HIGH-INTENSITY X-RADIATION ON VELOCITY OF NERVE CONDUCTION Herbert B. Gerstner, John S. Orth and Everett O. Rickey. Am. J. Physiol. 180, 232-6(1955).

Sciatic nerves of bullfrogs and rabbits were isolated and stored at 24°C. Conduction velocity was determined prior to, and at 1, 2, and 4 hr postexposure to total doses of 9 kr (9,000 r)/mm of x rays. Rabbit nerves proved much more radiosensitive than those of frogs. NSA 9-2582

6801
COMPARATIVE-CYTOLOGICAL INVESTIGATION OF THE EFFECT OF LOW DOSES OF X RAYS AND RADIUM ON INTUSSUSCEPTION IN THE PERICARP OF SPRING RYE L. P. Breslavets. Izvest. Akad. Nauk. S. S. S. R. Ser. Biol., No. 6, 38-51(1954). (In Russian). NSA 9-2583

6802
THE EFFECTS OF X RAYS ON DIVISION RATE AND SURVIVAL OF *TILLINA MAGNA* AND *COLPODA SP.* WITH AN ACCOUNT OF DELAYED DEATH. Josephine Bridgman and R. F. Kimball. J. Cellular Comp. Physiol. 44, 431-45(1954).

An amiconucleate strain of *T. magna* and a micronucleate strain of a large species of *Colpoda* received x ray doses ranging from 25 to 400 Kr. Doses of 200-400 Kr were invariably lethal to *Tillina*, although some animals recovered nearly normal division rate, dying only after 4-14 divisions. Percentage of lines showing delayed death is a function of dose but number of divisions to death decreases only slightly with increasing dose. Differences between *Colpoda* and *Tillina* are described (responses are generally similar). Lower doses decreased division rate and caused abnormal divisions. NSA 9-2584

6803
THE EFFECTS OF X IRRADIATION ON BRISTLES OF *DROSOPHILA MELANOGASTER*. B. Naville. Oncologia 8, 55-67(1955). (In German).

The 5-hr-old chrysalis of *D. melanogaster* was exposed to 180 kv and 31 Mev x rays. Individual bristles showed a varied radiosensitivity, dose-effect curve was linear. X ray modifications are believed to represent phenocopies of known mutations due to chromosomal damage. NSA 9-2585

6804
LEUKEMOGENIC EFFECTS OF IONIZING RADIATION ON ATOMIC BOMB SURVIVORS IN HIROSHIMA CITY. William C. Moloney and Marvin A. Kastenbaum. Science 121, 308-9(1955).

Classification of survivors of the atomic bomb explosion in Hiroshima according to distance from the hypocenter and degree of irradiation permitted statistical confirmation of the suspected high incidence of leukemia among survivors. NSA 9-2586

6805
THE RESPONSE OF ADENOSINETRIPHOSPHATASE TO A SINGLE RADIATION WITH DIFFERENT HIGH RADIATION DOSES IN VITRO. Th. Hornykewytch and H. St. Stender. Strahlentherapie 96, 100-6(1955). (In German).

The author reports on *in vitro* irradiations, with doses from 0.5 to 100 kr, of diluted liver and muscle homogenates, containing adenosinetriphosphatase. With increasing dilution, the extent of inactivation of the ferments relative to the percentage of water increases up to an optimum. On the basis of the results, it seems unlikely that irradiations

are exerting a direct influence on the ATPase in the cells. NSA 9-2587

6806

CHANGES IN THE CENTRAL NERVOUS SYSTEM FROM LOCAL EFFECTS OF X RADIATION. P. F. Minaev. Inst. of Biological Physics Zhur. Obshchei Biol 15, 401-12(1954). (In Russian).

Histological, metabolic, and conditioned-reflex changes after irradiation of various portions of the brain in dogs, chickens, and rabbits with 500, 7000, or 30,000 r are described. NSA 9-2588

6807

Naval Radiological Defense Lab., San Francisco. CORTISONE AND X IRRADIATION IN RATS. F. T. Brayer, R. J. Holloway, and G. F. Leong. Jan. 14, 1955. 11p. (USNRDL-TR-28).

Physiological doses of cortisone increased median survival time (MST) in adrenalectomized, x-irradiated (720 r) rats, but had no such effect in intact, irradiated rats. Nonphysiological doses of cortisone decreased MST in both adrenalectomized, irradiated, and intact irradiated rats. NSA 9-2591

6808

THE EFFECTS OF OXYGEN ON THE FREQUENCY OF X-RAY-INDUCED MUTATIONS IN HABROBRACON EGGS. Anna R. Whiting. Genetics 39, 851-8(1954).

Metaphase I Habrobracon eggs were x-rayed in air or nitrogen, the latter administered only during exposure. Incidence of dominant embryo lethals, recessive embryo lethals and postembryo lethals, and visible mutations were all reduced at same relative frequency in nitrogen. NSA 9-2592

6809

RELATION OF CARBON DIOXIDE, OXYGEN, AND LOW TEMPERATURE TO THE INJURY AND CYTOGENETIC EFFECTS OF X-RAYS IN BARLEY. R. A. Nilan. Genetics 39, 943-53(1954).

X-rayed (15,000 r) barley seeds exhibited a constant mutation rate, whether exposed in air, O₂ or CO₂ (moderate temperature). Injury rate was reduced by low temp. but not by gases; aberration frequency was altered by both temp. and gases. Reunion of broken chromosome ends is believed to have been profoundly affected by gases and temperatures, while primary x-ray damage remained unaffected. NSA 9-2593

6810

THE RADIATION RECOVERY FACTOR: PRESERVATION BY THE POLGE-SMITH-PARKES TECHNIQUE. David W. Barnes and John F. Loutit. J. Natl. Cancer Inst. 15, 901-5(1955).

CBA mouse spleen (injected intravenously as a mush) led to recovery of homologous adult mice given an otherwise lethal x-ray dose. Recovery factor was not lost when infant spleens were stored in glycerol serum at -70°C for as long as 83 days. NSA 8-2594

6811

SOME NEW EXPERIMENTS ON PROTECTION AGAINST WHOLE-BODY IRRADIATION. A. Lacassagne, J. F. Duplan and N. P. BuuHoi. J. Natl. Cancer Inst. 15, 915-21(1955).

Reduced mortality and prolonged survival of x-rayed (total-body) mice and rats follows administration of (1) phenolic and naphtholic derivatives containing long-chain fatty acids and (2) glucosamine, if injection is made within 1 hr prior to exposure. Postirradiation survival of rats is increased by injecting them with an emulsion of fetal rat liver cells postexposure. NSA 9-2595

6812

THE TIME FACTOR IN INHIBITION OF LYMPHOID-TUMOR DEVELOPMENT BY INJECTION OF MARROW

CELL SUSPENSIONS INTO IRRADIATED C57BL MICE.

Henry S. Kaplan, Lincoln E. Moses, Mary B. Brown, C. Susan Nagareda and Barbara B. Hirsch. J. Natl. Cancer Inst. 15, 975-9(1955).

C57BL mice were x irradiated (total body) and injected intravenously with homologous bone-marrow cell suspensions at graded intervals. Lymphoid-tumor incidence was inhibited maximally when injection was made within 1.5 hrs after last x-ray dose. NSA 9-2597

6813

PROTECTION OF MICE AGAINST X IRRADIATION BY PLASMA PROTEINS. Agnes N. Stroud, Austin M. Brues and Mildred M. Summers. J. Natl. Cancer Inst. 15, 1109-23(1955).

Intravenous administration of serum or plasma, homologous or heterologous, or of plasma proteins to mice a few minutes before irradiation affords partial protection against death and other irradiation effects. NSA 9-2598

6814

THE PROTECTIVE EFFECT OF CARBON MONOXIDE AND OTHER GASES ON MICE IRRADIATED IN TOTO BY X RAYS. P. Bonet-Maury and F. Patti. J. radiol. et electrol. 35, No. 11-12, 851-3(1954).

Protection of mice against x-ray effects was accomplished by introduction (postexposure) of CO, H₂S, and KCN to their environment. Effect was evident up to gas concentrations which would normally be lethal. Protective mechanism is likened to that accompanying O₂ deficiencies. NSA 9-2599

6815

STUDIES ON THE NATURE OF RADIATION PROTECTION FACTOR IN MOUSE SPLEEN. L. J. Cole, M. C. Fishler and M. E. Ellis. Radiology 64, 201-9(1955).

On basis of results presented, it is concluded that the protective factor in spleens of young mice is a nondialyzable, unstable, heatlabile, radiosensitive substance with the nuclear fraction. NSA 9-2600

6816

THE MECHANISM OF THE PROTECTIVE EFFECTS OF CYSTEINE. D. Hofmann, R. K. Kepp, G. Oehlert and H. W. Vasterling. Strahlentherapie 96, 1-13(1955). (In German).

From the literature and from results of his own studies, author concludes that the action of cysteine is of the same complex nature as that of radiation. NSA 9-2601

6817

ERYTHEMA INHIBITION BY MEANS OF AMINO ACIDS. H. Theismann. Strahlentherapie 96, 107-10(1955). (In German).

The author describes two possibilities of inhibiting the formation of radioinduced erythema by means of amino acids. NSA 9-2602

6818

EFFECT OF X-IRRADIATION ON GASTRIC SECRETION AND THE ACCOMPANYING GROSS AND HISTOLOGICAL CHANGES IN THE "SHAY" RAT STOMACH. L. E. Detrick, H. C. Upham, D. Higby, V. Debley and T. Haley. Am. J. Physiol. 179, 462-66(1954).

6819

RADIOACTIVE FALLOUT FROM BOMB CLOUDS. Howard L. Andrews. Science 122, 453-6(1955).

Biological hazards associated with fall-out are discussed. NSA 9-6818

6820

Argonne National Lab., Lemont, Ill. REPORT ON BIOLOGICAL, MEDICAL AND BIOPHYSICS PROGRAMS PART I. QUARTERLY REPORT OF BIOLOGICAL AND MEDICAL RESEARCH DIVISION FOR APRIL, MAY, JUNE 1955. PART II. SEMIANNUAL REPORT OF RADIO-

LOGICAL PHYSICS DIVISION FOR JANUARY THROUGH JUNE 1955. July 1955. 147p. (ANL-5456).

Biological and Medical Research Division. Progress is reported on the following studies: the effects of exposure to x radiation on plasma amino acids in chick embryos; the effects of temperature on the radiosensitivity of frogs, the regeneration and recovery of the spleen and thymus after single doses of x irradiation, the effects of irradiation on tissue ascorbic acid levels, oxidative phosphorylation in mitochondria of brains of bats exposed to massive x irradiation, the pathological effects of continuous gamma irradiation on mice; the toxicity of Sr^{90} and Ca^{45} in mice, determinations on the circulating blood volume of adult roosters and 3- to 5-day-old chicks, the effect of mucopolysaccharide on the stability and structure of collagen, enzymatic factors affecting the mutation rate of *E. coli*, the biosynthesis of methionine by *A. aerogenes*, reaction mechanisms of amino acids, studies on protein biosynthesis using C^{14} -labeled lysine as a tracer, the toxicity of Ru^{106} for mice, the effects of tissue homogenates on radiosensitivity of amoeba, and development of a method for the separation of trace amounts of Be from bulk cationic mixtures, based on the affinity of salicylate analogs for Be. Radiological Physics Division. Modifications are described in instruments for the detection and measurement of neutrons and γ radiation. The natural body Ra content and rate of intake of Ra were measured for boys 16 to 18 years old, and results are compared with those previously obtained on adults. The performance of a scintillation detector for the counting of α particles from Rn and its radioactive daughters is described. Data are reported from a study of the movement of water in soil. Equipment for the scintillation measurement of the γ activity of the human body is described, and data are presented from measurements of background, Ra, and K^{40} body content. The absorption and scattering of B particles in gases and drift velocity of electrons in gases are discussed. Apparatus is described for the measurement of positive ion emission from potassium-sensitized platinum. Meteorology studies engaged during the period are summarized. (For preceding period see ANL-5426). NSA 9-6820

6821

Naval Medical Research Inst., Bethesda, Md. and Naval Radiological Defense Lab., San Francisco. THE RELATIVE BIOLOGICAL EFFECTIVENESS OF ATOMIC BOMB GAMMA RADIATION IN MICE. E. P. Cronkite, V. P. Bond, R. H. Lee, and W. H. Chapman. May 25, 1955. 24p. (NM-006-012. 04. 86).

The lethal effects of atomic bomb nuclear γ radiation as a function of distance from the weapon and as a function of measured dose was determined using mice as the test object. Data are compared with laboratory data on the effects of x radiation. NSA 9-6825

6822

Chicago. Univ. Air Force Radiation Lab. PHARMACOLOGICAL ACTION OF ANESTHETIC AGENTS IN IRRADIATED ANIMALS. (School of Aviation Medicine, Project No. 21-3501-0005, Report No. 20). James E. Wilson. July 1955. 8p. (NP-5758).

Administration of common anesthetic agents (cyclopropane, ethylene, nitrous oxide, ether and thiopental sodium) at various periods postirradiation produced no significant changes in 30-day mortality of x-rayed rats. Lowered tolerance to cyclopropane, and enhanced survival after use of ethylene are described. NSA 9-6826

6823

STUDIES ON NAGASAKI (JAPAN) CHILDREN EXPOSED IN UTERO TO THE ATOMIC BOMB. A ROENTGENOGRAPHIC SURVEY OF THE SKELETAL SYSTEM. Wataru W. Sutow and Emory West. Am. J. Roentgenol., Radium Therapy Nuclear Med. 74, 493-9(1955).

No differences in incidence of skeletal abnormalities were found between two groups of children exposed in utero to atomic bomb explosion - one group at less than 2000 meters from hypocenter, one group at 4000 and 5000 meters. NSA 9-6828

6824

ON THE CONTENT OF SULPHYDRYL GROUPS IN NORMAL MOUSE TISSUES AND FOLLOWING WHOLE-BODY EXPOSURE TO X RAYS IN LETHAL DOSES. E. Ya. Graevskii and L. I. Korchak. Doklady Akad. Nauk S. S. S. R. 102, 939-41(1955). (In Russian).

Doses of 700 r were given to white mice. The sulfhydryl content of brain, kidneys, liver, lungs, and spleen of normal and irradiated animals was determined 5-15 min., 3, 24 or 72 hours after radiation. Results are tabulated. NSA 9-6829

6825

ON THE SENSITIVITY OF PLANTS (OATS) TO THE EFFECTS OF RADIOPHOSPHORUS IN VARIOUS GROWTH PHASES. A. G. Shestakov, G. F. Ivanova, and N. I. Shmel'kova. Doklady Akad. Nauk S. S. S. R. 102, 1043-6(1955). (In Russian).

Comparatively high dose of radiophosphorus exerted a negative effect on the yield of seeds independently of the phase of development of the plants. Greatest negative effect of radiophosphorus on yield appeared in the phase of bushing out. Effect of radiophosphorus depends on the conditions of phosphate nutrition (or supply). NSA 9-6830

6826

SOME NUTRITIONAL ASPECTS OF BACTERIAL RECOVERY FROM IONIZING RADIATION. G. E. Stapleton, Anthony J. Sharra and Alexander Hollaender. J. Bacteriol. 70, 7-14 (1955).

B/r strain of *E. coli*, grown on a complete medium, e.g. nutrient broth, showed radiation-induced requirements for nutritional factors. Evidence was found indicating that bacteria showing new nutritional requirements are not stable auxotrophic mutants. Data suggest recovery process studied is related to synthesis of new enzymes in the irradiated cell. NSA 9-6831

6827

THE EFFECT OF TEMPERATURE ON X-RAY INDUCED MUTABILITY IN *ESCHERICHIA COLI*. E. H. Anderson and D. Billen. J. Bacteriol. 70, 35-43(1955).

Authors studied effects of several incubation temperatures on induction of mutations postexposure. Data suggest that at least a portion of x-ray-induced death is not the result of induced lethal mutants. Plating medium has a decisive influence on survival, as does temperature. NSA 9-6832

6828

FUNDAMENTALS OF RADIOBIOLOGY. Z. M. Bacq and Peter Alexander. New York, Academic Press Inc., Publishers, 1955. 389p. NSA 9-6833

6829

Rochester, N. Y. Univ. Atomic Energy Project. THE EFFECTS OF A MAINTAINED BODY BURDEN OF POLONIUM IN THE RAT. III. MORTALITY, LIFE SPAN, AND GROWTH. J. N. Stannard, H. A. Blair and R. C. Baxter. May 18, 1955. 33p. Contract W-7401-eng-49. (UR-395).

The long term effects of a maintained body burden of polonium²¹⁰ in the rat are described. A total of 483 Wistar-Rochester rats were maintained on a monthly intravenous injection schedule from early maturity throughout life and comparison made with animals receiving a single intravenous injection. The four dosage levels used were 0.023, 0.1, 0.3 and 1.5 $\mu\text{C}/\text{kg}/\text{month}$ and the body burdens maintained, after equilibrium had been established, were approximately 0.05, 0.23, 0.60, and 2.4 $\mu\text{C}/\text{kg}$. Results are summarized. NSA 9-5584

6830

REPARATION OF THE FETAL EYE FOLLOWING RADIATION INSULT. Roberts Rugh and Joan Wolff. A. M. A. Arch. Ophthalmol. 54, 351-9(1955).

Fetal CF₁ mice were exposed on 12.5th gestation day to x rays (50-300 r). Eyes were examined at 4, 24, and 72 hr and at 6 days and 6 wk thereafter to determine cytological changes caused by irradiation. NSA 9-6838

6831

EXPERIMENTAL OCULAR EFFECTS OF HIGH-VOLTAGE RADIATION FROM THE BETATRON. Albert C. Biegel. A. M. A. Arch. Ophthalmol. 54, 392-406(1955).

A study of the clinical and histologic effects of irradiating the rabbit eye with 16 to 19-Mev electrons and 23-Mev x rays by means of the betatron for a wide dosage range is described. NSA 9-6839

6832

THE EFFECTS OF DOSE RATE VARIATION OF FISSION NEUTRONS AND OF Co⁶⁰ γ-RAYS ON SURVIVAL IN YOUNG CHICKS. Howard H. Vogel, Jr. and S. Phyllis Stearns. Radiation Research 2, 513-22(1955).

Three-day-old white leghorn chicks were irradiated with fast neutrons at dose rates of 1 rep/min and 4 rep/min and with Co⁶⁰ γ rays at dose rates of 6 r/min, 12 r/min, and 22 r/min. Chicks exposed at the lower dose rates showed a marked increase in survival. Twenty-one-day mortality curves are presented for each dose rate. Early (48-hr) mortality was evident after exposure to the higher dose rates of both types of radiation but was insignificant after exposure to the lower dose rates. The relative biological effectiveness of fast neutrons and Co⁶⁰ γ rays for producing 21-day lethality in the chick was found to be 3.72 when the high dose rate survival curves were compared. NSA 9-6840

6833

THE RESPONSE OF HYPOPHYSECTOMIZED RATS TO X-RADIATION AND REPLACEMENT THERAPY. E. A. Sellers and John C. Barlow. Radiation Research 2, 534-7(1955).

Hypophysectomy reduced the resistance of rats to total-body x irradiation. Of ACTH, growth hormone, insulin, thyroxine, cortisone, and testosterone, only thyroxine increased percentage survival. Hypophysectomized irradiated animals receiving insulin died sooner than hypophysectomized irradiated controls. NSA 9-6841

6834

THE REACTION OF THE SKIN EPITHELIUM OF THE TAILS OF RANA CATESBIANA TADPOLES TO LOCAL X-IRRADIATION. V. V. Brunst. Radiation Research 2, 556-67(1955).

Of 100 *R. catesbiana* tadpoles, one group had tails amputated and received 2000-4000 r after formation of tail regenerates. Second group were exposed to same dose without amputation. Formation of degenerating giant cell epithelium occurred much more often in group irradiated after formation of tail regenerates. NSA 9-6842

6835

COMPARISON OF HEMATOLOGIC EFFECTS OF INTERNALLY DEPOSITED RADIUM AND PLUTONIUM IN DOGS. Jean H. Dougherty, John Z. Bowers, Robert C. Bay, and Panit Keyanonda. Radiology 65, 253-9(1955).

The results of a study of the intravenous administration of Pu²³⁹ and Ra²²⁶ in adult pure-bred beagles under optimal conditions are given and discussed. NSA 9-6843

6836

THE RELATIVE BIOLOGICAL EFFECTS OF X-RAYS AND BETA RAYS. William B. Seaman, Michel M. Ter-Pogossian and William B. Ittner. Radiology 65, 260-4(1955).

With equal doses and similar physical distribution in tissue, β rays of P³² were found to be slightly less than 1/2

as efficient as 200-kv x rays in producing erythema of the rabbit's ear. NSA 9-6844

6837

EFFECT OF MAGNESIUM ON THE RESPONSE OF MICE TO LARGE DOSES OF WHOLE-BODY IRRADIATION. Henry C. Blount. Radiology 65, 250-2(1955).

Intraperitoneal injection of 15 mg (but not 5 and 10 mg) magnesium sulfate in 1 cc of water gave significant protection of mice exposed to whole-body x irradiation. Results may be due to fall in body temperature and presumably also a drop in metabolic rate. NSA 9-6846

6838

EFFECT OF HEMATOPORPHYRIN ON X-RADIATION SENSITIVITY IN PARAMECIUM. Frank H. J. Figge and Ralph Wichterman. Science 122, 468-9(1955).

Sensitization of paramecia to radiation by hematoporphyrin in presence of O₂ was demonstrated. A primary reason for increased x-ray susceptibility of dividing cells may be that they contain higher concentrations of porphyrin than do differentiated non-dividing cells. NSA 9-6847

6839

Naval Radiological Defense Lab., San Francisco. THE RELATIVE BIOLOGICAL EFFECTIVENESS OF FAST NEUTRONS IN MICE. R. E. Carter, V. P. Bond, and P. H. Seymour. Nov. 17, 1954. 22p. Project NM-006-015. (USNRDL-TR-20; AFSWP-759) Radiation Research 14, 413-23(1956).

RBE of fast neutrons (9 Mev mean energy), compared with 250 kvp x rays, was determined using reduction of spleen, thymus and gut weights, and mortality as biological endpoints. RBE values found: 1.7, 1.5, 2.3, and 1.6, respectively. NSA 9-6567

6840

THE RESPIRATION OF THE EPIDERMIS AFTER EXPOSURE TO IONIZING RADIATION. W. Gahlen and G. Stutgen. Strahlentherapie 97, 259-65(1955). (In German). NSA 9-6569

6841

BLOOD HISTAMINE LEVEL AND SKIN ERYTHEMA DETERMINATIONS FOLLOWING EXPOSURE TO SINGLE DOSES OF X RADIATION. L. Koslowski, H. Poppe and E. Walther. Strahlentherapie 97, 266-71(1955). (In German).

The authors examined the histamine level in the blood of 20 individuals submitted to a single roentgen irradiation of 400 r. In 18 persons they determined an increase in histamine of 45 to 400 γ per liter, respectively of 33 to 253%. No formation of erythema was observed. It is assumed that histamine is formed from histidine or by decomposition of cells in the skin. NSA 9-6570

6842

THROMBOCYTOPENIC PURPURA IN X RAY TECHNICIANS. A. Bohme and Oberste-Berghaus. Strahlentherapie 97, 292-6(1955). (In German).

Authors describe case of two female x-ray technicians exhibiting mild thrombocytopenic purpura which disappeared upon interruption of their work, but returned when they resumed duty. NSA 9-6571

6843

COLIBACILLI AS BIOLOGICAL INDICATORS OF RADIATION DOSAGE. Hubertus Bottcher. Strahlentherapie 97, 403-17(1955). (In German).

Dose-effect curves representing colibacilli exposed to x rays (60-180 kv) are presented. Possibilities and limits of using colibacilli for biological dosimeter are discussed. NSA 9-6572

6844

EFFECT OF X-IRRADIATION AND CHOLINE ON THE RETICULO-endothelial SYSTEM OF THE RAT. N. R. Di Luzio. Am. J. Physiol. 181, 595-8(1955).

Blood clearance and organ distribution of colloidal radioactive gold were studied in normal, choline-treated, and whole-body x-irradiated anesthetized rats. NSA 9-6574

6845

CERTAIN EFFECTS OF IRRADIATION AND CHEMOTHERAPY ON CELLULAR DIVISION AND DIFFERENTIATION. Nathan B. Friedman, James A. Sargent, and Eileen Drutz. *Cancer Research* 15, 479-84(1955).

Analysis of the reactions produced in tissue by irradiation or the administration of chemotherapeutic agents reveals that such factors do more than merely interfere with cellular division. Some modalities inhibit the completion of mitosis in cells with the capacity of multiplication, some interfere with premitotic nuclear metabolism, and others inhibit an earlier cytoplasmic phase of synthesis. A comparable interference with cytoplasmic synthesis and an inhibition of differentiation are exercised by some of the drugs on the somatic cells which lack the ability to divide, while irradiation in therapeutic doses and other chemical agents do not interfere with differentiation. Although tumors in general are presumed to arise from reserve cells, spontaneous differentiation occurs not uncommonly. The possibility of enhancement of the tendency to differentiate is a relatively neglected but important effect of treating neoplasms by irradiation and selective chemotherapy. NSA 9-6575

6846

THE EFFECT OF X RADIATION ON THE GENERAL MITOTIC ACTIVITY AFTER VARIOUS INTERVALS. Annemarie Grossmann. *Oncologia* 8, No. 3, 259-72(1955). (In German).

Xenopus larvae of 12-mm length were irradiated with a dose of 500 r, killed after various intervals, and the mitotic activity of the tissues of the whole animal examined. The mitosis was diminished after 2 hours, completely stopped after 6 and 12 hours, recommenced in all organs after 24 hours, increasing appreciably above normal in the gills, and diminished again after 48 hours. Abnormalities were found 2, 24, and 48 hours after irradiation, sometimes occurring in cells, which, at the time of irradiation, had not been in mitosis. NSA 9-6576

6847

HETEROLOGOUS TRANSPLANTATION OF TUMORS AFTER PRE-TREATMENT WITH RADIOISOTOPES. W. Bollag and Cl. Meyer. *Oncologia* 8, No. 3, 300-9(1955). (In German).

Heterologous transplantation of mouse Crocker sarcoma on young rats is reported. Pretreatment of rats with P^{32} and Au^{190} led to development of heterologous tumors. Long interval between injection and heterotransplantation was more advantageous to tumor growth than was a short interval. Intraperitoneal Au^{198} application gave better tumor growth than did intravenous dose. NSA 9-6578

6848

LATENT CHANGES IN ERYTHROCYTES AND EXPERIMENTAL CANCER. Thilde Eilers. *Oncologia* 8, No. 3, 309-20(1955). (In German).

By means of special after-staining of vital preparations, it was possible morphologically to demonstrate damage to the erythrocytes of the circulating blood a short time after total x-ray irradiation and also after local irradiation of the peripheral blood in rats. After x-ray irradiation with high doses a latent change in the erythrocytes commenced which, with individual differences, was not always reversible when stopping the irradiation. A relationship between latent erythrocyte changes and tumour development after x-ray irradiation could be demonstrated. A similar relationship had been shown previously in experiments with rats to which 4-dimethylaminoazobenzol or benzyren was applied. NSA 9-6579

6849

MODIFICATION OF THE RADIATION-INDUCED INCREASES

IN PHOSPHATASE ACTIVITY OF HEMATOPOIETIC TISSUES BY CHEMICAL AGENTS. Donald F. Petersen and Kenneth P. DuBois. *Am. J. Physiol.* 181, 513-18 (1955).

P-Aminopropiophenone, cysteine and mercaptoethylamine administered prior to irradiation resulted in less increase of ATP-ase and 5-nucleotidase activity of rat spleens and thymus glands than did irradiation alone. NSA 9-6580

6850

RESEARCH ON BIOLOGICAL PROTECTIVE AGENTS. PART X. OXYGEN REDUCTION PROCEDURES IN RADIATION INJURIES AND PROTECTION FROM RADIATION. H. Langendorff, R. Koch, and U. Hagen. *Strahlentherapie* 97, 218-30(1955). (In German).

Roentgen irradiations of living yeast and bacteria have shown that irradiations in vivo do not induce changes in the cytochrome system. Irradiations of mice have proved that the protective effect produced by cysteine and glutathione is not due to the redox potential of these substances. Thio-glycollic acid, dialuric acid, iso-propyl alcohol and xanthin are ineffective as redox substances. Within the range of carbohydrate metabolism, the protective effect of pyruvic acid and of d-ribose is particularly striking. Lactate, acetate, and fructose are ineffective. NSA 9-6581

6851

THE EFFECT OF FOLIC ACID AND VITAMIN B_{12} ON THE BLOOD FORMATION IN IRRADIATED GUINEA PIGS. Dietrich Mucke, Adolf Morczek, and Werner Mischel. *Strahlentherapie* 97, 473-88(1955).

The author irradiated 56 guinea pigs with 250 r each and studied the protective effect produced by folic acid and vitamin B_{12} on the hematopoietic system. Regular examinations of the blood picture over a period of several weeks proved that both vitamins are capable of protecting against the damaging effect of roentgen rays. These vitamins cause the absolute leucocyte and erythrocyte values to drop more slowly. The numerical values of the average minima of the corpuscular constituents of the blood proved to be higher as compared to the non-treated controls. The most favorable results were obtained with folic acid and its administration prior to the irradiation produced the best effect. Combined application of both folic acid and vitamin B_{12} did not result in a summation of the therapeutic effects. NSA 9-6583

6852

New York Univ., New York. Post-Graduate Medical School and New York Univ., New York. University Hospital. STUDIES OF THORIUM X APPLIED TO HUMAN SKIN. IV. CLINICAL AND AUTORADIOGRAPHIC FINDINGS FOLLOWING THE INTRODUCTION BY IONTOPHORESIS. Paul Fleischnager and Victor H. Witten. 1955? 13p. (AECU-3061).

Studies carried out on living human skin *in situ* demonstrate that iontophoresis of weak thorium X solutions will increase its biologic effects as judged by erythema and pigmentation, and cause greater penetration as shown by autoradiography. NSA 9-6585

6853

RADIATION BIOLOGY IN THE TREATMENT OF CANCER. Werner Lorenz. *Strahlentherapie* 97, 325-37(1955). (In German).

Author reports on his experiments in mice vaccinated with Ehrlich ascites carcinoma and treated with cysteine before irradiation. Implication of the results for cancer therapy are discussed. NSA 9-6589

6854

ABSORPTION AND TISSUE DISTRIBUTION FOLLOWING THE INTRAPERITONEAL APPLICATION OF RADIOGOLD BRINE. Friedrich Pfander and Hanno Poppe. *Strahlentherapie* 97, 389-94(1955). (In German).

Strong, undesired radiation action on reticulo-endothelial system, particularly the liver and excretory organs, is reported. NSA 9-6591

6855

California. Univ., Berkeley. Radiation Lab.
THE PROBLEM OF SYNTHETIC LETHALS IN DROSOPHILA MELANOGASTER (Thesis). Philip Elwin Hildreth. Aug. 1955. 29p. Contract W-7405-eng-48. (UCRL-3085).

Data are reported from studies (on *D. melanogaster*) carried out to determine if lethals are formed by recombination between normal X-chromosomes of different populations and between normal 3rd chromosomes of different populations. It appears that recombination played no role in producing such lethals. Possible mechanisms are discussed. NSA 9-7606

6856

RADIOACTIVE ISOTOPES IN MEDICINE AND BIOLOGY. V. K. Modestov, L. I. Ivanov, Yu. M. Shtukkenberg, E. F. Romantsev, and E. I. Vorobev. Moscow, Medgiz (1955). (In Russian). NSA 9-7608

6857

SESSION OF THE ACADEMY OF SCIENCES OF THE U. S. S. R. ON THE PEACEFUL USE OF ATOMIC ENERGY. JULY 1-5, 1955. MEETINGS OF THE DIVISION OF BIOLOGICAL SCIENCES. Moscow, Publishing House of the Academy of Sciences of the U. S. S. R. 339p. (1955). (In Russian).

Separate abstracts are included for the 20 papers in this volume. NSA 9-7609

6858

Army Medical Research Lab., Fort Knox, Ky.
THEORY OF INTERMITTENT RADIATION EFFECTS ON CHEMICAL AND BIOLOGICAL SYSTEMS. I. CHEMICAL SYSTEMS AND GENERAL FORMULATION. Richard W. Michie and Lawrence H. Krohn. June 10, 1955. 21p. (AMRL-200).

A broad mathematical theory is developed which presents, using a postulatory basis, the overall mechanism whereby the chemical and biological systems behave under intermittent radiation. NSA 9-7610

6859

EFFECTS OF IONIZING RADIATIONS ON THE ANIMAL ORGANISM. L. A. Orbeli. Moscow, Publishing House of the Academy of Sciences of the U. S. S. R., p. 3-13 in MEETINGS OF THE DIVISION OF BIOLOGICAL SCIENCES. (1955). (In Russian).

Some suggestions are discussed and experimental evidence presented regarding the tentative ways and means of development of the radiation injury. The line of procession of the "chain reaction" of the radiation effect is discussed. NSA 9-7612

6860

Naval Radiological Defense Lab., San Francisco.
HYPERGLYCEMIA AND INCREASED LIVER GLYCOGEN IN RATS AFTER X IRRADIATION. R. E. Kay and C. Entenman. Aug. 1, 1955. 14p. Project No. NM-006-015. (USNRDL-TR-55).

A quantitative study was made of the effect of whole-body x irradiation on liver glycogen and blood sugar levels of the rat. Each of three experiments used fed nonirradiated and fasted irradiated rats. The irradiated rats were prefasted 24 hr and exposed to 50, 750, 1200, 2500, or 5000 r, and analyses were made 24 and 48 hr later. Whole body x irradiation elevated both the liver glycogen and blood sugar levels of fasting rats. As the dose of radiation increased, the percentage of liver glycogen at 24 hr after the time of irradiation also increased. At all doses, except 5000 r, the percentage of liver glycogen was about the same at 24 hr and 48 hr after x irradiation. In no case did the liver glycogen levels of the fasting, irradiated rat exceed that of the fed, normal animal. Blood sugar

levels were elevated during the first 24 hr after irradiation and continued to increase over the next 24 hr. Forty-eight hours after the time of irradiation the blood sugar levels were, in every case, greater than in the fed, normal rat. NSA 9-7611

6861

EFFECTS OF IONIZING RADIATIONS ON THE FERTILITY OF MICE AND THE VIABILITY OF THEIR PROGENY. N. I. Nuzhdin, N. I. Shapiro, O. N. Petrova, and O. N. Kitaeva. Moscow, Publishing House of the Academy of Sciences of the U. S. S. R., p. 14-33 in MEETINGS OF THE DIVISION OF BIOLOGICAL SCIENCES. (1955). (In Russian).

Authors describe x-ray effects on mating capacity and litter numbers of male mice, and x- and γ -ray effects on oestral cycle of female mice. NSA 9-7613

6862

LOCAL ACTION OF ROENTGEN RAYS ON VARIOUS DIVISIONS OF THE CENTRAL NERVOUS SYSTEM. P. F. Minaev. Moscow, Publishing House of the Academy of Sciences of the U. S. S. R., p. 51-68 in Meetings of the Division of Biological Sciences. (1955). (In Russian).

Postirradiation changes included: leucocytosis after exposure of cerebral hemispheres, leucopenia after exposure of cerebellum. Some structural changes in blood cells were noted. NSA 9-7614

6863

THE PECULIARITIES OF INACTIVATION OF MICRO-ORGANISMS BY MEANS OF RADIATION STERILIZATION. M. N. Meisel, T. S. Remezova, R. D. Gal'tsova, G. A. Medvedeva, N. A. Pomoshchnikova, M. N. Shal'nova, and V. M. Alekseeva. Moscow, Publishing House of the Academy of Sciences of the U. S. S. R., p. 106-26 in Meetings of the Division of Biological Sciences. (1955). (In Russian).

Authors report results of a comparative study of radiation and heat inactivation of non-spore forming micro-organisms upon incomplete (85%) and complete (100%) sterilization. NSA 9-7617

6864

EFFECT OF NUCLEAR RADIATIONS ON PLANTS. P. A. Vlasyuk. Moscow, Publishing House of the Academy of Sciences of the U. S. S. R., p. 127-48 in Meetings of the Division of Biological Sciences. (1955). (In Russian).

Effects of radioisotopes on various physiological processes of plants were found to vary according to nutritive conditions of the plants and external medium. Exposure of seeds is believed to be beneficial in stimulating metabolism and increasing crop yield. NSA 9-7618

6865

EFFECT OF NATURAL RADIOACTIVE SUBSTANCES ON THE YIELD OF AGRICULTURAL CROPS. N. G. Zhezheh. Moscow, Publishing House of the Academy of Sciences of the U. S. S. R., p. 149-61 in Meetings of Division of Biological Sciences. (1955).

Radioelements of uranium, thorium, and actinium series are described as possible powerful factors in increasing yield of agricultural crops. Experiments demonstrating this are described. NSA 9-7619

6866

IONIZING RADIATIONS AS A STIMULANT OF ERGOSTEROL BIOSYNTHESIS. R. D. Gal'tsova. Moscow, Publishing House of the Academy of Sciences of the U. S. S. R., p. 162-72 in Meetings of the Division of Biological Sciences. (1955). 339p. (In Russian).

Ergosterol content of yeast cultures increased post-exposure. Author attributes increase to increased production. NSA 9-7620

6867

BLOOD FORMATION AND IONIZING RADIATION. A. P.

Egorov and V. V. Bochkarev. Moscow, Medgiz. (1955). (In Russian).

The collection opens with an exposition of certain data on the structure of matter and on characteristics of ionizing radiation. The major part of the monograph is devoted to the general laws of radiation effect on the blood system and to the morphological changes in blood cells. (publisher's note). NSA 9-7621

6868

PRINCIPLES OF THE BIOLOGICAL EFFECT OF RADIO-ACTIVITY. B. N. Tarusov. Moscow, Medgiz (1955). 2nd Edition. (In Russian).

Includes: general laws of ionizing radiation effects; secondary processes occurring postexposure, toxicology of radioisotopes that are most active biologically. NSA 9-7622

6869

EFFECTS OF HIGH-ENERGY PARTICLES, X-RAYS AND AGING OF LENS EPITHELIUM. L. von Sallmann, C. A. Tobias, H. O. Anger, C. Welch, S. F. Kimura, C. M. Munoz, and A. Drungis. A. M. A. Arch. Ophthalmol. 54, 489-514 (1955).

Selective exposure of equatorial and central area of rabbit lens epithelium to deuteron beam confirmed earlier impression of high radiosensitivity of cells in germative zone and relative radioresistance of cells in large central part. Effects of α particles, deuterons and x rays on cell division are compared. NSA 9-7623

6870

EFFECT OF PARENTERAL INJECTION OF PARTICULATE MATTER ON RESISTANCE OF X-IRRADIATED MICE TO INFECTION. Willie W. Smith, Falconer Smith, and Ilo M. Alderman. Am. J. Physiol. 182, 400-2 (1955).

In mice given parenteral injection of particulate matter after midlethal irradiation, increased survival is attributed to reduced *Proteus* and *E. coli* infection. There was no change in *Pseudomonas* infection. Injection of particulate matter after sublethal irradiation increased resistance to *Proteus* or *Pseudomonas* challenge 5-12 days postexposure. NSA 9-7625

6871

FUNCTIONAL STUDIES OF THE HYPERPLASTIC SPLEEN OF MICE RECOVERING FROM RADIATION DAMAGE. Willie W. Smith, Ilo M. Alderman, and H. Jeanette Ruth. Am. J. Physiol. 182, 403-6 (1955).

Granulocyte counts were substantially higher in intact than in splenectomized mice 20 days, but not 15 days, after 600 r dose. Intact mice had higher resistance than splenectomized mice to *Pseudomonas* challenge 15 and 20 days after exposure to 600 r. Effects of spleen homogenate administration are described. NSA 9-7626

6872

ROLE OF HYPOTENSION IN THE INITIAL RESPONSE OF X-IRRADIATED CHICKS. S. P. Stearner, A. M. Brues, M. Sanderson, and L. J. Christian. Am. J. Physiol. 182, 407-10 (1955).

Severe hypotension developed in young chicks during initial postirradiation period after exposure to 1000 r of x rays (43 r/min). Shielding of kidneys during exposure did not alter effect. NSA 9-7627

6873

X-RAY BREEDING OF PEANUTS (*ARACHIS HYPOGAEA* L.). Walton C. Gregory. Argon. J. 47, 396-9 (1955).

Amounts of genetic variation in a quantitative character and yield of dried fruits were estimated in progenies of x-irradiated peanuts. Total genetic variance among randomly chosen irradiated normals was 4 times that of control progenies. Several high-yielding mutants were recovered from populations studied. NSA 9-7628

6874

THE EFFECT OF 180-KEV AND 31-MEV X-RADIATION

ON EHRLICH-ASCITES-CARCINOMA OF WHITE MICE.

Kurt Reiche. Strahlentherapie 97, 549-67 (1955). (In German).

Cellular structure, especially of mitosis, of Ehrlich-Ascites-Carcinoma, without and after irradiation was compared. Rhythm of mitosis after 500 r and effects of doses of (100-500 r) were analyzed. Results indicate that 31-Mev radiation is somewhat less effective than 180 Kev x rays. NSA 9-7629

6875

EFFECTS IN DOGS OF LARGE DOSES OF INTRAPERITONEALLY ADMINISTERED RADIOACTIVE COLLOIDAL GOLD (Au^{196}). Andrew H. Jackson and P. F. Hahn. Cancer 8, 482-7 (1955).

Clinical observation and hematological changes are presented on nine dogs receiving one to four intraperitoneal injections of radioactive colloidal gold. Histological changes in seven of these animals are described. A mean group weight loss of 14.1 per cent occurred. Peritoneal effusion occurred in eight of the nine animals following gold injection; however, no cases of adhesions or radiation ulcer were seen. Adjacent organ changes were not remarkable. An omental reaction to the injected substance was noted. Dogs receiving multiple injections suffered varying degrees of bone-marrow hypoplasia and anemia. NSA 9-4673

6876

RADIOSENSITIVITY WITH RESPECT TO THE ESTROUS CYCLE IN THE MOUSE. Roberts Rugh and Helen Clugston. Radiation Research 2, 227-36 (1955).

Male CF_1 mice are more radiosensitive than are females of the same strain, regardless of the phase of the estrous cycle in which the females are x-irradiated. Female CF_1 mice, if x-irradiated during any of the three major phases of the estrous cycle, are not equally radio-sensitive. Those in estrus are the most radioresistant, those in diestrus the most radiosensitive. This was demonstrated in three experiments involving 447 females. In every experiment the mice x-irradiated during estrus showed the best and those in diestrus the poorest survival value. However, the fact that this combined stage was the least consistent suggest that possibly one might well prove to be the most radioresistant of all stages, by virtue of its high estrogen production. It is postulated that the hypersecretion of estrogens during estrus, plus possibly the correlated endocrine and hydration changes, may be the cause of increased radioresistance during this phase in CF_1 female mice. NSA 9-4675

6877

ORGAN WEIGHT ANALYSIS IN MICE GIVEN FRACTIONATED X-IRRADIATION. A. N. Stroud, J. M. Gurian, A. M. Brues, and M. M. Summers. Radiation Research 2, 267-79 (1955).

CF_1 females 7-9 wks old were given weekly total-body x-ray doses totaling 400-1200 r, sacrificed 1 wk after last exposure. There was no relative weight change in kidneys, heart or adrenals, muscle and liver increased slightly; thymus, uterus, and ovaries lost exponentially with increasing dose. Spleen responded atypically. NSA 9-4076

6878

THE REACTION OF THE MOUSE THYMUS TO X-RAYS MEASURED BY CHANGES IN ORGAN WEIGHT. Robert F. Kallman and Henry I. Kohn. Radiation Research 2, 280-93 (1955).

In normal, nonirradiated CAF_1 mice, the weight of the thymus increased until the animals were approximately 45 days old when age involution began. Involution ceased at 80 to 90 days of age. With female mice 50 to 60 days old, the acute involution of the thymus after total-body exposure to 250-kv constant potential x rays was measured by changes in organ weight. Twenty-four hours of fixation in 10% formalin increased thymic weight by 20 to 40%, depending on the strain of mice, CAF_1 or A/He. Dose-effect analyses

of the weights of either fresh or fixed, wet or dry thymuses, however, yielded qualitatively similar results. Thymic weight was reduced as much as one-fourth by handling the mice preparatory to irradiation. Decreased food consumption per se could account for half the thymic weight loss after 400 r, total-body irradiation. The time of maximum weight loss to occur varied from 1 day for a dose of 30 r to 5 days for 800 r. Weight determined at 5 days after total-body irradiation was a linear function of the logarithm of radiation dose but was not a true measure of radiation injury, since some recovery had occurred at doses below 400 r. There was no significant difference in percentage weight loss per roentgen in the CAF₁ and A/He strains tested in this Laboratory. The dose for 50% weight loss was 150 r, significantly lower than 210 r for the Carworth Farms strain reported from Los Alamos. Minimum post-irradiation thymic weight was a curvilinear function of radiation dose. The interpretation of the curve was difficult, since total-body irradiation caused loss indirectly due to injury in other organs as well as directly. The dose for 50% loss was 90 r. The data were considered in terms of different dose-effect models. The best fitting equation was one which assumed that the thymus was composed of two independently reacting populations with different sensitivities. NSA 9-4677

6879

STUDIES ON THE MECHANISM OF RADIATION PROTECTIONS AND RECOVERY WITH CYSTEAMINE AND β -MERCAPTOETHANOL. Alexander Hollaender and C. O. Doudney. Radiobiology Symposium (Proceedings). p. 112-15(1954). Z. M. Bacq and P. Alexander. Eds. London, Butterworths Scientific Publications, 1954.

Results are reported from a comparison of the protection efficiency of cysteamine and β -mercaptoethanol against radiation injury and recovery of *E. coli*. NSA 9-4678

6880

Army Inst. of Pathology, Washington, D. C. STATISTICAL ANALYSIS OF THE MEDICAL EFFECTS OF THE ATOMIC BOMBS. (FROM THE REPORT OF THE JOINT COMMISSION FOR THE INVESTIGATION OF THE EFFECTS OF THE ATOMIC BOMB IN JAPAN). Ashley W. Oughterson, George V. LeRoy, Averil A. Liebow, E. Cuyler Hammond, Henry L. Barnett, Jack D. Rosenbaum, and B. Aubrey Schneider. Apr. 19, 1951. TIS issuance date Feb. 28, 1955. 288p. (TID-5252).

Statistical analysis of medical histories of 6882 persons in Hiroshima and 6621 in Nagasaki alive 20 days after the atomic bombing is presented. Burns, mechanical injury, blast effect, radiation syndrome, and hematological data are described. NSA 9-2535

6881

RADIATION HAZARDS IN THE USE OF THORIUM X FOR SKIN THERAPY. S. J. Wyard, A. Nightingale, and I. G. Austin. Brit. J. Radiol. 28, 274-8(1955).

Authors conclude that if reasonable precautions are taken, dangers to staff and patients are small. Particular attention is paid to effects of liberation of thoron gas into atmosphere, and effects of radioactive material penetrating patients' skin. NSA 9-4688

6882

Argonne National Lab., Lemont, Ill. QUARTERLY REPORT OF BIOLOGICAL AND MEDICAL RESEARCH DIVISION. Apr. 1955. 174p. Contract W-31-109-eng-38. (ANL-5426).

Includes reports on: acute x-ray lethality in mice, rabbits, biochemical changes in massively x-rayed rats, bats, tissue distribution of ascorbic acid in x-rayed rats, cold effect on x-rayed *Ascaris* eggs, DNA synthesis in radioinduced division block (tetrahymena), radiostrontium toxicity in dogs, x ray effect on mouse fertility, effect of normal protoplasm on x-rayed amoeba cells. NSA 9-4911

6883

EFFECT OF IRRADIATION ON HEMIN FORMATION. R. Bonnicksen and G. Hevesy. Acta Chem. Scand. 9, No. 3, 509-18(1955).

X-irradiation appreciably depressed the rate of extrusion of Fe⁵⁹ bound to β_1 -globulin in the circulation of the rabbit. Depression was much more pronounced 2 days postirradiation than shortly after exposure. Effects in guinea pigs are also described. NSA 9-4914

6884

EFFECTS OF X-RAYS AND WATER CONTENT ON SUGARS IN BARLEY SEEDS. L. Ehrenberg and M. Jaarman. Acta Chem. Scand. 9, No. 3, 539-40(1955). NSA 9-4915

6885

THE RELATION OF NEUTRON DOSE TO CHROMOSOME CHANGES AND POINT MUTATIONS IN DROSOPHILA. I. TRANSLOCATIONS. H. J. Muller. Am. Naturalist 88, 437-59(1954). NSA 9-4916

6886

STUDIES IN THE MODE OF ACTION OF IONIZING RADIATIONS. INFLUENCE OF CELL CONCENTRATION ON LETHAL EFFECTS OF X-RAYS ON *ESCHERICHIA COLI*. Carissimo Biagini. Arch. Biochem. Biophys. 56, 38-44(1955). NSA 9-4917

6887

EFFECT OF X-RAYS ON THE QUANTITY AND METABOLISM OF DESOXYRIBONUCLEIC ACID IN THE LIVER OF RATS EXAMINED WITH P³². Aleksandar D. Becarevic, Katica I. Kacanski, and Desanka D. Mancic. Bull. Inst. Nuclear Sci. "Boris Kidrich" (Belgrade) 5, 123-6(1955).

Incorporation of P³² decreased 72% during 24 hr postirradiation (950 r) period. NSA 9-4918

6888

THE DYNAMICS OF PLATELET PRODUCTION AS STUDIED BY A DEPLETION TECHNIQUE IN NORMAL AND IRRADIATED DOGS. Charles C. Craddock, Jr., William S. Adams, Seymour Perry, and John S. Lawrence. J. Lab. Clin. Med. 45, 906-19(1955).

Thrombopoiesis in normal and irradiated dogs has been studied by removal of platelets from the peripheral blood at a rate exceeding their entry from the marrow. Findings are summarized. NSA 9-4920

6889

RADIOLOGICAL HAZARDS FROM NUCLEAR EXPLOSIONS AND NUCLEAR POWER. John Cockcroft. Nature 175, 873-5 (1955).

Author believes present (1955) level of radioactive contamination in world too low to be dangerous. NSA 9-4921

6890

RADIATION SENSITIVITY AND THE MITOTIC CYCLE IN VICIA FABA. John McLeish. Nature 175, 890-1(1955). NSA 9-4922

6891

CURRENT STATUS OF INFORMATION ON THE INDUCTION OF MUTATIONS BY IRRADIATION. Herman M. Slatis. Science 121, 817-21(1955).

Author reviews status of data on x-ray induced mutations. Maximal and minimal estimates of irradiation effects on man are given. Author presents his conclusions concerning the effect that accidental radioactivity poisoning of atmosphere would have on mutation rate in man. NSA 9-4923

6892

A CLINICAL INVESTIGATION OF THE CHRONIC EFFECTS OF RADIATION SALTS ADMINISTERED THERAPEUTICALLY. W. B. Looney, R. J. Hasterlik, A. M. Brues, and E. Skirmont. Am. J. Roentgenol., Radium Therapy Nuclear Med. 73, 1006-37(1955).

Analysis of thousands of roentgenograms of 38 persons given radium therapeutically and 6 persons employed as radium dial painters demonstrates a general positive

correlation between level of body burden of radium and severity of osseous lesions. NSA 9-4928

6893

Brookhaven National Lab., Upton, N. Y.
QUARTERLY PROGRESS REPORT FOR JANUARY 1 - MARCH 31, 1955. (UNCLASSIFIED SECTION). 61p. (BNL-337).

Nematodes subjected to 20,000 r of x rays laid eggs which did not develop. Radiosensitivity of encapsulated and non-encapsulated pneumococci were studied. NSA 9-5206

6894

Utah. Univ., Salt Lake City. Radiobiology Lab. and Los Alamos Scientific Lab., N. Mex.
THE EFFECTS OF ACUTE WHOLE BODY X IRRADIATION ON THE ABSORPTION AND DISTRIBUTION OF Na^{22} AND H^3OH FROM THE GASTROINTESTINAL TRACT OF THE FASTED RAT. Charles J. Goodner, Thomas E. Moore, Jr., John Z. Bowers, and Wallace D. Armstrong. 1954. 51p. (AECU-3033). NSA 9-5209

6895

Naval Radiological Defense Lab., San Francisco.
THE EFFECTS OF TOTAL BODY FAST NEUTRON IRRADIATION IN DOGS. V. P. Bond, R. E. Carter, J. S. Robertson, P. H. Seymour, and H. H. Hechter. Jan. 10, 1955. 30p. (USNRDL-TR-36; AFSWP-760).

Authors found no significant differences between dogs heavily irradiated with x rays (250 kvp) or neutron (9 Mev) radiation with respect to signs of illness, survival time, blood count changes, gross and microscopic pathology. NSA 9-5213

6896

ELECTROPHYSIOLOGY OF THE X-RAY PHOSPHENE.
Leo E. Lipetz. Radiation Research 2, 306-29(1955).

Attempt has been made to test the hypothesis that x-ray phosphene results from direct action of rays on the photochemicals of retinal rods and cones. Electrical discharges of a single ganglion cell of a frog retina in situ were detected as an objective measure of retinal response. Results are summarized. NSA J-5214

6897

RESPONSE OF THE BAT (MYOTIS LUCIFUGUS) TO X-IRRADIATION. Douglas E. Smith, Donald R. Russ, and Eugenia M. Jackson. Radiation Research 2, 330-8 (1955).

Survival, blood, and histological studies were made in the bat (Myotis lucifugus) maintained in the laboratory at 23°C and exposed to x-rays (500 to 50,000 r). Non-irradiated starving bats survived much longer early than later in hibernation. In November experiments dosages as low as 500 r significantly shortened the life span of starving bats, but in February and March, exposures to 500 to 20,000 r were followed by survival times similar to those of simultaneously starved controls. Leucocytes were depressed by as little as 500 r, but the erythrocytes remained unchanged even after 20,000 r. Typical irradiation effects were found in bone marrow, spleen, lymph node, and duodenum after dosages as low as 500 r. These findings are compared with those of other irradiated mammals and frogs in an effort to establish the radiosensitivity of the bat. NSA 9-5215

6898

EVIDENCE FOR TWO TYPES OF X-RAY-INDUCED LETHAL DAMAGE IN SACCHAROMYCES CEREVISIAE. Robert K. Mortimer. Radiation Research 2, 361-8(1955).

Under proper conditions, haploid yeast cells of opposite mating types will conjugate when placed together by micro-manipulative techniques. When one of the two parent cells is x-irradiated before pairing, conjugation usually occurs normally, but the diploid zygote formed shows many evidences of radiation damage. These include division

delay, abnormal division, swelling, and death. The percentage of inviable zygotes increases with dose in a multiple-hit fashion. Irradiation of the one haploid parent in a nitrogen atmosphere results in a twofold effective dose reduction in the zygote survival curve. The reduction in zygote viability is found to be the same for irradiation of either parent cell. Irradiation of both parent cells before pairing results in a much larger reduction in zygote viability compared with the case where only one parent is irradiated. Doses which are lethal to a relatively large percentage of the irradiated haploid cells (i.e., 99.9%) still result in a relatively high zygote survival (i.e., 50%). Thus, many haploid cells receive damage which is lethal in the haploid state but which is nonlethal when incorporated into a diploid cell containing a normal set of alleles. This type of damage could correspond to recessive lethal mutations. The damage which is expressed in the diploid zygote is considered as dominant lethal, although the present study does not allow its positive identification with any particular component of the irradiated cell. The relative frequency of recessive lethal to dominant lethal damage in a haploid cell is about 15:1. X-ray-induced inactivation in diploid, triploid, and tetraploid cells is predicted to be primarily of the dominant lethal type, inactivation due to pairing of recessive lethals playing a minor role. NSA 9-5216

6899

SENSITIVITY AND TIME FOR DEGENERATION OF SPERMATOGENIC CELLS IRRADIATED IN VARIOUS STAGES OF MATURATION IN THE MOUSE. Eugene F. Oakberg. Radiation Research 2, 369-91(1955).

Reduction in number of spermatogonia after irradiation can be explained by killing of cells, without postulating a prolonged mitotic inhibition of type A spermatogonia. Degeneration of spermatogonia occurs primarily as damaged cells reach late interphase or early prophase of their first postirradiation division. A few cells may undergo one or more divisions before degenerating. Irradiation damage to primary spermatocytes remains latent until the cells enter meiotic metaphase and anaphase. Many abnormal figures typical of chromosomal aberrations then occur, and nuclei of resulting spermatids show as abnormal size variation. Spermatids and sperm show no visible changes with doses up to 1500 r. However, numerous investigators have established the sensitivity of these cells to genetic damage which is expressed after fertilization. Intermediate and type B spermatogonia are extremely sensitive to radiation. Type A spermatogonia are of heterogeneous sensitivities depending on mitotic activity and stage of development. Spermatogenic cells in the mouse show quantitative and qualitative differences in sensitivity that are correlated with the dramatic nuclear changes in spermatogenesis. The inference is clear that the primary reactions determining behavior of these cells is nuclear. This conclusion is strengthened by the fact that, when similar correlations between sensitivity and nuclear state at time of irradiation are observed in favorable cytological material, the damage proves to be chromosomal. NSA 9-5217

6900

EFFECT OF FREE-RADICAL ACCEPTORS ON RADIO-SENSITIVITY OF PSEUDOMONAS FLUORESCENS. Philip S. Ranc and Samuel A. Goldblith. Nucleonics 13, No. 6, 32(1955).

Cultures of P. fluorescens were irradiated in nutrient broth and pea puree suspensions with and without the free-radical acceptors (FRA) sodium ascorbate and disodium fumarate combined with monosodium glutamate. The data presented indicate that the inactivation dose is increased in the presence of free radical acceptors. NSA 9-5218

6901

INVESTIGATION OF MORPHOLOGICAL TISSUE RESPONSE TO RADIOPHOSPHORUS. W. Hellriegel and H. Pauly. *Strahlentherapie* 96, 557-68(1955). (In German).

Morphological changes in cell nuclei and cellular groups of mouse testicles, liver, spleen, and kidneys after administration of β -irradiation (total dose: 52.5 mc P^{32}) are described. Severe disturbances were induced in cells and tissue of the organs examined. NSA 9-5219

6902

THE EFFECT OF SMALL DOSES OF X RADIATION ON BONE MARROW. Ilse Martin, Rudolph Pape, and Alexandra Piringner-Kuchinka. *Strahlentherapie* 96, 569-75(1955).

The authors investigated the influence of rather high and of minimum doses of roentgen rays on the bone marrow, while taking into account the meromitoses as a special form of proliferation. Their studies confirmed the data of other authors with respect to doses of 600 r. Doses from 5 to 20 r seem to exert a mild stimulus to proliferation. It seems advisable to distinguish between vital and functional radiosensitivity. NSA 9-5220

6903

AN INVESTIGATION OF THE EFFECTS OF IRRADIATION ON SODIUM-POTASSIUM EXCHANGE IN ERYTHROCYTES. Adolf Morezek. *Strahlentherapie* 96, 618-24(1953).

In heparinized, x-irradiated blood, erythrocytes lost capacity of accumulating potassium ions from plasma against high concentration gradient. Instead, part of cellular K^+ migrated into the medium. Migration continued beyond period of irradiation, and loss was compensated by intake of an equivalent amount of Na^+ from plasma. Number of ions exchange varied linearly with x ray dose over the range 1000-16000 r. NSA 9-5222

6904

ON THE PROBLEM OF THE BEHAVIOR OF SERUM MAGNESIUM LEVELS IN THE COURSE OF DEEP X RAY THERAPY. Hans-Joachim Maurer. *Strahlentherapie* 96, 629-31(1955). (In German).

No characteristic changes in serum magnesium levels occurred during therapeutic radiation as contrasted with observations regarding behavior of ATP and other substances in the same patients. NSA 9-5223

6905

MOTILITY AND MORPHOLOGY OF HUMAN SPERM AFTER EXPOSURE TO LONG WAVELENGTH X RADIATION. Georg Gerber. *Strahlentherapie* 96, 632-6(1955). (In German).

Half the sperms irradiated (55,000 r) preserved their mobility until irradiation ceased. Thereafter the decrease in mobility continued at greater rate, compared with controls. Normal sperms placed in irradiated medium also became non-mobile. NSA 9-5224

6906

SEQUELAE OF REARING HABROBRACON ON RADIO-ACTIVE HOST LARVAE. Daniel S. Grosch and Robert L. Sullivan. *Growth* 18, 191-205(1954).

Radiophosphorus at 48 dilutions injected by capillary needle into paralyzed *Ephestia* larvae. *Habrobracon* eggs were then transferred to these hosts as well as to controls, both injected and non-injected. Results summarized. NSA 9-5225

6907

GENETIC DAMAGE PRODUCED BY RADIATION. H. J. Muller. *Science* 121, 837-40(1955).

Regarding test explosions, author concludes that estimate of genetic damage must be weighed against potential benefits to be derived from such tests, or rather, against probable damage to society that would follow from the alternative policy. NSA 9-5226

6908

EFFECT OF FEEDING DOGS THE FLESH OF LETHALLY IRRADIATED COWS AND SHEEP. R. H. Wasserman and B. F. Trum. *Science* 121, 894-6(1955).

Analysis of data on weights gain, hematological findings, blood chemistry, and results of gross and histopathological examinations showed no statistical differences in dogs fed a diet of meat from lethally irradiated cattle and sheep, and controls fed meat from non-irradiated animals. NSA 9-5227

6909

LEUCOCYTE ADHESIVENESS FOLLOWING WHOLE BODY IRRADIATION. J. Philip Savitsky. *Am. J. Physiol.* 181, 215-17(1955).

An increased leucocyte adhesiveness is demonstrable within 15 hrs after total-body irradiation of dog and guinea pig. Complete correction of the increased adhesiveness in no way defers the subsequent leukopenia or survival. NSA 9-5228

6910

EFFECT OF WHOLE-BODY X-IRRADIATION ON UPTAKE OF IRON BY DUCK ERYTHROCYTES. J. Raymond Klein and Ralph Cavaheri. *Proc. Soc. Exptl. Biol. Med.* 89, 28-31(1955).

Decreased uptake of iron by duck erythrocytes in vitro after whole-body x-irradiation is attributed to decrease in number of one kind of reticulocyte, apparently the youngest in circulation. Decrease in erythropoiesis and normal maturation led to rapid loss of these cells and to loss of ability to remove iron from plasma. NSA 9-5230

6911

EFFECT OF ROENTGEN IRRADIATION AND OTHER TYPES OF INJURIOUS AGENTS ON CAPILLARIES. Peter Rieser. *Proc. Soc. Exptl. Biol. Med.* 89, 39-41(1955).

X-irradiation, heparin injection, trypsin, and peptone increased capillary fragility in mesenteric capillaries of the frog, apparently as a consequence of liberation of heparin into the circulation of the animals. NSA 9-5231

6912

COMPARISON OF BACTERIA ISOLATED FROM BLOOD TISSUES AND FECES OF X-IRRADIATED MICE. W. T. Bradner, S. E. Bernstein, and R. E. McCarthy. *Proc. Soc. Exptl. Biol. Med.* 89, 107-11(1955).

Organisms (*Proteus mirabilis*, *Paracolobactrum coliforme*, *Pseudomonas aeruginosa*) found in the blood and organs of x-irradiated mice were serologically identical to bacteria of same species found in the feces. NSA 9-5232

6913

CHROMOSOMAL ABERRATIONS IN DATURA DUE TO VARIOUS KINDS OF IRRADIATION. Jean M. Cummings, Lewis Goldstein, and A. F. Blakeslee. *Proc. Natl. Acad. Sci. U. S. A.* 41, 355-8(1955).

Thermal neutrons proved very damaging to *Datura* and authors suggest that they may cause a higher frequency of rings of four, plus rings of six than is caused by other radiations. Cyclotron neutrons were not as effective in causing chromosomal aberrations as were neutrons from nuclear detonation. NSA 9-5233

6914

MODE OF ACTION OF SOME SUBSTANCES WHICH PROTECT AGAINST THE LETHAL EFFECTS OF X-RAYS. P. Alexander, Z. M. Bacq, S. F. Cousins, M. Fox, A. Herve, and J. Lazar. *Radiation Research* 2, 392-415(1955).

More than 100 substances were studied as protective agents against x rays in two systems: mortality of mice, and degradation of dilute solutions of polymethacrylic acid in aerated water. Protective actions were parallel in the two systems. NSA 9-5237

6915

EFFECT OF HYPOPHYSECTOMY ON SURVIVAL AFTER X-IRRADIATION. J. F. Kent, B. L. Baker, E. C. Pliske, J. G. Van Dyke, and F. H. Bethell. *Proc. Soc. Exptl. Biol. Med.* **89**, 142-5(1955).

Hypophysectomy of 433 adult female rats reduced their capacity to survive total body x irradiation as compared with response of 542 nonhypophysectomized rats. In absence of pituitary gland, rats tended to die earlier after the lower doses of irradiation (0-157 r) although the % survival did not change with doses between 375-500 r. NSA 9-5238

6916

CONCERNING THE PROBLEM OF RADIATION PROTECTION BY INTRAVENOUS INJECTION OF ADENOSINE-TRI-PHOSPHATE. Hans-Joachim Maurer. *Strahlentherapie* **96**, 625-8(1955). (In German).

ATP injections did not prolong survival of rabbits, but rather, seemed to shorten survival time. Unfavorable influence of ATP is attributed to an increased stress on heart and circulation. NSA 9-5239

6917

PHARMACOLOGY OF IONIZING RADIATIONS. Werner Lorenz. *Strahlentherapie* **97**, 46-63(1955). (In German).

The author demands that all cancer patients receiving radiotherapy, be submitted to a general treatment prior to, parallel with and after the application of radiotherapy. He stresses, and demonstrates in animal experiments, the importance of vegetative-hormonal regulations. From the viewpoint of functional pathology the position of patients submitted to radiotherapy is a particular one. This situation therefore calls for a further development of radiopharmacology, covering the fields of research, instruction and practice. NSA 9-5240

6918

California. Univ., Berkeley. Radiation Lab. MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT FOR JANUARY, FEBRUARY, MARCH 1955. Apr. 25, 1955. 61p. Contract W-7405-eng-48. (UCRL-3013).

Includes reports on: effect of I^{131} in rats; toxicity of At^{211} in rats and monkeys, effect of body burden from birth of Sr^{90} on blood count and weight of infant monkey. NSA 9-5571

6919

Naval Radiological Defense Lab., San Francisco. EFFECTS OF X IRRADIATION ON LIPID METABOLISM. III. DOG SERUM LIPOPROTEINS. W. H. Goldwater and C. Entenman. Apr. 7, 1955. 24p. (USNRDL-TR-44).

Fatal x-ray doses produce terminal decrease of dense serum lipoprotein component dogs; lighter fractions increase the concentration. NSA 9-5573

6920

METABOLIC RATE CHANGES FOLLOWING THYROID DESTRUCTION BY At^{211} AND I^{131} IN THE RAT. R. W. E. Watts. *Proc. Soc. Exptl. Biol. Med.* **89**, 220-2(1955).

Metabolic rate decreased more slowly in I^{131} -treated than in At^{211} -treated animals, but ultimately attained similar steady values after both. Differences in effect may be correlated with the different nuclear properties of the two isotopes. NSA 9-5574

6921

Army Medical Research Lab., Fort Knox. THE EFFECT OF INJURY ON EHRLICH TUMOR CELLS. D. W. King, S. R. Paulson, N. C. Hannaford, and N. L. Puckett. May 8, 1955. 153p. (AMRL-170).

Death of control, irradiated, and Salyrgan-treated Ehrlich tumor cells in vitro was observed over 6-24 hr period. Protein loss, DNA content, mitotic index, respiration, lactic acid production, dehydrogenase, cell size, sodium and potassium content, entrance of trypan blue, and response to x rays measured. Process of mitosis was most susceptible to injury. NSA 9-5570

6922

RESILIENCE OF THE FETAL EYE FOLLOWING RADIATION INSULT. Roberts Rugh and Joan Wolff. *Proc. Soc. Exptl. Biol. Med.* **89**, 248-53(1955). NSA 9-5575

6923

INVESTIGATION BY THE USE OF LABELED COMPOUNDS OF X-RAY EFFECTS ON CERTAIN CHARACTERISTICS OF ALBUMIN AND ITS SYNTHESIS. A. M. Kuzin, L. Kh. Eidus and N. B. Strazhevskaya. *Doklady Akad. Nauk. S. S. R.* **102**, 267-70(1955). (In Russian).

Uptake of D_2O and C^{14} by roots and stems of growing wheat irradiated with 1000 r of 190-kv x rays was studied. NSA 9-5576

6924

USE OF HAPLOID AND DIPLOID EMBRYOS OF HABRO-BRACON IN THE STUDY OF CELL POISONS. A. M. Clark and W. C. Beiser, Jr. *Science* **121**, 469-70(1955).

Data tabulated on response (hatchability) of both haploid and diploid embryos to x rays and various chemicals. NSA 9-5577

6925

EFFECTS OF FASTING AND X-IRRADIATION ON OXYGEN POISONING IN MICE. Daniel L. Gilbert, Rebeca Gerschman, and Wallace O. Fenn. *Am. J. Physiol.* **181**, 272-4(1955).

Mice irradiated only (8800 r) and mice irradiated and fasted from onset of irradiation had about same survival time in oxygen as fasted non-irradiated mice. Protective effects of previous irradiation against O_2 poisoning is attributed to anorexia resulting from irradiation. NSA 9-5579

6926

AFTER-EFFECTS OF X-IRRADIATION AND PHENYL-HYDRAZINE ON THE HEMOGLOBIN, SERUM IRON AND RETICULOCYTES OF RATS. Alfred Chanutin and Elizabeth L. Word. *Am. J. Physiol.* **181**, 275-9(1955).

Total body x irradiation given before or after phenylhydrazine administration in rats caused marked anemia and hyperferremia during 1st 5 days after final phenylhydrazine treatment. Phenylhydrazine apparently stimulated bone marrow activity of animals previously x rayed (as judged by effect on reticulocyte count). NSA 9-5580

6927

PROTECTIVE EFFECT OF SPLEEN SHIELDING ON SUSCEPTIBILITY OF IRRADIATED MICE TO *ESCHERICHIA COLI*. I. L. Shechmeister, W. H. Paris, F. T. Krause, L. J. Paulissen, and R. Yunker. *Proc. Soc. Exptl. Biol. Med.* **89**, 223-30(1955).

Shielding of spleen in mice during irradiation protected them from subsequent infection with *E. coli*. Sixty-six per cent of the dying irradiated-infected animals succumbed within 48 hours, while only 18% of the sham-shielded-irradiated-infected animals succumbed within this time. The possible role of toxemia in experimental infection of irradiated animals is discussed. NSA 9-5581

6928

PROTECTIVE EFFECT OF α , β -AMINOETHYLISOTHIAURONUM. Br. HBr AND RELATED COMPOUNDS AGAINST X-RADIATION DEATH IN MICE. David G. Doherty and W. T. Burnett, Jr. *Proc. Soc. Exptl. Biol. Med.* **89**, 312-14(1955).

α , β -aminoethylisothiauronum. Br. HBr provides effective protection against radiation injury at dose levels considerably below those required to produce acute toxic effects. NSA 9-5582

6929

DESIGN OF A PORK-IRRADIATION FACILITY USING GAMMA RAYS TO BREAK THE TRICHINOSIS CYCLE. H. J. Gomberg, S. E. Gould, J. V. Nehemias, and L. E. Brownell. *Symposium Ser. No. 13*, 89-104(1954).

Radiation dose of 15,000 r will sterilize trichinae encysted within hog carcass. Flavor tests with ground

pork show no detectable taste changes with doses up to 60,000 r. Pasteurization, achieved by 60,000 r, increases refrigerator shelf-life of meat approximately 100%, 30,000 r increases shelf-life almost 30%. NSA 9-493

6930

California. Univ., Berkeley. Radiation Lab. RADIOISOTOPES IN HEMATOLOGY. Rollin K. McCombs and John H. Lawrence. Mar. 29, 1955. 27p. Contract W-7405-eng-48. (UCRL-2942).

Summarizes hematological studies in which radioisotopes were used as tracers or in therapy of various hematological disorders. Reviews literature from 1950. NSA 9-5587

6931

TOTAL-BODY γ -RADIATION FROM PATIENTS WITH INTERNALLY DEPOSITED THORIUM. J. Rundo and Mogens Faber. Rec. trav. chim. 74, 416-22(1955). NSA 9-5726

6932

Los Alamos Scientific Lab., N. Mex. RELATIONS BETWEEN BACTEREMIA AND DEATH IN MICE FOLLOWING X-RAY AND THERMAL COLUMN EXPOSURES. Irene U. Boone, Kent T. Woodward and Payne S. Harris. 1955? 22p. (AECU-3049).

A direct relationship was demonstrated between mortality and bacteremia following exposure of mice to 400-800 r of x rays or 480-616 rem of thermal column radiation. NSA 9-5836

6933

California. Univ., Los Angeles. Atomic Energy Project. TISSUE DEPOSITION OF POLYVINYLPYRROLIDONE IN NORMAL AND IRRADIATED RABBITS. Harvey C. Upham, F. Warren Lovell, Lawrence E. Detrick, Dorothy Highby, Virginia Debley, and Thomas J. Haley. July 25, 1955. 29p. Contract AT-04-1-Gen-12. (UCLA-341). NSA 9-5838

6934

ON THE ROLE OF THE PEROXIDES IN THE FORMATION OF LESIONS PRODUCED BY RADIATION. P. Dubouloz and J. Dumas. J. radiol. et electrol. 36, No. 5-6, 343-5 (1955). (In French).

Authors concludes that primary peroxides probably play a role in production of skin lesions due to ultraviolet rays, but that biological action of x rays is due to another mechanism. NSA 9-5842

6935

FACTORS MODIFYING SENSITIVITY OF BACTERIA TO IONIZING RADIATIONS. G. E. Stapleton. Bacteriol. Revs. 19, 26-32(1955).

Investigations of several systems which can modify efficiency of x or γ rays in producing lethal effect on bacteria are described. Physiological state of organism at time of irradiation was found to determine the bacterium's radiosensitivity to some extent. Conditions were found under which a moderate fraction of a population of irradiated bacteria could recover from damaging radiation effects. NSA 9-5843

6936

SOME EFFECTS OF X-IRRADIATION OF DIFFERENT EMBRYONIC STAGES OF THE TROUT (SALMO GAIARDNERII). Arthur D. Welander. Growth 18, 227-55(1954).

Author describes effects of graded x-ray doses (25-2570 r) on 6 different embryonic states of rainbow trout ranging from 1 cell to hatching stage. NSA 9-5844

6937

SENSITIVITY TO X-RAYS OF THE EARLY CLEAVAGE STAGES OF THE SNAIL HELIOMA SUBCRENATUM. Kelshaw Bonham. Growth 19, 9-18(1955).

In 1- and 2-cell stages, resting eggs withstood 2 to 4 times as much radiation as cells in mitosis. LD₅₀ (hatching): 300-400 r for resting cells, 100 r for mitotic. Later stages were less sensitive. LD₅₀ for trochophore

through early shelled embryo stages: 500-1000 r. There was no significant difference in effectiveness of hard (200 pKV) and soft (50 pKV) x rays. NSA 9-5845

6938

THE INDUCTION OF X-RAYS OF RECESSIVE LETHALS IN THE MATURE SPERM OF MORMONIELLA VITRIPENNIS (WALKER). George B. Saul, II. Radiation Research 2, 447-60(1955).

Mature *M. vitripennis* (Walker) males were x rayed (568 to 5112 r) and mated to virgin females differing from them by an allele at a single locus. Numbers of lethals linked to two separate loci were computed for each dose. Mutation rate/roentgen = 0.004% for "R" locus; 0.001% for "black" locus. Dose-effect curve for recessive lethal inductions was linear. NSA 9-5846

6939

EFFECTS OF 50 ROENTGENS AND 25 ROENTGENS FRACTIONAL DAILY TOTAL-BODY γ -IRRADIATION IN THE BURRO. John H. Rust, Bernard F. Trum, John J. Lane, U. S. Grant Kuhn, III, John R. Paysinger, and Thomas J. Haley. Radiation Research 2, 475-82(1955).

A study has been reported on the response of the burro (*Equus asinus asinus*) to 50 r and 25 r fractional daily total-body Co⁶⁰ γ radiation. The mean survival time for the 50 r/day study was 30 days with a range of 25 to 35 days, and in the 25 r/day animals it was 63 days with a range of 47 to 87 days. All hematologic values were decreased. Lymphocytes were the most sensitive cell, and eosinophils the most resistant. Platelets were reduced significantly with 725 r at 25 r/day. A pronounced hyperferremia was observed after 500 r in the 50 r/day animals and after 200 r in the 25 r/day group. This elevation continued until near death. The clinical syndrome was characterized by weight loss, ulcerations, hyperesthesia, and hemorrhagic diathesis. The similarities of response of the animals receiving 50 and 25 r/day with those receiving 100 to 400 r/day were discussed. NSA 9-5847

6940

POST-IRRADIATION TIME AND DOSE-RESPONSE STUDIES ON THE INCORPORATION OF P³² INTO DNA OF MOUSE TISSUES. Lola S. Kelly, J. Dorothy Hirsch, Genevieve Beach, and Anita H. Payne. Radiation Research 2, 490-501 (1955). NSA 9-5848

6941

ULCERATIVE COLITIS LESIONS IN IRRADIATED RATS. Sheldon C. Sommers and Shields Warren. Am. J. Digest. Diseases 22, 109-11(1955).

Crypt abscess lesions, such as occur in one type of human ulcerative colitis were found in 9% of large series of irradiated parabiotic rats. Affected animals also showed metaplastic granular abnormality of mucus-producing cells in salivary glands and gastro-intestinal tract. Temporary hypofunction of adrenal cortex with normal activity of ovarian corpus luteal or testicular interstitial cells was considered to encourage development of intestinal crypt abscesses. NSA 9-5849

6942

BIOLOGICAL EFFECT ON ATOMIC BOMB GAMMA RADIATION. Eugene P. Cronkite, Victor P. Bond, W. H. Chapman, and R. H. Lee. Science 122, 148-50(1955).

Mice were exposed in aluminum containers to γ rays of a nuclear detonation, or to laboratory sources of x rays. With respect to lethality, the RBE of nuclear radiation as compared to laboratory sources was approximately 1. NSA 9-5850

6943

CONDITIONAL AVERSION TO SACCHARIN RESULTING FROM EXPOSURE TO GAMMA RADIATION. J. Garcia, D. J. Kimelforff, and R. A. Koelling. Science 122, 157-8 (1955).

Saccharin solutions and water were made available to 2 groups of rats. Before γ irradiation, both showed marked preference for saccharin. Postexposure, there was a definite decrease in this preference. A 30 r exposure negated the previous preference, while a 57 r exposure caused a definite aversion to saccharin. NSA 9-5851

6944

C¹⁴-ACETATE INCORPORATION INTO LIVER LIPIDS AND GLYCOGEN OF IRRADIATED RATS. Margaret G. Morehouse and Ronald L. Searcy. *Science* 122, 158-9 (1955).

Female albino rats were x irradiated, fasted and then fed C¹⁴. Irradiated animals showed significant increases in percent of liver glycogen, compared with controls. Total liver fatty acids showed that irradiation increased incorporation of C¹⁴ about ten-fold over controls. Same exposure and C¹⁴ feeding were repeated with group whose livers were extracted for lipids. It did not appear that radiation affected synthesis of phospholipids. NSA 9-5852

6945

RADIATION SENSITIVITY OF DORMANT AND GERMINATING BARLEY SEEDS. Calvin F. Konzak. *Science* 122, 197 (1955).

Striking differences in relative sensitivity of seeds to x rays and thermal neutrons were observed. These differences were thought to be associated with changes in physiological state, which differentially influenced the relative efficiency of the two radiations. NSA 9-5853

6946

RADIATION SICKNESS IN MAN FOLLOWING THE ADMINISTRATION OF THERAPEUTIC RADIOIODINE. John D. Abbatt and W. M. Court Brown. *Brit. J. Radiol.* 331, 358-63 (1955).

Radiation sickness occurring after therapeutic radioiodine administration as I¹³¹ has been observed on 28 out of 44 occasions. The symptoms have been described and their resemblance to the symptoms occurring after a single x-ray dose has been noted. The latent period prior to the onset of symptoms after radioiodine administration varied between 4 and 13 hours with a mean of eight hours. This finding has been contrasted with the latent periods of two to five hours after medium voltage x rays. The correlations between integral dose at eight hours per square meter and mean dose rate per hour to symptom onset per square meter and latent period have been noted. It is suggested that dose rate may be an important factor involved in the production of the symptoms of radiation sickness. NSA 9-5854

6947

THE DESTRUCTIVE EFFECTS OF RADIOACTIVE IODINE. J. A. Forbes. *Brit. J. Radiol.* 331, 378-80 (1955).

Effects of I¹³¹ radiation on thyroid gland and thyroid carcinoma tissue were observed in rats. No take-up and storage of I¹³¹ could be detected in uniformly cellular tumors in which no vesicles were observed or in cellular areas of well-differentiated thyroid-like tumors. Whereas normal thyroid was ultimately destroyed, destruction of well-differentiated tumor tissue was patchy. NSA 9-5855

6948

THE MODE OF ACTION OF THORIUM X ON HUMAN SKIN. Victor H. Witten and Marion B. Sulzberger. *Am. J. Roentgenol., Radium Therapy Nuclear Med.* 74, 90-7 (1955).

Authors discuss possible mechanisms by which thorium X applied to human skin may produce its biological effects. NSA 9-5856

6949

REDUCTION OF LIFE SPAN OF RATS BY ROENTGEN IRRADIATION. J. B. Hursh, T. R. Noonan, G. Casaretti, and F. Van Slyke. *Am. J. Roentgenol., Radium Therapy Nuclear Med.* 74, 130-4 (1955).

Comparison was made between response of rats to single doses of 150, 300, and 600 r x radiation and response to 600 r administered as single and divided doses. Single dose was found to produce a greater effect than same total dose delivered in daily fractions. Possible explanations are presented. NSA 9-5857

6950

THE LETHAL DOSE OF TOTAL BODY COBALT-60 GAMMA RADIATION FOR THE RABBIT. John H. Rust, Glenn D. Folmar, Jr., J. J. Lane, and Bernard F. Trum. *Am. J. Roentgenol., Radium Therapy Nuclear Med.* 74, 135-8 (1955).

LD_{50/30} for rabbits given Co⁶⁰ γ -ray exposure at rate of 45 r/hr was 1094 r. Mean survival time decreased as dose increased; for all animals succumbing it was 9.1 days. NSA 9-5858

6951

NATURAL COLOURED PHOTOGRAPHS OF RADIATION SICKNESS CAUSED BY BIKINI ASHES. Y. Koyama, et al. Iryo (Tokyo) 9, 1-4 (1955). (Text in English and Japanese). NSA 9-5861

6952

IS THE CONCEPT OF "CRITICAL ORGAN" VALID IN DETERMINING THE MAXIMUM PERMISSIBLE LEVEL FOR EXPOSURE TO RADIOACTIVE MATERIALS? J. N. Stannard. *Proc. Internat. Congr. on Peaceful Uses of Atomic Energy, Geneva, Switzerland, Aug. 1955, Vol. 13*, p.205-210. United Nations Publication (1956). Contract W-7401-eng-49.

This paper reviews, in part, the rationale of the critical organ concept in calculations of maximum permissible exposures to radioactive materials. It is shown that in many instances there is little evidence to indicate the existence of a critical organ. Furthermore, the choice is frequently quite arbitrary and without real evidence of damage to the organ in a chronic exposure situation, or evidence that the organ is critical in producing damage to the body as a whole. Very frequently, the only information available is the concentration of radioactive material in the various body organs and the organ with the highest concentration is perforce chosen as the critical organ. On the other hand, a review of the quantitative differences seen in maximum permissible operating levels when various possible critical organs are chosen or even entirely independent approaches used reveals that most values will lie within an order of magnitude range. While some of these differences may be important, a range of 10 is considered small in a field involving as many assumptions as that concerning the long term effects of radioisotopes. A review of pertinent parameters is urged, however, in cases where large issues such as cost, plant operating practices, etc. are involved. NSA 9-5863

6953

THE EFFECT OF GROWTH HORMONE ON RECOVERY FROM EXPOSURE TO X-RADIATION. John C. Barlow and E. A. Sellers. *Radiation Research* 2, 461-6 (1955).

Growth hormone had no effect on survival, organ weights relative to body weight, or on histological changes postirradiation. Initial loss of body weight after sublethal radiation was partially prevented. NSA 9-5864

6954

THE EFFECTIVENESS OF COLLOIDAL THORIUM DIOXIDE AS AN INTERNAL ALPHA EMITTER: A COMBINED MORPHOLOGIC AND RADIOAUTOGRAPHIC STUDY. Hermann J. Schaefer and Abner Golden. *Yale J. Biol. and Med.* 27, 432-40 (1954-55).

No evidence of hepatic fibrosis or instances of neoplasia were observed 9 mo after intravenous injection of thorotrast to rabbits. The material accumulated in progressively

large amounts in reticuloendothelial cells, principally in the liver, spleen and bone marrow. Much of the α energy was dissipated within the thorium deposits. NSA 9-5865

6955

CLINICAL COURSE OF THE RADIATION SICKNESS CAUSED BY BIKINI ASHES. INTERMEDIATE REPORT. Y. Koyama. et al. Iryo (Tokyo) 9, 5-45(1955). (In Japanese).

Authors summarize clinical data on 16 patients during first 5 mo after exposure to radioactive fall-out from thermo-nuclear explosion. (Crew of the "Lucky Dragon.") NSA 9-5866

6956

PATHOLOGICAL FINDINGS IN THE FATAL CASE (THE LATE MR. KUBOYAMA) OF THE RADIATION SICKNESS CAUSED BY BIKINI ASHES. AN INTERMEDIATE REPORT. S. Ohashi, K. Hashimoto, N. Fukushima, K. Tashiro, H. Sugano, and Y. Mori. Iryo (Tokyo) 9, 46-55(1955). (In Japanese).

Secondary virus hepatitis and *Aspergillus fumigatus* pneumonia were among findings at autopsy. NSA 9-5867

6957

CONFERENCE ON THE RADIOACTIVE DISEASE CAUSED BY THE ATOMIC BOMB EXPLOSION IN THE CENTRAL PACIFIC. Y. Koyama. et al. Iryo (Tokyo) 9, 56-68(1955). (In Japanese). NSA 9-5868

6958

California. Univ., Los Angeles. Atomic Energy Project. GONAD DOSE DURING ROUTINE ROENTGENOGRAPHY. M. S. Billings, A. Norman, and M. A. Greenfield. July 22, 1955. 16p. Contract AT-04-1-gen-12. (UCLA-340).

Average gonad dose received during routine roentgenography by age 30 is calculated to be 5 to 15% of dose accumulated in that time from natural background radiation. NSA 9-5869

6959

CLEARANCE OF RADIOACTIVE DUST FROM THE HUMAN LUNG. Roy E. Albert and Lawrence C. Arnett. A. M. A. Arch. Ind. Health 12, 99-106(1955).

Effective half life of thoron daughters in lung after deposition, together with kaolin particles of mass-median diameter 1.1-1.3 μ was found to be 9 hrs, indicating that pulmonary clearance is not adequate to reduce radiation hazard materially under these conditions. The larger the average inhaled particle size, the greater the fraction removed in 2-4 hr. (the first phase of bronchial clearance). NSA 9-5875

6960

SYMPOSIUM ON GENETIC RECOMBINATION GIVEN AT RESEARCH CONFERENCE FOR BIOLOGY AND MEDICINE OF THE ATOMIC ENERGY COMMISSION; SPONSORED BY THE BIOLOGY DIVISION, OAK RIDGE NATIONAL LABORATORY. J. Cellular Comp. Physiol. 45, Supple. 2, (1955). NSA 9-6153

6961

Chicago. Univ. Air Force Radiation Lab. QUARTERLY PROGRESS REPORT NO. 16. July 15, 1955. 110p. Contract AF-33(038--27353. (NP-5730).

Includes reports on: effect of organic sulfur-containing compounds, adrenergic blocking agents, and purine and pyrimidine derivatives on mortality of x-rayed rats and mice; effect of; x radiation on borneol metabolism in mice and rats; decreased barometric pressure on mortality of x-rayed rats; starvation and 800 r x-rays on free amino acid content of rat plasma, x rays on body weight, spleen and thymus weight; survival time; 5-nucleotidase and adenosine triphosphatase activity of spleen and thymus in rats. NSA 9-6154

6962

California. Univ., San Francisco. School of Medicine. Radiological Lab.

RADIOLOGICAL LABORATORY SEMIANNUAL REPORT FOR PERIOD ENDING JUNE 30, 1955. July 1955. 36p. Contract AT-11-1-Gen-10-Project No. 2. (UCSF-11).

Includes reports on: statistical analysis of effect of age at time of exposure on LD₅₀ for mice; late effects of whole-body x rays on mice; direct and indirect x-ray effects on rat testis, effect of incubation time on macrocolony formation by x rayed microorganisms, combined effects of endogeneous respiration and cell concentration on killing of microorganisms by x rays. NSA 9-6155

6963

GENETICAL EFFECTS OF RADIATION FROM PRODUCTS OF NUCLEAR EXPLOSIONS. J. B. S. Haldane. Nature 176, 115(1955).

Serious nature of genetical effects of radiation is stressed. Upper and lower limits of radiation-induced human mortality are estimated. NSA 9-6157

6964

A FACTOR INFLUENCING THE SIGNIFICANCE OF RADIATION MORTALITY EXPERIMENTS. Antolin Raventos. Brit. J. Radiol. 28, 410-14(1955).

The distribution of post-irradiation mortality among apparently identical cages of mice was studied. It was found that the mortality of any single cage may be strongly influenced by a cage effect, which disappears when the mice are shuffled, each to a different cage every 24 hours. As a result of cage effect, the mortality of any single cage or small number of cages is a significantly less reliable estimate of the mortality of the entire population that can be accounted for by random variation alone. Therefore, a substantial difference in mortality between two experimental groups, although statistically significant by conventional tests, may be spurious if the groups are housed separately. Possible causes of cage effect are discussed, but no investigation of the causes was made. Cage effect can probably be avoided by caging each mouse individually, and this was found not to alter radiation sequelae materially. It was shown that valid mortality comparisons can be made with multiple animal caging if each cage originally contains an equal number of animals from each of the groups whose mortalities are to be compared. NSA 9-6158

6965

ACTION OF γ RAYS ON *CREPIS ZACINTHA* L. BABC: INFLUENCE OF THE INTENSITY OF IRRADIATION ON THE RATE OF CELLULAR FATALITY. Andre Bilquez. Compt. rend. 241, 327-9(1955). (In French).

Crepis Zacintha L. Babc were grown after exposure to Co⁶⁰ γ rays. Data indicate cellular lethality is greatly affected by radiation intensity. Allowing seeds to germinate only after a year has elapsed since irradiation does not affect lethality. NSA 9-6159

6966

METABOLISM AND CHROMOSOME-BREAK REJOINING. Sheldon Wolif and Henry E. Luppold. Science 122, 231-2 (1955).

Factors affecting rejoining of chromosomes of *Vicia* following radiomduced breakage were investigated. Data on effect of respiratory inhibitors and 2,4-dinitrophenol on chromosomes rejoining the tabulated. NSA 9-6160

6967

EFFECT OF X-IRRADIATION ON CECAL FLORA OF THE RAT. Emily J. Bell, John G. Coniglio, and Granville W. Hudson. Proc. Soc. Ezptl. Biol. Med. 89, 404-6(1955).

Numbers of lactobacilli, coliforms, and azide-resistant organisms in rats fasted 24 hr before and after irradiation were compared to those in pair-fed control rats (not

irradiated) fasted for same 48-hr period. Normally-predominant lactobacilli decreased; coliforms and azide resistant bacteria increased. NSA 9-6161

6968

EFFECT OF RADIOPHOSPHORUS ON GERMINATION AND GROWTH OF OATS IN RELATION TO CONDITION OF PHOSPHATE SUPPLY. A. G. Shestakov, G. F. Ivanova, and N. I. Shmel'kova. Doklady Akad. Nauk. S.S.S.R. 102, 395-7(1955). (In Russian). NSA 9-6163

6969

ON DIRECT AND INDIRECT EFFECTS OF IONIZING RADIATION ON BIOLOGICAL OBJECTS. Ya. L. Shekhtman. Doklady Akad. Nauk. S.S.S.R. 102, 511-14(1955).

Effects of low temperature (-120°C) and atmosphere (air and N_2) on root growth of wheat sprouts exposed to 32,000 r of 160-kv x rays were measured and interpreted in terms of direct and indirect radiation effects. NSA 9-6164

6970

ON THE REACTION OF PLANTS TO THE RADIATION EFFECTS OF P^{32} IN THE SECOND GENERATION. A. G. Shestakov, G. F. Ivanova, and N. I. Shmel'lova. Doklady Akad. Nauk. S.S.S.R. 102, 641-3(1955). (In Russian) NSA 9-6165

6971

ENHANCEMENT OF RADIOBIOLOGICAL EFFECTS BY MALONIC AND MALEIC ACIDS. M. Kiga, Y. Ando, and H. Koike. Science 122, 331-2(1955).

Reports studies on effect of malonic and maleic acids on radiosensitivity of yeast. NSA 9-6166

6972

U. S. Atomic Energy Commission
MAJOR ACTIVITIES IN THE ATOMIC ENERGY PROGRAMS JULY-DECEMBER 1954. Washington, D. C., U. S. Government Printing Office, 138p. (1955).

Includes extensive outline of AEC research and development activities. NSA 9-2537

6973

University of Notre Dame, South Bend, Ind. LOBUND Inst. STATUS REPORT OF LOBUND STUDY ON COMPARATIVE EFFECTS OF TOTAL BODY RADIATION. Helmut A. Gordon and William C. Scruggs. Nov. 16, 1953. 16p. (AECU-2977).

Data from studies on the radiation syndrome in germ-free rats are presented. At doses of 700-1000 r, lack of bacteria apparently prolongs life but does not save it. At 400 and 600 r, germ-free state definitely reduces mortality and prolongs life. Histological observations are listed. Effects of single bacterial contaminants upon radiation syndrome of germ-free animals are described. NSA 9-2546

6974

Argonne National Lab., Lemont, Ill.
SECTION II. BIOLOGICAL AND MEDICAL RESEARCH. p. 65-186 of REPORT ON BIOLOGICAL, MEDICAL AND BIOPHYSICS PROGRAMS. PART I. SEMIANNUAL REPORT OF RADIOLOGICAL PHYSICS DIVISION. PART II. QUARTERLY REPORT OF BIOLOGICAL AND MEDICAL RESEARCH DIVISION. Jan. 1955. 205p. (ANL-5378).

Extensive research report covering studies of x-ray, Co^{60} γ ray, Sr^{90} , and fast-neutron effects on mice, rats, rabbits, and chicks. Pertinent reports are abstracted individually. NSA 9-2547

6975

Air Force Radiation Lab., Univ. of Chicago.
QUARTERLY PROGRESS REPORT NO. 14. Jan. 15, 1955. 104p. Contract AF33(038)-27353. (NP-5526).

Progress is reported on studies on the effects of ionizing radiations on the biochemistry of mammalian tissues; the influence of high temperature and other environmental factors on the susceptibility of animals to the injurious actions of ionizing radiations; and testing

of various pharmacological and toxicological compounds as protective agents against radiation injury in experimental animals. Data are included on the pharmacological effects of cholinergic drugs and mercurial diuretics for mice and rats and the influence of x irradiation on the metabolism and excretion of phenol in rats. (For preceding period see NP-5419). NSA 9-2548

6976

Quartermaster Food and Container Inst., Chicago.
RADIATION STERILIZATION. REVIEW OF THE LITERATURE IN SELECTED FIELDS. Feb. 1955. 74p. (NP-5543).

Literature survey is summarized. Topics discussed include: effect of ionizing radiation on proteins, lipids, carbohydrates, vitamins, enzymes and meats, and radiation sensitivity of spoilage microorganisms. 20 references. NSA 9-2549

6977

California. Univ., Los Angeles. Atomic Energy Project
THE EFFECTS OF CRITICAL DOSAGES OF GAMMA IRRADIATION UPON THE CAPACITY OF THE PITUITARY GLAND OF BUFO TO SECRETE THYROTROPIC HORMONE. Bennett M. Allen and Betty L. Bachman. Feb. 18, 1955. 35p. Contract AT-04-1-Gen-12. (UCLA-324).

Pituitary glands of recently metamorphosed donor toads subjected to 5000-6000 r of γ rays, were transplanted into immature host tadpoles. Output of thyrotropic hormone was measured by activity of the host thyroid glands as indicated by hind limb growth and tendency to shed cuticular larval teeth.

6978

ON THE MECHANISM BY WHICH RADIATIONS PRODUCE CELL INJURY. F. Holweck and Lacassagne. Compt. rend. soc. biol. 103, 766-8(1930). (In French).

6979

POTATO STORAGE AND GAMMA-RADIATION. J. Evans. Atomics 6, 47-51(1955)

Results of experiments that have been conducted by Brookhaven National Lab. on the use of ionizing radiation in connection with the extended storage life of potatoes are summarized. NSA 9-2552

6980

THE HISTOPATHOLOGY OF BACTERIAL INFECTION IN IRRADIATED MICE. Charles C. Congdon, Fletcher P. Williams, Jr., Robert T. Haberman, and Egon Lorenz. J. Natl. Cancer Inst. 15, 855-75(1955).

Intestinal lesions found postexposure probably represent one portal of entry for the bacterial infection. Pathogenesis of the disease depends on existence of a bacteremia that rapidly progresses to a fulminating septicopyemia in which purulent exudation is lacking. NSA 9-2553

6981

THE EFFECT OF FRACTIONATED X-RAY DOSAGE UPON THE MOUSE TESTIS. I. MAXIMUM WEIGHT LOSS FOLLOWING 80 TO 240 r GIVEN IN 2 TO 5 FRACTIONS DURING 1 TO 4 DAYS. Henry I. Kohn and Robert F. Kallman. J. Natl. Cancer Inst. 15, 891-9(1955)

Irradiation injury to germinal epithelium of CAF_1 mice, as measured by maximum testicular weight loss (at 4 weeks postexposure), is described. NSA 9-2554

6982

ON WASTED RADIATION AND THE INTERPRETATION OF EXPERIMENTS WITH CHRONIC IRRADIATION. R. H. Mole. J. Natl. Cancer Inst. 15, 907-14(1955).

Effects of (1) continued daily irradiation until death, (2) limited daily exposure, were contrasted. Killing efficiency per r of (2) were much greater. When allowance was made for wasted radiation, (1) pattern of dose and effect for chronic irradiation is markedly altered. NSA 9-2555

6983

RESULTS OF EXPOSURE OF NEWBORN STRAIN HR MICE TO X RADIATION. Margaret K. Deringer and Egon Lorenz. J. Natl. Cancer Inst. 15, 923-9(1955).

Total x-ray dose of 450 r did not increase incidence of skin papillomas in strain HR mice but the average age of appearance decreased. Damage to ovaries and testes was the principal result of 400 r exposure within 12 hr after birth. NSA 9-2556

6984

Naval School of Aviation Medicine, Pensacola.

THE RATE OF ENERGY LOSS (REL) IN THE TERMINAL SECTION OF HEAVY NUCLEI TRACKS IN LIVING TISSUE. Hermann J. Schaefer and Ernst Stuhlinger. Mar. 11, 1953. 19p. (AD-10803).

Possible health hazard resulting from exposure to high-altitude cosmic radiation was investigated. NSA 9-3362

6985

Naval Medical Research Inst., Bethesda.

THE COMPARATIVE EFFECT OF PLATELETS ON PROTHROMBIN UTILIZATION FROM DOGS IN THE DEGENERATIVE AND REGENERATIVE PHASE OF IRRADIATION BONE MARROW APLASIA E. P. Cronkite, G. J. Jacobs, and P. K. Schork. Nov. 11, 1954. 10p. (NM-006-018.04.76).

Dogs were exposed to 150, 250, 400, and 600 r and prothrombin utilization and platelet counts performed periodically after exposure. Results show prothrombin utilization to be dependent upon platelet level which in turn dependent upon radiation dose. NSA 9-3363

6986

California. Univ., Berkeley. Radiation Lab.

VARIATION OF THE BIOLOGICAL EFFECTIVENESS OF X-RAYS AND ALPHA PARTICLES ON HAPLOID SACCHARO-MYCES CEREVISIAE. Mortimer M. Elkind and Carl A. Beam. Jan. 21, 1955. 27p. Contract W-7405-eng-48. (UCRL-2845).

Radiosensitivity of *S. cerevisiae*, SC-7, was studied in region of exponential survival using 50-kv x rays and 3.4-Mev α particles (Po^{210} source). While resistance to α particles remained relatively constant for starvation periods of up to 9 days, x-ray resistance increased by factor of 2.5 in same interval. RBE varied from 0.66 to 2.0 NSA 9-3364

6987

Naval Radiological Defense Lab., San Francisco.

ADRENAL CORTICAL RESPONSE IN THE RAT TO X IRRADIATION IN TERMS OF CORTICOSTERONE LEVELS. F. T. Brayer. Jan. 17, 1955. 18p. (USNRDL-TR-27).

Author describes an adaptation of prevailing methods for determining corticosteroids in small amounts of tissue. Corticosterone level in adrenal glands of rats is shown to be significantly increased by exposure of rat to 600 r of total-body x rays. NSA 9-3365

6988

ATOMIC BOMB INJURIES AMONG SURVIVORS IN HIROSHIMA. Mardelle L. Reynolds and Francis X. Lynch. Public Health Repts. (U.S.) 70, 261-70(1955).

Data pertaining to 6343 survivors of the atomic explosion in Hiroshima on Aug. 6, 1945 are analyzed with respect to incidence of mechanical and radiation injuries and flash burns, in relation to distance from ground center and type of protection. NSA 9-3366

6989

INACTIVATION OF BACTERIOPHAGES BY DECAY OF INCORPORATED RADIOACTIVE PHOSPHORUS. Gunther S. Stent and Clarence R. Fuerst. J. Gen. Physiol. 38, 441-58(1955).

Inactivation of phages T_1 , T_2 , T_3 , T_5 , T_7 , and λ by decay of incorporated P^{32} was studied. At same specific

activity of P^{32} in their DNA, T_2 and T_5 are inactivated 3 times as rapidly as T_1 , T_3 , T_7 , and λ , but the strains of the first class contained 3 times as much P^{32} per phage particle as those of the second. NSA 9-3367

6990

RESPONSE TO TOTAL BODY IRRADIATION. Andrew H. Dowdy and Leslie R. Bennett. Am. J. Roentgenol., Radium Therapy Nuclear Med. 73, 639-48(1955).

Most common prompt and late effects of total body x rays on mammals are summarized and discussed briefly. 43 references. NSA 9-3368

6991

THE EFFECTS OF X-RAYS, X-MEV ELECTRONS, THERMAL NEUTRONS, AND FAST NEUTRONS ON DORMANT SEEDS OF BARLEY. Richard S. Caldecort. Ann. N. Y. Acad. Sci. 59, 514-35(1955).

The inactivation of the phages T_1 , T_2 , T_3 , T_5 , T_7 , and λ by decay of incorporated P^{32} has been studied. It was found that these phages fall into two classes of sensitivity of P^{32} decay: at the same specific activity of P^{32} in their deoxyribonucleic acid (DNA), T_2 and T_5 are inactivated three times as rapidly as T_1 , T_3 , T_7 , and λ . Since the strains of the first class were found to contain about three times as much total phosphorus per phage particle as those of the second, it appears that the fraction of all P^{32} disintegrations which are lethal is very nearly the same in all the strains. This fraction α depends on the temperature at which decay is allowed to proceed, being 0.05 at -196°C , 0.1 at $+4^\circ\text{C}$, and 0.3 at 65°C . Decay of P^{32} taking place only after the penetration of the DNA of a radioactive phage particle into the interior of the bacterial cell can still prevent the reproduction of the parental phage, albeit inactivation now proceeds at a slightly reduced rate. T_2 phages inactivated by decay of P^{32} can be cross-reactivated, i. e., donate some of their genetic characters to the progeny of a mixed infection with a non-radioactive phase. They do not, however, exhibit any multiplicity reactivation or photo-reactivation. The fact that at low temperatures less than one-tenth of the P^{32} disintegrations are lethal to the phage particle and the dependence of the fraction of lethal disintegrations on temperature can be accounted for by the double stranded structure of the DNA macromolecule. NSA 9-3367

6992

Naval Radiological Defense Lab., San Francisco.

ON THE NATURE OF THE SPLEEN-BONE MARROW RADIATION RECOVERY FACTOR. L. J. Cole and M. E. Ellis. Dec. 13, 1954. 21p. (USNRDL-TR-23).

Data support view that DNA, as present in intact, non-homogenized spleen cells is not available as substrate for added DNA-ase. Recovery factor in rat bone marrow possesses some properties in common with the factor in mouse spleen. NSA 9-3370

6993

THE COUNTERACTION BY CYSTEINE OF THE EFFECTS OF X-RAYS AND OF TRYPTOPHAN ON THE ACTION OF SPECIFIC SUPPRESSOR SYSTEMS IN *DROSOPHILA MELANOGASTER*. Henry L. Plaine. Cancer Research 15, 151-8(1955).

L-cysteine was fed to larvae carrying both a suppressor-erupt and a suppressor-tumor system to test its effect in combination with x-ray treatments and with supplementary L-tryptophan in the diet. Interaction of tryptophan, oxygen, and cysteine were similar to that between x rays, oxygen, and cysteine. NSA 9-3371

6994

INDUSTRIAL HYGIENE AND MEDICAL SURVEY OF A THORIUM REFINERY. Roy Albert, Paul Klevin, James Fiesco, John Harley, William Harris, and Merrill Eisenbud. A. M. A. Arch. Ind. Health 11, 234-42(1955).

Although study of thorium refinery in operation 30 years revealed thorium exposures considerably in excess of currently acceptable standards, there was no evidence of overt industrial disease. NSA 9-3375

6995

Western Reserve Univ., Cleveland. Atomic Energy Medical Research Project.

INCORPORATION OF FORMATE- C^{14} AND BICARBONATE C^{14} INTO NORMAL AND X-IRRADIATED CHICK EMBRYOS. Paul S. Lavik. Mar. 10, 1955. 17p. (NYO-4916). Contract W-31-109-eng-78.

Embryonated eggs were exposed to 450 r of x rays on 11th day of incubation, then these and control groups were inoculated with formate C^{14} or bicarbonate C^{14} , and incorporation of isotope into RNA and DNA bases was determined. NSA 9-3376

6996

Los Alamos Scientific Lab., N. Mex.

RELATION BETWEEN SPECIFIC IONIZATION OF VARIOUS RADIATIONS AND THEIR RELATIVE BIOLOGICAL EFFECTIVENESS IN MAMMALIAN SYSTEMS. John Furchner. Sept. 1954. 101p. Contract W-7405-Eng-36. (LA-1849).

Relative biological effectiveness of several radiations (thermal column mixed radiations, 250-kvp x rays, tritium β particles, Co^{60} γ rays, Pu and Ra α particles) on depression of Fe^{59} uptake by red blood cells of male Sprague-Dawley rats is described. NSA 9-3007

6997

Naval Medical Research Inst., Bethesda, Md.

EFFECTS OF DRUGS AND RADIATION; SIMILARITIES AND DIFFERENCES AND THEIR SIGNIFICANCE FOR RESEARCH AND TEACHING. (LECTURE AND REVIEW SERIES NO. 54-5). Friedrich Ellinger. Oct. 22, 1954. 4p. (NP-5565). NSA 9-3008

6998

California. Univ., Berkeley. Radiation Lab.

X IRRADIATION AND LIPOPROTEIN METABOLISM IN VARIOUS SPECIES. John E. Hewitt and Thomas L. Hayes. Jan. 31, 1955. 27p. Contract W-7405-Eng-48. (UCRL-2857).

Changes in lipoprotein concentrations after x-irradiation were studied in rabbit, dog, rat and mouse. At doses employed, alteration in concentration occurred at a different time for each species. Relatively large increase in concentration of low density lipoproteins precedes death from irradiation in rabbit, rat, and dog. NSA 9-3009

6999

Rochester, N. Y. Univ. Atomic Energy Project.

A SURVEY OF THE LITERATURE ON THE BIOLOGICAL EFFECTS OF RADON AND A DETERMINATION OF ITS ACUTE TOXICITY. Donald A. Morken. Jan. 24, 1955. 101p. Contract W-7401-eng-49. (UR-379).

CAF_1 mice were exposed to high radon concentrations (2.3×10^{-4} curie/liter). LD_{50-30} was found to be exposure for 1 hr to concentration of 5.7 and 8.8 millicuries/liter of air. Generalized radiation damage resulted. Changes in cellular composition of the blood were less pronounced than those caused by equivalent doses of x rays. NSA 9-3010

7000

UPTAKE OF RADIOACTIVE IRON (Fe) BY NUCLEATED RED CELLS IN VITRO. L. G. Lajtha and H. D. Suit. Brit. J. Haematol. 1, 55-6(1955).

X irradiation *in vitro* did not inhibit Fe^{59} uptake by human bone marrow cells, but a relative shift to the right occurred in cellular composition of culture due to destruction of more early forms than late forms. NSA 9-3011

7001

THE EFFECT OF A SINGLE DOSE OF X-RAYS ON THE PERIPHERAL BLOOD COUNT OF MAN. W. M. Court Brown and John D. Abbatt. Brit. J. Haematol. 1, 75-85(1955).

Authors summarize changes in peripheral blood count of patients suffering from ankylosing spondylitis and treated with a single x-ray exposure to sacroiliac joints and whole length of spine. Average dose to bone marrow in spinal column is calculated to be 134 to 285 r. NSA 9-3012

7002

A COMPARISON OF THE EFFECTS OF RADIATION AND RADIOMIMETIC CHEMICALS ON THE BLOOD. L. A. Elson. Brit. J. Haematol. 1, 104-16(1955).

Effects of whole-body x rays on body weight and blood picture of rats are compared with effects produced by Myleran, 1;4-dimethanesulphonyloxybutane, and by nitrogen mustard derivative, N N-di (2 chloroethyl) -p-aminophenyl-butyric acid. NSA 9-3013

7003

RADIATION EFFECTS IN PARAMECIUM. E. L. Powers. Ann. N. Y. Acad. Sci. 59, 619-37(1955).

X-ray effect on death of cells, death after autogamy, and suppression of fission in Paramecium are reviewed. NSA 9-3014

7004

FACTORS IN THE RADIOSENSITIVITY OF MAMMALIAN CELLS. Harvey M. Patt. Ann. N. Y. Acad. Sci. 59, 649-64(1955).

No obvious common denominator seen to account for differences in radiosensitivity of various mammalian cells and tissues. Killing of lymphocytes appears mainly a direct consequence of their radiosensitivity. Protective agents discussed. NSA 9-3015

7005

THE BIOLOGICAL EFFECT OF FAST ELECTRONS AND EXTRA-HARD X-RAYS FROM THE 15 MEV ELECTRON SYNCHROTRON IN COMPARISON TO X RAYS OF USUAL HARDNESS. H. Gartner. Strahlentherapie 96, 201-27 (1955). (In German).

Effects of the various radiations on growth of tissue cultures are compared. NSA 9-3016

7006

THE RELATIONSHIP OF X-RAY DOSE TO THE TIME OF DEVELOPMENT OF RADIATION SICKNESS FOLLOWING EXPOSURE TO A SINGLE DOSE OF X RAYS. W. M. Court Brown and John D. Abbatt. Brit. J. Radiol. 28, 153-8 (1955).

Evidence indicates total-body integral dose cannot be correlated with severity of radiation sickness. Authors suggest expression of dose be qualified by level of dose received in specified organs and tissues of known radiosensitivity. NSA 9-3013

7007

ACUTE LEUKAEMIA FOLLOWING X-RAY AND RADIO-IODINE TREATMENT OF THYROID CARCINOMA. P. S. Blom, A. Querido, and C. H. E. Leeksa. Brit. J. Radiol. 28, 165-6(1955).

Authors present case history of woman suffering from thyroid carcinoma with cerebral and pulmonary metastases, who, after x-ray therapy, developed aplastic anemia which ended fatally in acute leukemia. NSA 9-3019

7008

RELATIVE EFFECTS OF QUALITATIVELY DIFFERENT IONIZING RADIATIONS ON THE PRODUCTION OF CHROMATID ABERRATIONS IN AIR AND IN NITROGEN. C. P. Swanson. Genetics 40, 193-203(1955).

Author reports on his comparative study of frequencies, in air and in nitrogen, of chromatid aberrations in *Tradescantia* caused by 50-, 100-, and 250- kvp x rays, as well as by Co^{60} γ rays. NSA 9-3020

7009

A COMPARATIVE STUDY OF INDUCED MUTATION IN THE OOCYTES AND SPERMATOZOA OF *DROSOPHILA MELANOGASTER*. I. TRANSLOCATIONS AND INVERSIONS.

Bentley Glass. *Genetics* 40, 252-67(1955). NSA 9-3021

7010

THE EFFECT OF OXYGEN AND OF HYDROGEN PEROXIDE ON THE ACTION OF A SPECIFIC GENE AND ON TUMOR INDUCTION IN DROSOPHILA MELANOGASTER. Henry L. Plaine. *Genetics* 40, 268-80(1955).

Results obtained when embryos are exposed to H_2O_2 solutions or to pure oxygen (no irradiation), together with those obtained when embryos are irradiated in different oxygen concentrations, suggest that x rays may produce melanotic tumors and erupt eyes by producing from oxygen certain oxidizing agents analogous to and including H_2O_2 . NSA 9-3022

7011

A COMPARATIVE STUDY OF INDUCED MUTATIONS IN THE OOCYTES AND SPERMATOZOA OF DROSOPHILA MELANOGASTER. II. DEFICIENCIES AND MINUTES. Bentley Glass. *Genetics* 40, 281-96(1955). NSA 9-3023.

7012

FEULGEN-NEGATIVE NUCLEAR DIVISION IN HABROBRACON EGGS AFTER LETHAL EXPOSURE TO X-RAYS OR NITROGEN MUSTARD. R. C. von Borstel. *Nature* 175, 342-3(1955).

Female *Habrobracon* were treated with a lethal dose of x rays or nitrogen mustard. Developmental pattern of eggs (from metaphase I) is described and possible mechanisms of action of mutagens are discussed. NSA 9-3024

7013

NATIONAL SURVEY OF CONGENITAL MALFORMATIONS RESULTING FROM EXPOSURE TO ROENTGEN RADIATION. Stanley H. Macht and Philip S. Lawrence. *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 73, 442-66(1955).

Data in this study indicate that amount of radiation received by radiologists under usual conditions does not have any very large effect on fetal and infant death rates in their children. NSA 9-3025

7014

RADIOISOTOPE CONFERENCE 1954. PROCEEDINGS OF THE SECOND CONFERENCE, OXFORD, JULY 19-23. VOL. I. MEDICAL AND PHYSIOLOGICAL APPLICATIONS. J. E. Johnston, A. Faïres, and R. J. Millett, eds. London, Butterworths Scientific Publications. (1954). 418p.

Proceedings include papers on use of radioisotopes in therapy and diagnosis and in studies on animal physiology and pathology. NSA 9-3719

7015

National Research Council. Div. of Medical Sciences. SECOND CONFERENCE ON RADIATION CATARACTS AND NEUTRON EFFECTS FOR THE UNITED STATES ATOMIC ENERGY COMMISSION. ABSTRACTS OF PAPERS. Dec. 2, 1950. 34p. (AECU-3016).

Topics include effects of x rays and neutrons on various aspects of cataract formation in man, dogs, rabbits, and mice. NSA 9-3722

7016

National Research Council. Div. of Medical Sciences. THIRD CONFERENCE ON RADIATION CATARACTS FOR THE UNITED STATES ATOMIC ENERGY COMMISSION. ABSTRACTS AND PROCEEDINGS. Jan. 28, 1952. 73p. (AECU-3017, U-23920).

Papers presented on various aspects of radioinduced cataracts are summarized. NSA 9-3723

7017

National Research Council. Div. of Medical Sciences. FIFTH CONFERENCE ON RADIATION CATARACTS FOR THE UNITED STATES ATOMIC ENERGY COMMISSION. ABSTRACTS AND PROCEEDINGS. Mar. 26, 1954. 116p. (AECU-3018).

Papers presented on the various aspects of radioinduced cataracts are summarized. NSA 9-3724

7018

National Research Council. Div. of Medical Sciences. FOURTH CONFERENCE ON RADIATION CATARACTS FOR THE UNITED STATES ATOMIC ENERGY COMMISSION. ABSTRACTS AND PROCEEDINGS. Feb. 28, 1953. 93p. (AECU-3019)

Papers presented on various aspects of radioinduced cataracts are summarized. NSA 9-3725

7019

Naval School of Aviation Medicine, Pensacola. THE RADIAL SPREAD OF THE TISSUE IONIZATION DOSAGE IN HEAVY NUCLEI TRACKS OF THE PRIMARY COSMIC RADIATION. Hermann J. Schaefer. Aug. 5, 1952. 31p. (ATI-169195).

Possible radiobiological consequences of findings are discussed briefly. NSA 9-3726

7020

School of Aviation Medicine, Randolph AFB, Tex. THE BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION. EFFECT OF HIGH-INTENSITY X RADIATION ON VELOCITY OF NERVE CONDUCTION. Project No. 21-3501-0005, Report No. 18. Herbert B. Gerstner, John S. Orth, and Everett O. Richey. Oct. 1954. 12p. (NP-5584).

Conduction velocity of isolated sciatic nerves (bullfrogs, rabbits) was measured prior to and at 1, 2, and 4 hrs postexposure. Rabbit nerves are more radiosensitive than frog nerves. NSA 9-3727

7021

Air Force Radiation Lab., Univ. of Chicago. THE BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION. EFFECT OF WHOLE BODY X IRRADIATION ON A NATURAL INHIBITOR OF CARBOXYPEPTIDASE. School of Aviation Medicine Project No. 21-3501-0005, Report No. 9 Robert N. Feinstein and John C. Ballin. May 1954. 7p. Contract AF 33(038)27353. (NP-5586).

Whole-body X-irradiation (LD_{50}) increases activity of certain cathepsins in liver, kidney, and intestine, apparently by destroying an enzyme inhibitor. Source of inhibitor may be the leucocyte. A determination of inhibitor reduction in the blood may provide an indicator of radiation exposure. NSA 9-3728

7022

BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION. ACETYLATION OF SULFANILAMIDE BY X IRRADIATED ANIMALS. (School of Aviation Medicine Project No. 21-3501-0005, Report No. 21). Kenneth P. DuBois, Gladys J. Cotter and Donald F. Petersen. Air Force Radiation Lab. and Dept. of Pharmacology, Univ. of Chicago. Dec. 1954. 6p. Contract AF33(038)27353. (NP-5587).

Acetylation of sulfanilamide was unaffected in rats by 500, 600, 800, or 1200 r of x rays, in guinea pigs by 400 or 800 r. Authors conclude that x rays cause no inactivation of coenzyme A of the liver *in vivo*. NSA 9-3729

7023

California. Univ., Berkeley. Radiation Lab. MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT FOR OCTOBER, NOVEMBER, DECEMBER 1954. Feb. 28, 1955. 46p. Contract W-7405-eng-48. (UCRL-2881).

Report includes discussion of preliminary results on pathological effects of At^{211} on rats and monkeys. NSA 9-3730

7024

THE EFFECT OF THE WAVE LENGTH OF X RAYS ON THE FREQUENCY OF VISIBLE MUTATIONS IN DROSOPHILA MELANOGASTER. M. E. Neuhaus and J. L. Schechtmann. 12p. Translated from *Biol. Zhur.* 4, 923-8(1935). (AEC-tr-2108). NSA 9-3731

7025

VERTEBRATE RADIOBIOLOGY (LETHAL ACTIONS AND ASSOCIATED EFFECTS). John F. Thomson. *Ann. Rev. Nuclear Sci.* 4, 377-400(1954).

Recent work concerned with radiation toxicology, modification of lethal effects, and mechanisms of lethal action is reviewed. NSA 9-3734

7026

EXTENDING ONION STORAGE LIFE BY GAMMA IRRADIATION.

S. L. Dallyn, R. L. Sawyer, and A. H. Sparrow.

Nucleonics 13, No. 4, 48-9(1955).

White and yellow Sweet Spanish onions were exposed to 1000, 2000, 4000, or 8000 r for 24 hr, then stored at: (a) 60-65°F in 30-40% relative humidity; or (b) 50-55°F in 70-80% R.H. Table of data shows percent of sprouting in two groups and in a control group. NSA 9-3735

7027

EFFECTS OF DELAYED OVIPOSITION ON X-RAY-INDUCED STERILITY. Leo LaChance. *Nucleonics* 13, No. 4, 49-50(1955).

Effect of delay in period of oviposition on x-ray induced sterility was studied on the parasitic wasp, *Habrobracon*. NSA 9-3736

7028

INACTIVATION OF MEFl POLIOMYELITIS VIRUS BY IONIZING RADIATION. Ernest C. Pollard and Lisbeth M. Kraft. *Proc. Soc. Exptl. Biol. Med.* 88, 331-3(1955).

Poliomyelitis virus was bombarded by deuterons and α particles. Inactivation of infectivity corresponds to cross section of $7.1 \pm 3.5 \times 10^{-12}$ cm² for α particles; $6.0 \pm 5.3 \times 10^{-12}$ cm² for deuterons. Radius of assumed spherical sensitive volume = 15.7 ± 4.8 μ . NSA 9-3737

7029

BIOCHEMICAL CHANGES IN SPLEENS OF RATS AFTER LOCALIZED X-IRRADIATION. Donald F. Petersen, Frank W. Fitch, and Kenneth P. DuBois. *Proc. Soc. Exptl. Biol. Med.* 88, 394-7(1955).

Rats received dose of 800 r x rays to the entire body, or 800 r to exteriorized spleens with bodies shielded. ATP activity, 5-nucleotidase activity, DNA concentration, citric acid synthesis, and histology of spleens were studied. Results indicate that the effect of x rays on functions studied is not a direct one. NSA 9-3738

7030

STIMULATION OF ERYTHROPOIESIS IN IRRADIATED DOGS AND RATS. Frederick Stohlman, Jr., E. P. Cronkite, and G. Brecher. *Proc. Soc. Exptl. Biol. Med.* 88, 402-6(1955).

After whole-body sublethal x-ray doses, erythropoiesis was depressed in dogs and rats; could be markedly increased by bleeding animals shortly before or after exposure. Postirradiation administration of PAPP gave similar increase in erythropoiesis. Blood loss 24 hr postirradiation had no appreciable effect. Data indicate injury to erythropoietic system is reversed or modified; recovery of other marrow elements is unaffected. NSA 9-3739

7031

EFFECT OF WHOLE-BODY X-IRRADIATION ON CONCENTRATIONS OF DPN AND DPNH IN RAT LIVER.

Herbert J. Eichel and M. A. Spirtes. *Proc. Soc. Exptl. Biol. Med.* 88, 412-14(1955).

X-irradiation (700 r) of intact rats had little effect on concentration of oxidized and reduced DPN of liver; 980 r lowered level of reduced DNP by 15-32% without significantly altering amount of oxidized coenzyme. Possible explanations for results are discussed. NSA 9-3740

7032

AN X-RAY ANALYSIS OF CHROMOSOME DUPLICATION.

Karl Sax and Edward D. King. *Proc. Natl. Acad. Sci. U. S.* 41, 150-5(1955).

Time of chromosome duplication as indicated by types of x-ray-induced aberrations is compared with autoradiographs of DNA synthesis in microspore development and in the meiotic cycle. NSA 9-3027

7033

THE EFFECT OF HIGH AND LOW ROENTGEN INTENSITY ON DOMINANT LETHALS IN *DROSOPHILA MELANOGASTER*.

K. G. Luning, Bo Lindell, and R. Falk. *Acta Radiol.*

43, 89-92(1955).

Drosophila males were irradiated with 800-900 r from discharge roentgen tube, and after 7 days, mated to selected females of high egg-laying capacity. No significant difference in hatchability was seen when high, compared with low, intensity irradiation dose was used. NSA 9-3029

7034

EFFECTS OF PILE RADIATION ON BARLEY SEEDS.

L. Ehrenberg and E. Saeland. *J. Nuclear Energy* 1, 150-69(1954).

Barley seeds were irradiated in Kjeller heavy-water reactor, and effects of different pile radiations (thermal, epithermal, and fast neutrons; γ rays, x rays) on growth rate, survival in the field, fertility, and mutation rate were studied. NSA 9-3030

7035

THE INFLUENCE OF IONIZING RADIATION ON THE BODY FLUID COMPARTMENTS OF PATIENTS WITH MALIGNANT LYMPHOMA. Joseph Greenberg and Daniel Laszlo. *J. Clin. Invest.* 34, 405-16(1955).

Ionizing radiation caused expansion of the extracellular fluid and plasma volumes at the expense of the intracellular compartment in all 4 patients studied. Reduction in intracellular volume was much more marked in the 2 on the restricted diet (low in protein, deficient in B vitamin and certain minerals). NSA 9-3031

7036

California. Univ., Los Angeles. Atomic Energy Project. FAILURE OF HETEROLOGOUS SPLEEN EXTRACTS TO INCREASE SURVIVAL TIME IN IRRADIATED MICE. Thomas J. Haley, John Heglin, and Eve F. McCulloh. Contract AT-04-1-Gen-12. Oct. 27, 1954. 10p. (UCLA-312).

Crude beef spleen extract and its acidic and basic components were ineffective in counteracting lethal effects of 550 r acute whole-body x rays when administered to mice on postirradiation days 1 and 2. Extracts acted synergistically with irradiation, decreasing survival time when given on days 3 and 4. Possible reasons for such effects are discussed. NSA 9-3033

7037

ON THE PROTECTIVE MECHANISM OF THIOUREA ON MICE IRRADIATED WITH A LETHAL DOSE OF X RADIATION. E. H. Betz. *Compt. rend. soc. biol.* 148, 1915-18(1954). (In French).

Thiourea injected immediately before irradiation produced protective effects when not influenced by subsequent injection of thyroxine. Other tests were also made with thiourea administered orally over extended period prior to irradiation. In the latter case, radiation resistance disappeared when thyroxine was injected. NSA 9-3034

7038

REMARKS CONCERNING SULPHYDRYL PROTECTION AGAINST MAMMALIAN RADIATION INJURY. Harvey M. Patt. *Proc. of the Symposium held at Liege, Aug.-Sept., 1954*. London, Butterworths Scientific Publications, p. 105-9(1954).

Mechanisms involved in protective action of sulphhydryl substances, cysteine in particular, against radiation injury are reviewed. NSA 9-3035

7039

PROPHYLAXIS AND THERAPY OF RADIATION SICKNESS BY MEANS OF BETA-MERCAPTOETHYLAMINE. V. Albano

and L. Oliva. *Radiologia (Rome)* 11, 37-50(1955). (In Italian)

Beneficial effects of 200-400 mg doses of β -mercaptoethylamine administered to 23 patients suffering with radiation sickness following radium or x-ray therapy are described. NSA 9-3036

7040

COMPARATIVE SURVIVAL TIMES OF X-RAY TREATED VERSUS P^{32} TREATED PATIENTS WITH CHRONIC LEUKEMIAS UNDER THE PROGRAM OF TITRATED, REGULARLY SPACED TOTAL-BODY IRRADIATION. Edwin E. Osgood, Arthur J. Seaman, and Harold Tivey. *Radiology* 64, 373-81(1955).

Prognosis for survival was not significantly different following total-body irradiation delivered externally by spray technique from that following P^{32} therapy. NSA 9-3037

7041

CHANGES IN THE HUMAN LEUKOCYTE COUNT DURING X-RAY THERAPY FOR CANCER AND THEIR DEPENDENCE UPON THE INTEGRAL DOSE. Henry I. Kohn. *Radiology* 64, 382-91(1955).

Author describes changes in count of each kind of leukocyte in 48 patients undergoing conventional course of x-ray-therapy. Tumor dose varied from 3000 to 6000 r; integral dose varied from 1 to 50 megagram-r. NSA 9-3038

7042

EXPERIMENTAL AND CLINICAL STUDIES WITH RADIO-ACTIVE COLLOIDAL GOLD IN THE THERAPY OF SEROUS EFFUSIONS ARISING FROM CANCER. Campbell Moses, Edward Kent, Joseph B. Boatman, R. D. Cole, Joseph H. Sunder, R. S. George, Clem Russ, W. B. Ford, and E. R. Kutz. *Cancer* 8, 417-23(1955).

In dogs, 5 mc of Au^{198} kg given intrapleurally produced mild leukopenia, but no sharply deleterious effects. NSA 9-3041

7043

ANAEMIA AND ERYTHROPOIESIS IN THE IRRADIATED RAT. AN EXPERIMENTAL STUDY WITH PARTICULAR REFERENCE TO TECHNIQUES INVOLVING RADIOACTIVE IRON. C. F. Baster, E. H. Belcher, Eileen B. Harriss and L. F. Lamerton. *Brit. J. Haematol.* 1, 86-103(1955).

The distribution of subcutaneously injected radioactive iron in bone marrow, spleen and liver, its uptake in the red cells, and its elimination in the faeces have been studied in normal rats, and in rats receiving whole-body and partial-body x irradiation. Rats of two strains have been employed. By these means, it has been possible to follow quantitatively the radiation response of the erythropoietic system. The effects of shielding one hind limb and of splenectomy with and without hind-limb shielding on the pattern of response and the severity of the post-irradiation anaemia have been investigated. NSA 9-3050

7044

HYDRATION AND RADIOSENSITIVITY. Roberts Rugh and Helen Clugston. *Proc. Soc. Exptl. Biol. Med.* 88, 467-72 (1955).

Artemia, essentially in blastula stage in suspended development, can tolerate about 200,000 r more x radiation in the dry than in the wet state, if criteria of hatching and motility after 48 hrs hydration are considered. Further studies are described. NSA 9-3741

7045

DIFFUSION OF FLUIDS IN SKIN AFTER EXPOSURE TO X-IRRADIATION. G. Prodi and R. Miceli. *Proc. Soc. Exptl. Biol. Med.* 88, 472-5(1955).

India ink and diphtheria toxin were injected intradermally in rabbit in x rayed and normal skin areas. Spreading surface of injected agents was greater in irradiated than in control areas. Increased diffusion is assumed to be due to depolymerization of mucopolysaccharides of ground substance by x rays. NSA 9-3742

7046

THE INFLUENCE OF PRETREATMENTS AND POST-TREATMENTS ON BACTERIAL INACTIVATION BY IONIZING RADIATIONS. George E. Stapleton. *Ann. N. Y. Acad. Sci.* 59, 604-18(1955).

Studies on ability of a strain of *E. coli* to recover from radiation injury are described, including studies aimed at the identification of "recovery factors" obtainable from tissues (especially spleen) and yeast extracts. Findings suggest involvement of more than one biochemical system in the recovery process in *E. coli*. NSA 9-3743

7047

ATOMIC BOMB INJURIES. Nobuo Kusano, ed. Tokyo, Tsukiji Shokan Co., (1953). 112p.

Author summarizes of many studies and reports by Japanese scientists on effects of atomic explosions on Nagasaki and Hiroshima residents. 112 illustrations. NSA 9-3745

7048

EFFECT OF CHLORPROMAZINE ON SURVIVAL TIME IN IRRADIATED MICE. Thomas J. Haley, W. G. McCormick, and Eve F. McCulloh. *Proc. Soc. Exptl. Biol. Med.* 88, 475-7(1955).

Premedication with 5 mg/kg of chlorpromazine intraperitoneally significantly increased mean survival time in x-rayed mice. Postirradiation medication (same dose) was neither beneficial nor detrimental. Doses of 10 and 20 mg/kg shortened survival times, acted synergistically with irradiation. Sensitivity of irradiated animals to medication is discussed. NSA 9-3747

7049

Argonne Cancer Research Hospital, Chicago
SEMIANNUAL REPORT TO THE ATOMIC ENERGY COMMISSION. Leon O. Jacobson, ed. Sept. 1954. 170p. (ACRH-2).

Includes reports on: effect of sublethal x-ray dose on leukemia-resistant mice, role of spleen in resisting successful proliferation of injected leukemic cells, effect of intravenous injection of plasma from x-irradiated, spleen-shielded rats on erythropoiesis in normal rats, nature of splenic agent responsible for survival of mice after lethal x-ray exposure. NSA 9-3748

7050

Brookhaven National Lab., Upton, N. Y.
ANNUAL REPORT-JULY 1, 1954. 145p. (BNL-303).

Describes program and activities of Brookhaven National Laboratory for fiscal year 1954. NSA 9-4038

7051

Brookhaven National Lab., Upton, N. Y.
QUARTERLY PROGRESS REPORT FOR OCTOBER 1-DECEMBER 31, 1954. (UNCLASSIFIED SECTION) 56p. (BNL-380).

Includes data from studies on effect of: I^{131} on selected rat tissues, thiouracil on growth of pituitary adenomas in rats, thiouracil on thyroidal accumulation of At^{211} in rats, boron (as borax) on mice; boron on patients with brain tumors. NSA 9-4039

7052

Army Medical Research Lab., Fort Knox.
ADAPTATION TO IONIZING RADIATION. A. T. Krebs and John B. Storer. Feb. 2, 1955. 17p. (AMRL-175).

Acquired radioresistance is reviewed briefly. Theories of mechanism are discussed; original unsuccessful attempts to adapt mice to total body radiation are reviewed. It is concluded that adaptation does occur in certain tissues, but much more information is required before significance and possible importance of phenomenon can be evaluated. NSA 9-4043

7053

Brookhaven National Lab., Upton, N. Y.

THE EFFECT OF CHRONIC GAMMA RADIATION ON THE PRODUCTION OF SOMATIC MUTATIONS IN CARNATIONS. Alan Richter and W. Ralph Singleton. 1955. 13p. (BNL-2255).

Carnations grown under conditions of chronic gamma radiation produced somatic mutations which could be vegetatively propagated. Relation between mutation rate and dose rate is uncertain. NSA 9-4044

7054
LEUKEMOGENESIS BY IONIZING IRRADIATION. J. Furth and A. C. Upton. *Acta Radiol.* 116, Suppl. 469-76(1954).

Authors review major essential findings on the subject. Three sets of new experiments in mice are summarized. Threshold dose for induction of myelogenous leukemia in mice was found to be 128 r (mixed radiations from detonation of nuclear device). NSA 9-4047

7055
Rochester, N. Y. Univ. Atomic Energy Project.
AN EXPERIMENTAL APPROACH TO THE STUDY OF THE RESPIRATORY DEPOSITION AND RETENTION OF CERTAIN ALPHA EMITTERS. P. E. Morrow and Louis J. Casarett. Jan. 10, 1955. 25p. Contract W-7401-eng-49. (UR-308).

Authors describe their study of respiratory tract deposition and retention of certain airborne α emitters. NSA 9-4048

7056
Rochester, N. Y. Univ. Atomic Energy Project.
PERSONNEL PROTECTION IN THE RADIOACTIVE INHALATION PROGRAM. G. Hoyt Whipple, J. N. Stannard, G. J. Miller, M. Ingram, and T. T. Mercer. Feb. 4, 1955. 40p. Contract W-7401-eng-49. (UR-310). NSA 9-4049

7057
Naval Radiological Defense Lab., San Francisco.
RECOVERY FROM ACUTE RADIATION INJURY IN MICE FOLLOWING ADMINISTRATION OF RAT BONE MARROW. L. J. Cole, J. G. Habermeyer, and V. P. Bond. Jan. 19, 1955. 24p. (USNRDL-TR-29).

Data suggest that administration of cortisone may enhance protective effect of rat bone marrow in x-rayed mice. NSA 9-4051

7058
Rochester, N. Y. Univ. Atomic Energy Project.
THE ACUTE TOXICITY AND RETENTION OF ORALLY ADMINISTERED POLONIUM²¹⁰ IN THE RAT. R. J. Della Rosa, R. G. Thomas, and J. N. Stannard. Apr. 8, 1955. 11p. Contract W-7405-eng-49. (UR-392).

Authors conclude that there is no marked difference in toxicity of Po after gavage as compared with an equivalent body burden after intravenous administration. NSA 9-4055

7059
BIOCHEMICAL EFFECTS OF RADIATION. Kenneth P. DuBois and Donald F. Petersen. *Ann. Rev. Nuclear Sci.* 4, 351-76(1954).

Actions of ionizing radiations on enzyme systems, particularly alteration of enzyme reactions by high energy radiations are reviewed. (192 references.) NSA 9-3733

7060
LATE EFFECTS OF BETA RADIATION OF THE EYE. George R. Merriam, Jr. A. M. A. Arch. Ophthalmol. 53, 708-17(1955).

Conservatism in use of β rays in superficial ophthalmic lesions is urged. Numerous late effects have been observed including (telangiectasis of conjunctiva, keratinization of the conjunctival epithelium, atrophy of sclera, superficial punctate keratitis, corneal vascularization, corneal scarring, iritis, iris atrophy, radiation cataract. NSA 9-4347

7061
THE CONTRIBUTION OF RADIATION GENETICS TO AGRICULTURE. W. Ralph Singleton. *Argon. J.* 47, 113-17(1955).

Early studies on genetic effects of radiation on plants are reviewed and recent experiments on radioinduced mutations in corn are described. NSA 9-4348

7062
EXPERIMENTAL TUMORS PRODUCED BY COMBINED CHEMICAL AND PHYSICAL STIMULI. G. Castigiani. *Bull. Soc. Ital. Biol. Sper.* 2, 636-42(1927).

Formation of epithelioma in rats was accelerated by x rays and tar x ray stimulated production of preneoplastic and neoplastic cells. Histological observations are discussed. CA 22-1389

7063
BACTERIOPHAGE AS INDICATOR IN RADIATION CHEMISTRY. Tikvah Alper. *Radiation Research* 2, 119-34(1955).

Author reports results of studies on mechanisms of radioinduced inactivation of bacteriophage. Role of H₂O₂ formation and of O₂ on response to radiation are discussed. Use of bacteriophage as radiation chemical indicator is suggested. NSA 9-4350

7064
HEMATOLOGIC CHANGES IN RATS PROTECTED FROM LETHAL X-RADIATION BY POST-IRRADIATION PARABIOSIS. George Metz, Robert T. Binhammer, Martin Schneider, and John C. Finerty. *Radiation Research* 2, 159-65(1955).

Rats placed in parabiosis within 3 hr after lethal x irradiation showed early leucopenia similar to unprotected animals, but leucocyte count was normal by 8th post-irradiation day. NSA 9-4351

7065
EFFECTS OF ROENTGEN IRRADIATION ON THE TUMOR BED. I. THE INHIBITING ACTION OF LOCAL PRE-TRANSPLANTATION ROENTGEN IRRADIATION (1500 r₀) ON THE GROWTH OF MOUSE MAMMARY CARCINOMA. K. W. Stenstrom, H. Vermund, D. G. Mosser, and J. F. Marvin. *Radiation Research* 2, 180-91(1955).

Pretransplantation x-irradiation of 1500 r/air (half-value layer 4.2 mm Al) delivered locally to leg 48 hr before subcutaneous inoculation of tumor cell suspension inhibits development and growth rate of mouse mammary carcinoma. Authors attribute this to effect on tumor or normal cells. NSA 9-4353

7066
THE EFFECTS OF GAMMA AND ROENTGEN RADIATION ON THE INTACT SPINAL CHORD OF THE MONKEY. AN EXPERIMENTAL STUDY. Robert L. McLaurin, Orville T. Bailey, Griffith R. Harsh, III, and Franc D. Ingraham. *Am. J. Roentgenol., Radium Therapy Nuclear Med.* 73, 827-35(1955).

Thirty-five *M. rhesus* monkeys were γ -irradiated (radioactive tantalum) or x irradiated over the spinal cord. NSA 9-4354

7067
THE RELATIVE EFFECTIVENESS OF VARIOUS IONIZING RADIATIONS ON CHROMOSOME BREAKAGE IN TRADE-SCANTIA. J. S. Kirby-Smith, C. W. Sheppard, and Doris L. Craig. *Radiobiology Symposium (Proceedings)*. p. 262-4(1954). Z. M. Bacq and P. Alexander, eds. London, Butterworths Scientific Publications, 1954. NSA 9-4356

7068
Army Medical Research Lab., Fort Knox, Ky.
FURTHER STUDIES OF THE EFFECT OF PARTIAL SHIELDING BY GRIDS ON SURVIVAL OF X-IRRADIATED ANIMALS. J. G. Kereiakes and T. A. O'Neill. Mar. 4, 1955. 17p. (AMRL-178).

Results indicate that in rats exposed to equal volume x ray doses through grids of constant hole size but of various ratios of open to closed area, observed survival is the result of individual effects of interface area, tissue volume irradiated, and total incident dose. Results with mice are also described. NSA 9-4357

7069

Western Reserve Univ., Cleveland. Atomic Energy Medical Research Project.

STUDIES ON THE NATURE OF THE PROTECTIVE ACTIONS OF β -MERCAPTOETHYLAMINE AND CYSTEINE AGAINST X RAYS AND A NITROGEN MUSTARD. Paul R. Salerno and Hymer L. Friedell. Apr. 27, 1955. 10p. Contract W-31-109-eng-78. (NYO-4921).

Protective action of the chemical agents against nitrogen mustard is the result of direct interaction of free sulfhydryl groups of cysteine or Becaptan with cyclic ethylene imonium of HN_2 , but protection against x ray is mediated indirectly through reduction of intracellular oxygen tension. NSA 9-4358

7070

Chicago. Univ. Air Force Radiation Lab.

QUARTERLY PROGRESS REPORT NO. 15. Apr. 15, 1955. 144p. Contract AF 33(038)-27353. (NP-5645).

Reports x-ray effects on rat hematopoietic system tissue weight, respiration and enzyme activity, and on metabolism of borneols and phenols in rats, protective effects of methyl bis-(2-chlorethyl)-amine hydrochloride on shielded tissues, temperature and pressure effects on lethality in x rayed rats, effect of antipyretic analgesics on mouse survival, effect of various agents on survival of x-rayed rats and mice. NSA 9-4665

7071

Western Reserve Univ., Cleveland. Atomic Energy Medical Research Project.

EFFECT OF SHORT INTERVAL FRACTIONATION ON THE LETHAL PROPERTIES OF TOTAL BODY RADIATION IN RATS. J. P. Storaash, S. Rosenberg, J. S. Krohmer, and H. L. Friedell. Apr. 27, 1955. 25p. Contract W-31-109-eng-78. (NYO-4919). NSA 9-4666

7072

Western Reserve Univ., Cleveland. Atomic Energy Medical Research Project.

THE REVERSAL BY HIGH OXYGEN TENSION OF THE PROTECTIVE ACTION OF CYSTEINE IN IRRADIATED RATS. Paul R. Salerno and Hymer L. Friedell. Apr. 27, 1955. 25p. Contract W-31-109-Eng-78. (NYO-4920).

7073

Naval Radiological Defense Lab., San Francisco.

THE EFFECT OF WHOLE BODY X IRRADIATION OF MICE ON IMMUNITY TO TETANUS TOXOID. PART I. THE EFFECT OF PRE- AND POST-IRRADIATION INJECTIONS OF TETANUS TOXOID WITH RESPECT TO THE DEVELOPMENT OF IMMUNITY. M. S. Silverman and P. H. Chin. Mar. 3, 1955. 18p. (USNRDL-TR-37).

Post-antigen irradiation was as effective as pre-antigen irradiation in injuring the immunity mechanism. Injury was proportional to dose. The closer to the time of irradiation that toxoid is given, the greater the inhibition of immunity. NSA 9-4668

7074

OCULAR EFFECTS PRODUCED BY HIGH-INTENSITY X-RADIATION. Paul A. Cibis, Werner K. Noell, and Bertram Eichel. A. M. A. Arch. Ophthalmol. 53, 651-63(1955).

Effects of high-intensity ionizing radiation upon the eye of albinotic and pigmented guinea pigs, rabbits, rhesus monkeys, and dogs are reported. NSA 9-4669

7075

INCREASED RADIATION SENSITIVITY OF PERTUSSIS VACCINATED MICE. M. Rowen, W. S. Moos, and M. Samter. Proc. Soc. Exptl. Biol. Med. 88, 548-50(1955).

After pertussis vaccination, mice showed increased sensitivity to one half the $\text{LD}_{50/30}$ (total body exposure). Results were not altered by administration of antihistamine or hydrocortisone. (40 vaccinated and 40 control mice.). NSA 9-4670

7076

INDUCED POLLEN LETHALS FROM SEEDS OF DATURA STRAMONIUM EXPOSED TO DIFFERENT RADIATIONS.

J. L. Spencer and A. F. Blakeslee. Proc. Natl. Acad. Sci. U. S. 41, 307-12(1955).

Analysis of pollen lethals in Datura plants developing from radiated seeds demonstrates marked difference in RBE of (1) fast neutrons from nuclear detonation, (2) fast neutrons from cyclotron, and (3) α radiation. NSA 9-4671

7077

THE ROLE OF OXYGEN AND PEROXIDE IN THE PRODUCTION OF RADIATION DAMAGE IN PARAMECIUM. R. F. Kimball. Ann. N. Y. Acad. Sci. 59, 638-47(1955).

Reduced oxygen tension lowered x-ray induced mutation rate in *P. aurelia*. Effect could not be attributed to decreased production of H_2O_2 since this substance is ineffective as a mutagen either by itself or in combination with x rays. NSA 9-3672

7078

ON THE FREQUENCY OF THE RETARDATION OF SKELETON BY RADIATION TREATMENT OF HEMANGIOMA. Emil Fisher. Strahlentherapie 97, 599-607(1955). (In German).

In 14 of 73 patients irradiated (x ray or radium) for hemangioma of extremities in childhood, reduction in length of irradiated bone in vicinity of joint was observed. In all these cases, hemangioma had embraced large area of respective part of the extremity. NSA 9-7630

7079

SEX-LINKED LETHAL MUTATIONS INDUCED BY THERMAL NEUTRONS IN MALE AND FEMALE DROSOPHILA MELANOGASTER. R. C. King and Eunice M. Wood. Genetics 40, 490-9(1955).

Nitrogen capture protons are 1.5 times as effective in producing sex-linked lethal mutations in sperm as are 90 kv x rays. Over dose range used, lethal mutation rate/dose for X chromosomes of sperms appears linear. Differences in mutation rates induced in male and female germ line are discussed. NSA 9-7631

7080

AFTER-EFFECTS OF IONIZING RADIATION IN BARLEY. I. MODIFICATION BY STORAGE OF X-RAYED SEEDS IN OXYGEN AND NITROGEN. A PRELIMINARY REPORT. Jack D. Adams, R. A. Nilan, and Helga M. Gunthardt. Northwest Sci. 29, 101-8(1955).

Data are presented to show that storage of dormant barley seeds postexposure increases radiation damage as measured by frequency of chromosome bridges, seedling height, germination rate and emergence. The data presented suggest that oxygen enhances, nitrogen retards storage effect. NSA 9-7632

7081

HISTOCHEMICAL STUDY OF THE ACTION OF X-RAYS ON CHOLINESTERASES. S. Hajdukovic. Experientia 11, 356-7(1955). (French with English summary).

Using a histochemical method, the cholinesterase activity in mice after x irradiation was observed. Both types of cholinesterases were examined: AChE (specific ChE) of megacaryocytes of spleen and bone marrow, and AChE of motor endplates, and non-specific ChE of liver, pancreas, and prostate. There is no inactivation of AChE even after 5000 r. ChE is also very resistant. Activity is slowed down only 12 h or even a few days following irradiation and the inactivation remains slight. We suppose that the great alterations in cellular permeability caused by irradiation are not correlated with the enzymes. NSA 9-7633

7082

COMPARATIVE EFFECTIVENESS OF ROENTGEN RAYS OF 124 KV AND 50 MEV ON HABROBRACON EGGS

TREATED IN FIRST MEIOTIC METAPHASE. Gertrude Heidenthal, Leonard B. Clark, and John W. Gowen. *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 74, 677-85 (1955).

No statistically significant difference was found between effects of the two irradiations in dose range of these experiments (low voltage: 100-1750 r; high voltage 100-1500 r). NSA 9-7634

7083
THE EFFECT OF GAMMA RADIATION ON THE CENTRAL NERVOUS SYSTEM. II. THE EFFECTS OF LOCALIZED IRRADIATION FROM TANTALUM 182 IMPLANTS. Edgar A. Bering, Jr., Orville T. Bailey, Fred D. Fowler, Peter H. Dillard, and Franc D. Ingraham. *Am. J. Roentgenol., Radium Therapy Nuclear Med.* 74, 686-700 (1955).

Gross and microscopic observations on a series of experiments on 18 monkeys exposed to large single doses delivered to the spinal cord are reported. Data suggest direct neuronal or glial effect. NSA 9-7635

7084
A STUDY OF PROTECTION OF THE ANIMAL ORGANISM AGAINST THE DELETERIOUS EFFECT OF IONIZING RADIATIONS. E. Ya. Graevskii. Moscow, Publishing House of the Academy of Sciences of the U. S. S. R., p. 34-50 in *Meetings of the Division of Biological Sciences* (1955). (In Russian).

Prophylactic protective effect for mice was obtained with CO, CO₂, heroin, morphine, adrenaline and penamine, therapeutic effect by i.-v. injections of homologous bone marrow, nuclear nucleoproteids and some alkaline and salt solutions. NSA 9-7637

7085
EFFECT OF PARENTERAL INJECTIONS OF PARTICULATE MATTER ON SURVIVAL OF X-IRRADIATED ANIMALS. Falconer Smith, Willie W. Smith, Howard L. Andrews, and Marie M. Grenaz. *Am. J. Physiol.* 182, 396-9 (1955).

Intraperitoneal injection of suspensions of limestone, quartz and Pyrex glass postirradiation (midlethal) increased the survival of mice/22 animals/100. Comparable results were obtained with guinea pigs and hamsters, but not rats. Defenses against postirradiation infection are believed to have been enhanced by the injections. NSA 9-7640

7086
RESPONSE OF THE BLOOD CORPUSCLES IN HYPOPHYSECTOMIZED RATS TO IRRADIATION WITH X-RAYS. B. L. Baker, E. C. Pliske, J. F. Kent, J. D. McGinty, J. G. Van Dyke, and F. H. Bethell. *Endocrinology* 57, 472-81 (1955).

Three weeks after hypophysectomy, young adult female rats were given one dose (500 r) of total body x-irradiation. The ensuing depression in the erythrocyte and reticulocyte counts, hematocrit percentage and hemoglobin concentration was more severe than in the non-hypophysectomized, irradiated rats. During the 11-week period of observation, the erythrocyte count and hemoglobin concentration in hypophysectomized-irradiated rats returned toward the level of that shown by the non-irradiated hypophysectomized rats. The reticulocyte count and hematocrit percentage equalled or surpassed the values for the latter group. Macrocytosis resulted from irradiation in only the hypophysectomized rats. The total leucocyte count fell to the same level in both hypophysectomized and non-hypophysectomized rats but showed greater recovery in the hypophysectomized-irradiated animals. It was concluded that the capacity of the blood-forming tissues to recover from the damaging effects of x-irradiation is not completely dependent on the action of pituitary hormones. (auth). NSA 9-7641

7087
RADIOACTIVE COBALT THERAPY. M. N. Pobedinskii

and A. M. Strelin, eds. Moscow Medgiz (1955). (In Russian).

Biological effect and medical application of Co⁶⁰ in various diseases (cancer, lymphogranulomatosis, tuberculous lymphadenitis, acromegaly) included in this review. NSA 9-7644

7088
MAJOR ACTIVITIES IN THE ATOMIC ENERGY PROGRAMS, JANUARY-JUNE 1955. Washington, U. S. Government Printing Office (1955). NSA 9-7223

7089
CANADIAN CANCER CONFERENCE. VOLUME I. PROCEEDINGS OF THE FIRST CANADIAN CANCER RESEARCH CONFERENCE, HONEY HARBOUR, ONTARIO, JUNE 16-19, 1954. R. W. Begg, ed. New York Academic Press, Inc. (1955).

Proceedings include discussion of applications of ionizing radiations in tumor induction and therapy. NSA 9-7226

7090
Army Medical Research Lab., Fort Knox, Ky.
THE THEORY OF INTERMITTENT RADIATION EFFECTS ON CHEMICAL AND BIOLOGICAL SYSTEMS. II. BIOLOGICAL SYSTEMS. Richard W. Michie and Lawrence H. Krohn. June 17, 1955. 26p. (AMRL-202).

Mathematical theory developed for effects of intermittent radiation on chemical systems is extended to include biological systems, assuming that biological responses may be considered to be chemical reactions. NSA 9-7229

7091
Army Medical Research Lab., Fort Knox, Ky.
APPLICATIONS OF INTERMITTENT RADIATION THEORY TO CONSTANT DOSE VARIABLE RADIATION TIME PROBLEMS IN BIOLOGICAL SYSTEMS. Richard W. Michie and Lawrence H. Krohn. July 21, 1955. 26p. (AMRL-207).

Mathematical formulation of intermittent radiation effects on biological systems is extended to include problems involving constant dose and variable reaction time. NSA 9-7230

7092
California. Univ., Berkeley. Radiation Lab.
THE EFFECT OF PHYSIOLOGICAL AND MORPHOLOGICAL CHANGES ON THE RADIATION SENSITIVITY OF *ESCHERICHIA COLI*. Arnold Stanley Brownell. July 1955. 104p. Contract W-7405-eng-48. (UCRL-3055).

E. coli, strains B and B/r, were grown aerobically in 3 different culture media. Sensitivity to x rays at various stages of growth cycle was determined. NSA 9-7231

7093
California. Univ., Berkeley. Radiation Lab.
MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT FOR APRIL, MAY, JUNE 1955. July 26, 1955. 37p. Contract W-7405-eng-48. (UCRL-3096).

Reports studies on: thyroxine influence on toxicity of At²¹¹ in rats; mercaptoethylamine effect on red cell formations in irradiated rats, influence of ploidy and division stage on anoxic protection of *Saccharomyces* against x-ray inactivation. NSA 9-7232

7094
Naval Radiological Defense Lab., San Francisco.
URINARY EXCRETION AND PLASMA LEVELS OF FREE NINHYDRINREACTIVE COMPOUNDS IN X-IRRADIATED RATS. R. E. Kay, D. C. Harris, and C. Entenman. Aug. 4, 1955. 13p. Project No. NM 006-015. (USNRDL-TR-53).

Daily urinary excretion and plasma concentration of ninhydrinreactive compounds in fasting, x-irradiated rats was measured by paper chromatographic method. Data on 15 amino acids are tabulated. NSA 9-7233

7095
Naval Radiological Defense Lab., San Francisco.

THE CONVERSION OF GLYCINE-1-C¹⁴ TO PROTEIN-C¹⁴ AND C¹⁴O₂ IN LIVER SLICES FROM X-IRRADIATED RATS. R. E. Kay and C. Entenman. Aug. 1, 1955. 19p. Project NM 006-015. (USNRDL-TR-54).

The effects of whole-body x irradiation upon protein synthesis in rat liver were investigated. The new incorporation of C¹⁴ from glycine-1-C¹⁴ into protein of liver slices was greater for x-irradiated, fasted rats than for fasting control rats. The incorporation in control rats falls off as the fast progresses. In contrast, the incorporation in x-irradiated rats increases with increasing time after irradiation and length of fast. The rate of conversion of glycine-1-C¹⁴ to C¹⁴O₂ is not the same for liver slices taken from x-irradiated and control rats. After a 1-day fast the liver slices from the control rats convert 18 to 28% of the glycine label of C¹⁴O₂. This rate increases to a peak value of 26 to 45% after 2 days of fasting and declines to 16 to 26% at the end of 3 days of fasting. In the irradiated rat, conversion is 20 to 30% after a 1-day fast and this amount rises steadily to 21 to 37% at the end of a 3-day fast. NSA 9-7234

7096
MODIFICATION OF X-RAY MUTAGENESIS IN DROSOPHILA. I. REUNION OF CHROMOSOMES IRRADIATED DURING SPERMIOGENESIS. I. I. Oster. Genetics 40, 692-6 (1956).

Chromosome ends broken during spermiogenesis undergo reunion before fertilization, while breaks produced in mature spermatozoa remain open and reunite during fertilization. In these stages of germ cell development, prior irradiation does not lead to an alteration in the reactions to subsequent x-ray doses. NSA 9-7235

7097
A COMPARISON OF X-RAY AND ULTRAVIOLET EFFECTS ON CHROMOSOMES OF ZEA MAYS. M. H. Emmerling. Genetics 40, 697-714 (1955)

Analysis of chromosomal aberrations revealed a quantitative but not a qualitative difference between effects of ultraviolet and x-rays. NSA 9-7236

7098
 α -PARTICLE DOSIMETRY AND THE INHIBITION OF MITOSIS IN THE GRASSHOPPER NEUROBLAST BY LOW DOSAGE α -IRRADIATION. Robert W. Rogers. Radiation Research 3, 18-37 (1955).

Polonium α -particle sources and a microscope-adapted source holder were utilized for irradiating special mica hanging-drop living culture preparations of grasshopper embryos. A single-crystal zinc sulfide scintillation-photomultiplier technique was developed and employed for measuring α -particle traversal of single biological cell dimensions with improved dosimetry. Studies were made of polonium sources comparing scintillation, photographic, and mathematical techniques in measurement of the aberrant effects of nonuniform polonium deposition. The ranges of polonium α -particles in air and mica were determined, and the α -particle energy delivered to biological material was graphically computed. The scatter of α -particles in mica, the spatial distribution of particles, the random emission, and the Poisson dose distribution were studied. The effects of 56 rads of α -radiation on the mitotic rate of grasshopper neuroblast cells were determined, only 75% of normal mitotic activity being observed 6 hours after irradiation. Comparison with similar studies of β - and x-ray inhibition indicate that α -particles were most effective and β -particles least effective in producing inhibition of mitosis, with x-rays intermediate. A comparative study of inhibition of the midprophase and late prophase stages of the neuroblast by 56 rads of x-rays and α -particles showed greater radiosensitivity in early midprophase, the effectiveness of both radiations becoming inappreciable by prometaphase.

At this dose level, α - and x radiation effects on early and late midprophase are indistinguishable in terms of mitotic inhibition or failure to inhibit division. A low-dosage α -radiation study of five substages comprising midprophase showed that inhibition of mitosis was related to Poisson distribution of dosage in gross effect, the dose having been administered in 1 second with an average of 0.8 α -particle per second per neuroblast. The effects presumably attributable to a single α -particle were observed, with radiosensitivity decreasing with mitotic progress throughout the midprophase. NSA 9-7237

7099
ON THE RADIOSENSITIVITY OF THE YEAST, SACCHAROMYCES ELLIPSOIDEUS. A. Lacassagne and F. Holweck. Compt. rend. soc. biol. 104, 1221-3 (1930). (In French).

7100
LETHAL EFFECTS ON RATS OF SINGLE AND MULTIPLE EXPOSURES OF 400-Kv AND 22-Mv X-RADIATION. W. S. Moos, J. B. Fuller, W. J. Henderson, F. Dallenbach, and R. A. Harvey. Radiation Research 3, 44-51 (1955).

Irradiation of rats with single doses of 400-kvp and 22-Mv x rays showed the latter to be 75% as effective as the former when based on LD₅₀₍₃₀₎. Fractionated doses of 51 r/day of 22-Mv 55-60% were as effective as 400-kvp fractionated doses. NSA 9-7239

7101
THE REACTION OF THE MOUSE SPLEEN TO X-RAYS MEASURED BY CHANGES IN ORGAN WEIGHT. Robert F. Kallman and Henry I. Kohn. Radiation Research 3, 77-87 (1955). NSA 9-7240

7102
CLEARANCE OF BACTERIA FROM THE BLOOD OF IRRADIATED RABBITS. Lee L. Gordon, Dorothy B. Cooper, and C. Phillip Miller. Proc. Soc. Exptl. Biol. Med. 89, 577-9 (1955).

Normal and irradiated rabbits were inoculated intravenously with approximately 10⁶ Klebsiella pneumoniae, type A. The R-E system in irradiated rabbits was able to remove bacteria from the circulating blood for a few hours but was unable to retain and destroy them. NSA 9-7241

7103
EFFECT OF VARIOUS DOSES OF TOTAL BODY X-IRRADIATION ON TOTAL AMOUNT OF DESOXYRIBONUCLEASE II IN RAT SPLEEN. Carl D. Douglas and Paul L. Day. Proc. Soc. Exptl. Biol. Med. 89, 616-17 (1955).

Increases in activity of spleen DNase were measured 24 hr after a series of various doses of total-body x irradiation. Increases correlated with change in spleen weights associated with irradiation. NSA 9-7242

7104
STUDIES WITH RADIOIODINE. V. VALIDITY OF HISTOLOGIC DETERMINATION OF I¹³¹ RADIATION CHANGES IN THE THYROID GLAND. Earl R. Miller, Stuart Lindsay, and Morris E. Dailey. Radiology 65, 384-93 (1955).

Histological changes in thyroid tissue due to radiations from I¹³¹ are described and the characteristics which distinguish them from changes attributable to pathological conditions due to other causes are emphasized. NSA 9-7244

7105
THE EFFECT OF RADIATION ON THE NUCLEIC ACID, NITROGEN, AND WATER CONTENT OF THE YOSHIDA SARCOMA. Joseph W. Gardella and Eleanor J. Lichtler. Cancer Research 15, 529-31 (1955).

There was marked and simultaneous increase in mena cell volume, RNA, nitrogen, and water content of Yoshida sarcoma cell 17-24 hr after exposure to 1000 r x rays in vivo. Implications of findings are discussed. NSA 9-7246

7106
UNIFORMITY OF IONIZING RADIATION ACTION ON

SEVERAL TRANSFORMING FACTORS OF PNEUMOCOCCUS. Julius Marmur and Donald J. Fluke. Arch. Biochem. Biophys. 57, 506-14(1955).

Preparations of transforming pneumococcal DNA were bombarded with 2 Mev electrons and tested for transforming activity with respect to three drug-resistant factors and one metabolic factor. Results show no difference in radiation effect among these 4 factors. NSA 9-7247

7107
EMERGENCY RADIATION EXPOSURE CONTROL: DEVELOPMENT OF CRITERIA. Alvin F. Meyer, Jr. Am. Ind. Hyg. Assoc. Quart. 16, 210-214(1955).

Criteria for use in planning operations which require unavoidable exposure to radiation levels above the maximum permissible levels are presented. Available data on biological effects of radiation are reviewed. NSA 9-7251

7108
Argonne Cancer Research Hospital, Chicago.
SEMIANNUAL REPORT TO THE ATOMIC ENERGY COMMISSION. Leon O. Jacobson, ed. Mar. 1955. 84p. (ACRH-3).

Yttrium⁹⁰, in form of yttrium hydroxide, impregnated into Gelfoam and placed extra- or intradurally in normal cats, produced necrosis. NSA 9-7253

7109
California. Univ., Berkeley. Radiation Lab.
CHEMISTRY DIVISION QUARTERLY REPORT FOR MARCH, APRIL, MAY 1955. July 6, 1955. 57p. Contract W-7405-eng-48. (UCRL-3068).

Includes a report on the effect of x-irradiation upon incorporation of adenine into rats. NSA 9-7272

7110
EXPERIMENTAL ROENTGEN IRRADIATION OF THE HYPOPHYSIS OF RABBITS. A. Fehr. Schweiz. med. Wochschr. 66, 289(1936). (In German).

7111
HISTOLOGICAL INVESTIGATION OF THE CENTRAL NERVOUS SYSTEM AFTER ROENTGEN IRRADIATION OF THE CEREBELLUM FOR SARCOMATOSIS IN CHILDREN. J. Fenyés and P. von Kiss. Arch. Kinderheilk 113, 151(1938). (In German).

7112
Chicago. Univ. Metallurgical Lab.
ACUTE RADIOTOXICITY OF INJECTED YTTRIUM⁹¹. D. S. Anthony. June 3, 1947. Decl. Sept. 10, 1947 16p. (MDDC-1240, CH-3838).

7113
Chicago. Univ. Metallurgical Lab.
RADIOTOXICITY OF INJECTED SR⁸⁹ FOR RATS, MICE, AND RABBITS. PART II. METABOLISM AND ORGAN DISTRIBUTION. D. Anthony, K. Lathrop, and R. Finkle. June 1, 1946. Decl. Oct. 9, 1947. 36p. (MDDC-1363, CH-3846).

7114
Chicago. Univ. Metallurgical Lab.
RADIOTOXICITY OF INJECTED SR⁸⁹ FOR RATS, MICE, AND RABBITS. PART III. LETHAL ACTION AND CLINICAL CHANGES. D. Anthony, K. Lathrop, and R. Snyder. June 1946. Decl. Oct. 17, 1947. 20p. (MDDC-1364, CH-3845).

Authors found LD₅₀₋₃₀ days to be 7-8 μ c/g of Sr⁸⁹-Sr⁹⁰ administered intraperitoneally to mice, for rats and rabbits the LD₅₀₋₃₀ day dose was slightly less than 5 μ c/g. Observations on food intake and weight gain after smaller doses are also included.

7115
PRESERVATION OF POTATOES BY EXPOSURE TO X-RADIATION. Hans Otten and Christoph Pazold. Strahlentherapie 101, 152-7(1956). (In German).

The report deals with experiments on sprout inhibition in potatoes by means of x rays. A dose of 7000 r has proved sufficient for medium size tubers. There is no risk of toxic irradiation products, as far as can be ascertained up to now. A certain influence on vitamins is unavoidable. Changes in taste cannot be proved. The use of x rays is not an economic proposition. This may become possible with the help of radioactive isotopes, which will soon be available to a greater extent. (auth) NSA 11-1401

7116
RADIOSENSITIVE MOLECULAR WEIGHT OF TOBACCO MOSAIC VIRUS NUCLEIC ACID. W. Ginoza and A. Norman. (Univ. of Calif. at Los Angeles). Oct. 3, 1956. (UCLA-377). Nature 179, 520-2(1957).

By means of x ray inactivation techniques, molecular weight of tobacco mosaic virus RNA (frozen state) is shown to be between 1.5 and 6 x 10⁶. Whole molecule is considered to be the infectious unit.

7117
EFFECTS OF PLUTONIUM IN THE LIVER Austin M. Brues. Trans. Conf. Liver Injury. 7th Conf., 59-61(1948).

Dose of 1 γ /g was lethal for the rat. After smaller doses, rats and mice showed clinical and histological evidence of liver disease. Bone carcinomas occurred nearly a year after administration.

7118
Argonne National Lab., Lemont, Ill
BIOCHEMISTRY EFFECTS OF A SINGLE LETHAL INTRAVENOUS DOSE OF RADIOACTIVE STRONTIUM CHLORIDE ON THE PLASMA OF A GOAT. D. L. Buchanan, B. Gasvoda, and E. S. Guzman Barron. p. 130-135 of BIOLOGY DIVISION QUARTERLY REPORT FEBRUARY 1947 TO MAY 1947. June 1, 1947. 6p. (MDDC-1418).

Lethal dose of radioactive.

7119
LATE EFFECTS OF THORIUM DIOXIDE IN MAN. Chester Cassel, Julian M. Ruffin, and Robert J. Reeves. A. M. A. Arch. Internal Med. 88, 42-50(1951).

Authors report their studies on 3 patients 17, 16 and 13 yr. after ThO₂ administration.

7120
THORIUM RESORPTION IN THE RETICULOENDOTHELIAL SYSTEM. Alfred Engels, Werner Maurer, and Annemarie Nikias. Z. ges. exptl. Med. 115, 221-8(1949).

7121
Argonne National Lab., Lemont, Ill.
SOME FURTHER NOTES ON THE MICE TREATED WITH PLUTONIUM BEFORE WEANING. Mariam P. Finkel. August 1, 1947. Decl. May 26, 1948. 11p. (AECD-2024-H; ANL-4078).

Relative contributions of Pu from placenta and breast milk, retention of Pu by mice treated before weaning and effects of low levels of Pu on growth are discussed.

7122
Argonne National Lab., Lemont, Ill.
THE TOXICITY AND METABOLISM OF PLUTONIUM IN LABORATORY ANIMALS. Raymond D. Finkle, Robert H. Snyder, Leon O. Jacobson, Walter Kisielewski, Blanch Lawrence and Eric Simmons. Aug. 1946. Decl. July 25, 1947. 144p. (MDDC-1140, CH-3783).

No peripheral blood changes were found in mice, rats, or rabbits during 300 days after administration of Pu in doses of 0.0003 or 0.0006 μ c/g. Dose of about 0.003 μ c/g caused some fall in leukocyte and platelet counts (all species) within first 100 days, 0.0156-0.125 μ c/g markedly depressed hematopoiesis and shortened life. Morphological changes in peripheral blood cells are described.

7123
Argonne National Lab., Lemont, Ill.

THE ACUTE RADIOTOXICITY OF INJECTED Na^{24} FOR MICE AND RATS. PART I. METABOLISM AND GENERAL TOXICITY. R. D. Finkle, et al. June 1946. Decl. May 24, 1948. 29p. (AECD-2011; CH-856).

The LD-50 lies between 20 and 40 $\mu\text{c/g}$, some suggestion of difference between LD-50 for males and females. Lowest dose administered, 12 $\mu\text{c/g}$, had no effect on growth. Excretion of the isotope after various methods of administration was studied. Ratio of β ray to x ray effectiveness was found to be approximately one. ANL-5111-971

7124

Argonne National Lab., Lemont, Ill.
FIVE PUPPIES BORN WITH RADIOSTRONTIUM. A PRELIMINARY NOTE. Miriam P. Finkel. p. 71-82 of BIOLOGICAL AND MEDICAL DIVISIONS. QUARTERLY REPORT AUGUST 1948 TO NOVEMBER 1948. Austin M. Brues and Hermann Lisco. Nov. 1, 1948. 210p. (AECD-2053).

7125

Argonne National Lab., Lemont, Ill.
POLONIUM AND CF-1 FEMALE MICE, THE 30-DAY LD_{50} . RETENTION, DISTRIBUTION, AND CONCENTRATION. Miriam P. Finkel and Gertrude M. Hirsh. p. 84-96 of BIOLOGICAL AND MEDICAL DIVISIONS. QUARTERLY REPORT MAY, JUNE, JULY 1949. Austin M. Brues and Hermann Lisco. [nd] 143p. (ANL-4333).

The status of research is reported for the following subjects: effect of x-radiation on antibody formation; blood picture of chronically irradiated LAF-1 mice; effect of radiation on a transplantable mouse lymphoma; the 30-day LD-50 and accompanying blood picture of hybrid guinea pigs; comparison of the biologic effect of 186-kv and 11.4 Mev x-rays, comparison of the 30-day LD_{50} for mice following total-body irradiation with x-ray and intravenously administered radon; the 30-day LD_{50} retention, distribution, and concentration of polonium in CF-1 female mice, the effect of total time of treatment upon survival of young chicks following x-irradiation, a quantitative method for the determination of polonium in animal tissues, counting and calibration of Geiger counting and calibration apparatus, effect of x-irradiation on the ultraviolet absorption spectrum of crystalline bovine serum albumin, preliminary report on effects of high dosages of x-rays on *Paramecium aurelia*, plutonium and yttrium content of the blood, liver, and skeleton of the rat at different times after intravenous administration, toxicity of tritium oxide to mice. NSA 4-1616

7126

Argonne National Lab., Lemont, Ill.
RADIOTOXICITY OF INJECTED Na^{24} FOR MICE AND RATS. PART II. THE EFFECT OF Na^{24} ON THE LEUCOCYTES OF THE PERIPHERAL BLOOD OF MICE. Leon O. Jacobson and E. L. Simmons. June 1946. Decl. June 9, 1948. 11p. (AECD-2036, CH-3857).

Male mice given Na^{24}Cl in doses of 12, 47, 65 or 90 $\mu\text{c/g}$ by intraperitoneal injection developed leukopenia after all except lowest dose. Other changes in peripheral blood leukocyte picture are also described. NSA 1-14

Groups of male mice of the ABC and CF-1 strains were injected intraperitoneally with Na^{24} as the chloride in doses of 12, 23, 47, 65, and 90 $\mu\text{c/g}$. Leucocyte counts and differential blood smears were made on all animals before injection of the radioactive isotope and at intervals thereafter, through 10 days in one experiment and through 15 days in another. A moderate to severe leucopenia followed the injection of all the above doses except the 12 $\mu\text{c/g}$. Death of the animals in the groups which received 47, 65, or 90 $\mu\text{c/g}$ occurred before the eighth day. The number of neutrophils per cubic millimeter rose slightly for 3 days in the group which received 90 $\mu\text{c/g}$. No further sampling was possible in this group because of the death of all the animals. No reduction of neutrophils followed the injection

of 23 $\mu\text{c/g}$ in one experiment, 23, 47, and 65 $\mu\text{c/g}$ produced a marked neutropenia in another experiment. Lymphopenia occurred in all groups of animals which received 23, 47, 65, or 90 $\mu\text{c/g}$ and continued until sampling was discontinued or until death of the animals. NSA 1-14

7127

Rochester, N. Y. Univ. Atomic Energy Project.
INHALATION TOXICITY OF THORIUM OXALATE. p. 72-5 of QUARTERLY TECHNICAL REPORT, JULY 1, 1950 THRU SEPTEMBER 30, 1950. R. H. Hall. Nov. 1, 1950. 135p. (UR-142).

Dogs, rabbits, and rats were exposed to thorium oxalate dust by inhalation. Sole evidences of toxicity following inhalation were decreases in the serum Ca concentrations of the dogs and decreases in the number of circulating red blood cells with a concomitant increase of mean corpuscular volume, in the dogs and in one rabbit

7128

THE EFFECTS OF INJECTED YTTRIUM⁹¹. PART VIII. L. Simmons. (Argonne National Lab., Lemont, Ill.). June 1946. Decl. June 11, 1948. 21p. (AECD-2037; CH-5859).

7129

Argonne National Lab., Lemont, Ill.
A PRELIMINARY STUDY ON THE EFFECTS OF INJECTED YTTRIUM⁹¹ ON THE RIBOFLAVIN CONTENT OF RAT LIVERS. W. E. Kieleleski, B. E. Kline, and H. P. Rusch. p. 172-6 of BIOLOGICAL AND MEDICAL DIVISIONS. QUARTERLY REPORT FEBRUARY, MARCH AND APRIL 1949. Austin M. Brues and Herman Lisco. [nd]. 198p. (ANL-4291).

Data are presented from studies of the effects of injected Y^{91} on the riboflavin content of rat livers. Calculations of the radiation dose to the livers and a method for riboflavin determination are presented.

7130

Chicago. Univ. Metallurgical Lab.
CARCINOMA OF THE COLON IN RATS FOLLOWING THE FEEDING OF RADIOACTIVE YTTRIUM. Herman Lisco, Austin M. Brues, Miriam P. Finkel, and W. Grundhauser. p. 70 of BIOLOGY DIVISION. QUARTERLY REPORT FEBRUARY 1947 TO MAY 1947. June 1, 1947. 178p. (MDDC-1418). Cancer Research 7, 721(1947)

One group of rats received a single feeding by stomach tube of from 1.0 to 6.0 mc of Y^{91} . Of the 33 animals in this group, four died with adenocarcinoma of the colon. Additional animals died with acute and chronic ulceration of the colon. A second group of rats was given 78 feedings of 0.46, 0.20 or 0.06 millicuries of Y^{91} per feedings for 3 months. Six of the 8 animals at the 2 higher levels died with carcinoma of the colon in 304 to 548 days. No malignancies were observed at lower level.

7131

PLACENTAL BARRIER IN CARBON MONOXIDE, BARBITURATE, AND RADIUM POISONING. SOME ORIGINAL OBSERVATIONS IN HUMANS. Harrison S. Martland and Harrison S. Martland, Jr. Am. J. Surgery 80, 270-9 (1950).

Authors discuss their studies on 17 children of 10 of the original New Jersey radium dial painters. 16 children were born 2-16 years after the period of ingestion of Ra by the mothers. Seven of the mothers had died of Ra poisoning. None of the children showed body burdens of more than 0.01 μg . NSA 4-6046

7132

BLOOD STUDIES IN INTOXICATION EXPERIMENTS WITH URANIUM CHLORIDE. Aldo Masturzo. Folio Med. (Naples) 33, 748-59(1950)

Prothrombin time and clotting time were prolonged in rabbits receiving weekly doses of uranium chloride.

7133

STUDIES OF APPARENT SUBMICROSCOPIC CHANGES IN BONE MATRIX AND PERIPHERAL BLOOD CHANGES ASSOCIATED WITH METABOLIZED RADIUM. Paul G. Roofe and Frank E. Hoecker. *Anat. Record* **103**, 500(1949).
An abstract.

7134

Argonne National Lab., Lemont, Ill.
RADIOTOXICITY OF INJECTED Sr^{89} FOR RATS, MICE, AND RABBITS. PART IV. THE HEMATOLOGICAL EFFECTS OF ENTERALLY AND PARENTERALLY ADMINISTERED STRONTIUM⁸⁹ IN MAMMALS. Eric L. Simmons and Leon O. Jacobson. Aug. 1946. Decl. Oct. 8, 1947. 101p. (MDDC-1367, CH-3797).

7135

Argonne National Lab., Lemont, Ill.
THE EXCRETION, RETENTION, DISTRIBUTION AND CLINICAL EFFECTS OF STRONTIUM⁸⁹ IN THE DOG, PART I. REPORT OF EXPERIMENTAL WORK. Marguerite N. Swift and C. Ladd Prosser. July 24, 1947. Decl. Oct. 9, 1947. 61p. (MDDC-1388, CH-3843).

7136

LATE CHANGES IN THE HUMAN BRAIN AFTER INTENSIVE ROENTGEN IRRADIATION OF THE HEAD. H. Kalbfleisch. *Strahlentherapie* **76**, 586(1946)

7137

THE RELATION OF THE INDUCED MUTATION RATE TO DIFFERENT PHYSIOLOGICAL STATES IN DROSOPHILA MELANOGASTER. I. IRRADIATION AFTER STARVATION. F. B. Hanson and F. Heys. *Am. Naturalist* **67**, 127-135 (1933)

7138

THE RELATION OF THE INDUCED MUTATION RATE TO DIFFERENT PHYSIOLOGICAL STATES IN DROSOPHILA MELANOGASTER. II. IRRADIATION DURING COMPLETE ANESTHESIA. F. B. Hanson and F. Heys. *Am. Naturalist* **67**, 419-428(1933).

7139

REVERSE GENOVARIATIONS AND GENE MUTATIONS IN DIFFERENT DIRECTIONS. II. THE PRODUCTION OF REVERSE GENOVARIATIONS IN DROSOPHILA MELANOGASTER BY X-RAY TREATMENT. N. W. Timofeeff-Ressovsky. *J. Heredity* **22**, 67-70(1931). BA 6-6210

7140

THE ORIGIN OF TISSUE ABNORMALITIES AND THE INITIATION OF NODULES IN CONSEQUENCE OF INFILTRATION OF SPECIAL CELL GROUPS IN X RAYED PLANT TISSUE. Hideo Komuro. *Proc. Imp. Acad. (Tokyo)* **7**, 117-120(1931). (In German). BA 6379

7141

DETECTION OF HETEROZYGOTES WITH X RAYS. DIFFERENCE IN STRENGTH OF GENETIC CHARACTER RESULTING FROM SINGLE OR DOUBLE GENES SHOWN IN CASE OF COLOR IN THE MOUSE. Robert T. Hance. *J. Heredity* **19**, 480-485(1928).

Exposure to x rays causes pigmented hair of colored mice to fall out. This is replaced with uncolored or white hair. A tentative explanation based on the observed increases of oxidative activity of tyrosinase following x radiation is suggested. BA 6-6191

7142

Michigan. Univ., Ann Arbor. Engineering Research Inst. OPERATION OF THE FISSION PRODUCTS LABORATORY. QUARTERLY PROGRESS REPORT NO. 1 FOR THE PERIOD JANUARY 1, 1955 TO MARCH 30, 1955. L. E. Brownell, J. V. Nehemias, and J. J. Bulmer. May 1955. 27p. (AECU-3028).

Includes report on effect of irradiation on insects as possible method of controlling insect infestation of flour. NSA 9-6507

7143

THE RELATION OF THYROIDAL ACTIVITY AND RADIATION TO GROWTH OF HYPOPHYSEAL TUMORS. Abraham Edelmann. THE THYROID REPORT OF SYMPOSIUM HELD JUNE 9-11, 1954-BROOKHAVEN SYMPOSIA IN BIOLOGY NO. 7, p. 250-5. Washington, Office of Technical Services. 1955. 271p.

In radiothyroidectomized mice x irradiation of either head or body or administration of Na^{24} was found to produce tumors. Castration followed by whole-body x irradiation produced a basophile adenoma in mice. NSA 9-6835

7144

PRODUCTION OF CATARACTS IN ANIMALS BY X-RAYS AND FAST NEUTRONS. P. J. Leinfelder, T. C. Evans, and L. Riley. *Radiology* **65**, 433-8(1955).

Authors discuss hazard of cataracts and methods of avoiding occurrence. NSA 9-7245

7145

ASSOCIATION OF POLONIUM-210 WITH BLOOD. J. E. Campbell and L. H. Talley. *Proc. Soc. Exptl. Biol. Med.* **87**, 221-3(1954). NSA 9-1708

7146

Army Medical Research Lab., Fort Knox.
STUDIES OF THE INCIDENCE OF ABNORMAL LYMPHOCYTES IN THE BLOOD OF MICE AND RATS EXPOSED TO LOW DOSES OF IONIZING RADIATION. Steve Bellack and J. B. Storer. Sept. 23, 1954. 15p. (AMRL-162).

Mice and rats exposed to γ or x-ray doses of 2-75 r exhibited significant increase in incidence of bilobed and binucleated lymphocytes in peripheral blood. Peak incidence was found 1 wk postexposure. No threshold dose for effect was demonstrated, no correlation between dose and magnitude of response was identified. NSA 9-1710

7147

Los Alamos Scientific Lab., N. Mex.
STUDIES ON THE MECHANISM OF ACTION OF THERMAL NEUTRONS IN PRODUCING BIOLOGICAL EFFECTS. 2. COMPARATIVE EFFECTIVENESS IN PRODUCING INTESTINAL DAMAGE, LETHALITY AND MARROW DAMAGE IN RATS. John B. Storer, John E. Furchner, L. Edward Ellinwood, Phyllis C. Sanders, and William Schweitzer. Sept. 1954. 32p. Contract W-7405-eng-36. (LA-1848).

The biological effectiveness of thermal neutrons relative to x radiation for production of (1) lethality, (2) atrophy of small intestine and (3) depression of Fe^{59} uptake by red blood cells in rats was found to be 1.4, 1.1, and 1.1, respectively. NSA 9-1711

7148

California. Univ., Berkeley. Radiation Lab.
PHYSICAL STUDIES OF CELL DIVISION. STATISTICAL FLUCTUATIONS, EFFECTS DUE TO X RADIATION, TEMPERATURE, AND HYDROSTATIC PRESSURE (Thesis). Victor W. Burns. Dec. 9, 1954. 95p. Contract W-7405-eng-48. (UCRL-2812).

Effect of x rays on generation times of individual cells and their progeny was studied. Ploidy does not have same role in division-delay effects of x rays as it has in lethal x ray effects. Budding cells were resistant to lethal x-ray effects. P-chloro-mercuribenzoate gave some protection to yeast against lethal x-ray action, while application of high hydrostatic pressures to yeast before and during irradiation did not. NSA 9-1712

7149

THE FOOD INDUSTRY'S ATTITUDE TOWARD RADIATION STERILIZATION. L. E. Clifton. *Nucleonics* **13**, No. 1, 39-41(1955).

Radiation changes taste and odor of some products and destroys some nutrients NSA 9-1714

7150

MUTATIONS IN ASTASIA LONGA INDUCED BY RADIATION Henry W. Schoenborn. *J. Protozool.* **1**, 170-3(1954).

About 3000 clones of *A. longa* J. each derived from a single irradiated (x-ray or ultraviolet) flagellate and cultured prior to exposure in complete medium, were grown in minimal medium sufficient for parent strain. Some clones were incapable of continuous growth in complete medium, others failed to grow or grew slowly in minimal medium, and others grew abnormally in minimal medium initially, later reverted to normal. Results are compared with those reported for various fungi. NSA 9-1716

7151

CHANGES IN NUCLEIC ACIDS OF CELLS OF MOUSE MAMMARY CARCINOMA FOLLOWING EXPOSURE TO X-RAY OF LOW DOSAGE. Maud L. Menten, E. T. Feldsted, and M. Willms. *Exptl. Cell. Research* **7**, 83-94 (1954).

X ray dose of 150 r caused continuous decrease in nucleic acid content of cells of mouse mammary carcinoma uniformly suspended in Ringer's solution, 100 r produced variable increase in cellular nucleic acids, apparently correlated with high RNAP/DNAP ratios, 75 r produced changes described as "difficult to interpret." NSA 9-1718

7152

RADIATION BIOLOGY. VOLUME I. HIGH ENERGY RADIATION. Alexander Hollaender. McGraw-Hill Book Co., Inc., New York (1954). 1265 p.

Principles of radiological physics reviewed, various phases of biological effects of ionizing radiations discussed by authorities in each field. Each chapter is supplemented by an extensive bibliography, and subject and author indexes are included. Chapters are abstracted as individual references. NSA 9-1719

7153

THE PROTECTIVE EFFECT OF GRANULOCYTES IN RADIATION INJURY. (Lecture and Review Series 34-4). Eugene P. Cronkite, Naval Medical Research Inst., and George Brecher, National Inst. of Arthritis and Metabolic Diseases, National Institutes of Health. Oct. 7, 1954. 21p. (NP-5472). NSA 9-1720

7154

EFFECTS OF SOMATOTROPIC HORMONE (STH) AND SALINE ON MICE EXPOSED TO TOTAL-BODY IRRADIATION. Mitchell W. Spellman, Franklin E. Roth, Leo Blank, and C. Walton Lillehei. *Cancer* **8**, 172-8 (1955).

Daily subcutaneous administration of STH in small dosages effectively abolished increased mortality observed in irradiated mice receiving 0.5 or 0.2 cc saline/day; larger amounts were ineffective or deleterious. Small doses of STH in 0.5 or 0.2 cc saline/day for 2 wks prior to total-body exposure further decreased the 30-day mortality to levels significantly below those seen in saline-treated or untreated irradiated controls. NSA 9-1721

7155

Radiological Lab., California. Univ., San Francisco. School of Medicine. SEMIANNUAL REPORT FOR PERIOD ENDING DECEMBER 31, 1954. Jan. 1955. 27p. Contract AT-11-1-Gen-10. (UCSF-10).

Critical evaluation of tests for relative biological effectiveness of various ionizing radiations is reported. Data are presented from studies of: effect of cell concentration and oxygen tension on sensitivity of selected microorganisms to x rays, reaction of mouse spleen to x rays measured by changes in organ weight, and late effects of radioiodine treatment on patients. NSA 9-1723

7156

THE DISTRIBUTION OF INTERSTITIAL AND INTRACAVITARY INJECTIONS OF CERTAIN RADIO-CHEMICAL PREPARATIONS OF MEDICAL INTEREST. Ganvin C. Kyker. *Bol. assoc. med. Puerto Rico* **46**, 362-74 (1954). NSA 9-1725

7157

BIOLOGICAL INEFFECTIVENESS OF X-RAYS ON ARTIFICIAL

CULTURES. L. Karczag, G. Farkas, and L. Gyorgyi. *Magyar Orvosi Arch.* **28**, 331-8 (1927). (In Hungarian).

Tissue cultures of skin epithelium, spleen and fibroblasts show no staining differences with fuchsin S, water blue, and light green after irradiation with x rays.

7158

THE ABSORPTION OF X RADIATION IN LIVING TISSUE. H. R. Schinz and H. Waffler. *Fortsch. Gebiete Roentgenstrahlen* **81**, 804-11 (1954).

Physical elementary processes underlying absorption of soft (200 kev), hard (2 Mev), and ultrahard (20 Mev) x radiation in water and tissue are described and presented graphically. Photoeffect, pair formation, and nuclear processes are discussed. NSA 9-2038

7159

THE ANOMALIES IN THE REGULATION OF BLOOD SUGAR UNDER X-RAY IRRADIATION. J. Histamoto and M. Takeshima. *Okayama Igakkaï Zasshi* **39**, 315-31 (1927).

Blood sugar undergoes changes in level after x irradiation, especially when the liver is irradiated. CA 21-39658

7160

Brookhaven National Lab., Upton, N. Y. QUARTERLY PROGRESS REPORT FOR JULY 1-SEPTEMBER 30, 1954. (UNCLASSIFIED SECTION) 62p. (BNL-314).

Results of studies on *Tradescantia* microspores suggest that x-ray breakage of chromosomes is dependent upon condition of chromosomal material at time of irradiation. Also studies; response of skin to neutron irradiation; survival of *E. coli* following exposure to slow neutrons. NSA 9-2099

7161

Pittsburgh. Univ. EFFECTS OF X-RADIATION ON INFLUENZA VIRUS. Anne Buzzell, Frank B. Brandon, and Max A. Lauffer. Jan. 27, 1955. 23p. (AECU-2985).

Effects of x radiation on inactivation of infectivity and hemagglutination properties of influenza virus are described. Correlation between results and target theory is discussed. NSA 9-2106

7162

SOME EFFECTS OF CUMULATIVE DOSES OF X RADIATION UPON LEARNING AND RETENTION IN THE RHESUS MONKEY. Project No. 21-3501-0003, Report No. 11. Charles M. Rogers, Sylvan J. Kaplan, George Gentry, and John A. Auxier. School of Aviation Medicine and Radiobiological Lab., Univ. of Texas. Nov. 1954. 15p. (NP-5511).

Twelve rhesus monkeys were tested for ability to retain memory for multiple discrimination task and 11 color discrimination task. Their ability to learn new color discrimination tasks after radiation was also tested. Six were x irradiated (100 r) once a wk during experiment. Up to the point where they no longer responded to stimuli, the subjects showed no effect of cumulative exposure to x radiation. NSA 9-2199

7163

School of Aviation Medicine. Randolph AFB, Tex. BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION, TOLERANCE TO SIMULATED ALTITUDE AFTER WHOLE-BODY-X-IRRADIATION IN GUINEA PIGS. (Project No. 21-3501-0005, Report No. 17). Eugene B. Konecni, Oct. 1954. 6p. (NP-5516).

Guinea pigs received whole-body exposure to 260 KVP x-ray at dose rate of 145 r/min. Twenty animals received 500 r; 20 animals, 1600 r; 10 animals, 4000 r; 20 controls were not exposed. Results indicate: (1) no difference in tolerance to hypoxia 1 hr post irradiation, marked decrease at 24 hrs postexposure; (2) and (3) each tested 1 and 24 hrs postirradiation displayed statistically significant decrease in altitude tolerance. NSA 9-2110

7164

Naval Radiological Defense Lab.

PERFORMANCE DURING EXPOSURE TO IONIZING RADIATION. PART I. FOOD AND WATER CONSUMPTION OF RATS DURING EXPOSURE TO GAMMA RADIATION. PART II. A CONDITIONED AVERSION TOWARDS SACCHARIN RESULTING FROM EXPOSURE TO GAMMA RADIATION. J. Garcia, D. I. Kimeldorf, E. L. Hunt, and B. P. Davies. Nov. 12, 1954. 28p. (USNRDL-TR-19).

Rats consumed less food and water and showed drop in body weight during exposure to low intensity γ irradiation. Normally high preference for saccharin-flavored water was nullified when it had been previously associated with exposure. NSA 9-2111

7165

THE EFFECTS OF HYPOPHYSECTOMY AND OF THYROXINE ON THE RADIATION-INDUCED CHANGES IN THE RAT THYROID. F. Maloof. *Endocrinology* 56, 209-14(1955).

Thyroids of rats previously given I^{131} showed cellular hypertrophy and morphologic alterations in the nuclei. Cellular hypertrophy was completely, and nuclear changes partially, inhibited by hypophysectomy or administration of D1-thyroxine. Some morphologic changes in thyroid after thyroidal sublethal doses of I^{131} appear to be secondary and not primary radiation effects. NSA 9-2113

7166

DELAYED TOXICITY OF RADIOSTRONTIUM IN MONKEYS. G. M. Edington, J. M. Judd, and A. H. Ward. *Nature* 175, 33(1955).

Six monkeys died after single injections of Sr^{90} of less than 0.2 mc/kg body-weight. Data on hematological findings and survival times are compared with those in animals that received higher doses. NSA 9-2114

7167

RELATION OF THE INDIGENOUS FLORA OF THE SMALL INTESTINE OF THE RAT TO POST-IRRADIATION BACTEREMIA. James G. Vincent, Robert C. Veomett, and Richard F. Riley. *J. Bacteriol.* 69, 38-44(1955).

Following 650-r x irradiation, lactobacilli in small intestine of rat fell to 1/4 their normal numbers, pseudomonads increased about 1000-fold by 7th day, and proteus organisms and coliforms showed less marked increases. Invasion by gram negative organisms was paralleled by bacteremia of types characteristic of gram negative invaders in the gut. Severity of invasion was correlated with severity of post-irradiation syndrome. NSA 9-2115

7168

INFLUENCE OF GAMMA RADIATION ON PROTEOLYTIC ENZYME ACTIVITY OF BEEF MUSCLE. D. M. Doty and James P. Wachter. *Agr. and Food Chem.* 3, 61-3(1955).

Irradiation with Co^{60} at dosages 1.6×10^5 rep reduced apparent proteinase activity of beef muscle about 50%. Loss occurred largely in fraction extractable at pH 9.6. At lower doses, little reduction in proteinase activity occurred. Irradiation reduced amount of tyrosine extractable from beef, which suggest that the amino acid is changed by exposure. NSA 9-2116

7169

NATURE OF UNDESIRABLE ODORS FORMED BY GAMMA IRRADIATION OF BEEF. O. F. Batzer and D. M. Doty. *Agr. and Food Chem.* 3, 64-7(1955).

Sulfur compounds are believed to be the source of some undesirable odors in irradiated meat. NSA 9-2117

7170

BETA RADIATION CATARACTS. James E. McDonald, William F. Hughes, Jr., and Vincent G. Peiffer. *A. M. A. Arch. Ophthalmol.* 53, 248-59(1955).

Studies on rabbit and human eyes exposed to β rays from radon and Sr^{90} - Y^{90} show localized cataractogenic effect of these emanations. Threshold dose on these effects is

lower when radiation is applied over the limbus, resulting in equatorial opacities and vacuoles which migrate posteriorly. Tentative cataractogenic dosage schedules are given. This complication should be considered in clinical use of β rays on the globe. NSA 9-2118

7171

EFFECTS OF X-IRRADIATION ON PURINE-METABOLIZING ENZYMES OF RAT LIVER AND SPLEEN. Herbert J. Eichel. *Proc. Soc. Exptl. Biol. Med.* 88, 155-8(1955).

Whole-body x irradiation had no effect on activities of rat liver adenosine deaminase and nucleoside phosphorylase studied at intervals over a 10-day period after exposure. Specific activity of spleen nucleoside phosphorylase was increased, although total organ enzyme activity was reduced as result of decrease in spleen size. NSA 9-2120

7172

COUNTERACTING THE ACUTE RADIATION SYNDROME WITH CORTICOTROPIN (ACTH). Kenneth W. Taber. *Am. J. Roentgenol., Radium Therapy Nuclear Med.* 73, 259-64(1955).

Effectiveness of corticotropin in treating postirradiation injury makes it possible to administer radiation therapy more intensively and in much higher doses through a grid without unwarranted discomfort to the patient. NSA 9-2123

7173

IRRADIATION OF SKIN TUMOURS DURING PURE OXYGEN INHALATION. K. A. Hultborn and A. Forssberg. *Acta Radiol.* 42, 475-84(1954).

Four cases of skin tumors treated by trial irradiation with concomitant inhalation of pure oxygen are presented. Results are considered to be encouraging. NSA 9-2124

7174

HOW PROCESSING CONDITIONS AFFECT MICROORGANISM RADIORESISTANCE. S. A. Goldblith, B. E. Proctor, S. Davison, E. M. Oberle, C. J. Bates, B. Kan, O. A. Hammerle, and B. Kusmirek. *Nucleonics* 13, No. 1, 42-5(1955).

Oxygen atmosphere increased radiosensitivity of *E. coli*, while inert or vacuum atmosphere and freezing protected the bacteria from radiation or decreased radiosensitivity. A pea puree suspension protected the bacteria. In some cases oxygen consumption by food material occurred more rapidly during irradiation. NSA 9-1715

7175

THE EFFECT OF X RAYS ON THE NERVE FLEMENTS OF THE CORNEA. T. V. Krestinskaya. *Doklady Akad. Nauk S. S. R.* 103, 243-6(1955). (In Russian). NSA 10-24

7176

ON THE SIGNIFICANCE OF RADIATION INTENSITY ON ANIMAL ORGANISM DAMAGED BY X RAYS. B. M. Graevskaya and R. Ya. Keilina. *Doklady Akad. Nauk S. S. R.* 103, 425-6(1955). (In Russian). NSA 10-25

7177

DEUTERON CROSS SECTION OF β -AMYLASE IN VITRO AND IN VIVO. John Jagger and Dwight Wilson. *Radiation Research* 3, 127-34(1955).

Different preparations of malt β -amylase in the dry state have been bombarded with 3.75-Mev deuterons. The amylase was in a relatively pure form, in an immediately extracted form, and within barley seed slices. Although there is a wide spread of cross sections, the range of this spread is the same for all three preparations, and the spread is attributed to complex population of amylase molecules. It is concluded that β -amylase responds to ionizing radiation in essentially the same manner in all three cases and that, consequently, conclusions reached from radiation studies of semipurified enzymes can be extended to nonmetabolizing living systems in the dry state. NSA 10-31

7178

RECIPROCAL ACTION OF RADIATION WITH MATTER. W. Hanle. *Strahlentherapie* 38, 4-20(1955). (In German).

The importance of considering the reciprocal action of high-energy radiations with matter in biological and other technological studies is stressed. Characteristics of the different types of radiation and the origin of artificial radiations are reviewed. Factors affecting excitation, ionization, and chemical effects, and the influence of gases, liquids, and solids on these effects are discussed. NSA 10-27

7179

A STUDY OF THE IRRADIATION SYNDROME. PART II. TISSUE WATER AND TISSUE ELECTROLYTES. Roy E. McDonald, Ross E. Jenson, Herbert C. Urry, and Philip B. Price. *Am. J. Roentgenol., Radium Therap. Nuclear Med.* 74, 889-97(1955).

A study has been made of water and electrolytes in canine tissues following total-body irradiation, with an attempt to delineate those changes which are due essentially to irradiation. (auth). NSA 10-26

7180

Quartermaster Food and Container Inst., Chicago. IONIZING RADIATIONS: THEIR PRODUCTION, EFFECTS, AND UTILIZATION (WITH SPECIAL REFERENCE TO FOOD AND PACKAGING TECHNOLOGY). Bibliographic Series No. 4. Supplements No. I and II. Subject Index. Aug. 1955. 159p. (NP-5793).

This is a subject index to NP-5792, which contains 2,939 references covering the production, effects, and utilization of ionizing radiations in the sterilization of food. (C.H.) NSA 10-18

7181

ACTION OF X RAYS ON *CREPIS ZACINTHA* L. BABC.: INFLUENCE OF DIFFERENT FACTORS ON THE RATE OF CELLULAR LETHALITY PRODUCED BY X RAYS. Andre Bilquez. *Compt. rend.* 241, 900-2(1955).

Some seeds of *Crepis Zacintha* L. Babc. (chicory), having different water contents, were subjected to x radiation. The irradiated material was made to germinate at variable temperatures. Cytological studies, made at the first stage of the first division of germination, show that the sensitivity as regards x rays varies greatly according to the experimental conditions. (tr-auth) NSA 10-23

7182

Rochester, N. Y. Univ. Atomic Energy Project. THE LETHAL EFFECT OF ACUTE X-IRRADIATION ON RATS AS A FUNCTION OF AGE. J. B. Hursh and G. Casarett. *Mar.* 31, 1955. 11p Contract W-7401-eng-49. (UR-403).

An experiment was performed in which groups of 16-month-old female rats of a Wistar strain were given single doses of 0, 350, 450, 550, and 650 r of 250 kvp x radiation. The 30-day lethality of these rats is compared with that of the 6-month-old female rats receiving 0, 650, and 750 r as single doses. The LD₅₀ of the 16-month-old-group is 600 r as contrasted with 715 r for the 6-month-old rats. NSA 10-20

7183

RADIOBIOLOGY SYMPOSIUM-1954. PROCEEDINGS OF THE SYMPOSIUM HELD AT LIEGE, AUGUST-SEPTEMBER 1954. Z. M. Bacq and Peter Alexander, eds. New York, Academic Press, Inc., 1955. 362p. London, Butterworths Scientific Publications.

Pertinent chapters are abstracted individually. NSA 10-524

7184

SOME EFFECTS OF PERIODIC X-RADIATION. Louis E. Moon, Harry F. Harlow, George P. Bogumill. *Science* 122, 863-4(1955).

Twenty-three monkeys were used in an investigation of progressive behavioral and physiological changes resulting from repeated mild doses of x radiation administered over a long period of time. Data are summarized. (C.H.) NSA 10-520

7185

ALTERATIONS OF THE ULTRAVIOLET AND INFRARED SPECTRA OF ALBUMIN BY RADIATION. T. E. Pavlovskaya and A. G. Pasynskii. *Kolloid. Zhur.* 17, 305-14(1955).

Alterations of ultraviolet absorption spectra in the 240- to 340-mμ range of human serum albumin, serum albumin, gelatin, and blood serum of a horse with x and ultraviolet radiation of various doses and the infrared absorption spectra of human serum albumin and gelatin by x radiation were investigated. (R.V.J.) NSA 10-525

7186

REGENERATION OF X-RAYED SALAMANDER LIMBS PROVIDED WITH NORMAL EPIDERMIS. Florence C. Rose, Henry Quasler, and S. Meryl Rose. *Science* 122, 1018-19(1955).

Both forelimbs (distal to elbow) of adult *Triturus viridescens* were exposed to a single x ray dose ranging from 500 r - 10,000 r while the rest of the animal was shielded. Conclusions: the epidermis or any limb tissue can serve as the sole source of cells for limb regeneration. Regeneration was more complete when normal whole skin was transplanted than when muscle or bone was transplanted to the irradiated limb. NSA 10-521

7187

ACTH IN RADIOTHERAPY. A CLINICAL TRIAL. K. Sicher. *Brit. J. Radiol.* 28, 620-22(1955).

A brief survey is given of literature on the effects of ACTH on bone marrow and on radiation sickness. A personal experience of application of this drug in radiotherapy is described, and the results of a clinical trial are discussed. (auth) NSA 10-538

7188

MODIFICATION OF X-RAY SENSITIVITY OF BEAN ROOTS BY HYDROGEN GAS. Michael Ebert and Alma Howard. *Nature* 176, 828-9(1955).

Oxidizing action of hydroxyl radicals is responsible for part of the damage caused by radiation in bean roots. Presence of oxygen during radiation increases biological damage, indicating that HO₂ radicals are more damaging than hydrogen radicals. Reduction of growth rate in bean roots is due partly to the direct action of radiation and partly to energy absorbed in water molecules which exerts its influence via chemical intermediates. NSA 10-539

7189

CELLULAR AND TISSUE RADIOLESIONS, THEIR CONSEQUENCES AND THEIR DISTRIBUTION. J. Maisin, H. Maisin, A. Dunjic, and P. Maldague. *J. belge radiol.* 38, 394-429(1955). (In French).

An intestinal syndrome appearing within 3 days after irradiation, and a hematopoietic syndrome occurring between the 9th and 15th day after irradiation were both found to contribute to the death of rats exposed to 700 r x radiation. Data on the protective effects of small lead screens and of mercaptoethylamine injections against radiation injuries in rats are summarized. NSA 10-532

7190

EFFECT OF X-IRRADIATION ON GLUCOSE ABSORPTION. H. M. Dickson. *Am. J. Physiol.* 182, 477-8(1955).

X irradiation reduced the rate of glucose absorption from the intestine in mice. This effect could not be attributed to retarded gastric emptying or to a diminution of intestinal hexokinase. (auth) NSA 10-531.

7191

ACTIONS OF RADIATION ON LIVING CELLS. D. E. Lea. Cambridge, England, University Press, 1955. 416p. (2nd Edition).

Fundamental actions of x radiation and other ionizing radiations on living cells are reviewed. Mechanisms of actions of radiation on viruses, and on the genes and chromosomes of higher cells are discussed in detail. A mathematical analysis of the data is included. 532 references. (C. H.) Chapters are abstracted individually NSA 10-38

7192
THE INCIDENT OF ENDOGENOUS BACTEREMIA IN X-IRRADIATED RABBITS. Carolyn W. Hammond and C. Phillip Miller. *Radiation Research* 3, 191-201(1955).

Daily blood cultures were made four to six days after exposure of rabbits to 900 r total-body x-radiation. Positive blood cultures never contained more than a few microorganisms. All bacteria recovered ante- or post-mortem were members of the rabbit's normal intestinal flora. There was no evidence that bacteremia in irradiated rabbit progresses to an overwhelming sepsis as it does in the mouse. Irradiated rabbit can combat endogenous infection more effectively than can the mouse. NSA 10-36

7193
FUNDAMENTAL PRINCIPLES OF X-RAY TREATMENT. R. du Mesnil de Rochemont. *Strahlentherapie* 98, 21-9 (1955).

Discussions presented during a brief post-graduate conference on the physical and biological fundamentals of radiotherapeutical methodology are summarized. (auth) NSA 10-47

7194
REPRESSION AND ENHANCEMENT OF IRRADIATION EFFECTS ON GRASSHOPPER CELLS BY METABOLIC POISONS AND OXYGEN. Theodore N. Tahmisian and Rosemarie L. Devine. *Radiation Research* 3, 182-90 (1955).

Grasshopper embryos irradiated in air undergo negative growth. Degree of negative growth is less if embryos are irradiated in 20% O₂: 80% CO in the dark. Protection is greater under anaerobic conditions. Cyanide protects if administered after radiation. Eggs that have high tetrazolium-reducing capacity are more resistant. There may be a relationship between resistance of a tissue to radiation and its dehydrogenase content. Radiation protection is dependent on hydrogen and electron transfer of tissues and cells. (from authors summary).

NSA 10-45

7195
RADIATION-INDUCED PYCNOSIS OF CHROMOSOMES AND ITS RELATION TO OXYGEN TENSION. C. P. Swanson and Helen Johnston. *Am. Naturalist* 83, 425-30(1954). NSA 10-728

7196
VARIATIONS IN THE SENSITIVITY OF *ESCHERICHIA COLI* TO IONIZING RADIATIONS DURING THE GROWTH CYCLE. G. E. Stapleton. *J. Bacteriol.* 70, 357-62(1955).

Variations in radiation sensitivity of *E. coli* strain B/r during the positive portion of the growth cycle can be correlated with the recognized phases of the cycle. Cells increase in their radioresistance for the duration of the log phase, logarithmic phase is marked by a rapid and steady decay in radioresistance. When the culture enters the maximum stationary phase, there is a return to initial sensitivity. (from authors summary). NSA 10-526

7197
EFFECTS OF WHOLE BODY X-IRRADIATION ON 17-HYDROXYCORTICOSTEROID LEVELS, LEUCOCYTES AND VOLUME OF PACKED RED CELLS IN THE RHESUS MONKEY. A. B. French, C. J. Migeon, L. T. Samuels, and J. Z. Bowers. *Am. J. Physiol.* 182, 469-76(1955).

Plasma 17-hydroxycorticosteroid levels, total white counts, direct eosinophil counts, differential white cell counts, and volume of packed red cells were followed in

1 cynomolgus and 23 rhesus monkeys after total-body x irradiation in doses of 50 to 800 r. Data are summarized. (auth) NSA10-530

7198
THE INFLUENCE OF GAMMA RAYS ON THE BIOLOGICAL ACTIVITY OF THE RETINA. B. P. Kalashnikov. *Doklady Akad. Nauk S. S. S. R.* 104, 64-7(1955). (In Russian).

Effects of Co⁶⁰ gamma rays on rabbit retina were registered on a Siemens electrocardiograph. Electroretinograms are shown. (R. V. J.) NSA 10-527

7199
Quartermaster Food and Container Inst., Chicago. IONIZING RADIATIONS: THEIR PRODUCTION, EFFECTS, AND UTILIZATION (WITH SPECIAL REFERENCE TO FOOD AND PACKAGING TECHNOLOGY). Bibliographic Series No. 4. Supplements No. I and II. Aug. 1955. 536p. (NP-5792).

A total of 2939 references are included, covering the production, effects and utilization of ionizing radiations in the sterilization of food. NSA 10-17

7200
Mound Lab., Miamisburg, Ohio. REPORT FOR BIOLOGICAL RESEARCH FOR JUNE 18, 1951 TO SEPTEMBER 17, 1951. Oct. 22, 1951. Decl. with deletions Oct. 3, 1955. 73p. Contract AT-33-1-Gen-5(3). (AECD-3685). NSA 10-12

7201
Naval Medical Research Inst., Bethesda, Md. and Naval Radiological Defense Lab., San Francisco. SKIN LESIONS, EPILATION AND NAIL PIGMENTATION IN MARSHALLESE AND AMERICANS ACCIDENTALLY CONTAMINATED WITH RADIOACTIVE FALLOUT. Robert A. Conrad, Nahum R. Shulman, David A. Wood, Charles L. Dunham, Edward L. Alpen, and L. Eugene Browning. Aug. 29, 1955. 28p. (NM-006-012.04.82).

Following the detonation of a thermonuclear device in the Marshall Islands in the Spring of 1954 a significant amount of radioactive fallout material was deposited on neighboring Pacific islands. Of the 239 Marshallese people and 28 Americans exposed, 64 Marshallese on the island of Rongelap received the highest dose of whole-body penetrating radiation (an estimated 175 r), the most extensive epilation and beta lesions of the skin, and small amounts of internal absorption of radioactive materials. Other island groups were less heavily irradiated. This report is concerned with the epilation and beta lesions which occurred. Many individuals in the higher exposure groups complained of burning and itching of the skin during the first 24 to 48 hr after exposure. Epilation and skin lesions were observed, beginning approximately two to three weeks after exposure, on skin areas contaminated with fallout. Bluish-brown pigmentation of the fingernails was also a common finding. No primary or secondary erythema was observed and consistently the first evidence of skin damage was increased pigmentation in the form of dark brown to black macules, papules, and raised plaques. The lesions developed largely on the exposed parts of the body not protected by clothing, and occurred usually in the following order; scalp (with epilation), neck axillae, antecubital fossae, feet, limbs, and trunk. Epilation and lesions of the scalp, neck, and foot (dorsal surface) were the most common. The majority of lesions were superficial without vesicle formation, and after simple dry desquamation healed and repigmented. Approximately 20% of the people in the highest exposure group developed deeper lesions, usually occurring on the feet or neck and were characterized by wet desquamation with ulceration, mild burning, itching, and pain accompanied the lesions. The majority healed rapidly with nonspecific therapy. Residual pigment aberration consisting of hyperpigmentation and lack of repigmentation

and mild atrophic changes were noted in some deeper healed lesions at six months and one year. Regrowth of hair, normal in color and texture, began about nine weeks post-exposure and was complete at six months. Biopsies of typical lesions at three to six weeks showed changes consistent with radiation damage with marked epidermal damage and much less severe dermal damage. Biopsies at six months showed only a few residual changes. The nail discoloration had grown out completely at six months in all but a few individuals. NSA 10-16

7202

Mound Lab., Miamisburg, Ohio.
REPORT FOR BIOLOGICAL RESEARCH FOR MARCH 19, 1951 TO JUNE 18, 1951. July 23, 1951. Decl. with deletions Oct. 7, 1955. 66p. (AECD-3684).

Includes report on; effect of type of diet and presence of Po on lipid composition of rat tissue, bone marrow studies in rats injected with various doses of Po, roentgenographic changes in the skeletons of Po-bearing rats, effects of Po on cell metabolism, binding of Po by yeast cells, effect of Po on life span of rats, biological effects of Actinium; histopathological studies on tissues of Po-bearing dogs, minimally effective doses of injected Po for hematological and pathological changes, effects of injected Po on renal function in laboratory animals and effects on cholesterol content of rat blood. NSA 10-11

7203

A COMPARATIVE STUDY OF THE EFFECTS OF β -RAYS, γ -RAYS AND X-RAYS ON DEVELOPMENT IN HABROBRACON. Robert L. Amy. Radiation Research 3, 166-81 (1955).

Eggs of *H. juglandis* were exposed 1 to 3 hours after being laid, to various doses of β -rays from P^{32} , γ rays from Co^{60} , to 125-Kvp x rays under otherwise equivalent physical conditions. X rays were most effective in reducing percentage of eggs hatching, β rays were less effective, and γ rays were least effective. Effects on larval stage are discussed. Histological observations made on embryos exposed to x-, β -, or γ rays are included. At higher dose levels, radiation-induced damage was visible 4 hours after exposure. (from author's summary). NSA 10-35

7204

ON THE DIRECT AND INDIRECT EFFECTS OF X-RAYS ON THE TESTIS OF THE RAT. Henry I. Kohn. Radiation Research 3, 153-6 (1955).

Changes in weight and histologic appearance of the rat testis were studied after exposure to x rays. The testes were irradiated locally, with the rest of the body shielded, or along with the entire body. The tissue doses were 60, 180, and 210 r. The dose to the testis determined the changes in that organ. The dose received by the rest of the body had little if any effect on the testis. (auth) NSA 10-34

7205

γ -IRRADIATION OF PNEUMOCOCCUS DEOXYRIBONUCLEIC ACID. Ruth M. Drew. Radiation Research 3, 116-20 (1955).

The effect of γ irradiation on pneumococcus type III DNA has been studied. The transforming activity of DNA irradiated in saline solution was destroyed at low radiation dose levels. A much higher tolerance was observed when DNA was irradiated in cysteine solution, and transforming activity could be demonstrated in material which had received as much as 250,000 rep. Highly active transforming principle was isolated from cells exposed to 100,000 rep. (auth) NSA 10-30

7206

EXCRETION PATTERNS OF RATS FOLLOWING TOTAL-BODY EXPOSURE TO X-RADIATION. Roy B. Mefferd, Jr. and Herman H. Martens. Science 122, 829-30 (1955).

Nitrogen and sulfur metabolism change radically following total-body exposure to ionizing radiation, with excretion increasing within 1 day and remaining high in nonsurvivors but decreasing after a period in survivors of 500 r dose. Effect on urine volumes, glycine, urea, alanine, phosphate, taurine, histidine, aspartic acid, uric acid, creatinine, glutamic acid, valine and body weight are discussed. NSA 10-28

7207

GENETICAL EFFECTS OF RADIATIONS FROM PRODUCTS OF NUCLEAR EXPLOSIONS. F. W. Spiers. (Included is a reply to this paper by J. B. S. Haldane, Univ. Coll., London). Nature 177, 226-7 (1956).

Relative effective radiation dose-rates to man and to *Drosophila* are discussed. Data previously presented by Prof. J. B. S. Haldane on the genetical effects of radiation resulting from nuclear explosions are reviewed. A reply from Prof. Haldane presents revised calculations of radiation dose rates. (C. H.) NSA 10-5471

7208

MODIFICATION OF RADIATION INJURY IN THE RABBIT. L. O. Jacobson, E. K. Marks, and E. O. Gaston. Proc. Soc. Exptl. Biol. Med. 91, 135-9 (1956).

Postirradiation injection of mouse embryo cells or baby mouse liver or spleen cells enhances significantly the survival of rabbits exposed previously to 900 r total-body x radiation without producing an appreciable effect upon hematologic recovery as observed in the peripheral blood. NSA 10-5479.

7209

CHEMICAL PROTECTION AGAINST IONIZING RADIATIONS. Z. M. Bacq. Research 9, 62-6 (1956).

The protection of living organisms against ionizing radiation is of prime importance. Experiments have shown that certain radio-protectors are equally effective in reducing radio-damage. The protector competes with radio-sensitive molecules or groups for the free radicals formed from the products of water hydrolysis and their reaction with oxygen during radiation. (auth). NSA 10-5478

7210

Mound Lab., Miamisburg, Ohio.
REPORT FOR BIOLOGICAL RESEARCH FOR SEPTEMBER 17, 1951 TO DECEMBER 17, 1951. Jan. 21, 1952. Decl. with deletions Oct. 3, 1955. 65p. (AECD-3686). NSA 10-13

7211

Brown Univ., Providence.
EFFECTS ON THE SKIN BY COSMIC RAY HEAVY PARTICLES. Herman D. Chase, Janet D. M. Bliss, William E. Straile, and Janice S. Post. May 1955. 12p. (HALC-TR-55-2, AD-68166).

White hairs occurred in clusters in black mice exposed to high-altitude cosmic radiation during high-altitude balloon flights. The white hairs were attributed to exposure to heavy cosmic particles. No other abnormal skin effects were observed. NSA 10-4480

7212

Naval Radiological Defense Lab., San Francisco.
INDUCTION OF INTESTINAL CARCINOMA IN THE MOUSE BY WHOLE BODY FAST NEUTRON IRRADIATION. P. C. Nowell, L. J. Cole, and M. E. Ellis. Mar. 9, 1956. 20p. Project NM 006 015. 04. (USNRDL-TR-79) NSA 10-4484

7213

Naval Radiological Defense Lab., San Francisco.
PROBLEMS OF THE DELAYED EFFECTS OF IONIZING RADIATION. R. W. Brauer, J. S. Krebs, C. H. Murden, and H. W. Carroll. Mar. 2, 1956. 18p. Project NM 006 015. 04. (USNRDL-TR-30).

Authors discuss the delayed radiation syndrome, i. e. decreased life expectancy and various types of deterioration of general health seen in animals surviving 60 days or

longer after exposure to a large dose of radiation. Tumors, agranulocytosis and leukemia are among the cause of death associated with prior exposure in several species. In many instances, however, a specific cause of early death is not apparent and deterioration in such instances has been variously described as radiation cachexia, radiation atrophy, decreased vitality or premature aging. Mechanisms responsible for the deterioration include deposition of faulty cellular products in surviving tissues (e.g. cataracts), elimination of stem cells (e.g. in testes, skin), survival of cells with nuclear damage, genetic and cytogenetic changes. Reference is made to the life span shortening concepts of Blair and Sacher. NSA 10-4485

7214
CIRRHOSIS OF THE LIVER IN RATS FOLLOWING TOTAL BODY X IRRADIATION. Julius White. J. Natl. Cancer Inst. 15, Suppl., 1617-18(1955). Apr.

In studying nitrogen excretion of rats exposed to 450 to 500 r total-body x radiation, it was observed that rats ingesting a 6% protein (casein) diet failed to gain weight early in the post-radiation period, whereas animals ingesting a 15 or 20% casein diet, and isocaloric with the 6% casein diet, began to gain weight rapidly 3 days following radiation. NSA 10-4499

7215
THERMAL NEUTRON EQUIVALENCE OF WHOLE-BODY X-IRRADIATION. L. F. Nims and L. Lewis. Radiation Research 4, 42-8(1956).

Growth delay under standardized experimental conditions can serve as a convenient and practical dosimeter that is particularly useful for mixed radiations. The thermal neutron flux equivalent to 1 r of x rays for the biological end point of growth delay in rats is $0.79 \times 10^{10} \text{ n cm}^2$. (auth) NSA 10-4492

7216
EFFECTS OF ADRENALECTOMY ON SPECIFIC ACTIVITY OF DEOXYRIBONUCLEASE IN RAT SPLEEN AFTER TOTAL BODY X-IRRADIATION. Carl D. Douglass, Paul L. Day, and Thomas W. Snyder. Proc. Soc. Exptl. Biol. Med. 90, 702-3(1955).

Adrenalectomy has been found to have no effect on increased specific activity of rat spleen DNase II following total-body x irradiation, but size of spleen and therefore total quantity of enzyme changed in both irradiated and unirradiated animals. (auth) NSA 10-4496

7217
EFFECTS OF IRRADIATION ON THE METABOLISM OF NUCLEIC ACIDS AND THEIR ACID SOLUBLE DERIVATIVES IN THE RAT. A. Becarevic, K. Kacanski, D. Mancic, and Ljiljana Hadzic. Experientia 12, 23-4(1956). (In French).

In the rat, x irradiation leads to a decrease of the net RNA and DNA content of the spleen, without, however, increasing the low molecular weight nucleic acid derivatives in the acid-soluble fractions of the same tissue. It is suggested that alteration of the cell membranes could account for the apparent elimination of these nucleic acid degradation products which should normally appear in the acid-soluble fraction. (auth) NSA 10-4500

7218
ON THE RATE OF TRACER INCLUSION INTO THE ALBUMIN OF IRRADIATED ANIMALS. I. THE RATE OF TRACER INCLUSION IN WHITE BRAIN MATTER, KIDNEYS, LIVER, AND SPLEEN IN THE ACUTE FORM OF RADIATION SICKNESS. S. N. Aleksandrov. Doklady Akad. Nauk. S. S. R. 106, 153-6(1956). (In Russian).

A systematic study was made to observe the rate of albumin restoration in various organs of irradiated animals at different stages of radiation sickness. Methylamine labeled with S^{35} was used as tracer and the rate of albumin restoration was judged by the speed of absorption of the labeled acid. (R. V. J.) NSA 10-5467

7219
PRELIMINARY REPORT OF X-RAY STUDIES ON THE GOLDEN NEMATODE. G. Fassuliotis and A. H. Sparrow. Plant Disease Repr. 39, 572(1955).

Data are presented which indicate that the life cycle of the golden nematode is interrupted by exposure to doses of X radiation of 20,000 r or above. Radiation treatment of potatoes not only increases storage life of the potatoes, but prevents the spread of the golden nematode on infected potatoes. (C. H.) NSA 10-5460

7220
THE RELATIVE BIOLOGICAL EFFECTIVENESS OF FAST NEUTRONS, X-RAYS, AND γ -RAYS FOR ACUTE LETHALITY IN MICE. A. C. Upton, F. P. Conte, G. S. Hurst, and W. A. Mills. Radiation Research 4, 117-31 (1956).

Young adult female mice were exposed to single doses of Co^{60} γ -rays, 250-kvp x rays, or cyclotron fast neutrons. The $LD_{50/30}$ days was 730 rep for γ -rays, 525 rep for x-rays, and 362 rep for fast neutrons. If the RBE of γ rays is assumed to be 1.0, then the RBE of x rays is 1.4 and that of fast neutrons 2.0 for $LD_{50/30}$ days NSA 10-5457

7221
THE EFFECTS OF THERMAL NEUTRON RADIATION ON MUTATION OF ENDOSPERM LOCI IN MAIZE. Calvin F. Konzak and W. Ralph Singleton. Proc. Natl. Acad. Sci. U. S. 42, 78-84(1956). NSA 10-5467

7222
INDUCTION OF MUTATIONS IN MICE BY CHRONIC GAMMA IRRADIATION; INTERIM REPORT. T. C. Carter, Mary F. Lyon, and Rita J. S. Phillips. Brit. J. Radiol. 29, 106-8(1956).

Estimation of the genetic hazard of ionizing radiations to man calls for ecological and genetic study of human populations and experimental work on other mammals. An interim report is given of a long-term experiment intended to check the linearity of the mutation-rate/radiation-dose law at seven specified loci in the mouse, using low accumulated γ -ray doses. (auth) NSA 10-5465

7223
THE EFFECT OF INCUBATION TIME ON MACROCOLONY FORMATION AFTER X-IRRADIATION OF MICROORGANISMS. Shirley E. Gunter and Henry I. Kohn. J. Bacteriol. 71, 124-5(1956).

E. coli, Azotobacter agile, Pseudomonas fluorescens, Rhodospseudomonas spheroides, Saccharomyces cerevisiae. NSA 10-5468

7224
LEUKEMIA FOLLOWING RADIOIODINE TREATMENT OF HYPERTHYROIDISM. E. E. Pochin, N. B. Myant, and B. D. Corbett. Brit. J. Radiol. 29, 31-5(1956).

A patient died of acute leukemia 28 months after her hyperthyroidism had been effectively treated with 7.1 mc of radioiodine. This dose is unlikely to have caused radiation of more than 100 reps in relevant extrathyroid tissues. (auth) NSA 10-5496

7225
MODIFICATION OF LETHAL RADIATION EFFECTS IN RATS BY SHORT-TERM PROTRACTION OF DOSAGE. Jack S. Krohmer, John P. Storaasli, and Hymer L. Friedell. Radiology 66, 270(1956).

Results are reported from studies of radiation effects in rats from which it was concluded that, within certain limits, dose fractionation is not important, provided the total time of irradiation and the total dose are kept constant and that no individual fraction is so great as to produce significant lethal radiation effects by itself. (C. H.) NSA 10-5466

7226
THE INACTIVATION OF ATTACHMENT AND MUTUAL EXCLUSION PROPERTIES IN BACTERIAL VIRUSES BY

IONIZING RADIATION. Ernest Pollard and Jane Setlow. Radiation Research 4, 87-101(1956).

The property of attachment of P^{32} radioactive T1 bacteriophage to *E. coli* and to glass was inactivated by deuterium and α -particle bombardment. The T2 phage attachment was also studied. Comparative sizes for radiation sensitive regions for infectivity, bacterial killing, attachment, and serological affinity are given for T1 phage. (from authors' summary) NSA 10-5456

7227

Naval Medical Research Inst., Bethesda, Md.
PHARMACOLOGICAL STUDIES ON IRRADIATED ANIMALS. PART V. THE EFFECTS OF POSTIRRADIATION ADMINISTRATION OF VITAMIN K ON X-RAY INDUCED MORTALITY. Friedrich Ellinger. Sept. 15, 1955. 9p. (NM-006-012. 05. 16). NSA 10-4507

7228

Naval Medical Research Inst., Bethesda, Md.
FURTHER STUDIES WITH CELL FREE EXTRACTS FROM MOUSE SPLEEN ON X-RAY INDUCED MORTALITY. Friedrich Ellinger. Dec. 23, 1954. 8p. (NM-006-012. 04. 80). NSA 10-4506

7229

CELLULAR RADIOBIOLOGY. Robert K. Mortimer and Carl A. Beam. Ann. Rev. Nuclear Sci. 5, 327-68(1955).

Literature published primarily during 1953 and 1954 on various aspects of cellular radiobiology is reviewed. 401 references. NSA 10-5453

7230

THE EARLY CHANGES IN BONE MARROW AND BLOOD OF IRRADIATED ANIMALS, WHICH WERE DETECTED WITH THE LUMINESCENT MICROSCOPE. M. N. Meisel and V. A. Sondak. Doklady Akad. Nauk S.S.R. 105, 1221-4 (1955). (AEC-tr-2472). NSA 10-4488

7231

Naval Radiological Defense Lab., San Francisco.
THE EFFECT OF WHOLE BODY X IRRADIATION OF MICE ON IMMUNITY TO TETANUS TOXOID. PART II. THE DELAYED IMMUNE RESPONSES TO INJECTIONS OF TETANUS TOXOID. M. S. Silverman and P. H. Chin. Apr. 6, 1956. 17p. Project NM 006 015. (USNRDL-TR-85). NSA 10-4487

7232

THE ACTION OF IONIZING RADIATIONS ON BIOLOGICAL MATERIALS: FACTS AND THEORIES. J. A. V. Butler. Radiation Research 4, 20-32(1956).

Possible mechanisms of radiation effects on biological materials are reviewed. 26 references. (C.H.) NSA 10-4491

7233

RADIATION TOLERANCE CONTROL. A. Graves. Atomics 6, 278-81(1955).

Suggestions that the aqueous medium is responsible for the reaction of chemical radiation-detectors led to a theory of radiation tolerance control in humans. Control of tissue liquid content is seen as a radiation damage control and as a factor to be considered in x-ray therapy. (D. E. B.) NSA 10-4489

7234

COBALT-INDUCED POLYCYTHEMIA AND SURVIVAL OF X-IRRADIATED ALBINO RATS. Carl F. Gessert and Paul H. Phillips. Proc. Soc. Exptl. Biol. Med. 89, 651-4(1955).

Cobaltous chloride was added to the diet of rats in amounts of 0, 10, 30, 40, 70, and 100 ppm of added cobalt for 19 wks prior to whole-body x irradiation for 6 wks after exposure. The magnitude of the induced polycythemia was measured. Rats with Co polycythemia had higher mortality rate after 750 r whole body x ray exposure than did non-Co-treated controls. NSA 9-7243

7235

BETA IRRADIATION EFFECTS ON RETICULO-ENDOTHELIAL SYSTEM FOLLOWING INTRAVENOUS INJECTION OF RADIOACTIVE CHROMIUM PHOSPHATE. Elemer R. Gabrieli and John L. Culter. Proc. Soc. Exptl. Biol. Med. 87, 661-5(1954).

Colloidal chromium phosphate suspensions containing graded amounts of P^{32} were injected intravenously into rats. Radioautographic studies of livers showed changes similar to those after whole body x-ray exposure; distortion of peripheral lobular pattern and large "sunbursts." Changes are believed to indicate great radiosensitivity of RE system. NSA 9-1717

7236

THE EFFECT OF X RADIATION ON THE LARVAE OF XENOPUS. Alice Hohn. Oncologia 8, No. 3, 273-89(1955).

After irradiation of regenerating tail tip of *Xenopus laevis* Daudin larvae, all animals showed normally differentiated regeneration. Degeneration began on 3rd-5th day postexposure, death occurred on 15th-20th day. NSA 9-6577

7237

AN EXPERIMENTAL STUDY OF RADIATION-INDUCED ANAEMIA WITH REFERENCE TO SHIELDING PROCEDURES AND PLATELET CHANGES. L. F. Lamerton and C. F. Baxter. Brit. J. Radiol. 28, 87-94(1955).

Shielding of certain tissues containing active bone marrow (rat) greatly reduces the severity of radiation-induced anemia and secondary weight loss, without affecting weight loss of animal immediately postirradiation. Shielding of skin has no apparent effect on response of animal. Platelet investigations are described. NSA 9-2119

7238

RADIATION STUDIES ON THE MONKEY EYE. I. EFFECT OF GAMMA RADIATION ON THE RETINA. David V. L. Brown, Paul A. Cibbs, and John E. Pickering. A.M.A. Arch. Ophthalmol. 54, 249-56(1955).

Co^{60} γ rays (10,000 r at 1000 $\pm$ 50 r/min) were delivered to: (1) head of 16 monkeys, (2) body of 16 monkeys; (3) whole body of 16 monkeys. (Five unirradiated controls.) Monkeys were killed by decapitation 2-96 hrs post-exposure. Eye changes were similar after head exposure and whole body exposure. Histological changes and their sequence of occurrence are described. NSA 9-6162

7239

INTERACTION OF NUCLEIC ACID AND X-RADIATIONS ON THE CHROMATIN OF RYE AND PEA. Louis Roberta Sieburth. Northwest Sci. 24(1), 29(1950).

An abstract. BA 25-3592

7240

EXPERIMENTAL PRODUCTION OF RARE TUMORS BY STIMULATION (TAR AND RADIUM). R. Bracanti. Bull. e Atti accad. med. Roma 52, 47-52(1926). (In Italian).

Various sarcomata were induced in mice.

7241

CHANGES IN CARBOHYDRATE METABOLISM INDUCED BY RADIUM IRRADIATION OF TISSUES. Herbert G. Crabtree. Tenth Sci. Repts. Imp. Cancer Res. Fund 33, (1932).

Author studied: (1) normal and tumor tissue Ra-irradiated *in vitro*; (2) Jensen rat sarcoma, tests and spleen exposed *in vivo*. Power of using O_2 was lost after a few hours by (1), Ra apparently accelerates naturally occurring degenerative processes. Glycolytic processes were very resistant to Ra effects. Similar effects were produced in (2), but less rapidly. Concept that tumor tissue is inherently more vulnerable than normal tissue is not upheld.

7242

Massachusetts Inst. of Tech., Cambridge.
RADIUM AND MESOTHORIUM POISONING AND DOSIMETRY

AND INSTRUMENTATION TECHNIQUES IN APPLIED RADIOACTIVITY. ANNUAL PROGRESS REPORT. May 1955. 71p. (AECU-3045). NSA 9-5721

7243

A VITAMIN-C-FREE DIET IN RADIATION THERAPY OF MALIGNANT DISEASES. Theodore R. Miller and Boris Sokoloff. Am. J. Roentgenol., Radium Therapy Nuclear Med. 73, 472-80(1955).

Effect of vitamin C-free diet on tumor response to radiation therapy (x ray) in guinea pigs (liposarcoma); rats (Crocker rat carcinoma) and man (various types of malignant disease) was studied. NSA 9-3043

7244

California. Univ., Berkeley. Radiation Lab. THE METABOLISM OF INJECTED EGG LIPOPROTEIN IN THE NORMAL AND IRRADIATED RABBIT. Thomas L. Hayes and John E. Hewitt. May 26, 1955. 10p. Contract W-7405-eng-48. (UCRL-3015).

On the basis of clearance of egg lipoprotein from the blood of normal and irradiated animals, it is concluded that no block in lipoprotein metabolism is produced at the time of radiation or for at least 4 hrs postirradiation. NSA 9-5839

7245

Western Reserve Univ., Cleveland. Atomic Energy Medical Research Project. INCORPORATION OF OROTIC ACID-2-C¹⁴ AND CYTIDINE-C¹⁴ INTO NUCLEIC ACIDS OF NORMAL AND IRRADIATED CHICK EMBRYOS. Paul S. Lavik. Apr. 22, 1955. 15p. Contract W-31-109-Eng-78. (NYO-4918).

Embryos exposed to 450 r (x ray) 30 min or less before injection with labeled orotic acid contained more C¹⁴ in RNA and DNA pyrimidines than did controls 48 hours later. If cytidine contained the C¹⁴ label, irradiated embryos contained more C¹⁴ in RNA; about half as much in DNA as did unirradiated controls. NSA 9-4691

7246

Army Medical Research Lab., Fort Knox, Ky. A LABORATORY TEST FOR DIAGNOSIS OF LETHAL EXPOSURE TO IONIZING RADIATION IN RATS. J. B. Storer and H. C. Simonson. July 22, 1955. 14p. Project No. 6-59-08-014. (AMRL-198).

By determining blood plasma levels of trace amounts of I¹³¹ in rats 24 hrs after injection and 72 hrs after x irradiation (0-900 r), it was possible to divide animals into sublethal and lethal exposure groups with an accuracy of 83-95%. Following doses greater than 900 r, a reversal of effect on I¹³¹ levels appeared. This may provide a tool for diagnosing supralethal exposure. NSA 9-6824

7247

California. Univ., Berkeley. Radiation Lab. AGING: A THEORY BASED ON FREE RADICAL AND RADIATION CHEMISTRY. Denham Harman. July 14, 1955. 5p. Contract W-7405-eng-48. (UCRL-3078).

Author suggests that changes in living cells produced by irradiation, as well as spontaneous changes, have a common source, viz the OH and HO₂ radicals. Methods of testing the theory are outlined. NSA 9-6563

7248

BIOCHEMICAL BASIS OF BIOLOGICAL ACTION OF IONIZING RADIATIONS. A. M. Kuzin. Moscow, Publishing House of the Academy of Sciences of the U. S. S. R., p. 69-84 in Meetings of the Division of Biological Sciences (1955). (In Russian).

Author describes basic biochemical effects of irradiation in plants and animals. NSA 9-7615

7249

California. Univ., Berkeley. Radiation Lab. RADIATION HYPOPHYSECTOMY WITH HIGH-ENERGY PROTON BEAMS. PRELIMINARY REPORT. Cornelius A.

Tobias, J. E. Roberts, J. H. Lawrence, B. V. A. Low-Beer, H. O. Anger, J. L. Born, R. McCombs, and Charles Huggins. July 1955. 50p. Contract W-7405-eng-48. (UCRL-3035).

Authors describe initial use (9 mo experience, 12 patients) of high energy 340 Mev protons for destroying pituitary gland in humans with advanced metastatic carcinoma of the breast. Definite depression of pituitary function was observed after doses of 14,000-30,000 rad at center of pituitary. NSA 9-7642

7250

RADIATION INJURY OF THE CENTRAL NERVOUS SYSTEM. Kenneth L. Krabbsnhof. Am. J. Roentgenol. Radium Therapy Nuclear Med. 73, 350-2(1955). (Editorial).

Recent studies are reviewed and the author emphasizes evidence indicating that radiation has a direct effect on nerve tissue as well as an effect secondary to vascular changes. NSA 9-4355

7251

A TECHNIQUE OF MEASUREMENT, AND THE EFFECT OF X-RAY ON THE LEAKAGE OF PAH OUT OF THE RABBIT KIDNEY SLICE. Mortimer L. Mendelsohn. Am. J. Physiol. 182, 119-23(1955).

Method was found for estimating leakage of PAH (paraaminohippuric acid) out of rat kidney cortex slice preparation, by determining rate of loss of a PAH concentration difference after chemical inhibition of the transport medium. After 150,000 r of x rays leakage of slices did not change due to x-ray interference with active transport mechanism. NSA 9-6837

7252

RADIOPATHOLOGIC CYTOLOGY. THE TECHNIQUE OF PROGNOSTIC CYTOLOGY. Carl Deden. Acta Radiol. 43, 417-20(1955).

Author investigated the significance of cytological changes, especially the occurrence of bizarre cell shapes, in vaginal secretion smears after irradiation. Need for careful technique to eliminate artifacts is stressed. With careful technique, some bizarre cell shapes are still observed during and after radiation therapy. They are considered to represent a response to irradiation; probably secondary to changes in cell viscosity. NSA 9-5860

7253

THE PROTECTIVE EFFECT OF CYSTEAMINE ON YOUNG MICE EXPOSED TO ROENTGEN RAYS. Arne Nelson. Acta Radiol. 42, 485-93(1954).

Protective effect of cysteamine against ionizing radiation were investigated in young mice. Observations on weight, per cent surviving and duration of survival indicate that cysteamine afforded a good protective effect if given about 30 min before a dose of irradiation of up to 800 r and was also of some value when x ray dose was 1000 r. Optimal effect was obtained when cysteamine was administered immediately before exposure. Toxic effects of cysteamine are noted. NSA 9-2121

7254

EFFECTS OF COMBINED WHOLE BODY ROENTGEN IRRADIATION AND HIGH EXPLOSIVE BLAST INJURY IN MICE. Carl-Johan Clemedson and Arne Nelson. Acta Radiol. 43, 161-72(1955).

Mice (480 white, male) were exposed x rays and/or high explosive blast. Doses of 145 kv x ray: 25-600 r, with 10 mice per dosage group. Effect of combined injuries was no greater than effect of either agent alone. Only in group exposed to highest radiation dose and highest blast pressure was the number of deaths correlated with radiation dose. Effect on body weight is also reported. NSA 9-3744

7255

REMARKS ON THE RADIOSENSITIVITY OF UNICELLULAR ORGANISMS. Cornelius A. Tobias. Acta Radiol. 41, 105-108(1954).

Author discusses mechanism of radiation effects as shown by inhibition of cell division in haploid and diploid *Saccharomyces cerevisiae*. Lethal action is genetic in nature. Radiations used covered range of specific ionizations from 6×10^6 ev/g cm² (high energy deuterons and roentgen rays) to 2×10^9 ev/g cm² (low energy alphas).

7256

Hanford Atomic Products Operation, Richland, Wash. BIOLOGY RESEARCH-ANNUAL REPORT FOR 1954. Jan. 3, 1955. Changed from Official Use Only Nov. 9, 1955. 138p. (HW-35917). Contract W-31-109-Eng-52.

Progress is reported on studies of the effects of reactor effluent on aquatic and plant life; a radiobiological survey of the Columbia River; plant and animal absorption and metabolism of fission products, plutonium, and tritium; the chronic effects of I¹³¹ and external radiations administered to sheep; the toxicity of radioactive particles; and development of new or improved techniques applicable to radiobiology.

NSA 10-513

7257

Naval Medical Research Inst., Bethesda, Md. THE USE OF SMALL LABORATORY ANIMALS IN MEDICAL RADIATION BIOLOGY. IV. CORRELATION OF PHYSICAL FACTORS WITH THE BIOLOGICAL EFFECT PRODUCED BY TOTAL-BODY IRRADIATION OF PIGS. Friedrich Ellinger, Jasper E. Morgan, Ellsworth B. Cook, and W. A. Sterling. June 27, 1955. 13p. (NM-006-012.04.81).

Base-line data on the lethal effect of total-body irradiation have been established in an inbred guinea pig strain. It has been demonstrated that guinea pigs can be used with an accuracy similar to that established for mice in radiobiology problems. The LD_{50/14} days was found to be 337.4 r/air. NSA 10-514

7258

Michigan. Univ., Ann Arbor. Engineering Research Inst. PROPOSED NEW METHOD OF WHOLESALING FRESH MEAT BASED ON PASTEURIZATION BY GAMMA RADIATION. L. E. Brownell, J. V. Nehemas, and J. J. Bulmer. Dec. 1954. 32p. (AECU-3043). NSA 10-512

7259

Columbia Univ., New York. TERMINATION REPORT-PART I. FOOD IRRADIATION AND ASSOCIATED STUDIES. Sept. 15, 1954. 47p. (NYO-3320; CU-3-54-AEC-1186-Chem.) Contract AT(30-1)-1186.

Results from the following studies are summarized: two-year rat feeding experiment designed to test possible unwholesomeness of partially irradiated diets, effects of irradiated diet on rats; oxidative deterioration in irradiated milk, the effect of γ radiation on fats; and the γ -ray induced oxidation of ascorbic acid as studied and interpreted in terms of the oxidation of ferrous ion under similar conditions. NSA 10-515

7260

Columbia Univ., New York. Radiological Research Lab. ANNUAL REPORT ON RESEARCH PROJECT. Apr. 1, 1955. 174p. Contract AT-30-1-Gen-70. (NYO-4642).

Results are reported from studies on: radiosensitivity of the eyes of fetuses and lens epithelium of laboratory animals; the postirradiation protection of rabbits by injection of splenic plasma; effects of x and ultraviolet radiation, alone and consecutively, on bacteriophage. Report includes summaries of work published during the period. NSA 10-516

7261

California. Univ., Los Angeles. Atomic Energy Project. NOTIONS ON SENSITIVITY OF CELLS TO RADIATION. Ole A. Schjeide, James F. Mead, and Lawrence S. Myers, Jr. Oct. 15, 1955. 19p. Contract AT-04-1-gen-12. (UCLA-348).

The cytoplasm of cells contain enzymes for reduction of oxygen, hence are constantly exposed to small amounts

of the radicals and oxidizing agents derived therefrom. Nuclei, however, are not concerned to the same degree with such reactions and may not be as readily protected. Ionizing radiation produces the same or similar destructive agents. It is proposed that initial radiation damage occurs at loci within the cell which lack protective mechanisms, i.e., the nucleus; and that certain cells owe their high radiation sensitivity to their relatively large nuclear component. NSA 10-517

7262

Naval Radiological Defense Lab., San Francisco. PHYSICO-CHEMICAL ALTERATIONS IN SPLEEN DEOXYRIBONUCLEOPROTEIN FOLLOWING IN VITRO X-IRRADIATION WITH 660 r. L. J. Cole and M. E. Ellis. Aug. 8, 1955. 30p. Project NM-006-015. (USNRDL-TR-58). Rad. Research 5, 252(1956).

The deoxyribonucleoprotein (DNP) complex was isolated from spleens of immature mice, and characterized chemically. It was observed that low doses (850 r) of x-ray *in vitro* elicit detectable physico-chemical changes in isolated spleen DNP. Results suggest that initial effect may involve labilization of protein-to-DNA bonds in the original complex. NSA 10-518

7263

HEMOLYSIN PRODUCTION IN IRRADIATED MICE GIVEN SPLEEN OR BONE-MARROW HOMOGENATE. Falconer Smith and H. Jeanette Ruth. Proc. Soc. Exptl. Biol. Med. 90, 187-91(1955).

Recovery of hemolysin production in irradiated mice receiving bone marrow or spleen cell homogenate occurred at the same rate as in litter-mate control mice exposed to 450 r of x rays. Recovery of antibody production (to injected sheep erythrocytes) is gradual; begins 4th week after exposure to 450 r. Recovery of the hemolysin response is not complete even at 7 wk after this dose. Time required for development of peak titer following a single immunizing injection was not lengthened by 450 r whole-body exposure. NSA 10-522

7264

EFFECT OF X-RADIATION ON THE FLOW OF PERFUSION FLUID THROUGH THE ISOLATED RABBIT'S EAR. Herbert B. Gerstner, Phillips M. Brooks and Sidney A. Smith. Am. J. Physiol. 182, 459-61(1955).

Flow rate, protein washout, and weight gain were measured in 100 isolated rabbit's ears perfused with tyrode's solution at 24°C under pressure of 24 to 26 mm Hg. Fifty ears received x radiation from 1 to 8 kr; 50 served as controls. X radiation caused immediate but transitory reduction of flow rate, effect became more striking the higher the dose. Irradiated ears showed marked protein washout. NSA 10-529

7265

EFFECTS OF RADIATION ON GLYCOGEN PROCESSES IN ANIMALS EXPOSED TO X RAYS. R. Ya. Keilina. Biokhimiya 20, 420-4(1955). (In Russian).

Investigation of glycogen reactions in animals exposed to lethal and sublethal doses of x rays were made with rats weighing 150 to 200 g. Various tables of results obtained before and after exposure to 500 r and after lethal doses of x rays are presented. Decay of liver glycogen in rats not exposed to x rays was basically phosphoryl. In rats 2 days after exposure to 500 r radiation, phosphoryl glycogen was depressed, glycogen decay took place as result of hydrolysis. Hexokinase activity was not disturbed NSA 10-533

7266

EFFECTS OF ULTRAVIOLET AND X RADIATION ON ALBUMIN SOLUTIONS. M. S. Volkova and A. G. Pasyanski. Biokhimiya 20, 470-8(1955). (In Russian).

A detailed study of denaturation of albumin solutions by ultraviolet and x radiation as reported. NSA 10-534

7267

Chicago. Univ. Air Force Radiation Lab.
QUARTERLY PROGRESS REPORT NO. 17. Oct. 15, 1955. 132p. Contracts AF33(038)-27353 and AF 41(657)-25. (NP-5815).

Includes reports on: effects of antimetabolites, cellular preparations, testosterone propionate and estrogenic preparations on radiosensitivity of mice and rats; dose fractionation and exposure schedule on metabolic rate, survival time, weight loss and on 5-nucleotidase activity of rat spleen and thymus; effects of simultaneous exposure to high doses of x ray, simulated high altitude and high temperature on mortality. NSA 10-536

7268

Naval Radiological Defense Lab., San Francisco.
GROWTH AND CONTINUED FUNCTION OF RAT MARROW CELLS IN X IRRADIATED MICE. P. C. Nowell, L. J. Cole, J. G. Habermeyer and P. L. Roan. Sept. 2, 1955. 13p. Project NM 006 015. (USNRDL-TR-59). NSA 10-537

Blood and bone marrow smears from rats and mice were treated for histochemical demonstration of alkaline phosphatase activity. In the rat, mature neutrophilic leukocytes showed marked activity of the enzyme, while immature myeloid cells, megakaryocytes, and nucleated red cells showed less activity. In mouse smears, no phosphatase was observed in corresponding cells. After intravenous injection of rat marrow cell suspension into x-irradiated mice (810 r), alkaline phosphatase-positive cells were found in blood and bone marrow of the mouse within 2 hr. At 7 days, the percentage of phosphatase-positive cells markedly increased in irradiated mice, in the second, third, and fourth weeks after irradiation, the cells composed almost the entire mouse marrow population and were morphologically indistinguishable from rat marrow cells. There was no evidence of a return of phosphatase-negative (i. e., mouse) marrow cells during the 28-day period studied. Findings indicate that injected rat marrow cells are able to survive, divide, and repopulate the marrow cavity of irradiated mice. The cells function hematopoietically and permit survival of the mice following otherwise lethal doses of radiation. NSA 10-537

7269

THE EFFECT OF CYSTEAMINE, CYSTAMINE AND HYPOXIA ON MORTALITY AND BONE MARROW CHROMOSOME ABERRATIONS IN MICE AFTER TOTAL BODY ROENTGEN IRRADIATION. Finn Devik and Francis Lothe. Acta Radiol. 44, 243-5(1955).

A total of 154 mice were subjected to 1100 r and 110 mice to 200 r total-body irradiation following the administration of cysteamine or cystamine. With the former dose, death of mice was the indicator of damage while, with the latter dose, chromosome aberrations in the bone marrow were evaluated quantitatively. In both series, the chemical compounds had protective effects, particularly when mice were hypoxic during exposure (oxygen tension of 8.4%). NSA 10-540

7270

MODIFICATION OF THE RADIOSENSITIVITY OF RAT BY DEEP HYPOTHERMY. S. Hajdukovic. Acta Radiol. 44, 249-56(1955). (In French).

Author found that 50% of rats, irradiated in state of deep hypothermy (rectal temperature 14-15°C) with lethal doses of 800 and 900 r, survived more than 30 days; all controls died within 17 days. The same degree of protection was obtained if the rats were cooled in the presence of oxygen or under an air pressure of 1.25 atmosphere. It is likely that the influence of hypothermy on the mortality of roentgen-irradiated mammals is related to the general level of metabolic processes and not only to anoxia. NSA 10-541

7271

Rochester, N. Y. Univ. Atomic Energy Project.
THE BINDING OF POLONIUM BY RED CELLS AND PLASMA PROTEINS. Robert G. Thomas and J. N. Stannard. Oct. 19, 1955. 18p. Contract W-7401-eng-49. (UR-414).

An average of 97 and 83% of the red cell and plasma Po, respectively, appears to be bound to proteinaceous material when PoCl_3 is given either intravenously or orally to rats. Erythrocyte stroma preparations show a polonium concentration equal to that of hemoglobin. Globin binds all of the hemoglobin polonium and plasma proteins appear to share the metal according to their respective concentrations. Both red cell and plasma lipids give no evidence of radioactivity. It is proposed that an equilibrium exists between red cells, plasma, and tissues with respect to Po metabolism and that the relationship between each compartment is a direct function of the effective half life in each. Data on the uptake of Po by red cells soon after intravenous injection to the rat and rabbit are interpreted in terms of this proposal. NSA 10-556

7272

FAILURE OF Y^{90} TO ESCAPE FROM SKELETALLY-FIXED Sr^{90} . J. S. Arnold, B. J. Stover, and M. A. Van Dilla. Proc. Soc. Exptl. Biol. Med. 90, 260-3(1955).

The data presented demonstrate that Y^{90} produced in vivo from long term skeletal deposits of Sr^{90} in young dogs does not escape from the local areas of bone in which it is produced. The findings agree with previous experimental evidence. Implications: (1) combined energy of the Sr^{90} and Y^{90} β rays irradiates the skeleton, hence, dosimetric data determined in vitro can be directly applied to in vivo conditions; (2) Sr^{90} deposited in growing skeleton is probably intracrystalline. NSA 10-558

7273

STUDIES ON THE MECHANISM OF PHYTOHORMONE DAMAGE BY IONIZING RADIATION. I. THE RADIOSENSITIVITY OF INDOLEACETIC ACID. Solon A. Gordon and Robert P. Weber. Plant Physiol. 30, 200-10(1955).

The in vitro sensitivity of indoleacetic acid (IAA) to x and γ radiation is re-examined by a kinetic approach. Observations interpreted as indicating that some explanation other than direct auxin photolysis probably accounts for lowering the auxin levels in plants exposed to low doses of ionizing radiation. NSA 10-656

7274

Rochester, N. Y. Univ. Atomic Energy Project.
THE HISTOPATHOLOGY OF MICE EXPOSED TO RADON. James K. Scott. July 26, 1955. 13p. Contract W-7401-eng-49. (UR-411). NSA 10-548

7275

Los Alamos Scientific Lab., N. Mex.
QUANTITATIVE BIOLOGICAL METHODS FOR STUDYING RADIATION EFFECTS IN MAMMALS. John B. Storer and Wright H. Langham. 1954? 43p. (AECU-3099).

Ten quantitative biological responses of mice and/or rats to x and γ rays, neutrons of various energies, mixtures of γ rays and neutrons and internally administered α and β emitters gave quantitative dose-response curves which can be transformed to straight lines and characterized by mathematical expressions. Responses described: median lethal dose determination, median survival time, splenic and thymic atrophy; testicular atrophy; intestinal atrophy; whole body weight loss, depression of Fe^{59} uptake by red blood cells; incidence of lens opacities, incidence of heterologous tumor implants in irradiated animals. NSA 10-15

7276

Michigan. Univ., Ann Arbor, Engineering Research Inst.
THE DESIGN OF A GAMMA IRRADIATION FACILITY FOR THE CONTROL OF INSECT INFESTATION IN FLOUR, MEAL, OR GRAIN. L. E. Brownell, J. V. Nehemias, and J. J. Bulmer. May 1955. 23p. (AECU-3050).

The feasibility of using γ radiation to control insect infestation in stored flour, grains, and cereal effect of γ radiation on the baking quality of wheat flours are included. Costs are calculated-based on use of two cooling reactor fuel elements to provide radiation dose of 25,000 rep. NSA 10-14

7277

REPORT OF THE SEVENTH INTERNAT. CONGR. ON RADIOLOGY FROM THE DEPARTMENT OF RADIOTHERAPY HELD IN COPENHAGEN 1953. E. H. Graul and F. Hess, Eds. Munchen/Berlin, Urban and Schwarzonberr (1955). (In German).

Includes discussion of: chemical protection from radiation; radiation biology problems, genetic problems resulting from radiation therapy in region of gonads; radioresistance of cancer. NSA 10-46

7278

THE ADVANTAGES OF USING POLYTOMA UVELLA FOR STUDIES OF CELLULAR RADIOSENSITIVITY. A. Lacassagne and F. Holweck. *Compt. Polytoma rend. soc. biol.* 107, 120-2(1931).

Polytoma, a flagellate, grows well, forming colonies from isolated cells on gelatine medium. There is a remarkably regular rhythm of cell division (multiplied). There are several nearly synchronous divisions of new colonies, permitting studies of the rate of cell division in addition to other variables.

7279

CHANGES IN LENS DURING THE FORMATION OF X-RAY CATARACT IN RABBITS. Antonette Pirie, Ruth Van Heyningen, and P. H. Flanders. *Biochem. J. (London)* 61, 341-7(1955).

Radiation effects on organic phosphate compounds in the lens of the very young rabbit were studied by an enzymic method. No change was observed in high energy phosphate groups of ATP and ADP or in hexose monophosphates within few days of irradiation. Fall in glutathione was detected 24 hr post-exposure. Hexose and triose phosphate, determined enzymically, were less than when determined chemically, a discrepancy also found in other tissues. NSA 10-40

7280

INFLUENCE OF X-RAY ON OXYGEN CONSUMPTION OF SPLEEN AND THYMUS GLANDS OF RATS. Maurice F. Sullivan and Kenneth P. DuBois. *Radiation Research* 3, 202-9(1955).

Oxygen consumption of slices of spleen and thymus glands from rats given 400 r whole-body x-radiation were studied manometrically. Marked reduction in endogenous QO_2 was observed in both tissues. Maximal inhibition occurred 48 hours after x ray, after which time there was gradual reversal of inhibitory effect. Endogeneous respiration of irradiated tissues declined more rapidly than in case of normal tissues when incubation period was extended. (from authors' summary) NSA 10-37

7281

DOMINANT LETHAL MUTATION AND X-CHROMOSOME ELIMINATION AFTER X-IRRADIATION OF FEMALE DROSOPHILA MELANOGASTER. R. C. King. *Radiation Research* 3, 143-52(1955).

Author determined the frequency of dominant lethals and x-chromosome losses in eggs laid at successive daily intervals after x ray treatment of female *Drosophila*. There was no significant difference in fecundity between control and irradiated flies. X radiation induces many more chromosome breaks in mature eggs than in oocytes. (from author's summary) NSA 10-33

7282

EFFECT OF VARIOUS DOSES OF X-RAYS ON THE NUMBER OF CELLS SYNTHESIZING DEOXYRIBONUCLEIC

ACID. S. R. Pelc and Alma Howard. *Radiation Research* 3, 135-42(1955).

The number of cells synthesizing DNA (observed by means of autoradiographs as uptake of P^{32} into DNA in a form not removed by acid hydrolysis) in *Vicia faba* root meristems is reduced by moderate doses of x rays to about 60% of the normal value during the subsequent 12 hr. Reduction is the same after 50 r to 200 r dose. Result is considered to be due to greater radiosensitivity of cells which are in the first part of interphase (representing about 1/3 of the mitotic cycle) at the time of irradiation. NSA 10-32

7283

Naval Radiological Defense Lab., San Francisco. TEMPORAL RELATIONSHIPS WITHIN THE CONDITIONING OF A SACCHARIN AVERSION THROUGH RADIATION EXPOSURE. J. Garcia, D. J. Kimeldorf, and R. A. Koelling. Aug. 10, 1955. 18p. Project NM-006-015. (USNRDL-TR-57).

The optimal sequence for establishing conditioned aversion in rats to saccharin flavored H_2O was saccharin consumption during irradiation. Drinking the fluid immediately post-exposure did not result in aversion according to post-exposure preference tests. Some conditioning was observed in rats receiving saccharin flavored water immediately pre-exposure. NSA 10-22

7284

Naval Radiological Defense Lab., San Francisco. CONDITIONED RESPONSES TO MANIPULATIVE PROCEDURES RESULTING FROM EXPOSURE TO GAMMA RADIATION. J. Garcia, D. J. Kimeldorf, and E. L. Hunt. Aug. 9, 1955. 17p. Project NM-006-015. (USNRDL-TR-56).

Confinement of rats in plastic radiation chambers without actual exposure to radiation resulted in decreased food and water consumption if rats had previously experienced eating and drinking during irradiation under similar confinement. Animals deprived of both food and water during exposure did not decrease food and water intake during subsequent confinement in the radiation chamber. Three of five 8-hr exposures (75 r each) were employed to produce these effects. NSA 10-21

7285

Rochester, N. Y. Univ. Atomic Energy Project. EXTRA EMBRYONIC VASCULAR DETERIORATION IN THE IRRADIATED CHICK EMBRYO. M. Goldman, S. R. Glasser, and L. W. Tuttle. Aug. 3, 1955. 10p. Contract W-7405-eng-49. (UR-296).

Chick embryos exhibit extensive intraembryonic hemorrhage a few hours after 12 day old fertile eggs are exposed to 800 r of 250 kvp x rays. Vascular degeneration was pronounced within 2 hr after irradiation; was maximal by 20 hr at which time 62% of the embryos were dead. On a five rank scale, vascular damage in irradiated eggs scored 3 to 4 prior to death compared with similarly handled in irradiated controls which scored 0-1 throughout the experiment. NSA 10-19

7286

BASIC MECHANISMS IN RADIOBIOLOGY. III. BIOCHEMICAL ASPECTS. (Cover bears title: Biochemical aspects of Basic Mechanisms in Radiobiology.) Harvey M. Patt., ed. Nuclear Science Series Report Number 17 (1954). 158p.

Topics include: direct effect of radiation on proteins, viruses, and other large molecules, *in vitro* effects on molecules of biological importance; cellular biochemistry; enzyme and related effects in the intact cell, and changes in nucleic acid metabolism as a result of radiation. NSA 10-39

7287

THE INFLUENCE OF EXTERNAL BODY RADIATION ON MORTALITY FROM THERMAL BURNS. J. W. Brooks, E. I. Evans, W. T. Ham, Jr., and J. D. Reid. *Ann. Surg.* 136, 533(1952).

7288

RADIOACTIVE EMANATION AND OSMOTIC PHENOMENA IN VITRO. P. Mascherpa. Boll. Ital. biol. sper. 7, 1181-1188(1932). (In Italian).

Frog skin membranes were used as simple osmometers (filled with salt solution). Fluid level in the manometer rose more rapidly when the membrane was in radioactive water (activity of emanation in solution given as 4755.1 Mache units) than when it was in nonradioactive water.

7289

THEORETICAL AND EXPERIMENTAL INVESTIGATION OF THE EXCITATION OF CORPUSCULAR, ATOMIC AND MOLECULAR RADIATIONS IN TUMOR TISSUE. George Spertl and Robert J. Norris. Bull. Basic Sci. Research (Univ. Cincinnati) 2, 11-31(1928).

Energy absorption by tumor during x irradiation can be increased by injecting elements of such atomic numbers that characteristic radiations and photo-electrons or β particles are emitted within the tumor. Examples are considered. Author believes tumor lethal dose is independent of age of tumor and is same for all mice. BA 6-6686

7290

STERILITY ASSOCIATED WITH HABITUAL AMENORRHEA RELIEVED BY X-RAY THERAPY. I. C. Rubin. Am. J. Obstet. Gynecol. 12, 76-88(1926).

7291

ON THE RATE OF TRACER INCLUSION INTO THE ALBUMIN OF IRRADIATED ANIMALS. THE RATE OF TRACER INCLUSION INTO ALBUMIN IN THE SUBACUTE FORM OF RADIATION SICKNESS. S. N. Aleksandrov. Doklady Akad. Nauk S. S. R. 106, 363-6(1956). (In Russian).

Studies were made of the rate of tracer inclusion into the albumin of animals in sub-acute forms of radiation sickness in 18-20 g male and female mice. Methylamine labeled with S^{35} was used as a tracer, mice were killed 1.5 hours post-injection. Observations: in subacute radiation sickness, accelerated albumin restoration did not stop at the initial critical period and did not break off sharply as it did in acute radiation sickness. NSA 10-5463

7292

Chicago Univ. Metallurgical Lab. and California Univ., Berkeley. Radiation Lab. REPORT OF HEALTH ACTIVITIES FOR MONTH OF JULY 1945. Aug. 13, 1945. Decl. Dec. 15, 1955. 17p. Contracts W-7401-eng-37 and W-7405-eng-48a. (CN-3190).

Includes reports on: radiation damage in mice and guinea pigs receiving chronic exposure to x and γ radiation; tissue distribution of Pu^{238} in rats, daily urinary and fecal excretion of Pu in a human subject following administration of 5 μ g by intravenous injection. NSA 10-4120

7293

California. Univ., Berkeley. Radiation Lab. MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT FOR JANUARY, FEBRUARY, MARCH 1956. Apr. 30, 1956. 18p. Contract W-7405-eng-48. (UCRL-3386).

Includes reports on: toxic effects of intramuscular Ra^{223} in rats. NSA 10-4481

7294

Rochester, N. Y. Univ. Atomic Energy Project. DATA PERTAINING TO SHORTENING OF LIFE SPAN BY IONIZING RADIATION. H. A. Blair. Apr. 30, 1956. 42p. Contract W-7401-eng-49. (UR-442).

Using the median or average life span as a criterion, most of the existing data on shortening of life in mammals as a consequence of exposure to whole body irradiation from x ray and γ ray sources are reviewed and analysed mathematically. Related data on the variation of lethal dose, LD_{50} with age are discussed. NSA 10-4483

7295

INACTIVATION WITH FAST CHARGED PARTICLES OF

INFECTIVITY AND HEMAGGLUTINATION IN INFLUENZA A VIRUS. John Jagger and Ernest C. Pollard. Radiation Research 4, 1-19(1956).

Two strains of influenza A, MEL, and DSP, have been subjected to bombardment in the dry state with charged particles of energies 1 to 3 Mev. Target theory is applied to the resulting inactivations. In all cases, these are found to be single-hit. NSA 10-4490

7296

THE ADDITIVITY OF γ -RAYS AND FISSION NEUTRONS IN PRODUCING SPLEEN WEIGHT REDUCTION. Donn L. Jordan, John W. Clark, and Howard H. Vogel, Jr. Radiation Research 4, 77-85(1956).

The per cent spleen weight reduction 5 days postirradiation is a function of log dose for both Co^{60} γ rays and fission neutrons for dose ranges studied. Neutrons are 4.42 times as effective per unit energy absorbed in reducing splenic weight in mice from the 20% through the 80% range. Value at 50% weight reduction is 4.42 ± 0.45 . Biological effectiveness per unit energy absorbed increases for radiations dissipating from 0.3 to 30 kev/ μ of path. NSA 10-4494

7297

COMPARISON OF CYTOLOGIC EFFECTS PRODUCED BY 200 KV_p ROENTGEN RAYS, RADIO-IRIDIUM Ir^{192} GAMMA RAYS AND 30 MEV_p ROENTGEN RAYS IN THE MICROSPORES OF TRADESCANTIA BRACTEATA. K. C. Bora. Acta Radiol. 44, 129-44(1955).

At low levels (100-500 r), equal doses of 30 Mev_p roentgen rays and 0.4 Mev gamma rays produce equal frequencies of chromosomal aberrations in Tradescantia bracteata but, at higher dosages (600 to 1000 r), the same dose of the former radiation produces consistently lower frequencies of all types of aberration. NSA 10-4495

7298

RIBONUCLEASE. IV. THE EFFECT OF WHOLE BODY X-IRRADIATION ON THE RIBONUCLEASE SYSTEM OF RAT LIVER. Jay S. Roth. Arch. Biochem. Biophys. 60, 7-13(1956). NSA 10-4501

7299

Army Medical Research Lab., Fort Knox, Ky. INFLUENCE OF POLYVINYL-PYRROLIDONE COMPOUNDS ON THE POST-IRRADIATION SYNDROME W. Parr, J. Kerenakes, and A. Krebs. Dec. 12, 1955. 18p. (AMRL-229).

Under strictly controlled conditions low molecular weight Polyvinyl-Pyrrolidone, such as Periston "N" tended to influence beneficially the post irradiation syndrome in mice. Effect was slight but supports idea of wash-out of radiation-produced toxins by the substances. No protection was afforded by high molecular weight PVPs. NSA 10-4504

7300

Mound Lab., Miamisburg, Ohio BIOLOGICAL RESEARCH (SECTION) QUARTERLY REPORT FOR OCTOBER-NOVEMBER-DECEMBER 1949. Jan. 1, 1950. Decl. with deletions Jan. 11, 1956. 49p. (AECD-4051).

Includes reports on: effects of Po upon the breeding and fecundity of 120 pairs of adult Sprague-Dawley rats. NSA 10-5090

7301

SURVIVAL OF CELLS UNDER IRRADIATION. J. C. Mottram. J. Cancer Research 11, 130(1927).

Colpidium colpoda were exposed to continuous β radiation from radium emanation and radium. Effects of ionizing radiation, ultraviolet and exposure to phenol were compared. Radiation was found to produce nonspecific damage.

7302

Chicago. Univ. Air Force Radiation Lab. QUARTERLY PROGRESS REPORT NO. 18. Jan. 15, 1956. 140p. Contract AF41(657)-25. (NP-5377).

Includes reports on: effects of ionizing radiations on the 5-nucleotidase activity of mammalian hematopoietic

tissues, influence of substituted pyrimidines, phenothiazines, carbamates, cytotoxins, and metabolic antagonists on the survival time and mortality post-irradiation; influence of metabolic antagonists, cytotoxins, and cortical hormones on the ATP of hematopoietic tissues; influence of high temperature and other environmental factors on susceptibility of animals to radiation injury. NSA 10-5448

7303

INFLUENCE OF X-IRRADIATION UPON WATER CONSUMPTION BY THE RAT. Douglas E. Smith and Ella B. Tyree. *Am. J. Physiol.* 184, 127-33(1956).

Water consumption was measured daily after single, total-body x-irradiation of intact and adrenalectomized rats and single, partialbody irradiations of intact rats. Intakes of 20% sucrose and of 1% NaCl were measured in hypophysectomized and adrenalectomized, irradiated rats, respectively. Adrenalectomy abolished polydipsia which immediately follows irradiation. Possible influence of pituitary-adrenal system upon irradiation-induced changes in H_2O intake is discussed. NSA 10-5451

7304

STIMULATION OF ERYTHROPOIESIS IN SUBLETHALLY IRRADIATED RATS BY A PLASMA FACTOR. Frederick Stohman, Jr. and George Brecher. *Proc. Soc. Exptl. Biol. Med.* 91, 1-4(1956).

Injection of plasma from anemic donors into rats immediately after exposure to sublethal x ray doses produced statistically significant increase in erythropoiesis as measured by Fe^{59} incorporation. Factor present in anemic plasma was nondialyzable, not present in supernatant after heat precipitation of protein. Normal plasma produced variable response. NSA 10-5454

7305

WATER INTAKE OF GUINEA PIGS AS PARAMETER IN ORAL DRUG THERAPY OF EXPERIMENTAL IRRADIATION. Friedrich Ellinger. *Proc. Soc. Exptl. Biol. Med.* 91, 172-4(1956).

Drinking habits of guinea pigs kept on a diet of dry food and drinking water have been studied to ascertain the amount of daily water consumption which may serve as a parameter for oral drug administration. NSA 10-5455

7306

STUDIES ON BONE MARROW LIPID IN NORMAL AND IRRADIATED RABBITS. Frederick Bernheim, Athos Ottolenghi and Karl M. Wilbur. *Radiation Research* 4, 132-8(1956).

Forty-eight hours after exposure of rabbit to 1400 r, marrow homogenates produced peroxides when incubated *in vitro*. Extracts from rabbits exposed to 800 r were less effective than extracts from normal animals in protecting the succinoxidase against peroxides. There was a significant increase in linoleic, linolenic and total fat in the marrow of the irradiated animals. Vitamins K, A and E inhibited peroxide formation in liver homogenates but did not protect succinoxidase against inhibition by peroxides. (from authors' summary). NSA 10-5458

7307

ACTION OF X-RAYS ON DIDINIUM NASUTUM. D. C. Shepard, A. C. Giese and C. L. Brandt. *Radiation Research* 4, 154-7(1956).

Direct irradiation of Didinium nasutum delays division by an amount that is greater the larger the dosage. Diet of paramecia irradiated just short of a cytolytic dosage does not affect division of didinia. Only possible positive effect was death of a small fraction of the population. Brief exposure of didinia to irradiated medium delays division, longer exposure kills. Implications of the results are discussed. NSA 10-5459

7308

MORPHOLOGICAL CHANGES IN THE MEDULLA OB-LONGATA NERVE CELLS OF WHITE MICE DURING

GENERAL ROENTGEN IRRADIATION. M. I. Sorokina. *Doklady Akad. Nauk. S. S. R.* 106, 51-3(1956). (In Russian).

Morphological changes in the nervous system under irradiation were studied by observing the process from initial moment of animal exposure to the moment of death. Adult white normal mice, and mice exposed to roentgen radiation (700 r, 1000 r, and 5000 r) were used in the experiments. Morphological changes used as criteria of effect revealed high sensitivity of nerve tissue to radiation. Destructive changes appeared in early stages of exposure. NSA 10-5461

7309

THE UPTAKE OF PHOSPHORUS-32 BY THE KNEE JOINT AND TIBIA OF SIX-WEEK-OLD MICE AND THE EFFECT OF X RAYS UPON IT. VARIATION OF UPTAKE WITH TIME AFTER A DOSE OF 2000 r OF KV X RAYS. C. W. Wilson. *Brit. J. Radiol.* 29, 86-91(1956).

7310

THE ELIMINATION OF RADIOACTIVE BARIUM SULFATE PARTICLES FROM THE LUNG. H. Cember, T. F. Hatch, J. A. Watson, T. Grucci and P. Bell. *Arch. Ind. Health* 13, 170-6(1956).

Radiation effect on the pulmonary clearance mechanisms were studied by exposing one group of rats to radioactive barium sulfate particles of high specific activity and another group to particles of very low specific activity. No difference between elimination rates of these two classes of particles was observed. Effective half life of particles in deep respiratory tract: two days. NSA 10-5470

7311

Naval Medical Research Inst., Bethesda, Md. and Naval Radiological Defense Lab., San Francisco. EMERGENCY LABORATORY ORGANIZATION FOR THE CARE OF LARGE NUMBERS OF HUMAN BEINGS ACCIDENTALLY EXPOSED TO IONIZING RADIATION. C. R. Sipe, P. K. Schork, C. P. A. Strome, and William H. Gibbs. Nov. 18, 1955. 13p. (NM-006,012,04,91).

Accidental exposure of a group of Marshallese and Americans to radioactive fallout (spring, 1954) necessitated organizing and equipping an emergency medical team to conduct essential laboratory and clinical examinations on the exposed individuals. The material, facilities, and personnel required for emergency laboratory analyses in an operation of this kind are discussed. NSA 10-5476

7312

THE EFFECT OF ACTH AND CORTISONE ON RADIATION PNEUMONITIS. Florence C. H. Chu, James J. Nickson and Ali R. Uzel. *Am. J. Roentgenol., Radium Therapy Nuclear Med.* 75, 530-41(1956).

A study of the effects of ACTH and cortisone on radiation pneumonitis in 15 cases is presented. A brief review of the reports in the literature is given. NSA 10-5483

7313

RADIUM INHALATION ACCIDENT-RADIUM EXCRETION STUDY. W. B. Looney and V. E. Archer. *Am. J. Roentgenol., Radium Therapy Nuclear Med.* 75, 548-58(1956).

A report is made of 2 cases of accidental radium inhalation. The only clinical observations included are those representing excretion by way of urine and feces and exhalation in the breath. NSA 10-5502

7314

HISTOLOGICAL CHANGES IN THE GASTRIC MUCOSA (PAVLOV POUCH) OF THE DOG FOLLOWING IRRADIATION. A. B. Dawson. *Am. J. Roentgenol.* 13, 320-330(1925).

7315

RADIODERMATITIS AMONG PHYSICIANS. E. T. Leddy and F. J. Rigor. *Am. J. Roentgenol. Radium Therapy* 45, 696-700(1941).

7316

RADIATION OSTEITIS. J. Ewing. *Acta Radiol.* 6, 399-412 (1926).

The author describes 4 cases (3 men, 1 woman) who developed osteitis after large therapeutic radiation doses (radium γ in 3 cases, 250 kv x rays in 1 case). Radiation osteitis, developing about 2 years post-exposure, resulted in multiple fractures, necessitated amputation.

7317
LEUKOPENIC ANEMIA OF THE REGENERATIVE TYPE DUE TO EXPOSURE TO RADIUM AND MESOTHORIUM. G. S. Reitter and H. S. Martland. *Am. J. Roentgenol.* 16, 161 (1926).

Autopsy of two chemists who handled Ra and Mesothorium 4-5 days a week in various quantities for 14 years without taking any protective measures revealed red marrow showing erythroblastic hyperplasia. Body burden of radioactive elements was estimated to be 14 μ g.

7318
THE BIOLOGICAL MEASUREMENT OF THE DEPTH DOSE OF ROENTGEN RAYS WITH LETTUCE SEEDLINGS. C. I. Bliss. *Am. J. Roentgenol., Radium Therapy* 58, 222-233 (1947).

Lettuce seeds in paraffin discs were exposed *in vitro* to single doses of 200 kv x rays (3.23 mm Cu, 2.4 mm celluloid, 12.2 r/min). Biological effectiveness of radiation decreased as the 2.45 power of expected value in air; intensity of direct radiation decreased as the 4.85 power. Author concludes that 50% of effective radiation in paraffin is scattered radiation.

7319
STUDIES OF THE EFFECTS OF MILLION VOLT ROENTGEN RAYS, 200 KV X-RAYS, RADIOACTIVE P AND NEUTRONS BY THE MARROW CULTURE TECHNIQUE. E. F. Osgood, P. C. Aebersold, L. A. Erf and L. A. Packham. *Am. J. Med. Sci.* 204, 372-381 (1942).

Major effect of all the types of radiation on human marrow exposed *in vitro* was inhibition of cell division. Lymphocyte response: same to 200 r of 200 kv and 1000 kv x rays; same to 15 r neutrons and 60 r of 220 kv x rays. Neutron dose of 15 r produced same effect on progranulocytes as 400 r of 220 kv x rays.

7320
ACTIVATED ERGOSTEROL IN RADIATION SICKNESS. L. A. Smith. *Am. J. Roentgenol.* 22, 317-22 (1929)

Ergosterol is said to be good prophylaxis for radiation sickness.

7321
THE EFFECT OF X-RAYS ON THE RESPIRATION OF FOWL ERYTHROCYTES. L. Frankenthal and A. Back. *Biochem. J.* 38, 351-354 (1944).

Erythrocytes from defibrinated blood of 6-8 wk old chickens were x irradiated *in vitro* (35 kv, 15 ma, Cu anticathod, 50 mm T. O., 60,000 r/min). Irradiation markedly increased respiratory rate of the cells, effect increasing with increasing dose over range of 500,000-1,000,000 r.

7322
THE EFFECTS OF X-RAY THERAPY ON THE PARTITION OF PHOSPHORUS COMPOUNDS IN THE BLOOD IN DISEASE. Milan Sokolovitch. *Brit. J. Exptl. Pathology* 12, 147-50 (1931).

Concentration of various P compounds was studied in human venous blood (1 man) before and after whole-body x irradiation (dose not reported). After irradiation, ester P of plasma rose, of cells decreased, lipin P of plasma plasma rose, of erythrocytes decreased.

7323
WHOLE BODY IRRADIATION AND THE HEALING OF FRESH FRACTURES. A. W. Spittler, J. W. Batch and B. A. Rutledge. *A. M. A. Arch. Surg.* 68, 93 (1954).

Doses of 300-900 r given before fracture of left femur of rats delayed healing and altered the normal development of cartilage and ossifying osteoid tissue.

7324
A CONTRIBUTION TO THE BIOLOGICAL ACTION OF ROENTGEN RAYS. M. Y. Nemenow. *Brit. J. Radiol.* 31, 302-309 (1926).

On the basis of theoretical considerations, author proposes that Roentgen irradiation causes rapid exhaustion of "vital energy" cells. The radiation causes disturbed metabolism and retention of metabolic products in cells. CA-21-23306

7325
THE INFLUENCE OF ROENTGEN RAYS ON WHITE MICE AND THEIR PROGENY. M. Levine. *Am. J. Roentgenol. Rad. Therapy* 17, 546-51 (1927).

Large groups of immature mice were irradiated repeatedly with 155 kv x rays (Coolidge tube, 3.5-4 ma, T. D. 55-57 cm, 1 mm Al, 0.5 mm Cu). When male and female radiated mice were mated, 29 females gave birth to 168 young; 143 of these survived. Gross anatomy studies revealed no visceral, eye, foot, or leg abnormalities.

7326
PROTECTIVE ACTION OF CARBON MONOXIDE IN MAMMALIAN WHOLE-BODY X-IRRADIATION. Eugene B. Konecci, William F. Taylor and Syrrrel S. Wilks. *Radiation Research* 3, 157-65 (1955).

Whole-body x-irradiated guinea pigs, rats, and rabbits were tested with carbon monoxide inhalation of 0.10% CO or by IP injection of 100% CO in a variety of treatments. Untreated guinea pigs given 500 r ($LD_{100(30)}$) died, whereas 50% of the guinea pigs pre-CO treated and 15% of those post-CO treated survived the 30-day test period.

7327
Rochester, N. Y. Univ. Atomic Energy Project. THE EFFECTS OF IONIZING RADIATIONS FROM EXTERNAL SOURCES ON GAMETOGENESIS AND FERTILITY IN MAMMALS. A REVIEW. George W. Casarett. May 1, 1956. 48p. Contract W-7401-eng-49. (UR-441).

Author reviews of some experimental and clinical data, other than purely genetic data, which pertain to effects of irradiation from external sources on the gonads, gametogenesis and fertility of mammals. NSA 10-4482

7328
Naval Radiological Defense Lab., San Francisco. INCIDENCE OF NEOPLASMAS IN MICE PROTECTED AGAINST LETHAL DOSES OF X-RAY BY SPLEEN HOMOGENATE. L. J. Cole, P. C. Nowell, and M. E. Ellis. Mar. 22, 1956. 21p. Project NM 006-015. 04. (USNRDL-TR-82). Also, *J. National Cancer Inst.* 17, 435-6 (1956).

Previous studies have shown that the injection of splenic homogenates after otherwise 100% lethal whole-body x radiation exposure (800 r) affords protection against acute mortality in mice. In the present study, a total of 138 survivors from these protection experiments have been maintained and observed until natural death in order to investigate long-term effects. Malignant tumors of the leukemia-lymphoma type occurred in less than 1% of these mice, whereas in a group of non-irradiated mice of the same age the incidence was 22%. The occurrence of other malignant tumors, of ovarian adenomas, and of nephrosclerosis in the irradiated spleen-treated mice was markedly increased over that of non-irradiated controls. Analysis of the incidence of nephrosclerosis with respect to age at death reveals a striking rise in the occurrence of this disease during the period when the largest numbers of mice are dying. The data imply that nephrosclerosis is a major cause of late death in these mice. The apparent specific action of spleen homogenate post-protection in preventing radiation-induced leukemia appears to be associated with its promotion of more rapid regeneration of the damaged hematopoietic and lymphoid tissue. (auth) NSA 10-4486

7329

A COMPARATIVE STUDY OF DOSE-ACTION CURVES FOR VISIBLE EYE-COLOR MUTATIONS INDUCED BY X-RAYS. THERMAL NEUTRONS, AND FAST NEUTRONS IN MORMONIELLA VITRIPENNIS. Marion Kayhart. *Radiation Research* 4, 65-76(1956).

Female wasps were treated with a series of doses of x rays, thermal neutrons, and fast neutrons. They were unmated, and their haploid sons were examined for bright eye-color mutants. Dose-action curves are presented for production of visible eye-color mutations of each of the three radiations. Shape of the curves is similar, each shows an initial linear portion and then a rise more rapid than that calculated for proportionality. (from author's summary). NSA 10-4493

7330

ENZYMATIC ACTIVITY OF RADIATED AND NORMAL SALIVARY GLAND TISSUES. James A. English. *Am. J. Physiol.* 183, 463-74(1955). NSA 10-4498

7331

A STUDY OF THE PHOSPHORUS COMPOSITION AND P^{32} INCORPORATION IN IRRADIATED LYMPHATIC TISSUE. Helen Harrington and Paul S. Lavik. *J. Cellular Comp. Physiol.* 46, 503-15(1955).

A toxic dose of P^{32} given to adult rats caused a decrease in DNA phosphorus concentration in thymus and spleen and a smaller decrease in the RNA phosphorus concentration in thymus. Incorporation of P^{32} into DNA and RNA was reduced in the thymus and spleen of irradiated animals. The specific effect of radiation on the DNA of lymphatic tissue suggests that the results may be due to an inhibition of DNA synthesis and/or new cell formation. (from author's summary). NSA 10-4502

7332

EFFECT OF TOTAL-BODY X-IRRADIATION ON FAT BALANCE AND LIVER LIPIDS IN THE RHESUS MONKEY. John G. Coniglio, W. J. Darby, J. Ann Efner, Jim Fleming and Granville W. Hudson. *Am. J. Physiol.* 184, 113-18(1956). NSA 10-5450

7333

INITIAL RADIATION SYNDROME IN THE ADULT CHICKEN. S. Phyllis Stearner, Margaret Sanderson, Emily J. Christian, and Austin M. Brues. *Am. J. Physiol.* 184, 134-40(1956).

In the adult rooster the dose rate dependent early mortality that followed x irradiation was similar to that reported for young chicks. Although a small drop in blood pressure occurred within 30-60 minutes after exposure, a critical hypotension was not seen during the initial post irradiation period. The blood pressure fall did not affect renal function directly. Epithelium of adult kidney is not as radiosensitive as that of the young chick. Results of experiments on hemorrhagic shock indicate that the adult can compensate for much greater loss of circulating blood volume without a decrease in blood pressure than can the young chick. NSA 10-5452

7334

STUDIES ON CARCINOMA. IV. THE HYDROGEN ION CONCENTRATION. Heinrich Guthmann and Paul Wirz. *Arch. Gynakol.* 142, 530-46(1930). (In German).

In cancer patients treated with x ray, blood pH shifts to acid side in 6 hr, then shifts to alkaline side 24 hr after exposure. CA 25-5394

7335

INFLUENCE OF ROENTGEN RAYS ON GASTRIC SECRETION. A. Tugenburg. *Vestnik Rentgenol. i Radiol. Leningrad* 3, 247(1925).

Small doses of x rays caused increased gastric secretions, followed by a decrease. Large doses increased secretions.

7336

CINEMATOGRAPH DEMONSTRATION OF LIVING TISSUE CELLS GROWING IN VITRO. R. G. Cantl. *Arch. Exptl. Zellforsch.* 6, 86(1928). (English).

Normal and neoplastic cells were irradiated with intense β and γ rays and cinematographic records were made of effects on mitosis, amoeboid movement and morphology of chick embryo periaosteum, fibroblasts, and Jensen rat sarcoma.

7337

Naval Radiological Defense Lab. San Francisco. SOME RADIATION RESPONSES OF TWO SPECIES OF BATS EXPOSED TO WARM AND COLD TEMPERATURES. G. K. Osborn and D. J. Kimeldorf. *Feb. 9, 1956. 14p.* Project NM 006 015.04. (USNRDL-TR-76).

Bats kept at warm temperature and eating an artificial diet, died after total-body x irradiation within the lethal range for mammals. A long survival time was observed. Terminal loss of body weight, anorexia and gastrointestinal hemorrhage were similar to those observed in other mammals. The influence of a temporary period of cold exposure prolonged the latent period of various responses without abolishing their appearance. NSA 10-7399

7338

THE EFFECT OF ROENTGEN RAYS ON THE PROTOPLASM OF CELLS. Gosta Janssen. *Acta Radiol.* 8, 427-461(1927). (In German).

Cultures of human bone marrow cells were studied by darkfield microscopy after irradiation *in vitro*. Effects on neutrophils: disturbed amoeboid movement and pseudopod formation, abnormal Brownian movement of granules; cell death by liquefaction; death of myelocytes by coagulation. Myelocytes were more radiosensitive than neutrophils. In both cell types, cytoplasm changes were observed before, or in absence of nuclear changes.

7339

CARBOHYDRATE METABOLISM AFTER ROENTGEN AND RADIUM THERAPY OF UTERINE CARCINOMA. I. Lucas. *Arch. Gynakol.* 143, 389-411(1930). (In German).

Roentgen and radium rays were equally effective in treatment of uterine carcinoma. Observed changes in CO_2 combining power in patients following irradiation can be accounted for by hypocapnia. CA 25-2477

7340

THE QUESTION OF THE EFFECT OF RADIUM AND ROENTGEN RAYS ON FAT METABOLISM IN CANCER PATIENTS. K. Klaus. *Biochem. Z.* 220, 204-9(1930). (In German).

Ten patients were studied before and after therapeutic irradiation. Serum cholesterol and fatty acids increased after exposure. CA 24-3556

7341

MEDICAL EFFECTS OF THE ATOMIC BOMB IN JAPAN. NATIONAL NUCLEAR ENERGY SERIES, DIVISION VIII, VOLUME 8. Ashley W. Oughterson and Shields Warren, eds. New York-Toronto-London, McGraw-Hill Book Co., 1956.

Data are summarized from a survey of damage and pathological effects observed among the populations exposed to the atomic bombs at Hiroshima and Nagasaki. Although the bomb used at Hiroshima was composed of U^{235} and the one at Nagasaki had Pu^{239} , damage produced was similar. Each explosion resulted in mechanical, thermal, and ionizing radiation injuries, in various combinations. NSA 10-9964

7342

EFFECT OF ROENTGEN RAYS ON THE ISOELECTRIC POINT AND AMINO ACID LEVEL IN RAT SARCOMA. P. Szendro, E. Schleicher and L. Kluge. *Biochem. Z.* 276, 331(1935). (In German).

Tumor growth was restricted by x rays and then tumor extracts prepared. Isoelectric point of x rayed and non-irradiated tumors were the same, as were N content, tyrosine, tryptophan, cystine, total amino acids, and noncoagulable protein concentrations.

7343

Naval Radiological Defense Lab., San Francisco.
ALTERATION IN THERMAL FRAGILITY OF RAT ERYTHROCYTES FOLLOWING TOTAL BODY X-IRRADIATION. L. Goldschmidt, R. L. Rosenthal, V. P. Bond and M. C. Fishler. Feb. 14, 1950. 12p. (AD-199(B); NRDL-223).

7344

FAR REACHING EFFECTS OF GAMMA RAYS AND SHORT X-RAYS UPON HUMAN HEART. J. E. Gendreau. Ann. Surg. 93, 476-480(1931).

In man, the heart rate decreased, and auricular flutter and fibrillation and premature ventricular contractions were noted after radiation therapy. Authors show pictures of electrocardiograms representing patients receiving radiation therapy and emphasize that ECG changes are relatively common in such patients.

7345

POST-IRRADIATION CHANGES IN LUNGS AND THORAX, CLINICAL ROENTGENOLOGICAL AND PATHOLOGICAL STUDY; WITH EMPHASIS ON LATE AND TERMINAL STAGES. J. R. Fried and H. Goldberg. Am. J. Roentgenol. 43, 877-895(1940).

Clinical, roentgenographic and pathological changes in all stages of lung damage following x ray therapy are described as observed in 18 patients. Changes occurred in skin, bone and lungs. Right heart failure was often a complication in patients with extensive pulmonary fibrosis associated with contraction of the capillary bed of the lungs and increased vascular resistance.

7346

EFFECT OF ROENTGENOTHERAPY ON HUMAN HEART. E. S. Emery and B. Gordon. Am. J. Med. Sci. 170, 884-887(1925).

Therapeutic x irradiation over anterior thorax (man) was followed by premature auricular and ventricular beats, dyspnea, and chest pain.

7347

PHARMACOLOGIC RESPONSES OF THE ISOLATED RABBIT HEART DURING X-IRRADIATION L. E. Ellinwood, J. E. Wilson and J. M. Coon. Fed. Proc., Baltimore 11, 342 (1952).

After x irradiation with 34,000 r or more, the isolated rabbit heart responded atypically to (1) epinephrine (which produced arrest), (2) acetylcholine following atropinization (initial acceleration) followed by temporary arrest in diastole, and (3) nicotine (triphasic response consisting of arrest, stimulation and arrest again).

7348

ON THE ROLE OF CELLULAR METABOLISM AS A FACTOR IN THE RADIOSENSITIVITY OF SEEDS PRIOR TO THE APPEARANCE OF MORPHOLOGIC PHENOMENA. J. Lambert. Compt. rend. soc. biol. 112, 1570-3(1933). (In French).

Peas were irradiated under conditions in which their metabolic rate varied. The author concludes that the metabolic rate is an important factor in determining radiosensitivity.

7349

ACTION OF RADIUM RAYS ON BLOOD VESSELS. N. A. Dobrovolskaia-Zavadskaja. Lyon chir. 21, 397-427(1924).

7350

ACTION OF ROENTGEN RAYS AND RADIUM ON THE HEART AND LUNGS; EXPERIMENTAL DATA AND CLINICAL RADIOTHERAPY. A. U. Desjardins. Am. J. Roentgenol.

26, 145(1931); 27, 149-76, 303-35, 477-95(1932); 28, 127-43, 271-92, 421-36, 567-78, 699-720(1932).

Review article.

7351

CARDIOVASCULAR DISEASE FOLLOWING X RAY TREATMENT OF NEOPLASMS. H. Coutard and J. Lavedan. Compt. Rend. Soc. Biol. 86, 666-668(1922). (In French).

7352

EFFECTS OF ACUTE WHOLE-BODY X-IRRADIATION ON SALT AND WATER METABOLISM AND THEIR CLINICAL SIGNIFICANCE. J. Z. Bowers, V. Davenport, N. Christensen and C. J. Goodner. Radiology 61, 97-102 (1953).

Na, K, Cl of serum and of various tissues as well as food intake and body weight were measured at various times after exposure in rats exposed to an LD₅₀ dose of x rays and in a group of pair-fed controls. Electrolyte imbalance was marked in radiosensitive tissues after irradiation.

7353

HISTOLOGICAL CHANGES IN SINO-AURICULAR NODE AND ADJACENT TISSUES OF DOG FOLLOWING RADIUM EMANATION. M. C. Borman. Am. J. Roentgenol. 18, 111-119(1927).

Occlusion of vasa vasorum developed after implantation of radon seed in sino auricular node (0.6-5.0 mc seed applied for 3 hr-8 mo). Small blood vessels in exposed area became engorged, then the vessel wall ruptured.

7354

DOMINANT LETHALITY INDUCED BY X RAYS IN HAPLOID AND DIPLOID SACCHAROMYCES CEREVISIAE. M. E. Owen and R. K. Mortimer (Univ. of California, Berkeley). Nature 177, 625-6(1956).

The present experiments do not permit a definite characterization of the dominant lethal damage. They do, however, show that the frequency of this damage increases with the ploidy of the irradiated cell. NSA 10-7417

7355

OBSERVATIONS ON ANIMALS EXPOSED TO WHOLE-BODY X-RADIATION IN DIVIDED DOSES OVER LONG PERIODS: INTRODUCTION AND TECHNIQUES. Andrew H. Dowdy, Robert D. Boche, and Francis W. Bishop. p.207-221 in: Biological Effects of External Radiation (NNS VI-2). Henry A. Blair, ed. McGraw-Hill Book Co., Inc., New York (1954).

Author describes experiments undertaken to determine whether the accepted tolerance levels for exposure of persons to X and gamma radiation were safe. Machines of 250 and 1000 Kvp were used. Rats, dogs, rabbits and monkeys were exposed 6 days/week for periods up to 2 1/2 years to doses ranging from 0.1 r/day to 10 r/day.

7356

THE PATHOGENESIS OF IRRADIATION HEMORRHAGE. J. G. Allen. p.213-246 of 5TH CONFERENCE ON BLOOD CLOTTING AND ALLIED PROBLEMS HELD JANUARY 21 AND 22, 1952 IN NEW YORK CITY. Sponsored by the Josiah Macy, Jr. Foundation. J. E. Flynn, New York, Corlies, Macy and Co., Inc. 1952. 368p. \$4.95.

7357

A STUDY OF VASCULAR REACTION TO RADIATION: RABBIT EAR CHAMBER TECHNIQUE. R. D. Moseley, Jr., C. C. Lushbaugh and D. B. Hale. Am. J. Pathol. 28, 568(1952).

Hyperemia of ear capillaries was observed in rabbits after whole-body exposure, except for shielding of one ear, to 1500 r of 250 kv x rays. Leukocytes adhered to endothelium and there was leukocytic interstitial exudate in nonshielded ear. Sludging of RBC was the only change in shielded ear.

7358

FUNCTIONAL CHANGES OF BLOOD VESSELS AFTER

ROENTGEN IRRADIATION; PHARMACO-DYNAMIC RESEARCHES ON FUNCTIONAL CONDITION OF VESSELS OF ISOLATED EARS, ETC. OF RABBIT AFTER PREVIOUS IRRADIATION IN VIVO. N. W. Lazarew and A. Lazarewa. *Strahlentherapie* 23, 41(1926).

7359

HYPERTENSION AND NEPHROSCLEROSIS IN WISTAR RATS FOLLOWING TOTAL BODY IRRADIATION UNDER ANOXIA CONDITIONS. B. G. Lamson, L. R. Bennett and M. Billings. *Fed. Proc.*, Baltimore 14, 425(1955).

Hypertension developed 1 to 1-1/2 years after a single whole-body exposure to 800 r. Pathological findings in the animals are described.

7360

HISTOLOGY OF ROENTGEN-RAY ERYTHEMA. H. T. Schreus. *Deut. med. Wochschr.* 51, 358(1925).

7361

THE EFFECT OF X-RADIATION ON CIRCULATION IN THE WING OF THE BAT. D. E. Smith, G. Svihla and H. M. Patt. *Physiol. Zool.* 24, 249-57(1951).

Whole-body exposure to less than 10,000 r of 250 kv x rays produced no vascular changes in the wing. Doses of 10,000-60,000 r caused slowing of blood flow. No changes were observed following localized exposure (wing) to doses below 50,000 r. Blood flow was slowed following localized exposure to 50,000-5,000,000 r.

7362

RADIATION-INDUCED CHROMOSOME BREAKAGE, DEOXYRIBOSE-NUCLEIC ACID SYNTHESIS AND THE MITOTIC CYCLE IN ROOT-MERISTEM CELLS OF *VICIA FABA*. J. M. Thoday. *New Phytologist* 53, 511-516(1954).

The proportion of isolocus-breaks showing no evidence of sister-union is high before the synthesis period and low after it, indicating that DNA synthesis and chromosome reproduction occur at the same period of interphase. (from abstract). BA 29-10240

7363

HISTOLOGICAL FINDINGS IN HEARTS WHICH HAVE BEEN EXPOSED TO RADIATION IN COURSE OF TREATMENT OF ADJACENT ORGANS. A. A. Thibaudeau and W. L. Mattick. *J. Cancer Research* 13, 251-259(1929).

Among findings in autopsy material after pre-cordial therapeutic x irradiation were: interstitial fibrosis, hyalin and fatty degeneration of muscle fibres, and necrosis of muscle.

7364

EFFECT OF ROENTGEN RAYS ON HEART; TOLERATION DOSE FOR MYOCARDIUM OF RATS. A. S. Warthin and E. A. Pohle. *Am. J. Roentgenol.* 25, 635-43(1931).

"Toleration dose" for myocardium was 500 r. One week after 700 r of 100 kvp x rays, the following changes were observed: marked dilation of right ventricle, congestion of myocardial capillaries, pyknosis of capillary endothelial cells.

7365

THE EFFECT OF RADIATION UPON THE ACIDITY OF BLOOD. H. Q. Woodard and H. R. Downes. *Am. J. Roentgenol.* 25, 271-275(1931).

Rabbits were given whole body exposure to 200 kv x rays (30 ma, 0.5 mm Cu, 45 cm TSD) for 20-40 min, a lethal dose. An immediate fall in blood pressure occurred.

7366

BIOLOGICAL EFFECTS OF EXTERNAL X AND GAMMA RADIATION. R. E. Zirkle, ed. New York: McGraw-Hill Book Co., Inc. (1954). NNES Div. IV. Vol. 22B.

Chapters are abstracted individually.

7367

EFFECT OF TOTAL BODY X-IRRADIATION ON SERUM ELECTROLYTES AND ELECTROCARDIOGRAMS OF THE

HAMSTER. G. P. Fulton and F. N. Sudak. *Fed. Proc.*, Baltimore 13, 50(1954).

7368

TISSUE CHANGES FOLLOWING ROENTGEN IRRADIATION. G. Domagk. *Ergeb. inn. Med. u. Kinderheilk.* 33, 1-62 (1928). (In German).

Histopathological changes in various tissues of man and animals after x irradiation are described in this review article. Author also describes damage following irradiation *in vitro* of cells in culture.

7369

BLOOD PRESSURE CHANGES IN CATS INDUCED BY X-IRRADIATION OF THE ABDOMINAL AREA. P. M. Brooks and B. B. Konecni. *Fed. Proc.* 13, 18(1954).

Anesthetized cats were given 5000 r of 260 kvp (350 r/min) x rays over the abdomen. Carotid blood pressure increased within 10 min following exposure, the increase persisting for several hours. Blood pressure changes are considered to be mediated by humoral factor(s) since non-irradiated cats showed similar changes when their circulatory system was connected with that of irradiated cats. The nonirradiated cats had blood pressure increases that equalled or exceeded those in the irradiated partner.

7370

Hanford Atomic Products Operation, Richland, Wash. A COMPARATIVE STUDY OF HANFORD AND UTAH RANGE SHEEP. L. K. Bustad, S. Marks, N. L. Dockum, D. R. Kalkwarf, and H. A. Konnberg. Nov. 30, 1953. 44p. (HW-30119).

Observations on sheep representing flocks in Utah adjacent to the Nevada Proving Ground were compared with findings made on experimental sheep exposed to various amounts of radioiodine. The Utah sheep showed no evidence of the radiation damage observed in experimentally treated sheep. Estimations of amounts of radioiodine on vegetation required to cause serious thyroid damage following a contamination event are included NSA 10-2577

7371

Kansas. Univ., Lawrence. EFFECTS OF X IRRADIATION ON THE PLASMAS OF CHICKENS AS REVEALED BY SEROLOGICAL ANALYSIS. PART I. WHOLE PLASMA COMPARISONS; PART II. ALTERATION OF PROTEINS OF THE LIVER; (A PRELIMINARY REPORT), PART III. AUTOANTIBODY FORMATION. (A PRELIMINARY REPORT). Charles A. Leone. 1955. 41p. (AECU-3133).

Antisera produced in rabbits against normal chicken plasma could distinguish plasmas from birds exposed to 600 and 900 r (x rays). Principal changes were in β globulins. Cytoplasmic protein constituents of liver cells were examined serologically in hope of detecting modified metabolic pathways. Plasmas from normal chickens did not differ in their effects on tissue cultures of embryonic chick heart and liver. NSA 10-2575

7372

THE OXYGEN CONSUMPTION FOLLOWING X IRRADIATION OF *ALLESCHERIA BOYDII* 1699 IN A BIOTIN-RICH MEDIUM. A. Morczek and D. Mucke. *Strahlentherapie* 98, 277-83(1955).

The authors investigated the O₂ consumption after roentgen irradiations of *Allescheria boydii* 1699, an ascomycete requiring biotin. The experiments were made by means of Warburg's apparatus in a suspension medium with and without biotin. In both series, a decrease of the O₂ quotient was observed following doses of 100 to 500 kr. NSA 10-1991

7373

Hanford Atomic Products Operation, Richland, Wash. RADIOLOGICAL SCIENCES DEPARTMENT RESEARCH AND DEVELOPMENT ACTIVITIES QUARTERLY PROGRESS REPORT FOR OCTOBER-DECEMBER 1954. H. M. Parker.

Jan. 10, 1955. Decl. with deletions Dec. 7, 1955. 27p. (AECD-3617).

Data are presented from a radiobiological ecological survey of the Columbia River and the Hanford area. Report includes studies on: toxicology of I^{131} in sheep; effects of whole-body x irradiation in sheep, the effects of radioactive particles on the skin of swine. NSA 10-2242

7374

Kansas. Univ., Lawrence.

GENETIC RESISTANCE TO X-IRRADIATION IN MICE.

Harold D. Swanson, C. A. Leone, and J. A. Weir. 1955. 15p. (AECU-3130).

Authors compared effects of x-irradiation on mice of the high leucocyte count strain, LCH (15000 cells/mm³), and low leucocyte count strains, LCL (5000 cell/mm³). Among 30-day old mice, the LCH strain had a lower mortality after irradiation; in 5-month old mice there was no difference between strains. Leucocyte counts of both strains drop to the same level (400 cells/mm³) several days after irradiation. NSA 10-2574

7375

Kansas. Univ., Lawrence.

SOME EFFECTS OF IRRADIATION ON THE IMMUNOCHEMICAL AND PHYSICOCHEMICAL IDENTITY OF SERUM PROTEINS OF RATS. Frank Dolyak. 1955. 60p. (AECU-3134).

It is postulated that irradiation may alter body proteins so they react as foreign bodies in their own physiological environment. *In vitro* x irradiation altered serological activity of hemocyanins from sera of American lobster, and produced quantitative changes in serum albumin and globulin of other animals. These components in sera of normal animals produced effects similar to serological reactions. β particles from internally deposited P^{32} produced chronic changes in some of the proteins of rat serum NSA 10-2576

7376

THE SPLEEN-THYMUS WEIGHT RESPONSE TO TOTAL-BODY X-IRRADIATION IN THE ADRENALECTOMIZED RAT AND MOUSE. Mortimer L. Mendelsohn. Radiation Research 3, 444-51(1955).

The fractional weight changes of spleen and thymus 5 days after total-body x radiation of the rat with doses from 150 to 600 r (and of the mouse with 450 r) have been found to be unaffected by prior bilateral adrenalectomy. Results are consistent with concept that lymphocytolysis is secondary to radiation, either through a direct effect, or through indirect effects independent of adrenal function. Such effects must be of sufficient intensity to obscure the adrenal effects on lymphoid tissues usually associated with stress. (from author's summary). NSA 10-1087

7377

FURTHER STUDIES OF EFFECTS OF X-RADIATION ON PARTIALLY SHIELDED LENS OF RABBIT. P. J. Leinfelder and E. F. Riley. Arch. Ophthalmol. 55, 84-6(1956).

Doses of x-radiation as high as 12,000 r produced only partial cataract in the exposed quadrant of the rabbit lens when two or three of the lens quadrants were shielded from the radiation. NSA 10-2580

7378

RADIOSENSITIVITY OF BACILLUS SUBTILIS UNDER DIFFERENT ENVIRONMENTAL CONDITIONS. Bernard L. Proctor, Samuel A. Goldblith, E. Marilyn Oberle, and William C. Miller, Jr. Radiation Research 3, 295-303 (1955). Nov. NSA 10-1194

7379

THE PROTECTIVE EFFECT OF CYSTEAMINE AGAINST ROENTGEN RAY INJURY ON EARS OF RABBITS IRRADIATED UNDER CONDITIONS OF COMPLETE ANOXIA. Francis Lothe and Finn Devik. Acta Radiol 44, 306-12(1955).

In experiments with roentgen irradiation of rabbits' ears temporarily isolated from the rest of the animal, it was

shown that conditions of complete anoxia and the presence of cysteamine during exposure had a protective effect against damage. Cysteamine seemed to give some slight additional protection when administered to ears irradiated in the anoxic state, indicating that cysteamine and anoxia to some degree act along different paths in the radiobiologic process. NSA 10-1196

7380

THE INFLUENCE OF PLOIDY AND DIVISION STAGE ON THE ANOXIC PROTECTION OF SACCHAROMYCES CEREVISIAE AGAINST X-RAY INACTIVATION. C. A. Beam. Proc. Natl. Acad. Sci. U. S. A. 41, 857-61(1955).

Lethal effects of x rays administered in presence and absence of oxygen were compared in dividing and interdivisional cells of haploid, diploid, and tetraploid strains of *S. cerevisiae*. An approximately two-fold dose reduction was effected by anoxia in all instances. These findings favor the involvement of oxygen in early radiochemical events rather than in terminal biological changes (from author's summary). NSA 10-1193

7381

REDUCTION IN X-RAY SENSITIVITY OF SEEDS BY HYDRATION. Richard S. Caldecott. Nature 176, 306(1955).

Conclusions: (1) x ray sensitivity of dry seeds can be decreased by periods of soaking at both 0°C. and 22°C, (2) the duration of the reduced sensitivity is related to the temperature of the steeping water and is probably associated with increased physiological activity. Results suggest that radio-decomposition of water may play a less significant part in modifying radiosensitivity than has previously been assigned to it. NSA 10-1192

7382

ON DEPRESSOR REFLEX FROM VAGUS NERVE DURING RADIATION SICKNESS. V. F. Cherkasov. (Central Research Inst. of Roentgen Radiology). Med. Radiol. No. 2, 57-64 (1956). (In Russian). NSA 10-1104

7383

CONCERNING THE DETECTION OF FUNCTIONAL DISTURBANCE IN CIRCULATION IN AN ISOLATED RABBIT EAR FOLLOWING X IRRADIATION. Paul Erich Gehrels, Hans-Joachim Heite, and Peter Otzen. Strahlentherapie 100, 129-36(1956). (In German).

To supplement former investigations the authors have developed refined methods to examine the reactivity towards arterenol of the x-rayed rabbit-ear through which, in isolation, tyrode solution was sent at different times after the irradiation. Already before the appearance of an erythema a diminution of the excitability of the constrictors can be proved, the extent of which grows considerably with the forthcoming erythema and which is reversible *in vivo* after 6 to 8 days. NSA 10-11000

7384

Pittsburgh. Univ. Graduate School of Public Health PROPOSAL FOR FURTHER STUDIES ON LUNG HAZARDS FROM INHALATION OF INSOLUBLE RADIOACTIVE PARTICULATE MATTER. Summary Report for year of July 15, 1953 to July 14, 1954. Herman Cember. 1955. 9p. (AECU-3135). NSA 10-2006

7385

EXPERIMENTAL RESEARCH ON THE EFFECT ON ACUTE RADIATION SYNDROME BY GANGLION BLOCKING DRUGS AND OTHER SIMILAR SUBSTANCES. Emil Heinz Graul. Strahlentherapie 100, 142-52(1956). (In German).

The present report deals with explorations of so-called ganglion blocking drugs, such as pendiomide, buscopan, penthonum, tetraethyl ammonium chloride, and megraphen as to the possibility of their application for the prophylaxis and therapy of the acute radiosyndrome. Their protective efficiency against rays is not very high; their positive or negative effect depends largely on the

interval between their application and the attack of rays. Basing his discussion on the present knowledge in radiobiology and of the patho-physiology of the radiosyndrome, the author tries to explain this phenomenon. (auth)
NSA 10-11002

7386

CREATINURIA IN PREGNANT AND NON-PREGNANT RATS AFTER IRRADIATION. Z. N. Zhakhova and A. D. Braun. *Med. Radiol.* No. 3, 80-5(1956). (In Russian).
NSA 10-11006

7387

HEMATOLOGICAL RESEARCH ON THE EFFECT OF PROTECTIVE SUBSTANCE. PART I. THE EFFECT OF CYSTEINE ON THE BONE MARROW AFTER TOTAL BODY IRRADIATION. Helmut Hartweg. *Strahlentherapie* 100, 259-68(1956). (In German)

The author reports on hematologic and histologic investigations into the course of the radio-reaction in the bone marrow of albino rats, of which a certain number had been treated with cysteine. A diminution of the primary radiogenic damage by means of cysteine could not be observed. The animals, however, which had been previously treated with cysteine showed a more rapid and more intense recovery from the attack of rays. The cause of this effect seems to be a protection of higher regulation centres. NSA 10-11003

7388

STUDIES OF BLOOD PICTURE CHANGES DURING RADIATION SICKNESS. N. A. Kraevskii. *Med. Radiol.* No. 3, 6-11(1956). (In Russian). NSA 10-11005

7389

FAILURE OF MERCAPTOETHYLAMINE AND CYSTEINE TO PROTECT THE SILKWORM AGAINST THE MUTAGENIC AND LETHAL EFFECTS OF RADIATION. Yoshio Nakao, Yataro Tazuma, and Takashi Sugimura. *Radiation Research* 3, 400-6(1955).

Wild-type female moths, which received injection of MEA, cysteine or physiological salt solution, were irradiated with x rays and mated to double recessive pere/pere males. In other experiments eggs from mating wild females and w_2/w_2 males were immersed in MEA solution before radiation. Mutation rates were estimated as uncoverings of marked loci determined by examining egg color. There was no protective action of MEA and cysteine against the mutagenic and lethal effects of radiation in these experiments. (from authors' summary). NSA 10-1999

7390

THE FAILURE OF RADIATION PROTECTION WITH CYSTEINE, CYSTEAMINE, AND OTHER SULFHYDRYL COMPOUNDS. Hanns Langendorf, Ruprecht Koch, and Ulrich Hagen. *Strahlentherapie* 100, 137-41(1956). (In German).

1(-) 2-thiolhistidine, 1,3 dithiopropanol, thioacetamide, 4,6-dimethyl-2-mercaptopyrimidine, ortho-aminothiophenol, and dithiopentaerythrite have been examined for their protective effect against x rays in mice exposed to a total roentgen irradiation of 500 r. None of the substances produced a protective effect. In this connection, the authors point to the specific radioprotective effect of the cysteine-cysteamine-bodies as sulfhydryl substances. The increased radiosensitivity after thioacetamide results from its hepatotoxic effect. NSA 10-11001

7391

EFFECTS OF ACUTE X-IRRADIATION ON THE EVOKED CEREBELLAR RESPONSE. John C. Lee, Skuli Helgason and Ray S. Snider. *Radiation Research* 3, 267-71(1955).

The evoked neurological response of the cerebellum was recorded in cats while the animals were being irradiated with 220-kv x rays at rates of 50 to 120 r/min. Amplitude of the evoked cerebellar response began to decrease at an average

value of 6000 r but varied within a range of 1500 r on either side of this value. Animals to which more than 10,000 r was administered showed severe flattening of the response. Both the primary response and the after-discharge were affected by irradiation. Responses, reduced during exposure to radiation, showed a further reduction in the early post-irradiation period. NSA 10-1179

7392

STUDIES ON SUSCEPTIBILITY TO INFECTION FOLLOWING IONIZING RADIATION. III. SUSCEPTIBILITY OF THE INTESTINAL TRACT TO ORAL INOCULATION WITH *PSEUDOMONAS AERUGINOSA*. Carolyn W. Hammond, David Ruml, Dorothy B. Cooper, and C. Phillip Miller. *J. Exptl. Med.* 102, 403-11(1955). NSA 10-1185

7393

UPTAKE OF RADIOSULPHATE IN DIFFERENT ORGANS AFTER TOTAL BODY IRRADIATION. Erik Odeblad and Donato Ziliotto. *Acta Radiol.* 44, 313-16(1955).

Total-body roentgen irradiation of rats and mice with doses in the lethal dose range did not appreciably change the uptake of radiosulphate within two days after irradiation, by the intestine, trachea, skin, ovary, and kidney, according to autoradiographic studies. NSA 10-1183

7394

ACTION OF A SINGLE X-RAY DOSE, ADMINISTERED IN TOTAL OR LOCAL IRRADIATION, ON THE NUCLEIC ACIDS OF THE BONE MARROW IN THE WHITE RAT. J. C. Rodesch, C. Jaudel, B. Chirpaz, and P. Mandel. *Experientia* 11, 437-8(1955). (In French with English Summary).

Wistar rats were exposed to 700 dose of x rays delivered to entire body or to extremities of the left side only. DNA and RNA in bone marrow of long bones of hind legs were measured at various times after exposure. Total body exposure produced a more severe and prolonged depression of DNA and RNA than did partial body exposure. The authors feel that general systemic effects of whole body irradiation contribute to effects on marrow. NSA 10-1184

7395

THE EFFECTS OF γ -IRRADIATION AND OF AMINOPTERIN ON THE METABOLISM OF FORMATE- C^{14} , GLYCINE-2- C^{14} , AND ADENINE-8- C^{14} BY CHICK EMBRYOS. J. V. Passonneau and J. R. Totter. *Radiation Research* 3, 304-14(1955).

Chick embryos were suspended in saline containing either formate- C^{14} , glycine-2- C^{14} or adenine-8- C^{14} . Uptake of each substrate into acid-soluble RNA, DNA, and protein fractions was studied as a function of time and concentration of substrate. Radiation of embryos with γ rays prior to exposure to substrates reduced uptake of formate- C^{14} and glycine-2- C^{14} into DNA only with doses higher than 1000 r but did not diminish fixation of adenine-8- C^{14} into the nucleic acids. Low doses of γ radiation do not have a direct and immediate effect on DNA synthesis. (from authors' summary). NSA 10-1182

7396

STUDIES ON SUSCEPTIBILITY TO INFECTION FOLLOWING IONIZING RADIATION. IV. THE PATHOGENESIS OF THE ENDOGENOUS BACTEREMIAS IN MICE. Lee E. Gordon, David Ruml, Helen Jo Hahne, and C. Phillip Miller. *J. Exptl. Med.* 102, 413-24(1955). NSA 10-1186

7397

RADIOSENSITIVITY OF ANOXIC SKIN IN RELATION TO TEMPERATURE. J. P. O'Brien, E. J. Frank and J. L. Garner. *Science* 122, 1140(1955).

Results are summarized from studies on the effect of temperature during irradiation on the radiosensitivity of skin when variations in oxygen tension are simultaneously precluded. It was concluded that the temperature prevailing in anoxic mammalian tissue at the time of irradiation is a significant factor in modifying dose effects. NSA 10-1190

7398

X-IRRADIATION IN HAMSTERS, AND EFFECTS OF STREPTOMYCIN AND MARROW-SPLEEN HOMOGENATE TREATMENT. Willie W. Smith, Robert Q. Marston, Leon Gonschery, Ilo M. Alderman, and H. Jeanette Ruth. *Am. J. Physiol.* 183, 98-110(1955). NSA 10-1191

7399

HAS PERISTONIN A PROTECTIVE EFFECT AGAINST RADIATION? J. Becker and H. Kirchberg. *Strahlentherapie* 98, 343-7(1955). (In German) NSA 10-1996

7400

INFLUENCE OF YOLK ON MITOTIC RATE IN UNTREATED AND X-RAYED GRASSHOPPER NEUROBLASTS IN VITRO. Mary Esther Gaulden and Katherine L. Kokomoor. *Proc. Soc. Exptl. Biol. Med.* 90, 309-14(1955).

The frequency of mid-mitotic neuroblasts in grasshopper embryos in hanging drop cultures increases as the quantity of yolk in the culture is increased up to a quantity equivalent to 1/4 in the egg. The pronounced positive effect of yolk on recovery of neuroblasts from radiation damage demonstrates that, in this cell, some extracellular metabolite or metabolites greatly enhance repair of mitotic damage. (from authors' summary). NSA 10-1988

7401

COMPARISON OF BIOLOGICAL EFFECTS OF WHOLE-BODY IRRADIATION WITH 22.5-MEV X-RAYS, 18-MEV ELECTRONS, AND 400-KEV X-RAYS IN THE RAT. John B. Fuller, Irene Chen, John S. Laughlin, and Roger A. Harvey. *Radiation Research* 3, 423-34(1955).

No qualitative differences in responsiveness to high- and low-energy radiations were found, although consistent quantitative differences in responsiveness of the same order of magnitude as noted by others were found. In these rats, an immediate mechanism, causing death from 3 to 10 days post-radiation, was gastro-intestinal injury. A second delayed mechanism, causing death from 12 to 22 days post-radiation, was the result of injury to the hematopoietic system. (from authors' summary). NSA 10-1985

7402

METHEMOGLOBINEMIA INDUCED BY X-IRRADIATION. Robert M. Dowben and Jack K. Walker. *Proc. Soc. Exptl. Biol. Med.* 90, 398-400(1955). NSA 10-1989

7403

THE EFFECT OF ROENTGEN RAYS ON CELL METABOLISM. K. Erik and K. Posener. *Verhandl. deut. Ges. inn. Med.*, 411-15(1926). (In German).

Doses of 10,000-30,000 r on rat carcinoma, chicken sarcoma, chicken embryo and mature testes *in vitro* caused decreased anaerobic glycolysis by (about 40%). There were also effects on the retina of eye. Similar effects *in vitro* occurred only if irradiation was preceded by large doses of glucose. CA 21-2325

7404

PROTECTION OF MOUSE FETUS AGAINST X-IRRADIATION DEATH. Roberts Rugh and Helen Clugston. *Science* 123, 28-9(1956).

Cysteamine administered to pregnant mice 20 min before exposure provided some protection against x irradiation not only for the adult mouse, but also for the fetal mouse. NSA 10-1998

7405

A STUDY OF THE PROTECTIVE EFFECT OF DESOXYCORTICOSTERONE ACETATE AND DESOXYCORTICOSTERONE ENANTHATE ON SUPRARENAL CORTEX OF TOTAL X-IRRADIATED ALBINO RATS. Giselbert Suchowsky. *Strahlentherapie* 99, 577-82(1956). (In German).

Desoxycorticosterone acetate administered immediately and one hour before total body irradiation produces a protective effect on the dehydrogenase activity in the cortex of the suprarenal gland in rats. Desoxycorticosterone

enanthate administered 5 days before the total body irradiation considerably supports the dehydrogenase activity and thus the secretory function of the cortex of the suprarenal gland. NSA 10-10999

7406

PROTECTION BY SPLEEN HOMOGENATES AGAINST β -RAY-INDUCED SKIN INJURY IN RATS. Georges Ungar, Evelyn Damgaard, and Florence Williams. *J. Appl. Physiol.* 8, 287-8(1955-56).

Treatment with spleen homogenates was found to protect rats against β -ray-induced skin injury. In the spleen-treated group damage occurred later, was less marked and the over-all incidence was significantly lower than in the controls. NSA 10-2594

7407

THE EFFECT OF X RAYS ON COMPLEMENT OF X-RAYED GUINEA PIGS. E. Anderson, E. Emmerich. *J. Immunitats* 47, 565(1926). (In German)

X-irradiation of guinea pigs increased the activity of complement in the Wasserman reaction.

7408

THE IMPORTANCE OF CHOLESTEROL IN THE OCCURRENCE AND PREVENTION OF ROENTGEN-SICKNESS. F. Burghelm. *Deut. Med. Wochschr.* 53, 1858-9(1927). (In German).

In the clinical studies reported, x-ray sickness was associated with decreased cholesterol in blood. Cholesterol was administered therapeutically for radiation sickness.

7409

FURTHER RESULTS ON MUTATION RESEARCH. Hans Breider. *Strahlentherapie* 98, 616-27(1955). (In German).

An accumulated report on the most recent problems of research in mutation is presented. The following problems are considered: gene-environment-characteristic; judgement of a mutation from the viewpoint of the practitioner in genetics; judgement of a mutation from the viewpoint of the theorist in genetics; radiogenetics and human genetics, radiation dose and natural rate of mutation, atomic rays somatic mutations, and inactivated as well as reactivated genes. NSA 10-2590

7410

OBSERVATIONS ON RADIATION CANCERS. A. Beutel and F. Skopal. *Strahlentherapie* 98, 570-5(1955). (In German).

It has been shown that the maximum interval between the first irradiation and the appearance of cancer stretches over 35 yr. In special cases a roentgen-treatment of the radiogenic carcinoma is justified. In most cases the so-called radiogenic cancer is a defect caused by wrong combination of radiation and dose factors. Each case, therefore, must be strictly analysed. The development of cancer on sound skin is extremely infrequent. According to observations reported, first symptoms of a carcinoma could begin 6 yr after a post-irradiation following a Wertheim operation. In most cases of such slow onset, the so-called radiogenic carcinoma may involve tissue outside the irradiation field; it may spare the sound skin. NSA 10-2589

7411

RADIATION SENSITIVITY OF OVARIAN TISSUE AT -79°C. A. S. Parkes. *Nature* 176, 1216-17(1955).

Experimental results indicate that low temperatures reduce radiation damage in rat ovarian tissue. Criterion of damage was altered ability of gonadal tissue to form an endocrinologically active graft. NSA 10-2584

7412

PRONUCLEAR FUSION AS AFFECTED BY X-RAYS AND BY POSTIRRADIATION ANAEROBIOSIS. C. S. Bachofer. *Science* 123, 139-40(1956).

Observations are presented on the effect of x rays on the rate of pronuclear fusion in the eggs of *Ascaris*.

Modifications in effects produced by postirradiation anaerobiosis are described. NSA 10-2587

7413

THE EFFECT OF OXYGEN ON THE RADIOSENSITIVITY OF MAMMALIAN CELLS. Alan D. Conger. *Radiology* 66, 63-9(1956). Jan.

The effect of oxygen concentration on the radiosensitivity of mammalian cells was investigated, using Ehrlich mouse ascites tumor as the test cells. Data are presented on: the cytological abnormality of the cells growing *in vivo* after x irradiation in nitrogen, air and oxygen, the cytological abnormality, at time of minimum normalcy, as a function of *in vitro* x-ray dose in nitrogen, air, and oxygen, and the effect of oxygen concentration on the radiosensitivity of ascites tumor cells irradiated *in vitro* with x rays and with fast neutrons. Results show a close correlation with results from previous studies on the radiosensitivity of Vicia root tips and Tradescantia pollen grains as a function of oxygen concentration. NSA 10-2585

7414

CHANGES IN THE REACTION OF TISSUE PRODUCED BY IRRADIATION WITH X RAYS. A. Liecht. *Klin. Wochschr.* 5, 1911-1913(1926). (In German).

Irradiation of tissues causes reduction of pH of subcutaneous tissues, first becomes noticeable 2-3 months after exposure.

7415

STUDIES ON TRICHINELLA SPIRALIS. I. CONCERNING THE TIME AND SITE OF INSEMINATION OF FEMALES OF TRICHINELLA SPIRALIS. II. TIME OF INITIAL RECOVERY OF LARVAE OF TRICHINELLA SPIRALIS FROM BLOOD OF EXPERIMENTAL ANIMALS. III. EFFECT ON THE INTESTINAL PHASE OF TRICHINOSIS OF FEEDING MASSIVE NUMBERS OF IRRADIATED TRICHINA LARVAE. IV. EFFECT OF FEEDING IRRADIATED TRICHINELLA LARVAE ON PRODUCTION OF IMMUNITY TO RE-INFECTION. V. TESTS FOR STRAIN OF TRICHINA LARVAE RESISTANT TO RADIATION. S. E. Gould, H. J. Gomberg, F. H. Bethell, J. B. Villella, and C. S. Hertz. *Am. J. Pathol.* 31, 933-63(1955). NSA 10-1981

7416

THE EFFECT OF SMALL DOSES OF X RADIATION ON ASCITES TUMORS OF THE MOUSE AND THEIR PREVENTION. Franz Falk. *Strahlentherapie* 98, 518-42(1955). (In German).

Male albino mice were subjected to diffuse roentgen irradiation of 19 r. The basophilic cells of spleen and thymus multiplied considerably from the 2nd to the 4th post-exposure day. Other mice, which had been vaccinated with the liquid of tumor-ascites, received the same dose of x rays. From the 3rd to the 9th day an immense multiplication of the basophilic cells in both organs could be remarked. The lives of x-rayed tumor-bearing animals were prolonged by 5 to 10 days NSA 10-2588

7417

DEVELOPMENT OF AN UNSEGMENTED SALAMANDER EMBRYO AFTER TREATMENT WITH X RADIATION IN COMBINATION WITH OXYGEN DEFICIENCY, COLD, AND HYDROCYANIC ACID. Theofried Peters. *Strahlentherapie* 98, 628-39(1955). (In German). NSA 10-2591

7418

Mound Lab., Miamisburg, Ohio

THE EFFECTS OF INJECTED ACTINIUM EQUILIBRIUM MIXTURE ON RATS AND MICE. W. P. Jolley, D. Roesch, R. Horne, and D. S. Anthony. June 15, 1955, 5p. (MLM-1057).

The effects on rats and mice injected with Ac^{227} , which is in equilibrium with its daughter elements, is described. Single and multiple intravenous injections over a range of doses were investigated with respect to their effects on the animals. The lowest effective doses were determined. Bone tumor incidence was proved to be the most sensitive criterion of radiation damage. The results are extrapolated

to estimate the maximum permissible concentration of Ac in man. NSA 10-2966

7419

CHANGES IN THE PRODUCTION OF THE UTERUS-STIMULATING HYPOPHYSEAL SUBSTANCE AFTER CASTRATION AND AFTER ROENTGEN IRRADIATION OF THE OVARIES IN GUINEA PIGS. Siegert. *Klin. Wochschr.* 8, 979-81(1929). (In German).

Roentgen irradiation of the ovaries caused transitory stimulation and increased secretion of hormones by the hypophysis followed by atrophy of ovaries. Atrophy is seldom complete. CA 23-5224

7420

EFFECT OF X-RAYS ON TRACE-LABELED I^{131} INSULIN AND ITS RELEVANCE TO BIOLOGIC STUDIES WITH I^{131} -LABELED PROTEINS. Rosalyn S. Yalow and Solomon A. Berson. *Radiology* 66, 106(1956). NSA 10-2608

7421

California. Univ., Los Angeles. Atomic Energy Project. ENDOGENOUS HISTAMINE EXCRETION IN THE RAT AS INFLUENCED BY X RAY IRRADIATION AND COMPOUND 48/80. James L. Leitch, Virginia Debley, and Thomas J. Haley. Jan. 30, 1956. 27p. Contract AT-04-1-Gen-12. (UCLA-359).

Histamine excretion was found to be of little or no importance insofar as lethality from acute whole-body irradiation in rats is concerned. Endogenous histamine excretion in female rats was found to be 9 to 10 times greater than in males. Data are included on the effects of diet, gonadectomy, compound 48/80, and hormone treatment on the excretion of histamine before and after irradiation. NSA 10-2967

7422

School of Aviation Medicine, Randolph AFB, Texas. THE EFFECT OF REDUCED FOOD INTAKE ON THE HYPERLIPOPROTEINEMIA OF LOCAL RADIATION INJURY. Norman Weiner, Lawrence J. Milch, and Gordon E. Shults. May 1956. 4p. (AF-SAM-56-18).

The possible effect of voluntary food reduction on the hyperlipidemia and weight loss produced in rabbits after acute local radiation injury was investigated. Pair-fed controls did not develop significantly elevated plasma lipid and lipoprotein levels and did not lose weight, as did their injured mates. NSA 10-11606

7423

THE PATHOGENESIS OF THE HEMORRHAGIC STATE IN RADIATION SICKNESS: A REVIEW. A. C. Upton. *Blood* 10, 1156-63(1955). NSA 10-2598

7424

MEDICAL AND INDUSTRIAL RADIUM AND THORIUM INJURIES. A. Gebauer and R. Heincker. *Strahlentherapie* 98, 558-69(1955). (In German)

Five sick persons suffering from heavy defects in the reticuloendothelial system, which had appeared 10 to 15 yr after thorotrast injection, were studied. One of the patients fell ill of a leucosis. All patients complained temporarily of pain in the epigastric regions, which is linked with the occasionally observed increased porphyrinuria. A chemist who, in his professional work, had to handle radium and mesothorium fell ill of a pneumo-fibrosis leading to death. These observations underline the danger in employing radioactive material. NSA 10-2597

7425

EFFECTS OF RADIOPHOSPHORUS AND CORTISONE ON TRANSPLANTED MAMMARY ADENOCARCINOMAS IN SUSCEPTIBLE AND RESISTANT MICE. Norman E. Boucher, Jr., Jerome T. Syverton, and John J. Bittner. *Cancer Research* 16, 22-31(1956).

Pretreatment with P^{32} and cortisone in combination was found to enhance the development of implanted homologous tumor tissue in susceptible mice. Pretreatment with either

³²P or cortisone alone failed to elicit the enhancing effect obtained with these agents in combination. NSA 10-2600

7426

PUBLIC HEALTH ASPECTS OF ATOMIC ENERGY IN PEACETIME. Daniel Bergsma. Public Health Repts. (U. S.) 71, 43-6 (1956).

Public health problems are reviewed which may arise under conditions of the peacetime use of radioactive materials. NSA 10-2596

7427

Argonne National Lab., Lemont, Ill.

QUARTERLY REPORT OF BIOLOGICAL AND MEDICAL RESEARCH DIVISION. Oct. 1955. 103p. Contract W-31-109-eng-38. (ANL-5486).

Includes reports on: higher incidence of skin tumors in white populations closer to equator, pathological effects of daily doses (for life) of γ and x rays on mice lethality and decreased fertility in x-irradiated mice; protective effects of spleen homogenates and aminopterin against radiation injuries in mice, radiation syndrome in chickens, relationship of boron nutrition to radiosensitivity in sunflower plants. NSA 10-1161

7428

SUBSEQUENT REGENERATION OF NEREIS DIVERSICOLOR

O. F. MULLER AFTER LOCAL IRRADIATION WITH X RAYS. Francoise Stephen-Dubois. Comp. rend. 241, 1175-7 (1955). (In French).

Each worm was isolated in a Petri dish. The grubs were amputated between 1/2 and 3/4 of the way from the end of the body, then irradiated with x rays. Totally irradiated worms did not regenerate, and regeneration of locally irradiated worms was delayed. NSA 10-1177

7429

ANTIBIOTIC INDUCED BACTERIAL CHALLENGE OF IRRADIATED MICE. William T. Bradner and Ann M. Hald. Antibiotics and Chemotherapy 5, 449-504 (1955).

A method of inducing intrainestinal bacterial challenge by feeding an antibiotic to mice is described. The results of an experiment in which irradiated mice were challenged in this manner indicate that there is a complex sequence of events culminating in the invasion of the general circulation of these animals (bactecemia). The concomitant maximum reduction of both infection and mortality by antibiotic treatment supports the theory of a causal relationship between infection and radiation death. NSA 10-1187

7430

National Lead Co. of Ohio, Cincinnati.

INDUSTRIAL HYGIENE SURVEY OF THORIUM ROLLING AT SIMONDS SAW AND STEEL COMPANY. Charles E. Schumann. Dec. 14, 1953. Decl. with deletions Dec. 9, 1955. 18p. Contract AT(30-1)-1156. (AECD-3714).

Personnel exposures to the radioactive dust from a thorium rolling operation are tabulated.

7431

Tennessee. Univ., Knoxville.

AGRICULTURAL RESEARCH PROGRAM. SEMI-ANNUAL PROGRESS REPORT FOR JANUARY 1, 1955 TO JUNE 30, 1955. Nov. 1955. 134p. Contract AT-40-1) GEN-242. (ORO-145).

Includes data from the following studies: fission product metabolism in domestic animals, effects of whole-body irradiation on the sperm of bulls, and the response of burros, swine, and sheep to various doses of total-body γ radiation. NSA 10-1169

7432

General Electric Co. Hanford Atomic Products Operation, Richland, Wash.

HISTOPATHOLOGY OF SHEEP THYROID IN CHRONIC ADMINISTRATION OF ¹³²I. S. Marks, N. L. Dockum, and L. K. Bustad. Aug. 23, 1955. 44p. Contract W-31-109-Eng-52. (HW-38758).

The pathologic effects in the thyroid glands of sheep receiving chronic orally administered ¹³¹I are reported. Dose levels ranged from 0.15 μ c to 1800 μ c per day. No pathologic alterations were observed with a daily feeding level of 0.15 μ c after a maximum period of observation of four years. Pathologic changes observed involve the interstitial tissue, epithelium, and blood vessels. Effects on interstitial tissue may be considered of primary significance in the early diagnosis of low-level chronic exposure to ¹³¹I in the species investigated. NSA 10-1163

7433

Los Alamos Scientific Lab., N. Mex.

THE RELATIVE PHYSIOLOGICAL AND TOXICOLOGICAL PROPERTIES OF AMERICIUM AND PLUTONIUM. Wright Langham, Robert E. Carter, Elizabeth Pusch, Ogden Johnson, Verda Strang, Theodore Trujillo, Marion Vier, Julia Wellnitz, and Agnes Williams. Nov. 15, 1951. Decl. Jan. 5, 1953. 57p. Contract W-7405-eng-36. (LA-1309).

Following intravenous administration of Am to rats, urinary and fecal excretions were similar to that of Pu as Pu(NO₃)₄. Acute toxicity and deposition of Am in tissues and organs was also similar, the liver and skeleton being major depots. Observations of survival, blood and bone marrow changes, and incidence of tumors and bone changes revealed that Am and Pu have about same chronic toxicity when given on equal μ c basis. NSA 10-1200

7434

EFFECT OF KIDNEY SHIELDING ON SURVIVAL FOLLOWING WHOLE BODY IRRADIATION. David F. Bohr, P. A. Rondell, L. E. Palmer, and F. H. Bethell. Am. J. Physiol. 183, 335-9 (1955).

Shielding only the exteriorized kidneys gave significant protection against lethal effects of whole body irradiation (rat). Even greater protection resulted from shielding superficial structure in lumbar region, a finding which parallels the observation of protective effects of shielding diverse isolated structures as reported by others. Possible mechanisms of protective effect are considered. Two strains of rats were found to vary with respect to radiosensitivity. NSA 10-1700

7435

THE PROTECTIVE EFFECT OF VARIOUS CHEMICAL COMPOUNDS AGAINST DAMAGE TO CHROMOSOMES BY GAMMA RADIATION. Herbert Parkes Riley. Am. J. Botany 42, 765-9 (1955).

Protection against x-ray damage to chromosomes, as measured by frequency of chromosome interchanges and deletions produced in cells of onion root tips, is conferred by sodium hydrosulfite and BAL (2,3-dimercaptopropanol) in 2×10^{-3} and 2×10^{-4} M concentrations. Neither chemical had any effect on aberration frequency or mitotic process which could be detected by cytological observation on unirradiated root tips. NSA 10-1197

7436

EFFECTS OF HYDRATION ON X-RAY SENSITIVITY IN HORDEUM. Richard S. Caldecott. Radiation Research 3, 316-30 (1955).

Prior to x-radiation the water content of seeds of barley has been modified by storage at different relative humidities, steeping for 16 hours at 0°C followed by various periods of desiccation, and steeping at 0°C and 22°C for different periods of time. Pooled data from all studies shows that the x-ray sensitivity of barley seeds, as measured by inhibition of seedling growth and frequency of chromosomal aberrations, decreases as embryo water content increases from about 4%-8%. NSA 10-1195

7437

Naval Radiological Defense Lab., San Francisco.

EFFICACY OF HEMATOPOIETIC PROTECTIVE PROCEDURES IN RATS X-IRRADIATED WITH INTESTINE SHIELDED.

M. N. Swift, S. T. Taketa, and V. P. Bond. Sept. 13, 1955. 14p. Project NM-006-015. (USNRDL-TR-64).

Bone marrow dosage of the order of 60 to 90 mg/100 g body weight was required for optimal protection against mortality in rats x-irradiated with the exteriorized gastrointestinal tract shielded. The protective potential of spleen or marrow per se is considerably lower in rat than in mouse. NSA 10-1189

7438

TESTS FOR A ROLE OF H_2O_2 IN X-RAY MUTAGENESIS. I. ESTIMATIONS OF THE CONCENTRATION OF H_2O_2 INSIDE THE NUCLEUS. John Z. Hearon and R. F. Kimball, Radiation Research 3, 283-94 (1955).

Equations are derived which permit estimation of the concentration of H_2O_2 in micronuclei of *Paramecium aurelia* when known concentrations of H_2O_2 are added to the medium and when the cells are irradiated. Approximate solutions presented. The ratio of the micronuclear concentration to the concentration in the medium is essentially the same when cells are placed in an H_2O_2 containing medium and when they are exposed to radiation. Therefore, rather precise comparisons of the two situations can be obtained. (from authors' summary). NSA 10-1181

7439

COMPARATIVE STUDY OF THE SECONDARY SPLENIC LESIONS FROM A SELECTIVE IRRADIATION OF THE SPLEEN OR FROM AN *IN TOTO* IRRADIATION OF THE RAT BY X RAYS. Michel Boiron, Claude Paoletti, and Maurice Tubiana. Compt. rend. 241, 1231-4 (1955). (In French).

Using decreased spleen weight and histological appearance as indices of spleen damage, authors found that 1000 r x ray dose produced much less spleen damage when administered to spleen only (rest of body shielded) than when entire body exposed. NSA 10-1178

7440

Western Reserve Univ., Cleveland. School of Medicine. FURTHER STUDIES ON THE RELATIONSHIP BETWEEN OXYGEN TENSION AND THE PROTECTIVE ACTIONS OF CYSTEINE, MERCAPTOETHYLAMINE AND PAR-AMINOPROPIOPHENONE. Paul R. Salerno, Edwin Uyekii, and Hymer L. Friedell. Dec. 1, 1955. 27p. Contract 31-109-eng-78. (NYO-4924). NSA 10-1167

7441

Oak Ridge National Lab., Tenn. BIOLOGY DIVISION SEMI-ANNUAL PROGRESS REPORT FOR PERIOD ENDING AUGUST 15, 1955. E. J. Slaughter, ed. Dec. 12, 1955. 141p. Contract W-7405-eng-26. (ORNL-1953)

Reports on following studies: cytogenetic effects of radiation in *Paramecium*, *Tetrahymena*, *Tradescantia*, *Vicia*, *Neurospora*, maize, timothy roots, wasps, *Nemeritis*, *Habrobracon*, and *Drosophila*, radiation protection and recovery in bacteria, modification of radiation injuries in mice, effects on genetic factors and development in mice, pathological and physiological radiation effects in rats, studies on biophysical effects of radiation on *Tradescantia*. NSA 10-1168

7442

Naval Medical Research Inst., Bethesda. NEOPLASMS IN RATS PROTECTED AGAINST LETHAL DOSES OF IRRADIATION BY PARABIOSIS OR PAR-AMINOPROPIOPHENONE. George Brecher, E. P. Cronkite, and James H. Peers. Oct. 20, 1953. 19p. (NM-006.012.05.12).

Rats that survived otherwise lethal doses of radiation when protected by para-aminopropiophenone or parabiosis were observed along with their normal controls for the rest of their natural lives. Of seventy animals irradiated, 22 have survived 6 months or more. Between 6 and 16 mo after irradiation the following tumors appeared in survivors: adamantoma, renal carcinoma, sarcoma, glioma, adenocarcinomas of the duodenum, jejunum, ileum, and colon,

and the uterine sarcoma. Many of these seldom appear spontaneously. During this time no tumors have developed in control animals. NSA 10-1165

7443

Michigan. Univ., Ann Arbor. Engineering Research Inst. HIGH RADIOPASTEURIZATION AS A "NEW" FOOD PROCESS. L. E. Brownell and S. N. Purohit. Oct. 1955. 42p. Contract AT(11-1)-162. (COO-210) (ERI-1943-7-51-P).

Radiopasteurization, in which high γ radiation is combined with refrigeration, is proposed to increase storage life of cooked meats, blanched vegetables, and food items packaged in plastic bags. Various types of food poisoning caused by microorganisms and their toxins are reviewed, and their control by radiopasteurization is discussed. NSA 10-1162

7444

School of Aviation Medicine, Randolph AFB, Tex. THE SOLUTION OF DISCRIMINATION-REVERSAL PROBLEMS BY NORMAL AND IRRADIATED MONKEYS. Report no. 16. J. M. Warren, S. J. Kaplan, and D. D. Greenwood. Apr. 1955. 5p. Project No. 21-3501-0003. (NP-5822).

Three normal monkeys and seven monkeys exposed to sublethal doses of neutron and gamma radiation were tested on a series of 108 discrimination-reversal problems. Results: no significant difference between groups in prereversal learning; radiated subjects made significantly more errors than normal controls on the postreversal trials. Error scores of individual irradiated monkeys were not correlated with individual dose levels. NSA 10-1166

7445

Utah. Univ., Salt Lake City. Radiobiology Lab. SEMI-ANNUAL PROGRESS REPORT TO THE DIVISION OF BIOLOGY AND MEDICINE. Sept. 30, 1955. 80p. Contract AT(11-1)-119. (AECU-3109).

Report on the following studies using dogs, tissue distribution, hematological effects, toxicity of Pu, Ra^{226} , mesothorium (Ra^{226}), radiothorium (Th^{228}), and Sr, radioautographic analysis of bone after administration of Ra^{226} and Th^{228} , incidence of spontaneous tumors after injection with Ra^{226} , effect of parathyroid, radioautographic and histopathological studies following intravenous administration of Sr^{90} , studies, using Cr^{51} tagged red blood cells, of anemia following administration of Ru, Ra, $MnTh$, and $MdTh$ in beagle dogs. NSA 10-1160

7446

Rochester, N. Y. Univ. Atomic Energy Project. THE EFFECT OF POLONIUM ALPHA PARTICLE IRRADIATION UPON RETICULOENDOTHELIAL FUNCTION AS MEASURED WITH P^{32} LABELED PARTICULATE CHROMIC PHOSPHATE. L. W. Tuttle and R. C. Baxter. Oct. 10, 1955. 34p. Contract W-7401-eng-49. (UR-295).

Reticuloendothelial cells in spleens and livers (rats) receiving as much as 6200 and 580 rep respectively of α radiation from 23 days exposure to internally deposited Po^{210} (37 μ c/kg), retained their normal ability to remove circulating particulate P^{32} -labeled chromic phosphate. NSA 10-1983

7447

Mound Lab., Miamisburg, Ohio HISTOPATHOLOGICAL STUDY OF SPRAGUE-DAWLEY RATS INJECTED INTRAVENOUSLY WITH VARYING AMOUNTS OF POLONIUM. R. N. Cowden and Robert E. Zipf. Apr. 1, 1952. Decl. Oct. 17, 1955. 62p. Contract AT-33-1-GEN-53. (MLM-761).

Sprague-Dawley rats were sacrificed serially over 375 day period after injection of 35, 23, and 3.6 or 0.9 μ c of Po /kg. Most susceptible organs to the radiation: kidneys (degenerative changes at all dosage levels), gonads, spleen and lymph follicles (early hypoplasia of cellular elements with recovery to normal in lower dosage groups), and

blood. Lungs and stomach showed hemorrhage at 35 and 23 μ c levels. NSA 10-2578

7448

California. Univ., Los Angeles. Atomic Energy Project. RELATIVE RETENTION OF STRONTIUM AND CALCIUM IN BONE TISSUE. George V. Alexander, Ralph E. Nusbaum, and Norman S. MacDonald. June 14, 1955. 21p. Contract AT-04-1-GEN-12. (UCLA-337).

Bones of laboratory-raised mice, rats, and guinea pigs, together with their respective diets were analyzed for Sr and Ca by an emission spectrographic technique. Kangaroo rats and rabbits from the Nevada desert areas were also investigated along with representative samples of their forage. The number of atoms of Sr/1000 atoms of Ca present in the bone samples ranged from 0.19 for rats to 2.5 for guinea pigs. NSA 10-2973

7449

THE X-RAY SENSITIVITY OF CUTTING OF CREEPING-ROOTED ALFALFA. Beatrice E. Murray. Can. J. Agr. Sci. 36, 120-6(1956).

A method for the determination of radiosensitivity of alfalfa is presented. Alfalfa stem cuttings were exposed to 9 dosage levels of x radiation, namely, control (no radiation), 500 r, 1000 r, 2000 r, etc., to 7000 r, subsequent to the initiation of root primordia at the base of each cutting. A reduction in the lengths and the number of roots per cutting was the initial manifestation of sensitivity to x radiation. Complementary information was contributed by axillary bud growth and leaf anomalies. No irradiation effects on root or axillary bud growth were visible in cuttings exposed to the 1000 r level or less. Growth of both roots and axillary buds was inhibited at dosage levels of 5000 r or more. Adventitious stems developed on the roots at the base of cuttings if the rooting portion were shielded from x radiation. NSA 10-11615

7450

THE I^{131} -IRRADIATED RAT THYROID: ITS ALTERED RESPONSE TO VARIOUS STIMULI AND THE CHANGES INDUCED IN ITS IODINE METABOLISM. G. D. Potter, Alvin Taurog, and L. L. Chaikoff. Endocrinology 59, 12-26(1956).

Rats were injected with 5-300 μ c doses of carrier-free I^{131} . Radiation dosage to thyroid was calculated from in vivo uptake and disappearance of I^{131} from the glands. Two to 5 weeks after the I^{131} injection, irradiated thyroids were compared with control thyroids with respect to iodide-concentrating capacity, synthesis of organic I^{131} compounds, response to feeding propylthiouracil, response to cold, response to TSH injection, and cytology. Thyroid process concerned with growth appeared to be more sensitive than those concerned with I metabolism. NSA 10-11614

7451

THE PRODUCTION OF TWO CHEMICALLY DIFFERENT TYPES OF CHROMOSOMAL BREAKS BY IONIZING RADIATIONS. Sheldon Wolff and Henry E. Luppold. Proc. Natl. Acad. Sci. U. S. 42, 510-14(1956).

Experiments on the seed of *V. faba* indicate that radiation-induced chromosome breaks may have two chemically different natures. One seems to be an ionic break, which closes very rapidly, as would be expected if only electrical factors were necessary for its rejoining. The other is covalent, and it stays open for long periods of time and needs a source of energy for the biosynthesis of the bonds formed in its closing. NSA 10-11611

7452

California. Univ., Berkeley. Radiation Lab. MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT [FOR] APRIL, MAY, JUNE 1956. July 30, 1956 22p. Contract W-7405-eng-48. (UCRL-3479).

Data are presented from the following studies: the long-term effects of intramuscularly administered Ra^{223}

on rats, the body-burden and excretion in an infant monkey of Sr^{90} acquired by placental connection with the mother. NSA 10-11608

7453

Argonne National Lab., Lemont, Ill. BIOLOGICAL AND MEDICAL RESEARCH DIVISION QUARTERLY REPORT [FOR] APRIL, MAY, JUNE 1956. 102p. Contract W-31-109-eng-38. (ANL-5597).

Includes reports on: toxicity of Sr^{90} and Ca^{45} in mice, red cells mass of peripheral blood and other tissues of normal and x irradiated roosters, spermatogenesis in continuously γ irradiated mice, mortality from leukemia and all other causes in mice exposed daily to γ ray doses of 6-43 r, genetically controlled variation in survival time of mice exposed daily to Co^{60} γ radiation, effect of radiation on fertility of female mice, spleen protection in γ and neutron irradiated mice, and the effect of paired, equal doses of Co^{60} γ rays on 30 day mortality in mice. NSA 10-11607

7454

ON THE PATHOLOGICAL CHANGES IN PULMONARY TISSUE AFTER HIGH DOSES OF X RADIATION. Harold Henzl. Strahlentherapie 100, 275-90(1956). (In German).

The author describes the changes of the pulmonary tissue after irradiation with high doses of ionizing rays. The irradiation causes lesions of the capillary wall, extravasation of liquid blood constituents with imbibition of water by the tissue, reaction of local cells and warping of the collagen substance. Afterwards, a tendency towards fibrosis can be observed. The process is compared with the virulent pneumonias and with classical inflammation. Bronchopneumonia is a frequent secondary complication. NSA 10-11642

7455

ON THE SERUM-ALBUMIN CHANGE UNDER THE INFLUENCE OF IONIZING RAYS. H. Eberle and Julius Ries. Strahlentherapie 100, 369-74(1956). (In German)

By means of our own electrophoretic examinations as well as after the original method explained by Takata we have not succeeded in reproducing the effect called vital ionization, which means, that the irradiation of an experimental person or the application of a direct current, respectively, should have a regular influence on the serum-albumin quality. By means of the paper-electrophoresis the serum-albumin picture of patients treated with x-rays or radium has been controlled after the irradiation. NSA 10-11641

7456

THE EFFECTS OF DOSE PROTRACTION AND FRACTIONATION ON THE SKIN REACTION DURING IRRADIATION WITH Sr^{90} . Apostoulos Yiannakopoulos and Kurt Ernst Scheer. Strahlentherapie 100, 165-8(1956). (In German). NSA 10-11637

7457

RADIOSENSITIVITY OF IMMUNE RESPONSE BETWEEN TUMOR AND HOST ORGANISM. PART I. HETEROLOGOUS TRANSPLANTATION OF EHRLICH ASCITES TUMOR OF THE MOUSE INTO IRRADIATED AND NON-IRRADIATED RATS. Werner Lorenz. Strahlentherapie 100, 104-12(1956). (In German). NSA 10-11634

7458

THE EFFECT OF TOTAL RADIATION WITH AND WITHOUT A LEAD SCREEN ON THE SERUM ALBUMIN OF EXPERIMENTAL ANIMALS. Robert Bauer, Siegmund Piller, and Gerhard Schneider. Strahlentherapie 100, 16-29(1956). (In German).

By means of the plasma protein picture, and of the corpuscular blood picture as well as the bone marrow studies, the authors examine the effect of total roentgen radiation doses of 300-3000 r, with and without lead screen on white rats. There was a particularly striking difference between rats irradiated with 200 r without

the Pb screen and 3600 r (equal volume dose) with Pb screen. Dysprotenemia was less severe and there was nearly complete reparation in plasma protein and marrow pictures in latter. NSA 10-11633

7459

EFFECT OF X-RAYS ON MITOCHONDRIAL DESOXY-RIBONUCLEASE II. S. Okada and E. Kallee (Univ. of Rochester School of Medicine and Dentistry, N. Y.). Exptl. Cell Research 11, 212-14(1956). Aug.

Irradiated mitochondria suspended in 15 per cent sucrose have a higher activity of DNase II than do non-irradiated mitochondria. Exposure of mitochondria to sonic vibrations alone increased DNase II activity about five-fold as compared with non-treated mitochondria; prior x radiation does not produce a further increase in enzymatic activity of mitochondria so treated with sonic vibration. Results indicate that DNase II activity is not readily dissociated from fragments of disintegrated or radiation-damaged mitochondria.

NSA 10-11648

7460

RADIATION-INDUCED FISSION BLOCK IN SYNCHRONIZED CULTURES OF TETRAHYMENA PYRIFORMIS W. H. S. Ducoff (Argonne National Lab., Lemont, Ill.). Exptl. Cell Research 11, 218-20(1958). Aug. NSA 10-11649

7461

INVESTIGATION OF THE LETHAL EFFECT OF X-IRRADIATION ON THE YOUNG AXOLOTL (SIREDON MEXICANUM). V. V. Brunst (Roosevelt Park Memorial Inst., Buffalo). Radiation Research 5, 267-80(1956).

Animals irradiated totally with 6000 r died within 30 days after treatment. All animals irradiated totally with 3000 r died within 40 days after treatment. With radiation of the body exclusive of the head some animals lived more than 100 days after treatment. After radiation of the head only, some animals survived more than 150 days after radiation with 6000 r and more than 240 days after radiation with 3000 r. Body changes are described (from author's summary). NSA 10-11650

7462

CLINICAL AND ROENTGENOLOGIC OBSERVATIONS ON THE DEVELOPMENT OF BRONCHIAL CARCINOMA AT JOACHIMSTAL. A. Beutel and A. Woldruh. Z. Krebsforschung 34, 109-22(1931).

Yearly x rays were taken of uranium miners for detection and serial studies of developing bronchogenic carcinoma.

7463

POLYPLOIDY AND RADIOSENSITIVITY. Alan D. Conger and A. Helen Johnston. (Oak Ridge National Lab., Tenn.). Nature 178, 271(1956). Aug. 4. NSA 10-11645

7464

MUTAGENIC EFFECT OF THERMAL NEUTRONS ON WET AND DRY TOMATO SEED. A. B. Burdick (Purdue Univ., Lafayette, Ind.). Nature 178, 360-1(1956). Aug. 18.

With regard to the effect of hydration on response to thermal neutron radiation, the results from wet and dry treatments show a striking similarity. Wet and dry treated seeds germinate about equally well and about equally rapidly, and the plants survive about as well. NSA 10-11647

7465

INTRAUTERINE EMBRYO-INJURY BY X-RADIATION. Marko Basic and Danica Weber. Strahlentherapie 99, 628-34(1956). Apr. (In German).

The report deals with the case of a 3 year old girl suffering from microcephalia, cerebral atrophy, idiocy, anomalies of both eyes, considerable retardation of growth especially in the lower parts of the body and the lower left extremity, formation of an exostosis on the

proximal tibia metaphysis, generally spread anomalies of skin pigmentation and motorial disturbances of the extremities. In the first half of her intra-uterine life, the child had unintentionally been exposed to x-rays, which were applied to the post-operative metastases of a mammary carcinoma of the mother. NSA 10-11643

7466

THE COMPARATIVE EFFECTIVENESS OF FOUR BETA-EMITTING ISOTOPES FED TO HABROBRACON FEMALES ON PRODUCTION AND HATCHABILITY OF EGGS. Daniel S. Grosch, Robert L. Sullivan, and Leo E. LaChance (North Carolina State Coll., Raleigh). Radiation Research 5, 281-9(1956).

As shown by lowered egg production and hatchability, the descending order of effectiveness of the ingested radioisotopes is the same as the ascending order of physical half-life: P^{32} , Sr^{89} , and Ca^{45} . Effectiveness of a given isotope is correlated with the number of β particles received by an organism during the first day after ingestion and with the energy of these emissions. NSA 10-11651

7467

EARLY HYPOTENSION INDUCED IN THE RABBIT BY WHOLE BODY X-IRRADIATION. Phillips M. Brooks, Herbert B. Gerstner, and Sidney A. Smith (USAF School of Aviation Medicine, Randolph Field, Tex.). Am. J. Physiol. 186, 532-6(1956) Sept. NSA 10-11653

7468

EFFECT OF X-RAYS ON THE SURVIVAL OF BACTERIA AND YEAST. II. RELATION OF CELL CONCENTRATION AND ENDOGENOUS RESPIRATION TO SENSITIVITY. Shirley E. Gunter and Henry I. Kohn (Univ. of California School of Medicine, San Francisco). J. Bacteriol. 72, 422-8(1956). NSA 10-11656

7469

FIVE- TO EIGHT-DAY RADIATION DEATH IN MICE. Mildred K. Austin, Morton Miller, and Henry Quastler. (Univ. of Illinois, Urbana). Radiation Research 5, 303-7 (1956). Sept.

In some circumstances there is a high incidence of death 5-8 days after x irradiation. This may represent a mode of acute radiation death different from hematopoietic failure and intestinal injury. Statistical analysis of survival curves shows 1 or 2 strong modes between 5 and 8 days. Additional evidence in support of this interpretation is also presented. NSA 10-11652

7470

DEOXYRIBONUCLEIC ACID AND PHOSPHOLIPIDE METABOLISM IN REGENERATING LIVER AND THE EFFECT OF X-RADIATION. Christine D. Jardtetzky, Cyrus P. Barnum, and Halvor Vermund (Univ. of Minnesota, Minneapolis). J. Biol. Chem. 222, 421-33 (1956). NSA 10-11657

7471

LIVER FUNCTION IN THE CHICK FOLLOWING X-IRRADIATION, PLASMA AMINO ACIDS AND PLASMA GLUCOSE. Elaine Katz Bernstein, S. Phyllis Stearner, and Austin M. Brues (Argonne National Lab., Lemont, Ill.). Am. J. Physiol. 186, 543-8(1956) Sept. NSA 10-11654

7472

EFFECT OF TOTAL BODY IRRADIATION ON ABSORPTION OF SUGARS FROM THE SMALL INTESTINE. John T. Farrar, Melvin D. Small, Doris Bullard, and Franz J. Ingelfinger (Massachusetts Memorial Hospitals and Boston Univ. School of Medicine, Boston). Am. J. Physiol. 186, 549-53(1956) Sept. NSA 10-11655

7473

REPORT OF SURGICAL REPAIR IN THE FIRST GROUP OF ATOMIC RADIATION INJURIES. James Barrett Brown and Minot P. Fryer. Surg. Gynecol. Obstet. 103, 1-4(1956) July.

The case and surgical repair of skin lesions induced by exposure to atomic radiation is described. (C. H.)
NSA 10-11659

7474

EFFECTS OF PARATYPHOID INFECTION OF ANIMALS EXPOSED TO TOTAL X RADIATION. V. N. Sivertseva (Central Research Inst. of Roentgen-Radiology). Med. Radiol. No. 3, 52-9(1956) May-June. (In Russian).
NSA 10-11628

7475

EFFECTS OF X RADIATION ON ORGANISMS TREATED WITH ANTITETANUS SERUM. G. N. Kryzhanovskii and N. N. Lebedev. (Inst. of Normal and Pathological Physiology, Acad. of Med. Science S.S.S.R.). Med. Radiol. No. 3, 59-62(1956) May-June. (In Russian).
NSA 10-11629

Exposure of rats to x radiation of 400 r, 10 to 12 minutes before anti-serum injection, did not produce any complications and did not reduce the prophylactic and therapeutic effects of the serum. (R. V. J.).
NSA 10-11629

7476

FREE AMINO ACIDS IN BONE MARROW AND THE EXCHANGES CAUSED BY X RADIATION. B. S. Kasavina and E. B. Spector (Central Inst. of Traumatology and Orthopedics). Med. Radiol. No. 3, 72-80(1956) May-June. (In Russian). NSA 10-11630

7477

SOME DATA ON THE MECHANISM OF FETUS DAMAGE IN ANIMALS EXPOSED TO X RADIATION. N. A. Kalinina (Inst. of Gynecology Acad. of Med. Science S.S.S.R.). Med. Radiol. No. 3, 92-6(1956) May-June. (In Russian).
NSA 10-11631

7478

EFFECTS OF IONIZING RADIATION ON THE PENE-
TRABILITY AND FUNCTIONS OF EYE VESSELS. N. I. Arlashchenko. Med. Radiol. No. 3, 29-35(1956) May-June. (In Russian). NSA 10-11627

7479

COMPARISON OF BIOLOGICAL EFFECTS PRODUCED BY X-RAY AND RADIOACTIVE COBALT γ RADIATION. S. N. Aleksandrov, K. F. Galkovskaya, and Yu. G. Zil'berg (Central Research Roentgen-Radiological Inst.). Med. Radiol. No. 2, 80-7(1956) Mar.-Apr. (In Russian). AEC-TR-3272.

Non-pedigreed mice and C57 black mice in 2 age groups (young, approximately 1 mo. old and adults, approximately 3 mo. old) were exposed while packed together 10 to a box, to equal doses of 180 Kv x rays or to Co^{60} rays. Doses administered were (1) a single dose of 800 r or (2) 4 doses of 200 r each week for 4 weeks. Lethality, survival time, total and differential peripheral blood leukocyte counts, and the incidence of malignant tumors in survivors were selected as criteria of biological effect. Co^{60} radiation had a weaker lethal effect than did x radiation. Young animals showed more severe clinical symptoms and died earlier than did older mice. Co^{60} rays were also less effective in producing hematological effects. The strains of mice also differed with respect to hematological changes following exposure. Only with respect to induction of malignancy did Co^{60} radiation prove more effective than x rays. Principal causes of late death were septicemia and necrotic pneumonia. NSA 10-11624

7480

INTEROCEPTIVE REACTIONS OF LYMPH NODES DURING IRRADIATION. Yu. M. Zaretskaya. Med. Radiol. No. 3, 20-9(1956) May-June. (In Russian).

Lymph nodes in the mesentery of the small intestine of the cat were irradiated, with animals under ether anesthesia and nicotine (1×10^{-5} g/ml) and acetylcholine (2×10^{-5} g/ml) were introduced into

ligatured blood vessels. Ionizing radiation caused changes in the reflexes from the chemoreceptive apparatus of the lymph nodes during the 1st 6 days after the irradiation; there were definite phases in the changes. Penetrating radiation caused functional changes in the whole reflex arc, both in the center and the periphery. Lymph nodes damaged by the penetrating radiation could be the source of unusual, or pathological, impulses from the periphery to the center. Breathing and blood pressure were recorded daily for 6 days after operation.
NSA 10-11626

7481

EFFECTS OF X RADIATION ON THE NERVOUS SYSTEM OF ANIMALS (WHITE RATS). L. I. Kotlyarevskii, L. S. Gorsheleva, and L. E. Khozak (Inst. of Nervous System, Acad. of Med. Science S.S.S.R.). Med. Radiol. No. 3, 11-19(1956) May-June. (In Russian). NSA 10-11625

7482

OBTAINING NEW FORMS OF PLAGUE (B. PESTIS Ev₇₆) VACCINE FOLLOWING IRRADIATION. V. I. Ivanov, M. D. Pryadkina, and V. M. Vedeshkina (Tarasevich Inst. of Vaccine and Serum Control). Med. Radiol. No. 2, 52-6(1956) Mar.-Apr. (In Russian). NSA 10-11621

7483

REACTIONS OF GROWING ORGANISM TO THE EFFECTS OF PENETRATING RADIATION IN MASSIVE DOSES. V. V. Kholin (Orden of Lenin Inst. of Med. Radiology). Med. Radiol. No. 2, 75-80(1956) Mar.-Apr. (In Russian).

This is a literature review of 31 references.

NSA 10-11623

7484

INCORPORATION OF PHOSPHORUS INTO NUCLEIC ACID IN STABLE AND LABILE COMPOUNDS IN WHITE MICE ORGANS DURING TOTAL IRRADIATION. A. S. Orlov (Central Research Inst. of Roentgen-Radiology). Med. Radiol. 1, No. 2, 65-70(1956) Mar.-Apr. (In Russian).

White rats were irradiated with 500 r and killed at different times. Two hours before death, sodium phosphate p^{32} was injected. Nucleic acids of the proteins in the liver, kidney, spleen, and small intestine were studied. Immediately after irradiation phosphorus incorporation was normal, but then it changed, the magnitude of the change depending on the organ, type of acid and time after irradiation. After 48 hours, spleen values had increased but had not reached normal, small intestine values were above normal. Nucleic acid concentrations likewise decreased. In the liver and kidney proteins the decrease in phosphorus uptake was not accompanied by a drop in the nucleic acid concentration. Phosphorus inclusion in the stable and labile forms also differed in degree in the spleen and intestine, and in direction in the liver and kidney. NSA 10-11622

7485

A CORRELATION OF EARLY RADIATION CHANGES IN LYMPHATIC TISSUES WITH ANTITOXIN-PRODUCING ABILITY. William L. Williams, Richard D. Stoner, and William M. Hale (Univ. of Tennessee, Memphis and Brookhaven National Lab., Upton, N. Y.). Yale J. Biol. and Med. 28, 615-21(1955-56).

Results are reported from experiments which correlate the morphological changes in lymphatic tissues following gamma irradiation with the alteration in ability of the animal to produce antitoxin, and the morphology of aging of the thymus with its increasing ability to produce antitoxin in transplants. We believe we have demonstrated the ability of undifferentiated cells of the reticulo-endothelial system to produce antibodies in the absence of mature lymphocytes or plasma cells. (auth). NSA 10-11620

7486

STUDIES ON IRRADIATED POPULATIONS OF DROSOPHILA MELANOGASTER. Bruce Wallace (Biological Lab., Cold Spring Harbor, N. Y.). *J. Genet.* 54, 280-93(1956) May.

Data on 150 generations showed that the average viability of individuals in each of 2 populations with random combinations of chromosomes may not reflect the average effect of these chromosomes on the viability of homozygous individuals. The accumulation, within an irradiated population of chromosomes that are deleterious when homozygous may not result in generation-by-generation decline in viability of heterozygous individuals. NSA 10-11613

7487

Rochester, N. Y. Univ. Atomic Energy Project. ACUTE LETHALITY OF PARTIAL BODY IN RELATION TO WHOLE BODY IRRADIATION. H. A. Blair. Sept. 10, 1956. 10p. Contract W-7401-eng-49. (UR-462).

If to cause acute death from radiation the same amount of lethal substance or injury must be produced, whether the whole-body or segments thereof are irradiated, it is shown that the reciprocal of LD_{50} for the whole body, will be equal to the sum of the reciprocals of LD_{50} for the separate segments, all doses being measured in roentgens. Existing data are compatible with this view but they involve irradiation of large segments of the body. For small segments undoubtedly the rule will fail. Some general aspects of partial-body irradiation are discussed. (auth). NSA 10-11609

7488

RADIOACTIVITY INJURY AND RECOVERY FROM IONIZING RADIATION EXPOSURE. Joe W. Howland (Univ. of Rochester School of Medicine and Dentistry, N. Y.). *Ann. Rev. Med.* 7, 225-44(1956).

A survey of literature on the biological effects of ionizing radiations in animals and man is reported. Concepts of cellular damage, chemical factors modifying the effect of radiation, the role of spleen and bone marrow in recovery, the nature of infection, hemorrhage, and anemia in radiation injury, endocrine response, and irreversible effects of radiation injury are discussed in detail. (F.S). NSA 10-11616

7489

EFFECT OF SEED TREATMENTS WITH X-RAY AND PHOSPHORUS 32 ON TOMATO PLANTS OF FIRST, SECOND, AND THIRD GENERATIONS. J. W. Lesley and Margaret M. Lesley (Univ. of California Citrus Experiment Station, Riverside.). *Genetics* 41, 575-88 (1956) July.

Treatment with 10,000 r x rays for 33 minutes, or soaking seeds in P^{32} solution, caused formation of unequal pairs, segmental interchange, weakened pairing, inversion, and elongation and stickiness in meiosis of R_1 plants from treated seeds of tomatoes. Both x ray and P^{32} caused much pollen sterility in R_1 and R_2 . NSA 10-11610

7490

THE PROBLEM OF TOTAL AND PARTIAL BODY IRRADIATION. B. Rajewsky. *Strahlentherapie* 100, 5-15(1956) May. (In German).

The time of survival of rats, mice and guinea-pigs has been examined within a range of doses from 100 to 200,000 r. Between 1200 and 15,000 r, the animals die after 3.5 days. In order to clear the cause of decrease, intra-operative irradiation of certain body regions or organs was carried out. The irradiation of adrenalectomized, hypophysectomized and splenectomized rats has shown the great importance of the system of the hypophysis and the cortex of the suprarenal body for the 3.5 days effect. Furthermore, the author has examined the secretion of the adrenal cortical hormones and tissue metabolism. (auth). NSA 10-11632

7491

REACTIVE PROCEEDINGS AFTER GENERAL AND LOCAL IRRADIATION. Theophil Hornykiewytch and Hans-Stephan Stender. *Strahlentherapie* 100, 113-20 (1956) May. (In German).

The course of reactions after total or local irradiation is decisively influenced by the initial conditions of the organism. This effect can be observed especially if certain organs are under the specific influence of stimulants. (auth). NSA 10-11635

7492

THE SIGNIFICANCE OF THE REGULATING FACTORS OF RADIATION REACTION IN BONE MARROW. Helmut Hartweg. *Strahlentherapie* 100, 121-8(1956) May. (In German)

By means of comparisons between total and local irradiation the regulating factors in the bone marrow have been examined. The results show that there are intense extramedullary impulsions in the stage of damage and especially during repair. The marrow that was not damaged by the local irradiation imitates in a weaker form the reaction of the marrow damaged by the rays. (auth). NSA 10-11636

7493

CYTOLOGICAL INVESTIGATION OF RADIATION EFFECT ON THE LIVER AND SPLEEN. PART II. INVESTIGATION OF THE SPLEEN. Eberhard Scherer. *Strahlentherapie* 100, 211-24(1956) June. (In German).

Results of quantitative cytological methods indicate that the liver is an extremely radio-sensitive organ. The reticulum cells of the spleen, which have formerly been thought radio-resistant, are subject to distinct changes suggesting that these cells are most important in the defensive activity; and the observed cell changes can be provoked also by irradiation of the head or other remote regions of the body, the result being typical for each different case. NSA 10-11638

7494

Naval Radiological Defense Lab., San Francisco. FURTHER STUDIES ON THE MODIFICATION OF RADIATION INJURY IN MICE BY ISOLOGUS AND HETEROLOGOUS BONE MARROW. L. J. Cole, J. G. Habermeyer, and P. C. Newell. Aug. 6, 1956. 30p. Project NM-006-015. 04. (USNRDL-TR-104). NSA 10-11668

7495

RADIATION DOSAGE FROM BREATHING RADON AND ITS DAUGHTER PRODUCTS. Jacob Shapiro (General Dynamics Corp., Gorton, Conn.). *Arch. Ind. Health* 14, 169-77(1956) Aug. NSA 10-11665

7496

Naval Radiological Defense Lab., San Francisco. INFLUENCE OF SPLEEN HOMOGENATE INJECTION ON POST-IRRADIATION INFECTION. M. S. Silverman, V. Greenman, M. Ellis, and L. J. Cole. Aug. 14, 1956. 14p. Project NM 006-015-04. (USNRDL-TR-107).

Injections of spleen following whole-body x irradiation in the LD_{100} range of LAF_1 mice resulted in a decreased incidence of post-irradiation infection and an increased survival of the animals. The data presented provide further evidence of the critical role of infection in the death of mice following severe radiation injury to the hematopoietic tissue. If an accelerated repair of this injury is accomplished, a more rapid recovery of the anti-microbial defenses of the animal results. This leads to increased survival following irradiation. (auth). NSA 10-11664

7497

NEUTRON AND X-RAY EXPERIMENTS IN WHEAT AND A REVISION OF THE SPELTOID PROBLEM. James MacKey. Lund, Berlingska Boktryckeriet, 1954. 200p.

Results are presented from a study of the observable mutations in 6x-wheat and, for comparison, 2x-barley, where dormant seeds were treated with successively increasing doses of x-rays and fast neutrons. (254 references.) (C. H.) NSA 10-11660

7498

RECOVERY FROM IRRADIATION FOLLOWING THE ADMINISTRATION OF CULTURED TISSUES. Carol L. Miller. (Atomic Energy Research Establishment, Harwell, Berks, England). *Nature* 178, 142(1956).

Liver and spleen tissue from infant mice may be stored and preserved for treatment of x-ray lethal doses. Spleen fragments are stored with glycerol at 79°C and cultured in rabbit serum and glucose. Embryonic liver fragments may be cultured with rabbit serum and glucose. The cultured embryonic liver is active for four days although two days have been taken as a standard culture time.

7499

THE EFFECT OF SMALL RADIATION DOSES ON THE SPLEEN AND THYMUS OF THE RAT AFTER A SINGLE AND REPEATED APPLICATION. Rosemarie Fluhr, Lothar Weib, and Wolfgang Gehlen. *Strahlentherapie* 100, 225-40(1956).

The authors have studied the effect of small roentgen doses (10 r, 3 times 10 r, 30 r, 50 r) on the spleen and thymus of white rats. After irradiation of 10 r there were no changes; the application of 3 times 10 r caused distinct injury, above all in the spleen; 30 r provoked considerable activation of spleen and thymus, 50 r caused slight injury up to the 12th day, then activation of spleen and thymus. (auth)

7500

RADIATION DOSAGE AND CELL DECOMPOSITION. Eberhard Koch, Theophil Hornykiewytch, and Hans Stephan Stender. *Strahlentherapie* 100, 253-8(1956) June. (In German).

The behavior of leucocytic decomposition cells of the rat, 6 hours after an irradiation of the whole body with 5 to 1200 r can be characterized by a dose effect curve, which shows a rectilinear course in the logarithmic screen. The authors discuss the possibility of estimating the administered dose of rays by determining the number of the decomposition cells. NSA 10-11640

7501

BIOLOGICAL HAZARDS OF NUCLEAR AND OTHER RADIATIONS. C. Auerbach. *Nature* 178, 453-4(1956) Sept. 1.

A comparison of authoritative digests by Great Britain and the United States was discussed. Both reports show that the present dangers arise much more from excessive use of x rays than from bomb fall-out or from atomic energy establishments. (J. H. M.) NSA 10-11667

7502

THE EFFECTS OF CONTINUOUS IRRADIATION BY TRITIUM ON CELLS CULTIVATED IN VITRO. Agnes N. Stroud (Argonne National Lab., Lemont, Ill.). *Ann. N. Y. Acad. Sci.* 67, Art. 2, 11-34(1956) Aug. 29.

The effects of continuous irradiation with tritium oxide on chick embryo skeletal muscle tissue cultures were studied by means of stained preparations, time-lapse cinematographs, and serial photographs of large areas. Irradiation was delivered by the incorporation of tritium oxide into the water of the culture medium, which permitted observations to be made safely during irradiation. Data are summarized. (auth.) NSA 10-11619

7503

LONG-TERM RADIATION OF BONE FOLLOWING ADMINISTRATION OF C¹⁴-BICARBONATE. Howard E. Skipper, Linda Simpson, and Martelia Bell (Southern

Research Inst., Birmingham, Ala.). *Proc. Soc. Exptl. Biol. Med.* 92, 549-50(1956) July.

Studies have been carried out on retentions in the bones of mice of C¹⁴ from labeled bicarbonate. A single dose of 100 µc per mouse (a 280 millicurie man-equivalent) provided daily radiation of the most active areas of the long bones of above 0.05 rep/day for a period of approximately one year. (auth.) NSA 10-11618

7504

THE EFFECT OF FORMALDEHYDE ON THE MUTAGENIC ACTION OF X-RAYS IN DROSOPHILA. F. H. Sobels (Institute of Genetics of the State University, Utrecht, Netherlands). *Experientia* 12, 318-21(1956) Aug. (In English).

Results of experiments with two different concentrations of formaldehyde are presented. Pre-treatment with a concentration of 0.05 molar solution caused a significant increase in x ray induced mutation rates. Pre-treatment with 0.042 M formaldehyde solution enhanced mutation rates produced by the radiation. The data clearly show that pretreatment with low "sub-mutagenic" concentrations of formaldehyde enhances mutagenic action of x rays. NSA 10-11617

7505

Naval Medical Research Inst., Bethesda, Md. LONG-TERM OBSERVATIONS OF RADIATION CHANGES IN SALIVARY GLANDS AND THE GENERAL EFFECTS OF 1,000 r to 1,750 r OF X-RAY RADIATION LOCALLY ADMINISTERED TO THE HEADS OF DOGS. James A. English, Merrill G. Wheatcroft, H. W. Lyon, and Clarence Miller. *Oral Surg. Oral. Med., Oral Pathol.* 8, 87-99(1955). Sept. 21, 1955. NM-006-012. 04. 74.

Considerable morphologic alteration was observed in the salivary glands of dogs which had received 1,750 r of 200 kvp x ray radiation locally to the head. From a total of 6 dogs which were irradiated, 5 were sacrificed during a 5 to 16 months' period following exposure and provided the experimental material for histologic study. Normal glands were obtained from 7 unirradiated dogs for comparison. NSA 10-1164

7506

SOME RESEARCHES INTO THE ACTION OF RADIUM AND X RAYS CORRELATING THE PRODUCTION OF INTESTINAL CHANGES, THROMBOPENIA AND BACTERIAL INVASION. J. C. Mottram and A. Neave Kingsbury. *Brit. J. Exptl. Pathol.* 5, 220(1924). *Brit. J. Radiol.* 30, 18-25(1925).

7507

THE BIOLOGICAL EXPLANATION OF X-RADIATION EFFECTS. A. Richards. *Am. J. Roentgenol* 1-2, 908-11 (1913-15).

7508

THE BASIS IN EXPERIMENTAL PATHOLOGY FOR RADIUM THERAPY OF MALIGNANT DISEASE. R. Hughes Parry. *Brit. J. Radiol.* 29, 3-17(1924).

A review article concerned with the nature of the effect of radiation on malignant tissue in animals and man, in vivo and in vitro. Major topics: effects on tumors in situ, effects on tumors in vitro (histological effects, effects on growth after subsequent grafting, effect on immune response to tumor growth), effects on local resistance to tumor by various tissues (especially studies on connective tissue), radium in the treatment of malignant disease.

7509

ON THE SKIN REACTIONS TO RADIUM EXPOSURES AND THEIR AVOIDANCE IN THERAPY, AN EXPERIMENTAL INVESTIGATION. J. C. Mottram. *Brit. J. Radiol.* 29, 174-80(1924).

Description of various experiments with rats is presented.

7510

THE REACTION OF THE SKIN TO A RADIUM EXPOSURE REPEATED AFTER VARYING LENGTHS OF TIME.

J. C. Mottram. *Brit. J. Radiol.* 30, 387-91(1925).

7511

SOME EFFECTS OF EXPOSURE TO RADIUM ON THE BLOOD PLATELETS. (IN SECTION OF PATHOLOGY).

J. C. Mottram. *Proc. Roy. Soc. Med.* 16, 9-13(1923).

7512

THE OCCURRENCE OF TWO HERITABLE TYPES OF ABNORMALITY AMONG THE DECENDANTS OF X-RAYED MICE. C. C. Little and H. J. Bagg. *Am. J. Roentgenol.* 10, 975-989(1923).

7513

MORPHOLOGICAL CHANGES IN THE BLOOD PRODUCED BY RADIOLOGICAL TREATMENT OF CANCER UTERI AND CANCER MAMMA. Axel Westman. *Acta Radiol.* 4, 220-280(1925). (In German).

7514

A STUDY OF THE IMMEDIATE EFFECTS OF X RAYS ON THE FUNCTIONS OF CERTAIN TISSUES AND ORGANS. M. B. R. Swann. *Brit. J. Radiol.* 29, 195-219(1924).

Includes brief review of literature on x ray effects on patients (hematological and radiation sickness) and on experimental animals (kidney and liver function, g. 1. physiology, lethal effects). Experiments utilized cats, rabbits, guinea pigs; whole body exposures to x rays. Measured: blood pressure (abrupt fall in immediately lethal exposures), heart action (fibrillation in the immediately lethal cases), respiration reflex stimulation of respiration by galvanic stimulation of sciatic nerve effects on autonomic nervous system. Also studied effect on isolated heart (frog and rabbit), isolated uterus (guinea pigs) and intestines (g. pigs, cats, rabbits). Concludes: x rays lower blood pressure and prolonged exposures cause death from this effect which may, in early stages, be due to dilatation of arterioles and capillaries. Short exposures stimulate, long ones depress respiration, the effect probably being mediated via effects on sensory nerve endings, not the medulla. Bronchial muscular constricts. Autonomic nerves (vagus, sympathetic, and splanchnic) rendered more sensitive (greater reaction) by short exposures, may be less sensitive after long exposures. X rays cause isolated rabbit heart, but not frog heart, to die in systole. (short exposures increase contractibility). Isolated guinea pig uterus is driven into tonic contraction, later showing alternate periods of contraction and large automatic movement. In the intact animal, x rays send uterus into series of forceful contractions but latent period is longer than for isolated g. p. uterus. Isolated intestine; steadily increasing tonus. In vivo intestine slight rise in tonus, increased movement.

7515

EXPERIMENTAL STUDIES UPON THE LETHAL DOSES OF X RAYS AND RADIUM FOR HUMAN AND OTHER TUMOURS. S. Russ. *Brit. J. Radiol.* 29, 275-92 (1924).

7516

CONTRIBUTION TO THE STUDY OF THE RADIO-SENSITIVITY OF SEEDS AT THE ONSET OF GERMINATION. J. Lambert. *Compt. rend. soc. biol.* 108, 240-4(1931). (In French).

7517

CONTRIBUTION TO THE EXPERIMENTAL PROVOCATION OF TUMOURS BY MEANS OF RADIUM. Frans Daels. *Brit. J. Radiol.* 30, 474-476(1925).

7518

BIOLOGICAL REACTIONS OF X RAYS; EFFECT OF RADIATION ON THE NITROGEN AND SALT METABOLISM. C. F. Cori and G. W. Puncher. *Am. J. Roentgenol.* 10, 738-745(1923).

Increase in total nitrogen metabolism in post-radiation periods occurred, but only the urea, ammonia and uric acid, of the various nitrogen fractions, showed an increase.

7519

INVESTIGATIONS INTO THE BIOLOGICAL EFFECTS OF FILTERED AND UNFILTERED X RAYS, AS MEASURED ON PEAS. Leif Arntzen and Carl Krebs. *Acta Radiol.* 4, 5-28(1925).

7520

ANIMAL TUMOR CELLS MADE RESISTANT TO X-RAYS BY X-RAYS. S. Russ. *Lancet* 1, 592-3(1924).

Moderate doses of roentgen rays upon animal tumor cells retard their normal rate of growth while greater doses increase the resistance of the tumor cells to the rays.

7521

SKIN AND TUMOUR REACTIONS AND THEIR BEARING UPON RADIO-THERAPY. R. V. Hudson. *Brit. J. Radiol.* 30, 432-43(1925).

Experiments performed upon skin of rat and upon Jensen's rat sarcoma irradiated in vitro with beta and gamma rays are described and discussed.

7522

EXPERIMENTAL RESEARCHES PROVING THE DELETERIOUS INFLUENCE OF ROENTGEN-RAYS ON THE OVULES IN THE OVARY OF RABBITS. L. F. Driessen. *Acta Radiol.* 3, 86-87(1924).

7523

RESEARCHES ON THE MODIFICATIONS IN THE NUMBER AND FORMULA OF THE ELEMENTS OF THE BLOOD BROUGHT ABOUT BY WEAK DOSES OF X RAYS TO THE SPLEEN. C. Vianello. *Radiol. Med.* 10, 139-61 (1923).

Doses have cumulative action. Minimum dose applied once brings about leucocytosis; when applied repeatedly brings about leucopenia.

7524

CERTAIN BIOLOGICAL PRINCIPLES OF RADIATION THERAPY. S. Winters. *Am. J. Roentgenol.* 10, 776-781 (1923).

The cellular reaction to radiation depends upon the amount of radiant energy absorbed, whether it be primary or secondary in origin. The susceptibility to short wave length therapy is a cellular characteristic depending upon a definite histological structure. The normal tissue reaction to radiation and neoplastic invasion depends to a large degree upon the well being of the body as a whole. There is sufficient data extant to predicate on a priori grounds those tissues or tumors which will prove radio-resistant or radiosusceptible.

7525

THE MECHANISM OF THE ACTION OF ROENTGEN RAYS ON THE DEVELOPMENT OF SPONTANEOUS TUMORS IN MICE. James B. Murphy, Joseph Maisin, and E. Sturte. *Compt. rend. soc. biol.* 90, 972-4(1924).

Experiments led to the conclusion that tumor cells in vivo are no more sensitive to roentgen rays than they are in vitro.

7526

THE EFFECT OF RADIUM RADIATIONS ON THE RATE OF CELL DIVISION. Charles Packard. *J. Exptl. Zool.* 21, 199-212(1916).

Author reports on a series of experiments with the fertilized eggs of the arbacia.

7527

THE EFFECT OF ROENTGEN RAYS ON THE BODY FLUIDS AND ON THE METABOLISM OF THE HUMAN ORGANISM. A. Mahner and H. Zacherl. *Strahlentherapie* 16, 163-94(1924). (In German).

7528

ON THE PHYSICO-CHEMICAL NATURE OF THE ACTION OF RADIOACTIVITY ON PROTOPLASM. A. Richards and Alvalyn E. Woodward. *Am. J. Roentgenol.* 4, 564-70(1917).

Radioactive rays act as a stimulus to metabolism. A weak stimulus accelerates all metabolic activities, both constructive and destructive; a strong stimulus retards or, if strong enough, stops all activities of life. The most satisfactory explanation of the facts then available was based upon a theory of enzyme changes caused by the radiation.

7529

SOME BIOLOGICAL ASPECTS OF THE RADIATION THERAPY OF CANCER. Claude Reguad. *Am. J. Roentgenol.* 12, 97-101(1924).

Analysis of the effects of x and gamma rays on the testicles of mammals is presented.

7530

SPECIAL HISTOLOGICAL LOCALIZATIONS OF POLONIUM WITHIN CERTAIN ORGANS. Antoine Lacassagne and Jeanne Lattes. *Compt. rend. soc. biol.* 90, 485-7(1924). (In French).

Polonium was injected into rabbits. Large amounts of polonium became fixed in cortex of kidney, liver, and pulmonary epithelium.

7531

HISTOLOGIC LOCALIZATION OF POLONIUM WITHIN THE HEMATOPOIETIC ORGANS. Antoine Lacassagne and Jeanne Lattes. *Compt. rend. soc. biol.* 90, 487-9(1924). (In French).

Large amounts of polonium are fixed in the cells of the phagocytic reticulo-endothelial apparatus. Fixation of polonium in hematopoietic organs interferes with the formation of blood cells.

7532

ROENTGEN-RAY STIMULATION OF THE PANCREAS IN EXPERIMENTAL PANCREATIC DEFICIENCY. William F. Petersen and Clarence C. Saelhof. *Am. J. Med. Sci.* 163, 391(1922).

7533

THE EFFECTS OF ROENTGEN RAYS AND RADIOACTIVE SUBSTANCES ON LIVING CELLS AND TISSUES. Leo Loeb. *Am. J. Roentgenol.* 9, 497-501(1922).

There are intrinsic sources of radioactivity within the body. Different cells have different degrees of sensitivity to radiation. Radiation affects cytoplasm as well as nucleus. There is a graded series of effects of radiation on cell function. The intensity of radiation required for these graded effects varies with the sensitiveness of the cells and tissues upon which it acts. In some cases, there is a latent period separating the time of application of the rays and the appearance of the first manifest consequences stimulation or depression. Some indications that through repeated radiations, an immunization of tissues against the effect of radiation can take place. Cancer cells are especially susceptible to radiation. Some discussion on effects of radiation on tumors.

7534

THE EFFECT OF ROENTGEN RAYS UPON GROWTH ACCELERATION AND RETARDATION. V. Altmann, D. Rochlin and E. Gleichgewicht. *Fortschr. Gebiete Roentgenstrahlen* 31, 49-51(1923). (In German).

Studies on plants indicated that the initial effects of small x ray doses was accelerated development. Ultimately, the effect was detrimental. Authors then considered the implications of such studies for the effects of x ray in therapy and the biological effects in general.

7535

THE ACTION OF ROENTGEN RAYS UPON THE TESTICLE

OF THE ROOSTER. Jacques Benoit. *Compt. rend. soc. biol.* 90, 802-5(1924). (In French).

Irradiation of the animals resulted in complete and permanent disappearance of seminal cells but did not interfere with development of crest. This indicates that hormone responsible for this secondary sex character is derived from interstitial cells or cells of Sertoli.

7536

THE EFFECT OF ROENTGEN RAYS ON ENDOCELLULAR AND METABOLIC PROCESSES. O. Strauss. *Strahlentherapie* 16, 195-207(1924). (In German).

7537

A CONTRIBUTION TO THE STUDY OF THE EFFECTS OF RADIUM UPON RABBIT OVARIES. Howard A. Weis. *Surg. Gynecol. Obstet.* 36, 373-82(1923).

Author found no evidence that ova and maturing follicles were affected by 600 mg hrs of radium in these experiments using radium barium sulfate and shielding to exclude secondary γ rays.

7538

EFFECTS OF IRRADIATION ON FETAL DEVELOPMENT. Harold Bailey and Halsey J. Bagg. *Am. J. Obstet. Gynecol.* 5, 461(1923).

Authors describe experimental and clinical studies relating to the effects of radium and x-ray irradiation upon the functional activity of the ovary and the reaction upon the developing fetus, when irradiation is given before or during the various stages of pregnancy. Irradiation before fertilization resulted in greater deformities in fetus than did irradiation after conception, but irradiation in early pregnancy caused greater damage to fetus than irradiation late in pregnancy.

7539

A STUDY OF THE COMBINED ACTION OF X-RAYS AND OF VITAL STAINS UPON PARAMECIA. W. M. Baldwin. *Biol. Bull.* 39, 59(1920).

7540

THE EFFECT OF X-RAYS ON THE LENGTH OF LIFE OF *TRIBOLIUM CONFUSUM*. Wheeler P. Davey. *J. Exptl. Zool.* 22, 573(1917).

X rays have a lethal effect on *T. confusum*. The lethal effect bears a definite mathematical relation to the logarithm of the total x ray dose. An extension of the Psycho-physic law gives a theoretical explanation of the experimental data, if the resistance rather than the susceptibility of the organism to the x-rays is considered. (from author's summary).

7541

EARLY DIAGNOSIS OF PULMONARY TUBERCULOSIS BY THE USE OF THE X-RAYED GUINEA PIG. W. H. Eckford. *J. Lab. Clin. Med.* 3, 175(1917).

It is possible by means of the x ray to increase susceptibility of guinea pigs to tuberculosis. Frequently-repeated doses have a more certain effect than a single dose. Destruction of lymphoid cells in itself is insufficient to explain the decreased resistance.

7542

EFFECT OF RADIOACTIVE SUBSTANCES ON MOUSE CANCER. A. VanWassermann. *Deut. med Wochschr.* 40, 524(1914).

Author concludes that radioactive substances act directly on cancer cells. They do not kill cells but stop mitosis. The bactericidal forces of the body kill the sterile cells.

7543

THE EFFECT OF RADIANT ENERGY UPON THE CIRCULATION IN THE ISOLATED FROG'S HEART. Kawashima. *Strahlentherapie* 17, 381-89(1924). (In German).

7544

EXPERIMENTAL INVESTIGATIONS OF THE BIOLOGICAL EFFECT OF THORIUM X, ESPECIALLY ON THE BLOOD.

A. da Silva Mello. Z. klin. Med. 81, 285-354(1915). (In German).

Reports on results of various experiments with rabbits and rats in which thorium X, diluted with salt solution, was subcutaneously injected.

7545

REGARDING THE GROWTH-PROMOTING EFFECT OF ROENTGEN RAYS ON HIGHER PLANTS. G. Schwartz, Czepa, and Schindler. Fortschr. Gebiete Roentgenstrahlen 31, 665-80(1924). (In German).

Experiments with a great variety of plants are described. White filter paper without nutrient solution was used as culture medium. Irradiation was started on the third day after the planting of the seed. Authors conclude that roentgen-ray doses inhibit plant growth.

7546

EFFECT OF X-RAYS ON BACILLUS PRODIGIOSUS.

P. S. Meyer. Klin. Wochschr. 2, 297(1932). (In German).

Culture of Bacillus prodigiosus, after being irradiated once with x rays, is damaged in its growth. After continuous radiation, resistance develops. Resistance is towards x rays and does not exist towards ultraviolet light.

7547

CONCERNING THE INDIRECT DAMAGING EFFECTS OF IRRADIATION ON THE BODY THROUGH IRRADIATION OF ISOLATED ORGANS. Fritz. Poos. Klin. Wochschr. 1, 836(1922). (In German).

7548

SOME PHASES OF RADIUM ACTION WITH SPECIAL REFERENCE TO THE HEMATOPOIETIC SYSTEM.

John A. P. Millet and Theodore Mueller. J. Cancer Research 3, 127-179(1918).

The blood of ten cases of squamous cell carcinoma of the cervix, uteri and vagina was studied, in order to ascertain the immediate and remote effects of radium and x ray treatment upon the formed elements of the blood.

7549

THE ROENTGEN SENSITIVENESS OF ACTINOMYCETES.

Hans Kleesattel. Strahlentherapie 17, 390-2(1924). (In German).

7550

THE EFFECT OF ROENTGEN RAYS ON PROTEINS OF THE PLASMA. H. W. Knipping and H. L. Kowitz. Fortschr. Gebiete Roentgenstrahlen 31, 660-64(1924). (In German).

Plasmic protein determinations in patients receiving radiation therapy are reported.

7551

THE ACTION OF PRIMARY AND SECONDARY ROENTGEN RAYS UPON BACTERIA. L. Halberstaedter and P. S. Meyer. Fortschr. Gebiete Roentgenstrahlen 29, 489-495 (1922). (In German).

B. prodigiosus was irradiated with 180 K. V., 2.5 ma, 20 cm. distance, with or without filtration through glass. Twenty minutes exposure interfered with growth and coloration, 2-hr exposure sterilized culture. Since dose required to affect bacteria is so great, it is doubtful that it will have much practical application.

7552

THERAPEUTIC EXPERIMENTS IN "EXPERIMENTAL CANCER OF PLANTS." A. Gosset, A. Gutmann, G. Lakhovsky, and J. Magrou. Compt. rend. soc. biol. 91, 626-8(1924). (In French).

Palargonium zonatum was inoculated with Bact. tumefaciens in order to produce tumors. Plants were irradiated daily for 3 hrs. Continued treatment resulted in necrosis of the tumor. None of the normal tissues of the plant showed injury.

7553

EXPERIMENTAL RESEARCHES ON THE ACTION OF THE BETA AND GAMMA RAYS OF RADIUM IN THE TISSUES FOLLOWING RADIUM-PUNCTURE. Antoine Lacassagne. J. radiol. et electrol. 5, 160(1921). (In French).

7554

BIOLOGICAL DOSES IN DEEP RADIOTHERAPY. I. Solomon. J. radiol. et electrol. 7, 323-28(1923). (In French).

7555

STUDY OF THE BIOLOGIC ACTION OF THE ROENTGEN RAYS. M. I. Nemenoff. Russkiy Vrach. 15, 629. Ref. J. Am. Med. Assoc. 67, 1121(1916).

Authors studied proliferation of interstitial cells and the cells of the prostate gland when testicles of dogs were exposed to Roentgen rays. Roentgen exposures do not modify supply of nourishment to the testicles and as generative cells and cells of external secretion are destroyed by the radiation, the other cells get the benefit of the nourishment which otherwise would have gone to generative cells.

7556

INFLUENCE OF WEAK RADIOACTIVITIES ON GERMINATION. D. Montet. Compt. rend. soc. biol. 109, 678-80 (1932). (In French).

7557

VARIATIONS IN THE RADIOSENSITIVITY OF SEEDS OF LENS ESCULENTA AND PISUM SATIVUM IN THE COURSE OF HYDRATION. S. Lallemand. Compt. rend. soc. biol. 109, 1284-7(1932). (In French).

7558

Hawaii Univ., Honolulu. Hawaii Marine Lab. RADIOISOTOPE UPTAKE IN MARINE ORGANISMS WITH SPECIAL REFERENCE TO THE PASSAGE OF SUCH ISOTOPES AS ARE LIBERATED FROM ATOMIC WEAPONS THROUGH FOOD CHAINS LEADING TO ORGANISMS UTILIZED AS FOOD BY MAN. Annual Report from 1954-1955. Sept. 1, 1955. 47p. Contract AT-(04-3)-56. (AECU-3079).

7559

Rand Corp., Santa Monica, Calif. WORLDWIDE EFFECTS OF ATOMIC WEAPONS. PROJECT SUNSHINE. Aug. 6, 1953. 105p. Contracts AT(11-1)-135 and A133(038)-6413. (AECU-3488, R-251-AEC(Amended)).

The various aspects of long-range contamination due to the detonation of large numbers of nuclear devices are discussed. An improved methodology for assessing the human hazard is developed, and an extensive experimental program is proposed. NSA 11-8789

7560

COMPARISON OF THE INHIBITION OF GOITROGENESIS IN THE RAT PRODUCED BY X-RAYS AND RADIOACTIVE IODINE. John D. Abbott, I. Doniach, P. Howard-Flanders, and J. H. Logothetopoulos (Hammersmith Hospital, London). Brit. J. Radiol. 30, 86-8(1957). NSA 11-4788

7561

IDENTIFICATION OF HALF-TRANSLOCATIONS PRODUCED BY X-RAYS IN DETACHING ATTACHED-X CHROMOSOMES OF DROSOPHILA MELANOGASTER. Seymour Abrahamson, Irwin H. Herskowitz, and H. J. Muller (Indiana Univ., Bloomington). Genetics 41, 410-19(1956). NSA 10-9046

7562

THE RELATIVE CONSTANCY OF THE X-RAY-INDUCED MUTATION FREQUENCY OF DROSOPHILA MELANOGASTER SPERM IN INSEMINATED FEMALES. S. Abrahamson and J. D. Telfer (Indiana Univ., Bloomington). Genetics 41, 677-84(1956). NSA 11-844

7563

Chicago Univ. Metallurgical Lab.

ACUTE TOXICITY OF INTUBATED PLUTONIUM. Richard Abrams, Henri Seibert, Lyman Forker, David Greenberg, Hermann Lisco, Leon O. Jacobson, and Eric L. Simmons. June 1946. Decl. Dec. 20, 1955. 56p. Contract W-7401-eng-37. (M-5176, CH-3875).

Pu in 4^+ state and in the absence of complexing agents was administered intratracheally to rats. Five groups of animals received doses ranging from 7.5 to 500 μ c per 200 gram rat. All of these doses were lethal, mean survival time ranged from 203 days for the lowest dose to 26 days for the highest. The 150-day LD_{50} inhalation dose was only 0.1 that of intravenous dose. Pu seemed to be tightly bound in lungs. Dose remained in lung after 210 days. Approximately 15% of the initial dose was deposited in the skeleton. NSA 10-8757

7564

EXPERIMENTAL STUDIES ON THE BACTERICIDAL ACTION OF RADIATION OF VARIOUS WAVE LENGTHS. V. Dall'Acqua and V. deAntoni. Radiol. med. 18, 869-887(1932). (In Italian).

7565

Utah. Univ., Salt Lake City. Radiobiology Lab. ANNUAL PROGRESS REPORT. Mar. 31, 1955. 59p. Contract AT(11-1)-119.

Progress is reported in studies on the toxic effects of radioactive heavy metals in dogs. Data are included on the pathological effects, metabolism, and bone deposition of Pu, Ra, Ra^{224} , Th, Th^{228} , Sr^{85} , Sr^{90} , and Y^{90} , the effects of irradiation on the skeletal uptake of Sr, the hematological effects of internally deposited Pu and Ra, and the role of Th^{228} in Ra poisoning. A list of publications during the period is included. NSA 11-5133

7566

Smith (E. H.) and Co., Silver Spring, Md. ANALYSIS OF ANIMAL WHOLE-BODY IRRADIATION DATA. 208p. (AFSWP-496).

Data are reviewed from recent studies on both the chronic and acute effects of whole-body irradiation on laboratory animals. The accuracy of instrumentation, and the effects of backscatter, depth dosage, and radiation energy on radiation dosage determinations are considered. The effectiveness of various compounds in the prophylaxis and therapy of radiation injuries is discussed briefly. NSA 11-4224

7567

EXPERIMENTAL STUDY ON THE EFFECT OF X-RAYS ON THE HEART. S. Ajsaka. Japanese Obstet. and Gynecol. Soc. Jour. 19, 430-56(1936).

7568

THE EFFECT OF ORALLY ADMINISTERED FAT EMULSION ON SURVIVAL OF THE IRRADIATED RAT. Polly Vance Akin, John G. Conglio, and Granville W. Hudson. Radiation Research 6, 543-7(1957). (Vanderbilt Univ. School of Medicine, Nashville, Tenn.).

The possible effect of forced feeding of a fat emulsion to rats irradiated with 750 r or 1000 r Co^{60} x irradiation and with 800 r x irradiation was studied. No definite effects due to the emulsion were noted at the lower level of Co^{60} irradiation. With 1000 r Co^{60} and 800 r x irradiation, rats fed fat emulsion had lower food consumption, more severe diarrhea, greater stomach distension, and shorter survival times than irradiated controls forced-fed water. There was no effect on hematological values. NSA 11-8805

7569

BLOOD REACTIONS IN RABBITS IN THE EARLY STAGES OF PENETRATING RADIATION. M. F. Aleksandrova. Med. Radiol. 1, No. 4, 47-52(1956). (In Russian). NSA 11-853

7570

ON THE RATE OF TRACER INCORPORATION INTO THE PROTEINS OF IRRADIATED ANIMAL ORGANS. RATE OF TRACER INCORPORATION INTO THE PROTEIN

IN THE CASE OF HEAD IRRADIATION WITH A DOSE OF 4500 r. S. N. Aleksandrow. Doklady Akad. Nauk S. S. S. R. 106, 569-72(1956). (In Russian).

Analytic studies are made of the causes producing the changes in the rate of tracer incorporation into the protein of a series of organs in mice exposed to total x-ray radiation in doses inducing acute and sub-acute forms of radiation sickness. Also, the tracer incorporation rate into the protein during irradiation sickness in cases where only heads of animals were exposed was investigated. A dose of 4500 r and radioactive sulfur S^{35} as a tracer were used. NSA 10-7410

7571

ON THE RELATION OF THE THERAPEUTIC EFFECT OF X RAY ON THE GENERAL RESISTANCE OF ANIMALS CARRYING MALIGNANT NEOPLASMS. S. N. Aleksandrov. (Leningrad Central Research Roentgen-Radiological Inst.). Doklady Akad. Nauk S. S. S. R. 113, 90-3(1957). (In Russian). NSA 10-7080

7572

California. Univ. of Los Angeles. THE EFFECT OF GAMMA IRRADIATION UPON THE RETINA OF BUFO. Bennet M. Allen and Marion Hubble Devick. (1956). 19p. Contract AT-04-1-GEN-12. (UCLA-367). NSA 10-3969

7573

POSTIRRADIATION PROTECTION OF RABBITS BY INJECTION OF "SPLENIC" PLASMA. Bruce R. Allen, H. Gwendolyn Wardell, and Michael Clay (Columbia Univ., N. Y.). Science 123, 1080-1(1956).

The protective action of freshly drawn cell-free splenic plasma injected intraperitoneally into chinchilla rabbits soon after exposure to 1000 r of x rays is very definite. The protection conferred by the plasma after the first 35cc of blood is questionable. (from authors' summary). NSA 10-9972

7574

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF FISSION NEUTRONS FOR THE PRODUCTION OF ACUTE MORTALITY IN MICE. N. Delhas and H. Curtis. Radiation Research 8, 166-180(1958).

An RBE of 1.7 of fission neutrons with respect to 250-Kvp x rays to produce an LD_{50} in 30 days in CF_1 female mice was determined. X ray LD_{50} dose was 636 rads and neutron dose was 366 rads. Tissue-equivalent ionization chambers were employed to measure neutron dose.

7575

ROLE OF OXYGEN IN MODIFYING THE RADIOSENSITIVITY OF E. COLI B. Tikvah Alper and P. Howard-Flanders (Hammersmith Hospital, London). Nature 178, 978-9 (1956) NSA 11-883

7576

MITOTIC INHIBITION AND CHROMOSOME BREAKAGE INDUCED IN GRASSHOPPER NEUROBLASTS BY X-IRRADIATION AT KNOWN MITOTIC STAGES. W. St. Amand. (Univ. of Tennessee, Knoxville and Oak Ridge National Lab., Tenn.). Radiation Research 5, 65-78 (1956).

Neuroblasts irradiated in very late prophase, prometaphase, and metaphase progress to anaphase with little or not alteration of expected timing. Cells treated in late prophase may progress to anaphase with little or no delay, or they may revert to a stage similar to interphase only after passing through prophase for a second time. Chromosome breakage, average mitotic delay, sensitivity curves relating mitotic stage to chromosome breakage and sensitivity curves for viability and chromosome breakage are discussed. (from author's summary). NSA 10-9952

7577

RELATIONSHIP BETWEEN THE PROCESSES OF RECONSTRUCTION AND DISTRIBUTION OF MINERALS IN BONE. I. INVESTIGATION CONDUCTED WITH THE METHOD OF STUDY OF ABSORPTION OF ROENTGEN RAYS. Rodolfe Amprino. Translated from *Z. Zellforsch. u. mikroskop. Anat.* 37, 144-83(1952). NSA 11-6190

7578

A SUBSTANCE OBSERVED WITHIN THE VASCULAR SYSTEM OF DOGS RECEIVING LETHAL EXPOSURES OF WHOLE-BODY X-IRRADIATION. A. C. Anderson. (Univ. of California, Davis). *Radiation Research* 6, 361-70(1957).

A complex polysaccharide was observed within vascular system of dogs succumbing to whole-body x-radiation. This substance is presumably a secondary result of radiation. This polysaccharide was observed as a mass within larger blood vessels and as globules within capillaries. Bacterial stains fail to reveal evidence of micro-organisms within this polysaccharide. Evidence suggests that globules of this material are related to capillary congestion and hemorrhage developing late in radiation syndrome seen in dogs. (from author's summary). NSA 11-5730

7579

RELATIVE RESISTANCES OF MICROORGANISMS TO CATHODE RAYS. III. BACTERIAL SPORES. R. E. Pepper, N. T. Buffa and V. L. Chandler. *Appl. Microbiol.* 4, 149-52(1956).

7580

RADIATION THERAPY: A GENERAL THEORY J. Robert Andrews. (U. S. Dept. of Health, Education and Welfare, Bethesda, Md.). *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 77, 531-9(1957) NSA 11-4800

7581

Argonne National Lab., Lemont, Ill.
BIOLOGICAL AND MEDICAL RESEARCH DIVISION
QUARTERLY REPORT (FOR) JULY, AUGUST, SEPTEMBER 1956. (1956). 142p. Contract W-31-109-eng-38. (ANL-5655).

Includes reports on: effects of γ rays on the serological properties of ovalbumin and polio virus, toxicity of locally deposited Y^{91} in mice, the effects of radiation on the mating reaction in paramecium, early changes in plasma glucose in x rayed adult chickens, dose rate effect upon teratogenesis in grasshoppers, the survival of mice exposed daily to γ radiation, acute lethal response of first and second generation mice to whole-body x irradiation, mortality of female mice exposed to Co^{60} , lethal dosage of neutrons in mice, radiosensitivity of giant multinucleated amoeba, *Pelomyxa palustris*. NSA 11-4781

7582

THE SENSITIVITY OF THE CELL TO X RAYS. S. Timonen. *Exptl. Cell Research* 4, 142-150(1953).

The effect of x rays on onion root-tip cells was studied in combination with indole-3-acetic acid and colchicine treatments. Greatest sensitivity (breakage and reunion was shown by meristematic cells which had been arrested in interphase by indole-3-acetic acid. (from abstract). BA 27-21190

7583

Argonne National Lab., Lemont, Ill.
BIOLOGICAL AND MEDICAL RESEARCH DIVISION
QUARTERLY REPORT (FOR) OCTOBER, NOVEMBER, DECEMBER 1956. 1957. 122p. Contract W-31-109-eng-38. (ANL-5696).

Includes reports on: effect of Y^{90} on growth of ascites carcinoma (mouse), pathological effects of Sr^{90} in dogs and cats, effects of x irradiation on blood volume and hematopoietic system in chicks; spermatogenesis in grasshoppers, hyperpigmentation induced in appendages of

mice by γ irradiation; influence of paired doses of Co^{60} γ on recovery from radiation injury, survival of four-day chick embryo irradiated with fission neutrons; failure of isomers of phenargan to protect against radiation lethality in mice. NSA 11-7910

7584

URANIUM MILL EMPLOYEES TESTED TO LEARN RADIUM BODY BURDEN. A. M. A. Arch. Ind. Health 15, 175-6(1957). NSA 11-4251

7585

PROTECTION AGAINST X-RAY AND BETA RADIATION LEAD GLASS FABRIC. Vincent W. Archer, George Cooper, Jr., J. G. Kroll and D. A. Cunningham. *J. Am. Med. Assoc.* 148, 106-108(1952).

7586

THE HAZARDS FROM THE INCREASING USE OF IONIZING RADIATIONS: A SYMPOSIUM. II. THE DOSE TO OPERATOR AND PATIENT IN X-RAY DIAGNOSTIC PROCEDURES. G. M. Ardran. (Univ. of Oxford, England). *Brit. J. Radiol.* 29, 266-9(1956). NSA 10-9073

7587

IS THE PARENCHYMA OR THE STROMA OF THE ORGAN THE PRIMARY TARGET OF X-IRRADIATION? T. S. Argyris and H. B. Chase. (Syracuse Univ., N. Y. and Brown Univ., Providence, R. I.). *Exptl. Cell Research* 11, 646-8(1956).

Mouse skin was irradiated at various stages of the hair growth cycle in an attempt to gain more information about this problem. Data are presented from studies on the response to x irradiation of resting follicles present in skin at a variety of growth stages of hair cycle. NSA 11-3278

7588

Oak Ridge National Lab., Tenn.
RELATIVE BIOLOGICAL HAZARDS ASSOCIATED WITH RADIATIONS EXPECTED IN HOMOGENEOUS REACTORS K-23 AND K-49. E. D. Arnold and A. T. Gresky. June 7, 1955. 24p. Contract W-7405-eng-26. (CF-54-6-27)

The relative biological hazards of the various significant isotopes produced in K-23 and K-49 were obtained as functions of their maximum permissible concentrations in air, relative biological effectiveness in critical body organs, expected production rates, and decay. Conditions involving systems at biological equilibrium and an average 80-day reactor operating cycle were considered. Summation of these relative biological hazards in relation to the reported critical body organs permitted a qualitative analysis of the relative importance of critical organs in given cases, which may have significance in protections of personnel. NSA 11-2239

7589

ANGINA PECTORIS: ITS TREATMENT BY DEEP RADIATION THERAPY. F. C. Arrillaga. *Bull. mem. soc. med. hop. Paris* 52, 949-953(1928).

7590

California. Univ., Berkeley, Radiation Lab.
LONG-TERM SEQUELAE OF MASSIVE DOSES OF IODINE-131. I. HISTOPATHOLOGICAL FINDINGS. C. Willet Asling, Muriel E. Johnston, Patricia W. Durbin and Joseph G. Hamilton. Apr. 27, 1956. 16p. Contract W 7405-eng-48. (UCRL-3398).

Histopathological studies have been made of a number of tissues from rats that had survived various doses (ranging from 10 to 90 μ c per gram of body weight) of radioiodine. Findings described for each tissue at each dose level include staining reaction, degeneration and regeneration, and development of abnormal cells. NSA 10-6465

7591

"DIRECT EVIDENCE THAT BIOLOGICAL EFFECTS OF X-RAYS ARE NUCLEAR AND THAT FINAL X-RAYS

EFFECTS DO NOT DEPEND ON INITIAL CHANGE IN CYTOPLASM." B. L. Astaurov. Zhur. Obsheci Biol. 8, 421-41(1947). (In Russian).

7592

California. Univ., Berkeley, Div. of Medical Physics. IMMEDIATE AND DELAYED BIOCHEMICAL AND BIOLOGICAL EFFECTS OF IRRADIATION OF ANIMAL TISSUES. STATUS REPORT NO. 3 (FOR) JUNE 1947 TO DECEMBER 1947. 14p. Contract N6-ORI-III. (ATI-37462).

Methods which affect selective localization of radioactive compounds have been perfected for liver, spleen, and bone marrow. These are summarized with the status of the various investigations dealing with these specific irradiated tissues. A preliminary report of the effect of irradiation upon thyroid metabolism is attached, and it is noted that there is remarkably little effort upon iodine metabolism in the thyroid gland even with extreme irradiation dosages to the thyroid gland. NSA 11-4225

7593

AN INFLUENCE OF PLOIDY ON THE TIME OF EXPRESSION OF DOMINANT LETHAL MUTATIONS IN HABROBRACON. K. C. Atwood, R. C. von Borstel, and A. R. Whiting (Oak Ridge National Lab., Tenn. and Univ. of Pennsylvania, Philadelphia). Genetics 41, 804-13(1956).

Frequencies of x ray-induced dominant and recessive lethal mutations in *Habrobracon* oocytes are unchanged by subsequent fertilization with irradiated sperm. A significant proportion of the dominant lethal effect induced at metaphase I is expressed at a later stage in diploids than in haploids. Lethality caused by observable chromosome breakage can be delayed, whereas that due to other causes cannot. (from authors' summary). NSA 11-5147

7594

SENSITIVITY OF THE MOUSE TESTIS TO THE MUTAGENIC ACTION OF X-RAYS. C. Auerbach and B. M. Slizynski (Inst. of Animal Genetics, Edinburgh). Nature 177, 376-7 (1956).

Male mice were exposed to x ray doses from 400 to 600 r. A table presents the overall translocation frequency after the fourth litter, translocation frequency rises to a higher level, which is maintained to the end of the pre-sterile period. Authors conclude that spermatids are more sensitive to the mutagenic action of x rays than are mature spermatozoa. NSA 10-6476

7595

EFFECTS OF SINGLE AND FRACTIONATED DOSES OF X-RAYS ON MOUSE EMBRYOS. Robert Auerbach. (Oak Ridge National Lab., Tenn.). Nature 177, 574(1956).

The results of studies on the effects of single and fractionated doses of x radiation on developing mouse embryos *in vivo* indicates that while the incidence of malformation is not affected by fractionation, the severity of embryonic defects is far greater in response to a fractionated dose than in response to a single dose. NSA 10-7416

7596

EFFECTS OF X RADIATION ON INDUCTION OF LOCALIZED INFECTIONS. B. G. Avetkryan and A. G. Artemova (Inst. of Experimental Medicine). Med. Radiol. 1, No. 4, 35-41(1956). (In Russian).

A feces-free section of caecum was isolated by ligatures to produce a focus of auto-infection. Two days after the operation, mice received a 300 r dose of x rays. In unirradiated mice the infected segment contained bacteria in numbers of the order of 10^4 , in irradiated mice of the order of 10^5 and 10^6 , the maximum number being observed 2 days post exposure. Lymphatic nodes of

irradiated mice were found to be unable to fix bacteria and irradiated mice had much more extreme bacteremia. Authors feel that irradiation suppressed antimicrobial properties of the tissues. NSA 11-852

7597

RELATIONSHIP OF CATALASE AND SODIUM NITRITE TO PROTECTION AGAINST X-RAYS. C. S. Bachofer. (Univ. of Notre Dame, Ind.). Exptl. Cell Research 10, 665-74(1956).

Bacteriophage T1 was irradiated in presence of varying concentrations of catalase and sodium nitrite. High protection was conferred by high concentrations of catalase and of nitrite, with gross protection falling off rapidly when low concentrations of solute were used, although specific protection (protection per microgram of solute) was increased. With two protective agents combined there was impairment of ability of catalase to protect T1 against x rays. (from author's summary). NSA 10-9977

7598

ENHANCEMENT OF ACTIVITY OF NERVES BY X-RAYS. C. S. Bachofer. (Univ. of Notre Dame, Ind.). Science 125, 1140-1(1957).

Paired ventral caudal nerves of rats were irradiated on platinum electrodes at 280 Kv (peak) and 20 ma at a dose rate of 6 Kr/min. There was an initial small increase in conduction velocity followed by a steady decrease independent of the increase in spike amplitude. Conduction velocity showed an average increase of 5.8 per cent. Increase in spike amplitude is greatest for nerves kept in solution the shortest time prior to radiation. NSA 11-8782

7599

THE DANGERS FROM ROENTGENOLOGICAL DIAGNOSTIC EXAMINATIONS. Z. M. Bacq. J. belge radiol. 39, No. 5, 685-95(1956). (In French).

Increase of radioactivity of the earth, ignorance of irradiation which might increase the frequency of mutations in man (from the genetic point of view all doses are additive), the vast majority of these mutations are detrimental, and therefore genetic degeneration of mankind is to be feared. Physicians and radiologists should limit doses of radiation in all persons who might have children. Unnecessary or long exposure in x-ray procedures are to be avoided. Irradiation of the pelvic region, especially in pregnant women, and the testicles in young men should be refused. Dose levels should be reduced to a minimum. Chemical protection will eventually reduce danger. NSA 11-880

7600

HEMOTHERAPY IN RADIATION SICKNESS. A. A. Bagdasarov, B. F. Belyaeva, and L. S. Rogachev (Central Hematology and Blood Transfusion Inst.). Med. Radiol. 1, No. 5, 45-50(1956). (In Russian). NSA 11-2801

7601

Oak Ridge Gaseous Diffusion Plant, Tenn. MAXIMUM ALLOWABLE CONCENTRATION FOR AIRBORNE BETA CONTAMINATION. J. C. Bailey and H. F. Henry. July 5, 1951. Change from OUO Nov. 28, 1956. 16p. (AECD-3753; KS-213).

By comparing the damage produced by β particles and uranium α particles emitted by material uniformly distributed in the lungs, an equation was derived by which the maximum allowable atmospheric concentration of a β -emitting isotope for which lung damage is the limiting consideration can be calculated. It was calculated that the maximum allowable concentration is 20 counts per minute ft^3 as measured by the counter presently in use at K-25 for air sample β counting.

7602

THE OXYGEN EFFECT AND THE MUTATION PROCESS. William K. Baker. (Oak Ridge National Lab., Tenn.). pp. 191-200 of Mutation- Brookhaven Symposia in Biology No. 8, 1956.

Oxygen effect is discussed on basis of: (a) possible significance in problem of induced mutagenesis (b) generalities that can and cannot be made about O_2 effect on basis of available information and (c) recent atypical results bearing on mechanism of action of oxygen on chromosome breakage and rejoining. NSA 10-7426

7603

EXPERIMENTAL AND CLINICAL RESEARCH ON THE RADIOPROTECTIVE ACTION OF CYSTEAMINE AND CYSTAMINE. I. EXPERIMENTAL RESEARCH ON UNICELLULAR ORGANISMS. G. Baldini and L. Ferri (Univ. of Pavia, Italy). Brit. J. Radiol. 29, 623-4(1956). NSA 11-879

7604

EXPERIMENTAL AND CLINICAL RESEARCH ON THE RADIOPROTECTIVE ACTION OF CYSTEAMINE AND CYSTAMINE. II. EXPERIMENTAL RESEARCH UPON MAMMALS. G. Baldini and L. Ferri (Univ. of Pavia, Italy). Brit. J. Radiol. 30, 95-8(1957). NSA 11-4797

7605

EXPERIMENTAL AND CLINICAL RESEARCH ON THE RADIOPROTECTIVE ACTION OF CYSTEAMINE AND CYSTAMINE. III. CLINICAL RESEARCH. G. Baldini and L. Ferri (Univ. of Pavia, Italy) Brit. J. Radiol. 30, 271-3(1957). NSA 11-7071

7606

SIMILARITIES IN KILLING BY HEAT AND BY X-RADIATION IN THE INSECT DAHLBOMINUS FUSCIPENNIS (ZETT). William F. Baldwin. (Atomic Energy of Canada Ltd., Chalk River, Ont.). Radiation Research 5, 46-51 (1956). July.

Parallels in response to heat and to x irradiation were shown in the insect Dahlbominum fuscipennis (Zett.). The immediate consequence of high doses in both cases is a coma from which the insects may recover, to die later of the delayed effects. Tolerance diminishes with age, prior conditioning with moderately high temperatures increases female tolerance; diploid females are more resistant than haploid males, sharp breaks were found in curves relating dose and effect. All these observations are true for both agents. NSA 10-9951

7607

General Electric Co., Hanford Atomic Products Operation, Richland, Wash.
PHYSIOLOGICAL PARAMETERS FOR ASSESSING THE HAZARD OF EXPOSURE TO RUTHENIUM RADIOISOTOPES. II. CHRONIC EXPOSURE STUDIES. J. D. Ballou and R. C. Thompson. Dec. 1, 1956. 15p. Contract W-31-109-eng-52. (HW-46409).

Chronic exposure of rats to Ru^{106} in their drinking water for periods of up to 500 days resulted in tissue Ru concentrations of comparable hazard concern in kidneys, bone, and gonads. Because of uncertainties inherent in the extrapolation of the rat data to man, an unequivocal choice of critical organ among these three possibilities cannot be made. Based on a permissible dose to the critical organ of 0.3 rem per week, the maximum permissible concentration for Ru^{106} in water is calculated to be 4×10^{-9} uc/ml. NSA 11-3649

7608

ON THE MECHANISM OF THE PROPHYLACTIC ACTION OF CHRONIC HYPOXIA UPON RADIATION SICKNESS. (LABORATORY OF EVOLUTIONARY PHYSIOLOGY). Z. I. Barbashova. Doklady Akad. Nauk S. S. S. R. 107, 761-4(1956). (In Russian).

Preliminary acclimatization of rats to chronic hypoxia increases their resistance to ionizing radiation. Comparative evaluations were made to determine the functions of various systems in irradiated animals, acclimatized to hypoxia, and in control animals. Resistance to hypoxia was determined during the most active period of radiation sickness. NSA 10-9079

7609

RADIOIODINE STORAGE AND THYROID FUNCTION AFTER WHOLE-BODY IRRADIATION OF LIVING RATS. Gunther Barth and Friedrich Wolf. Strahlentherapie 99, 369-74(1956). (In German).

Iodine¹³¹ storage after whole-body irradiation of rats under protective covering of the thyroid gland has been compared to storage in normal controls. The result is demonstrated by a curve of biphasic course showing that after an initial decrease (depending on the dose) of the storage of 40 or 65% of the norm there follows, in case of irradiation with 650 r, an increased storage lasting about 50 to 55 days with adult animals and about 25 days with juvenile ones. NSA 10-9066

7610

DETERMINATION OF THE RBE OF ALPHA-PARTICLES FROM ASTATINE-211 AS COMPARED TO BETA-PARTICLES FROM IODINE-132 IN THE RAT THYROID. Johan K. Basson and Claire J. Shellabarger (Brookhaven National Lab., Upton, N. Y.). Radiation Research 5, 502-14(1956).

The results of a study of the effects of α -particles from At^{211} and β -particles from I^{132} on the capacity of the thyroid gland to accumulate I^{131} are presented. It appears that a β -particle dose of 2.8 times the corresponding α -particle dose was required to produce the same depression in I^{131} uptake. NSA 11-3289

7611

SENSITIVITY OF IMMATURE MOUSE SPERM TO THE MUTAGENIC EFFECTS OF X-RAYS. A. J. Bateman. (Cytogenetics Department, Christie Hospital and Holt Radium Institute, Manchester, Eng.). Nature 178, 1278-80(1956).

The highest mutagenic sensitivity is found in the relatively late stage sampled in the third week after radiation. Before and after this peak the sensitivity is almost constant, being about half that of the peak. NSA 11-1744

7612

INCIDENCE AND CHARACTERISTICS OF BETA RADIATION SURVIVORS (ESCHERICHIA COLI). W. Y. Koh, C. T. Morehouse, and V. L. Chandler Appl. Microbiol. 4, 153-55(1956).

Survivors of high dose irradiation in food preservation studies do not show an increase in radioresistance over the parent colony. (No radioresistant mutants produced.)

7613

Naval Radiological Defense Lab., San Francisco.
THE EFFECT OF DOSE RATE UPON IRON INCORPORATION INTO NEWLY FORMED ERYTHROCYTES OF RATS EXPOSED TO GAMMA RADIATION. S. J. Banm and D. J. Kimeldorf. Dec. 20, 1956. 14p. Project NM-006-015. (USNRDL-TR-128). NSA 11-5138

7614

ON THE FINAL PERIOD IN THE ACUTE RADIATION SICKNESS. G. V. Bavro. Med. Radiol. 2, No. 2, 31-41 (1957). (In Russian) NSA 11-7058

7615

HISTOPATHOLOGY OF THE NERVOUS SYSTEM AT DIFFERENT PERIODS OF ACUTE RADIATION SICKNESS. A. G. Beglaryan, K. A. Kyandaryan, and S. A. Papoyan (Armenian Ministry of Health, Research Inst. of

Roentgenology and Oncology). Doklady Akad. Nauk, S. S. S. R. 112, 422-4(1957). (In Russian). NSA 11-6198

7616

ROENTGEN DOSIMETRY. COMPLETE HANDBOOK OF RADIATION THERAPY, BIOLOGY, PATHOLOGY AND THERAPY. H. Behnken. (1929). (In German).

7617

SOME MEANS OF ELIMINATING ERYTHROCYTE HEMOLYSIS INDUCED BY IONIZING RADIATION.

A. P. Belousov (Molotov State Research Inst. of Roentgenology and Radiology). Med. Radiol. 2, No. 2, 46-51(1957). (In Russian).

Erythrocytes from irradiated rabbits and those from healthy rabbits irradiated in vitro were examined for hemolysis. Parenteral casein and saccharose solutions had protective action against chemical hemolysis. Parenteral native protein had no protective effect. Casein solution in vitro stopped the disintegration of erythrocytes irradiated with 1300 r. Transfusion of colloidal salt solution during development of the radiation sickness stopped erythrocyte disintegration, prevented development of anemia. It alleviated the radiation reaction. NSA 11-7073

7618

SPONTANEOUS AND RADIATION-INDUCED IRIS ATROPHY IN MICE. W. H. Benedict, K. W. Christenberry, and A. C. Upton (Oak Ridge National Lab., Tenn.). Am. J. Ophthalmol. 40, No. 5, Part II, 163-9(1955).

Male and female mice were exposed to acute whole body radiation at six to 12 weeks of age and examined periodically throughout life. Atrophy of the iris occurred in all aging mice. The atrophy appeared sooner and progressed to greater severity in irradiated mice than in controls. NSA 10-7402

7619

Rochester, N. Y. Univ., Atomic Energy Project. FAILURE OF β , β -AMINOETHYLISOTHIURONIUM $\cdot$ Br. HBr TO PROTECT AGAINST LETHAL TOTAL BODY X-IRRADIATION IN DOGS. R. E. Benson, S. Michaelson, and J. W. Howland. June 5, 1956. 15p. (UR-452). Contract W-7401-eng-49.

The protective effect of a new compound, S, β -Aminoethylisothuonium $\cdot$ Br $\cdot$ HBr (AET), against the lethal effects of 594 r of 1-Mev x radiation was tested in 21 dogs utilizing 14 additional dogs as controls. Data are presented which indicate failure of this compound to enhance survival or survival rate. NSA 10-6494

7620

COMPARISON OF PARENTERAL AND ORAL PROTEIN FEEDING ON RADIATION SUSCEPTIBILITY IN PROTEIN-DEPLETED RAT. F. L. Jennings. Proc. Soc. Exptl. Biol. Med. 80, 10-13(1952).

7621

SOME PHYSICAL CONSIDERATIONS GOVERNING THE CHOICE OF INTERNALLY ADMINISTERED RADIO-ISOTOPES FOR THERAPY. M. Berman, J. E. Rall, and J. Heslin (Sloan-Kettering Inst., New York). Phys. in Med. Biol. 1, 243-57(1956-57). NSA 11-6219

7622

Michigan. Univ., Ann Arbor.

STUDY OF THE BIOLOGICAL EFFECTS OF IRRADIATION. PROGRESS REPORT FOR PERIOD OF JANUARY 16, 1953 TO JANUARY 15, 1954. Frank H. Bethell. 109p. (AECU-3030).

Progress is reported in studies on the survival of experimental animals after total-body irradiation, and in studies on the fundamental problems concerned with the biochemical, physiological, and hematological effects of irradiation on experimental animals. Data are included from studies on the role of the pituitary in blood

cell regeneration after radiation injury. Blood coagulation problems, the effects of irradiation on enzyme systems, and the effects of x irradiation on Trichinella spiralis and on control of trichinosis by γ irradiation of pork.

NSA 11-3274

7623

Michigan Univ., Ann Arbor.

STUDY OF THE BIOLOGICAL EFFECTS OF IRRADIATION. PROGRESS REPORT FOR PERIOD OF JANUARY 16, 1954 TO JANUARY 15, 1955. Frank H. Bethell, Charles H. Altshuler, Burton L. Baker, David F. Bohr, Owen France, Henry J. Gomberg, Sylvester E. Gould, Jean Guy Laurin, James W. Linman, Richard L. Potter, James G. Van Dyke, and John B. Villella. 163p. (AECU-3139). NSA 10-3767

7624

Oak Ridge National Lab., Tenn.

A STUDY OF THE DISTRIBUTION AND EXCRETION OF URANIUM IN MAN. AN INTERIM REPORT. S. R. Bernard and E. G. Struxness. June 18, 1957. 58p. (ORNL-2304).

Data are presented on the tissue distribution and excretion of enriched uranium following intravenous administration to man. Data on methods of dosage determination and the effects of radiation from internally deposited U on various metabolic processes are included. NSA 10-8815

7625

MODIFICATION OF THE RELEASE OF CELLULAR CONSTITUENTS BY IRRADIATED ESCHERICHIA COLI. Daniel Billen (Oak Ridge National Lab., Tenn.). Arch. Biochem. Biophys. 67, 333-40(1957).

Release of cellular constituents occurred when x irradiated (60,000 r) suspensions of E. Coli B/r were incubated in phosphate buffer-glucose solution at 37°C. ATP accounted for less than 10% of total 260 m μ absorbing material released by such cells other constituents (maximum absorption of 260 m μ) lost from exposed cells were nucleic acid fragments from free bases to complex nucleic acid fragments - no release of peptides above that found with unirradiated cells. Release of nucleic acid fragments was inhibited under following conditions (a) absence of phosphate in suspending fluid, (b) absence of exogenous metabolite; (c) presence of arsenate, (d) low temp. of incubation. Ultra violet light-exposed cells, suspended in glucose-phosphate solution at 37°C released 360 m μ -absorbing material. This release was dependent on same conditions as for x ray exposed cells. NSA 11-7050

7626

RECOVERY OF LETHALLY IRRADIATED MICE BY TREATMENT WITH BONE MARROW CELLS MAINTAINED IN VITRO. Daniel Billen (Oak Ridge National Lab., Tenn.). Nature 179, 574-5(1957). NSA 11-5739

7627

TUMOR INDUCTIONS IN RATS BY SINGLE TOTAL-BODY X-IRRADIATION. R. T. Binhammer, J. C. Finerty, M. Schneider, and A. W. B. Cunningham (Univ. of Texas Medical Branch, Galveston). Radiation Research 6, 339-48(1957).

Female Holtzman rats were irradiated with lethal doses of x rays (700 r) and protected by post-radiation parabiosis. All irradiated rats which survived for a year or more developed cataracts, and in about half of all exposed rats neoplastic growths were observed. Adenocarcinomas in axilla and groin accounted for more than half of the tumors. Croton oil increased the number of tumors, but growth hormone and methylcholanthrene showed no cocarcinogenic effect. (from authors' summary). NSA 11-5729

7628

PREMATURE CHANGE IN BONES OF FULLY DEVELOPED GUINEA PIGS AFTER IRRADIATION. Rudolf Birkner, Julius Frey, and Karl-Heinz Ueberschar. *Strahlentherapie* 100, 574-90(1956). (In German).

The authors describe the early histological changes of the long bones of fully developed guinea-pigs after a single roentgen irradiation with 5000 r. As a direct consequence, the irradiation entails already during the first week a complete necrosis of the bone cells, which is considered the most significant criterion of the bone death. The tissue of the soft parts of the bones is less damaged and still starts slight reparative reactions, which, however, are stopped during the fourth week by the forthcoming changes in the parossal and compacta vessels. NSA 11-43

7629

INHIBITION OF GROWTH OF *BACILLUS SUBTILIS* ON A MODIFIED EXTRACT AGAR BY X-RADIATION OF THE MEDIUM. I. H. Blank and H. Kersten. *J. Bacteriol.* 30, 21-32(1935).

Action of soft x rays on agar or agar-water gel alters the agar in such a manner as to render a medium subsequently made from that agar unsuitable for the growth of *B. subtilis*. This seems to result from the production of a diffusible, non-volatile material which is antiseptic to *B. subtilis*. (from authors' summary).

7630

USE OF GAMMA RADIATION FOR THE DESTRUCTION OF WOOD-BORING INSECTS. J. D. Bletchly and Ronald C. Fisher (Forest Products Research Lab., Aylesbury, Bucks). *Nature* 179, 670(1957). NSA 11-6202

7631

BIOCHEMICAL CHANGES IN LIVER FUNCTION DURING THE COURSE OF RADIATION SICKNESS. N. N. Blokhin, I. S. Luganova, and L. S. Rotfel'd (Research Inst. of Blood Transfusions). *Med. Radiol.* 1, No. 6, 40-6 (1956). (In Russian). NSA 11-3670

7632

CARBOHYDRATE METABOLISM OF LIVER DURING THE RADIATION SICKNESS. N. N. Blokhin, I. S. Luganova, and L. S. Rotfel'd. *Doklady Akad. Nauk S.S.S.R.* 111, 723-6(1956). (In Russian).

Carbohydrate metabolism of liver and muscles of irradiated dogs were studied by the functional loading method, using dextran. NSA 11-3658

7633

MODIFICATION OF ACUTE IRRADIATION INJURY IN RATS BY DEXTRAN. H. Blondal (Univ. of Manitoba, Winnipeg, Can.). *Brit. J. Radiol.* 30, 219-22(1957). NSA 11-6215

7634

Brookhaven National Lab., Upton, N. Y.
QUARTERLY PROGRESS REPORT OCTOBER 1 - DECEMBER 31, 1955. 64p. (BNL-375).

Abstracts of papers submitted for journal publication are included. NSA 10-3891

7635

MESOTHORIUM GAMMA RADIATION IN LEMNA PLANTS. V. Vernadsky, B. Brunovsky and S. Kunasheva. *Compt. Rend.* 197, 1556-1557(1933). (In French).

Accumulation of the disintegration products of the thorium atom was studied in 3 *Lemna* spp. *Lemna* was capable of accumulating isotopes of radium, but does not contain the isotopes of thorium. (from abstract). BA 9-11122

7636

QUANTITATIVE AND QUALITATIVE CHANGES IN X-IRRADIATED CULTURE OF BONE MARROW. Irene Boll, Margarete Koppe, Johannes Schaaf, and Johannes

Trautmann. *Strahlentherapie* 100, 445-54(1956). (In German). NSA 11-41

7637

Naval Medical Research Inst., Bethesda, Md. and Naval Radiological Defense Lab., San Francisco.
MEDICAL EXAMINATION OF ROENGELAP PEOPLE SIX MONTHS AFTER EXPOSURE TO FALLOUT. V. P. Bond, R. A. Conrad, J. S. Robertson, and E. A. Weden, Jr. April 1955. 46p. Addendum Report, Project 4.1A of Operation Castle. (WT-937).

7638

EFFECTS OF RADIATION ON MAMMALS. V. P. Bond and E. P. Cronkite (Brookhaven National Lab., Upton, N. Y.). *Ann. Rev. Physiol.* 19, 299-328(1957).

A survey was made of the literature from June 1953 to July 1956 covering modification of radiation effects by chemical and biological means, and post-irradiation restoration of tissues. NSA 11-7923

7639

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF THERMAL NEUTRONS AND OF THE HEAVY PARTICLES FROM THE B^{10} (n, α) Li^7 REACTION FROM ACUTE EFFECTS IN THE MOUSE. (Brookhaven National Lab., Upton, N. Y.). V. P. Bond, O. D. Easterday, E. E. Stickley, and J. S. Robertson. *Radiology* 67, 650-64 (1956).

Single whole-body doses of thermal neutron radiation were delivered by the Brookhaven reactor to female CFI mice injected intravenously five minutes previously with boron in the form of borax. The biological endpoint was studied. NSA 11-868

7640

RADIATIONS ON BACTERIA. F. Bonet-Maury and H. R. Olivier. *Bull. soc. chim. biol.* 19, 1598-1608(1937). (In French).

The authors, after reviewing modern theories of the biological action of ionizing radiations, emphasize the significance of studies of irradiation of bacteria. Two methods of irradiation with α rays are described (using suspensions of bacteria) and results are compared with those reported by B. d'Eberth and B. deKoch. Their results indicate that it is possible to inhibit reproduction of organisms without killing them, and they suggest possible use of this technique in studies of immunity to bacteria. (used Po and Rn as α sources).

7641

PROPERTIES OF TUBERCULOSIS BACILLUS IRRADIATION BY X-RAYS. P. Bonet-Maury and H. R. Olivier. *Am. Rev. Tuberc.* 5, 37-43(1939).

7642

STUDIES WITH TRANSPLANTABLE Ak_4 MOUSE LEUKEMIA. I. SUSCEPTIBILITY OF SIX HETEROLOGOUS STRAINS OF MICE AFTER X-IRRADIATION. Irene U. Boone. (Los Alamos Scientific Lab., N. Mex.). *Radiation Research* 5, 450-8(1956).

Radiation doses ranged from 100 to 550 r. In four strains (CFW Swiss, Strong A, C57 Black and C57 Brown) it was possible to demonstrate a linear relation between the probit of per cent leukemic "takes" (equivalent to mortality in this case) 11 days after injection and log dose, and to calculate the LD_{50} dose. The possibilities of using this system to compare acute effects of other radiations on resistance to leukemia and to investigate the effects of radiation on innate immunity to leukemia discussed. (from author's summary). NSA 11-866

7643

STUDIES WITH TRANSPLANTABLE Ak_4 MOUSE LEUKEMIA. II. RELATIVE BIOLOGICAL EFFECTIVENESS OF THERMAL NEUTRONS AS COMPARED TO X-RAYS. Irene U. Boone, Betty S. Rogers, and Verda G. Strang. (Los

Alamos Scientific Lab., N. Mex.). *Radiation Research* **5**, 459-65(1956).

Values of RBE of thermal column radiation was established by determining incidence of successful AK₄ leukemia implants in three inbred strains of mice after 250-Kvp x ray and thermal column exposures. RBE's of mixed thermal column radiation were 1.1, 1.2 and 1.3 for Strong A, C57 Brown, and C57 Black strains of mice, respectively. By subtracting γ ray contribution of the mixed radiation, RBE values for the thermal neutron component ranged from 1.4 to 1.8. (from authors' summary). NSA 11-867

7644

COMPARATIVE BIOLOGIC EFFECT OF 30 Mev AND 220 kvp ROENTGEN RAYS AND 0.4 Mev GAMMA RAYS AT 8-9°C. K. C. Bora. (Indian Cancer Research Centre, Bombay). *Acta Radiol.* **47**, 321-6(1957).

Author studied production of chromosomal aberrations in *Tradescantia* at 8-9°C, found qualitative difference in biological actions of roentgen and γ rays. For same dose and intensity, 0.4 MeV gamma rays appeared to be less effective, in slowing the mitotic rate (i.e. synthesis of chromosomes). NSA 11-7049

7645

RADIATION-INDUCED DELAY OF PUPATION IN *DROSOPHILA*. Roco C. Bourgin, Rolf Krumins, and Henry Quastler (Univ. of Illinois and Carle Foundation, Urbana). *Radiation Research* **5**, 657-73(1956).

X-radiation induces delay of pupation in *Drosophila melanogaster*. The target zone for this effect is in the anterior third of the larva, probably it is the ring gland. An abnormal phase occurs between the time when a larva would normally pupate and the time when it actually pupates. Histological studies show two groups of changes: 1) changes in rapidly growing parts and 2) indirect changes connected with the abnormal phase of larval life. Implications of these findings on the normal hormonal control mechanism discussed. (from authors' summary). NSA 11-2792

7646

EFFECTS OF X-IRRADIATION, NITROGEN MUSTARD, FASTING, CORTISONE AND ADRENALECTOMY ON TRANSAMINASE ACTIVITY IN THE RAT. Myron Brin and Ralph W. McKee (Boston City Hospital, Boston, Mass. and California Med. School, Los Angeles, Calif.). *Arch. Biochem. Biophys.* **61**, 384-9(1956).

The enhanced transaminase activities in rat liver are probably secondary to the influence of hormonal outflow of the adrenal cortex. Cortisone resulted in increased, and adrenalectomy in decreased activities of these enzymes. Depressed transaminase activity in intestine following x irradiation and nitrogen mustard was correlated with concomitant destruction of mucosal cells. The glutamylalanine enzyme was far more sensitive to stress than the glutamic-aspartic enzyme. The relation between irradiation and adrenal stimulation was stressed. NSA 10-7406

7647

EFFECT OF LOCALIZED BRAIN STEM LESIONS AND SUPRADIAPHRAGMATIC VAGOTOMY ON X-IRRADIATION EMESIS IN THE MONKEY. Kenneth R. Brizzee (Univ. of Utah Coll. of Medicine, Salt Lake City). *Am. J. Physiol.* **187**, 567-70(1956). NSA 11-4232

7648

THE PROMPT EFFECTS OF WHOLE-BODY IRRADIATION AT A HIGH DOSE RATE ON THE ELECTROENCEPHALOGRAM OF MONKEYS. Phillips M. Brooks (U.S.A.F. School of Aviation Medicine, Randolph AFB, Tex.). *Radiation Research* **4**, 206-16(1956).

Rhesus monkeys were irradiated at dose rate of 1000 r/min from a multikilocurie source of Ba¹⁴⁰-La¹⁴⁰.

Results: a decrease in brain electrical activity; initial depression followed by a period of recovery which in several instances occurred while animal was still being irradiated, up to 2500 r, recovery of brain electrical activity after initial depression approached pre-exposure level, with 5000 r or more, the EEG index after recovery phase and during remainder observation period fell off. (from author's summary). NSA 10-6480

7649

PROMPT PULMONARY VENTILATION AND OXYGEN CONSUMPTION CHANGES IN RHESUS MONKEYS ASSOCIATED WITH WHOLE-BODY GAMMA-IRRADIATION. Phillips M. Brooks, Everett O. Richley, and John E. Pickering (Randolph AFB, Tex.). *Radiation Research* **6**, 430-49(1957).

The respiration in rhesus monkeys given whole-body irradiation at a dose rate of 1000 r/min in doses of 1000 r, 2500 r, 5000 r, 10,000 r, and 30,000 r from a Ba¹⁴⁰-La¹⁴⁰ source was followed for 100 minutes from start of exposure. Data are tabulated and results discussed. NSA 11-6606

7650

RETICULUM-CELL SARCOMA OF RATS. APPARENT INHIBITION BY X-IRRADIATION. David V. Brown and Theodore A. Thorson (Univ. of Washington, Seattle, Washington). *J. Natl. Cancer Inst.* **16**, 1197-205(1956).

The prolonged subcutaneous injection of dilute solutions of trypan blue produced reticulum-cell sarcomas in rats. A group of young Wistar rats were given 400 r of total-body irradiation and then treated with trypan-blue injections for periods up to 547 days. A second group received only the trypan blue. The dye stained controls showed reticulum-cell sarcomas, none of the irradiated animals developed these tumors. The more primitive reticuloendothelial elements are relatively resistant to the destructive effect of irradiation, although they may also be stimulated. X rays may have modified reticulum cells so that they did not respond to trypan blue as usual. NSA 10-7414

7651

γ EFFECT OF CORTISONE ON THE RADIATION REACTION OF THE RAT LUNG. Reynold F. Brown (Univ. of California School of Medicine, San Francisco). *Am. J. Roentgenol. Radium Therapy Nuclear Med.* **75**, 796-806(1956).

The effect of cortisone on the radiation reaction of the rat was studied during a ninety-day period after irradiation (3000 r to the right lung in one exposure) by means of mortality, body-weight changes, serial roentgenograms of the lungs, and postmortem macroscopic and microscopic examinations of the lungs. Cortisone did not significantly increase or decrease survival. NSA 10-7430

7652

EXPERIENCE OF IONIZING RADIATIONS. Ethel Browning. *Nuclear Eng.* **1**, 63-5(1956).

A survey of ionizing radiation injuries in industry is given. Early sufferings provide a grave warning on the hazards of ionizing radiations and genetic problems associated with radiation. NSA 10-9060

7653

Argonne National Lab., Lemont, Ill.
BIOLOGY DIVISION QUARTERLY REPORT FOR NOVEMBER 1946 TO JANUARY 1947. Austin M. Brues. Feb. 1. 1947. Decl. Dec. 20, 1955. 101p. (CH-3782).

Pertinent abstracts are included as individual references according to authors. NSA 10-3408

7654

DECAY OF INCORPORATED RADIOACTIVE PHOSPHORUS DURING DEVELOPMENT OF A TEMPERATURE BACTERIOPHAGE. G. S. Stent and C. R. Fuerst. *Virology* **2**, 737-52(1956).

Immediately after infection, both a lytic and a lysogenic phase (coliphage) are sensitive to P^{32} decay. Shortly thereafter, both become resistant. With heavy P^{32} labels, phages showed quantitative differences in sensitivity.

7655

THE DANGER OF CANCER FROM THOROTRAST AS A DIAGNOSTIC MEDIUM. Earl Budin and J. Gershow-Cohen (Albert Einstein Medical Center, Philadelphia). *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 75, 1188-93(1956). NSA 10-9070

7656

SOME RESULTS AND IMMEDIATE PROBLEMS IN MEDICAL RADIOLOGY. A. I. Burnazyan. *Med. Radiol.* 2, 3-10(1957). (In Russian). NSA 11-5721

7657

X-RAY-INDUCED DIVISION DELAY OF INDIVIDUAL YEAST CELLS. Victor W. Burns (Univ. of California, Berkeley). *Radiation Research* 4, 394-412(1956).

Dose range used: 1000 to 50,000 r. Discusses: radiation of mature diploid cells before division, diploid cells irradiated during division; a comparison of the delay-versus-dose curves for cells irradiated before or during division; the lethal and delay effects of radiation on a mature bud. Radiosensitivity for delay increases in the order haploid, diploid, tetraploid, whereas radiosensitivity for lethality is known to increase in the order diploid, tetraploid, haploid. (from author's summary). NSA 10-9064

7658

General Electric Co. Hanford Atomic Products Operation, Richland, Wash.
BIOLOGICAL EFFECTS OF I^{131} CHRONICALLY ADMINISTERED TO SHEEP. L. K. Bustad, L. A. George, Jr., S. Marks, D. E. Warner, C. M. Barnes, K. F. Herde, and H. A. Kornberg. Dec. 27, 1955. 56p. (HW-38757). Contract W-31-109-Eng-52. NSA 10-3774

7659

THYROID ADENOMAS IN SHEEP ADMINISTERED IODINE-131 DAILY. L. K. Bustad, S. Marks, L. A. George, Jr., and L. J. Seigneur (General Electric Co., Richland, Wash.). *Nature* 179, 677(1957). NSA 11-6204

7660

X-RAY STUDIES ON TOBACCO MOSAIC VIRUS. Anne Buzzell, David Trkula, and Max A. Lauffer (Univ. of Pittsburgh). *Arch. Biochem. Biophys.* 63, 470-6 (1956).

Confirming earlier work, 37% survival dose for inactivation by x rays of TMV was found to be 2.3×10^5 r which corresponds to a target volume of 4.1×10^{-18} cc, or approximately 1/12 anhydrous particle volume. Stability at 80°C of survivors of 5 Do is the same as that of unirradiated virus, supporting the view that x-ray inactivation is an all-or-none reaction. Nucleic acid may be the target. NSA 11-24

7661

THE CHANGES IN THE CORNEAL EPITHELIUM DUE TO THE MULTIPLE EXPOSURE TO SMALL DOSES OF X-RADIATION. I. B. Bychkovskaya (Central Research Inst. of Roentgen-Radiology). *Med. Radiol.* 1, No. 5, 16-22(1956). (In Russian). NSA 11-2784

7662

Rochester, N. Y., Univ., Atomic Energy Project.
DETERMINATION OF THE RECOVERY FROM LETHAL EFFECTS OF LOWER BODY IRRADIATION IN RATS. Atland L. Carsten and Thomas R. Noonan. July 9, 1956. 66p. Contract W-7401-eng-49. (UR-455).

Through use of a paired dose technique and application of related 30 day mortality data, the recovery rate from lower body x irradiation was determined. Data are tabulated and presented graphically. NSA 10-8139

7663

Oak Ridge National Lab., Tenn.

A REVIEW OF A POLONIUM CONTAMINATION PROBLEM. Dixon Callihan and Don Ross. Aug. 12, 1952. Decl. Mar. 23, 1956. 15p. Contract W-7405-eng-26. (ORNL-1381).

This report describes an incident in which about seven curies of Po from a Po-Be neutron source were spilled in an Oak Ridge Laboratory. The decontamination procedures which were followed are described and the clinical findings of one person who was significantly exposed to Po are given. There is no evidence of any permanent personal damage. NSA 10-7110

7664

Los Alamos Scientific Lab., N. Mex.

HEMATOLOGICAL CHANGES IN HUMANS CHRONICALLY EXPOSED TO LOW-LEVEL GAMMA RADIATION. Robert E. Carter and Norman P. Knowlton, Jr. Mar. 27, 1950. 14p. Contract W-7405-eng-36. (LA-1092).

Ten individuals exposed continually to small amounts of radiation were studied over a three year period to determine whether or not statistically significant hematological changes might be observed. A control group was also studied. Significant changes in the leukocyte picture occurred and results are presented. NSA 11-2235

7665

Los Alamos Scientific Lab., N. Mex.

FURTHER STUDY OF HEMATOLOGICAL CHANGES IN HUMANS CHRONICALLY EXPOSED TO LOW LEVEL GAMMA RADIATION. Robert E. Carter, Frederick C. V. Worman, Phyllis Sanders and Verda Strang. (1952). Changed from Official Use Only July 18, 1956. Contract W-7405-eng-36. (LA-1440).

The apparent hematological changes in 10 individuals, exposed to total-body γ radiation in near tolerance amounts, over a period of four and one-half years are summarized. Two control groups, in addition to the exposed group were used for comparative purposes. There was a significant depression of the absolute lymphocyte value of the exposed group. NSA 11-2236

7666

Rochester, N. Y., Univ. Atomic Energy Project.
PATHOLOGIC EFFECTS OF ORALLY ADMINISTERED POLONIUM. Nov. 16, 1956. 29p. Contract W-7401-eng-49. (UR-477).

Pathological changes in rats given a single dose (gavage) of 566 μ c of Polonium chloride/Kg were compared with changes following about 26 μ c/Kg intravenously. Both groups died in 3 months or less. Orally treated rats showed less effect in testes, bone marrow, lymphatic tissues, less prominent hemorrhagic phenomena. Progressive nephrosclerosis and considerable intestinal mucosal damage occurred in orally treated, not intravenously treated rats. NSA 11-1405

7667

Rochester, N. Y., Univ. Atomic Energy Project.
ACCELERATION OF AGING BY IONIZING RADIATION. George W. Casarett. May 22, 1957. 16p. Contract W-7401-eng-48. (UR-492). NSA 11-8765

7668

Rochester, N. Y. Univ., Atomic Energy Project.
AUTORADIOGRAPHIC STUDY OF EFFECTS OF ROUTE OF ADMINISTRATION ON DISTRIBUTION OF POLONIUM²¹⁰. Louis J. Casarett. Apr. 3, 1956. 21p. Contract W-7401-eng-49. (UR-447)

Tissues of rats and cats have been examined autoradiographically following oral or intravenous administration of Po^{210} in saline or citrate solution. The significance of autoradiographic findings is discussed, particularly with reference to distribution differences and toxicity. NSA 10-6516

7669

Naval Radiological Defense Lab., San Francisco.
THE EFFECT OF X IRRADIATION UPON THE DIFFUSE
ACTIVITY PERFORMANCE OF RATS, GUINEA PIGS,
AND HAMSTERS. T. J. Castanera, D. C. Jones, and
D. J. Kimeldorf. Nov. 30, 1956. 20p. Project NM-006-015.
(USNRDL-TR-124). NSA 11-4228

7670

ELECTROLYTE METABOLISM AFTER TOTAL-BODY
X-IRRADIATION. W. O. Caster and W. D. Armstrong.
Radiation Research 5, 189-204(1956).

Sodium and chloride losses after total-body x
radiation are strongly influenced by extracellular fluid
movements and by the extent to which these elements
are held in the gastrointestinal contents. After radiation
total-body potassium loss is directly correlated with loss
of muscle mass. Changes in tissue potassium concentration
roughly parallel changes in DNA concentration but are
less pronounced. (from authors' summary).

NSA 10-9957

7671

CHANGES IN THE CARDIOVASCULAR SYSTEM FOLLOW-
ING TOTAL BODY X-IRRADIATION. W. O. Caster,
W. D. Armstrong, and Ernst Simonson (Univ. of
Minnesota, Minn.). Am. J. Physiol. 188, 169-77(1957).
NSA 11-5142

7672

PULMONARY RADIATION EFFECTS AS A FUNCTION
OF ABSORBED ENERGY DISTRIBUTION. H. Cember,
J. A. Watson, and T. B. Grucci (Graduate School of
Public Health, Univ. of Pittsburgh). Am. Ind. Hyg.
Assoc. Quart. 17, 397-400(1956) NSA 11-1726

7673

PULMONARY EFFECTS FROM RADIOACTIVE
THALLIUM-ACTIVATED CLAY PARTICLES. H. Cember,
J. A. Watson, and T. B. Grucci. A. M. A. Arch. Ind.
Health 15, 449-50(1957). NSA 11-7051

7674

EFFECTS OF REPEATED SMALL DOSE X RADIATIONS
AS IMMUNIZATION MEASURE AGAINST TYPHOID
FEVER BACTERIA. O. V. Chakhava (Gamlei Inst. of
Epidemiology and Microbiology). Med. Radiol. 2, 29-32
(1956). (In Russian). NSA 10-9055

7675

United Kingdom Atomic Energy Authority. Atomic
Energy Research Establishment, Harwell, Berks,
England.
ESTIMATION OF MAXIMUM PERMISSIBLE LEVELS OF
RADIATION. A. C. Chamberlain. 1950. 52p. (AERE-
HP/R-551).

The evidence on which is based the maximum
permissible level of 0.3 rep/week of gamma radiation to
the critical tissue, corresponding to 0.5 rep/week
measured at the surface of the body, is briefly summarized,
and the corresponding levels for other radiations are
stated. The methods of deducing the permissible levels
under various conditions are indicated. The methods
of deduction of permissible levels for ingested isotopes
and tables for those most commonly met with are given.
Finally the hazards from statistically mixed fission
products are considered. NSA 11-2796

7676

THE DOSE TO THE TRACHEA AND BRONCHI FROM
THE DECAY PRODUCTS OF RADON AND THORON.
A. C. Chamberlain, and E. D. Dyson (Atomic Energy
Res. Est., Harwell, Berks, England). Brit. J. Radiol.
29, 317-25(1956). NSA 10-9075

7677

MULTIPLICATION OF ST. LOUIS ENCEPHALITIS
VIRUS IN MICE EXPOSED TO ROENTGEN RADIATION.
F. S. Cheever and Lee W. Smith. (Univ. of Pittsburgh

Graduate School of Public Health). Lab. Invest. 5, 44-52
(1956).

Mice were exposed to x radiation at varying intervals
before or after inoculation with St. Louis encephalitis
virus. Under certain conditions, exposure prior to
inoculation appeared to increase susceptibility to
infection with the agent, but this increase was neither
dramatic nor consistent. Exposure to x radiation after
intranasal inoculation of the virus did not have a
demonstrable effect. (from authors' summary).
NSA 10-7415

7678

Lovelace Foundation for Medical Education and Research,
Albuquerque, N. Mex.

RADIATION EFFECTS ON A PNEUMOCOCCAL IN-
FECTION PRODUCED BY SUBCUTANEOUS INJECTIONS
INTO WHITE MICE. William E. Clapper and Grace H.
Meade. Oct. 1953. 44p. Report No. 1. (AECU-3267).

Whole body x irradiation of white mice with 350 r
had no effect on the course of bacteremia induced by
subcutaneous inoculation with pneumococci at the time
of exposure. When the radiation dose was given either
3 or 6 days before inoculation the death rate was in-
creased, and the time from bacteremia to death was
reduced when the radiation dose was given 6 days before
inoculation. NSA 11-1393

7679

GENETIC EFFECTS OF X-RAYS IN RELATION TO
DOSE-RATE IN DROSOPHILA. A. M. Clark (Univ. of
Melbourne, Australia). Nature 177, 787(1956).

Using dose rates of 100 r/min and 2000 r/min, it
had been confirmed that, for a given dose, a greater
amount of genetic damage is produced if the radiation
is delivered at high intensity. The intensity effect is
enhanced if the flies are injected with 0.005 M sodium
azide in saline just prior to irradiation. NSA 10-8150

7680

THE EFFECT OF X-RAYS ON BACTERIA. G. L. Clark
and C. S. Boruff. Science 70, 74(1929).

Roentgen rays act like sterilizing agents on cultures
of *B. coli* and *Erythrobacillus prodigiosus*. Death rate
curves show that total counts of viable cell decrease
logarithmically with time. *B. coli* did not show variation
or mutation after x irradiation. With increasing x ray
doses, *Erythrobacillus prodigiosus* showed tendency
towards lack of ability to produce red pigment. When
organisms were allowed to grow on agar plate for 5 days,
the greater proportion of colonies produced pigment.

7681

BIOLOGICAL EFFECTS OF FAST NEUTRONS AND
GAMMA RAYS. John W. Clark, Donn L. Jordan, and
Howard H. Vogel, Jr. (Argonne National Lab., Lemont,
Ill.). Am. J. Roentgenol. Radium Therapy Nuclear
Med. 77, 524-30(1957).

Evidence is presented showing that exposure to fission
neutrons and Co^{60} gamma rays produced death in mice
by different mechanisms: (a) absence of dose rate
dependence for neutrons in contradistinction to gamma
rays; (b) different modes of mortality; (c) departure
from additivity for mixtures in producing death. Incidence
of positive blood cultures correlates with time of death
for both gamma and neutron irradiated mice. Since
streptomycin appreciably reduces mortality it is concluded
that bacteremia is a significant cause of radiation
death in mice. Gamma rays and fission neutrons have
the same relative efficiency for reducing spleen weight as
for acute mortality. Pre-treatment with cysteine has
protective effect throughout acute lethal period following
these irradiations. NSA 11-4785

7682

THE EFFECTS OF A HIGH EXPLOSIVE BLAST IN MICE

WITH RADIATION INJURY. Carl-Hohan Clemedson and Arne Nelson (Research Inst. of National Defense, Sundbyberg, Sweden). *Acta Radiol.* 47, 79-85(1957). NSA 11-5131

7683

EFFECT OF IN VITRO X IRRADIATION ON PIGMENTED AND PALE SLICES OF CLOUDMAN S91 MOUSE MELANOMA AS MEASURED BY SUBSEQUENT PROLIFERATION IN VIVO. Jewel Plummer Cobb (Univ. of Illinois Coll. of Med., Chicago and Harlem Hospital, N. Y.). *J. Natl. Cancer Inst.* 17, 657-66(1956).

The *in vitro* irradiation of pigmented and pale slices of the Cloudman S91 mouse melanoma with 2500, 2800, or 3000 r revealed that a larger number of pigmented slices remained viable following treatment. Viability was measured by the number of irradiated implants growing successfully in DBA mice, the strain of tumor origin. The relatively greater radioresistance *in vitro* of pigmented, as compared to pale, tissue was accompanied by an increased number of melanized cells. An explanation for this phenomenon is discussed. NSA 11-1741

7684

EFFECTS OF β - AND γ -RAYS ON THE PROTOPLASMIC VISCOSITY OF *HELODEA DENSE* CELLS. H. I. Virgin and Lars Ehrenberg. *Physiol. Plantarum* 6, 159-165 (1953).

Effects of beta-rays from P^{32} , S^{35} and Na^{22} and of external gamma-rays from Na^{22} on the protoplasmic viscosity of leaf cells of *Helodea densa* were investigated. Medium dose rates (0.02-0.2 rep. min.⁻¹) cause liquification of protoplasm after 1-5 min. followed by increased viscosity, observable after 5-15 min. (from abstract). BA 27-26134

7685

Naval Radiological Defense Lab., San Francisco. RADIOTOXICITY RESULTING FROM EXPOSURE TO FALLOUT SIMULANT. II. THE METABOLISM OF AN INHALED AND INGESTED SIMULANT OF FALLOUT PRODUCED BY A LAND-BASED NUCLEAR DETONATION. S. H. Cohn, W. B. Lane, J. K. Gong, R. K. Fuller, and W. L. Milne. Jan. 11, 1957. 29p. Project NM 006-015.04. (USNRDL-TR-118). NSA 11-4249

7686

INHALATION AND RETENTION OF SIMULATED RADIOACTIVE FALL-OUT BY MICE. I. STUDY OF A SIMULANT OF FALL-OUT FROM NUCLEAR DETONATION UNDER SEA WATER. Stanton H. Cohn, William B. Lane, Joseph K. Gong, John C. Sherwin, and Walter L. Milne. (U. S. Naval Radiological Defense Lab., San Francisco). *A. M. A. Arch. Ind. Health* 14, 333-40(1956).

The simulant, first of a series to be studied, contained the ionic form of three-day-old fission products from bombarded uranium. The fission-product mixture was developed to represent the fall-out produced by a nuclear detonation in sea water. This simulant was aspirated as a liquid aerosol into three animal chambers, at three different concentrations simultaneously, for a period up to one hour. NSA 11-53

7687

Naval Radiological Defense Lab., San Francisco and Naval Medical Research Inst., Bethesda, Md. INTERNAL RADIOACTIVE CONTAMINATION OF HUMAN BEINGS ACCIDENTALLY EXPOSED TO RADIOACTIVE FALLOUT MATERIAL. S. H. Cohn, R. W. Rinehart, J. S. Robertson, J. K. Gong, W. L. Milne, W. H. Chapman, and V. P. Bond. May 9, 1956. 50p. Project NM-006-015. (USNRDL-TR-86).

The first instance of exposure of human being to significant internal contamination with fission products occurred as a result of the ingestion and inhalation of

fall-out material from a nuclear detonation in the Spring of 1954. An evaluation of the nature and extent of this internal radioactive contamination is reported. NSA 10-6470

7688

EFFECTS OF IN VITRO X IRRADIATION (1000 r) ON THE DEOXYRIBONUCLEOPROTEIN COMPLEX OF SPLEEN. L. J. Cole and M. E. Ellis. Mar. 22, 1957. 22p. Project NM-006-015. (USNRDL-TR-143).

The deoxyribonucleoprotein complex was isolated from mouse spleen, x irradiation *in vitro* (1000 r) in the form of a dilute water solution (470 μ g/ml), and then incubated at 37°C for various time intervals up to 3 hr. The results have been interpreted in terms of a latent radiation-induced alteration in DNP, which reveals itself on subsequent 37°C incubation as a disaggregation of the original DNP gel into non-gel macromolecular DNP subunits. NSA 11-8766,

7689

RADIOISOTOPES IN THE STUDY OF MINERAL METABOLISM. C. L. Comar and R. H. Wasserman (Oak Ridge Inst. of Nuclear Studies, Tenn.). *Progr. Nuclear Energy, Series VI. Biol. Sci.* 1, 153-96(1956).

Certain aspects of skeletal physiology and the metabolism of calcium, strontium, and iodine are reviewed. Emphasis is given to recent developments arising primarily from the use of radioisotopes in these areas of research. The subject matter is considered and integrated from two points of view: the fundamental physiology and nutrition involved and the problems arising from the potential health hazards of the fission products. It is possible to estimate the retention by man and the entrances into edible products of the animal when the dietary intake is known. NSA 11-3680

7690

EFFECT OF GAMMA RADIATION ON GASTRIC EMPTYING TIME IN THE DOG. R. A. Conard (National Naval Medical Center, Bethesda, Md.). *J. Appl. Physiol.* 9, 234-6(1956).

Radiation doses of 300 and 600 r produced no notable effect within 2 or 3 days after radiation or 7 or 8 days after 300 r. Marked delay in gastric emptying time was observed 3 days after 1300 r, associated with other acute gastrointestinal manifestations of severe radiation injury. Lack of effect of radiation doses in the lethal range on gastric emptying of the dog was in marked contrast to observations in the rat in which species significant delay in gastric emptying is produced by doses in the sublethal range. (from abstract). NSA 11-3280

7691

Naval Medical Research Inst., Bethesda, Md. SOME EFFECTS OF IONIZING RADIATION ON THE PHYSIOLOGY OF THE GASTROINTESTINAL TRACT. A REVIEW. LECTURE AND REVIEW SERIES NO. 56-2. Robert A. Conard. Mar. 29, 1956. 19p. (NP-6038). NSA 10-7395

7692

SOME EFFECTS OF POST-IRRADIATION TREATMENT WITH METABOLIC INHIBITORS AND NUTRIENTS UPON X-IRRADIATED SPORES OF *STREPTOMYCES*. S. D. Wainwright and A. Nevill. *J. Bacteriol.* 70, 547-551(1955).

The effects of incubating x-irradiated spores of *Streptomyces T₁₂* in distilled water correspond to a reduction in radiation dose. A qualitative reversal in effects of treatment with casein hydrolysate was obtained as the radiation dose was increased. Other agents did not markedly modify the effects of x-radiation. (from abstract). BA 31-5825

7693

Brookhaven National Lab., Naval Medical Research Inst.

MEDICAL SURVEY OF MARSHALLESE TWO YEARS AFTER EXPOSURE TO FALLOUT RADIATION. R. A. Conard, Bradford Cannon, C. E. Huggins, J. B. Richards, and Austin Lowery. (1956). 18p. (BNL-412).

The medical survey shows that the people are in a generally good state of health and nutrition and are making satisfactory recovery. Serious illness has occurred in two but can not be attributed to radiation effects. One death in May 1956, was due to hypertensive heart disease, undoubtedly present at the time of exposure. There is no evidence of improvement of hemopoiesis. Lowered levels of blood elements have not lowered resistance. Residual changes in the skin show improvement. No bone defects are apparent. NSA 11-832

7694

Naval Medical Research Inst., Bethesda, Md. and National Inst. of Health, Bethesda, Md.
EXPERIMENTAL THERAPY OF THE GASTROINTESTINAL SYNDROME PRODUCED BY LETHAL DOSES OF IONIZING RADIATION. R. A. Conard, E. P. Cronkite, George Brecher, and C. P. A. Strome. J. Appl. Physiol. 9, 227-33(1956). 12p. (NM-006-012.04.93).

The gastrointestinal syndrome and its therapy were studied in dogs exposed to high supra-lethal doses of ionizing radiation. NSA 10-6504

7695

Naval Medical Research Inst., Bethesda, Md. and Armed Forces Inst. of Pathology, Washington, D. C.
BETA RADIATION LESIONS OF THE SKIN. MEMORANDUM REPORT 56-1. Robert A. Conard and Carl F. Tessmer. Dec. 9, 1955. 7p. (NP-5907).

A case history on a lesion of the forehead and right eyebrow region presumably due to irradiation from contamination with fission product material, is presented. The erythema, dry desquamation, depigmentation, symptoms of burning and itching, increased sensitivity to sunlight hyperesthesia, epilation of the eyebrows (with regrowth of hair) and minimal histological changes (17 months later) particularly in the elastic tissue were considered consistent with radiation damage to the skin. The most unusual feature of the lesion was the regrowth of white hair in the affected region of the right eyebrow which was formerly black in color. NSA 10-7390

7696

EFFECT OF INJECTION OF RAT MARROW ON RETICULAR TISSUES OF MICE EXPOSED TO X RADIATION IN THE MIDDLE THAL DOSE RANGE. C. C. Congdon, T. Makinodan, and N. Gengozian (Oak Ridge National Lab., Tenn.). J. Natl. Cancer Inst. 18, 603-13(1957).

The 100 per cent mortality in mice exposed to 710 r of total-body radiation and then injected with rat bone marrow was caused by a secondary degeneration of the transplanted bone marrow. Immediate cause of death was hemorrhage, infection and anemia. Effect on bone marrow, spleen, thymus and lymph nodes are described. NSA 11-8776

7697

THE EFFECT OF TRANSFUSIONS OF BLOOD SHOWING EXTREME LEUKOCYTOSIS ON SURVIVAL OF X-IRRADIATED MICE. C. C. Congdon, T. W. McKinley, Jr., H. Sutton, and P. Urso, Jr. (National Cancer Inst., Bethesda, Md. and Oak Ridge National Lab., Tenn.). Radiation Research 4, 424-34(1956).

Leukemoid blood from tumor-bearing mice promoted recovery of total-body irradiated mice as measured by regeneration of hematopoietic tissue and by survival.

Activity of the blood was associated with the formed elements. The extreme granulocytosis present suggests that the granulocyte may be capable of causing recovery from radiation injury. (from authors' summary) NSA 10-9077

7698

Naval Radiological Defense Lab., San Francisco.
RADIATION-INDUCED CHANGES IN TISSUE NUCLEIC ACIDS; RELEASE OF SOLUBLE DEOXYPOLYNUCLEOTIDES IN THE SPLEEN. L. J. Cole and M. E. Ellis. Oct. 12, 1956. 31p. Project NM-006-015.04. (USNRDL-TR-114).

Biochemical changes in nucleic acids of the spleen in mice were investigated at hourly intervals up to 14 hr following lethal whole-body x irradiation (810 to 850 r). The data suggest that spleen deoxyribonucleoprotein is the source of the free polynucleotide released after irradiation. NSA 11-2780

7699

BIOSYNTHESIS OF FATTY ACIDS IN LIVER AND INTESTINE OF INTACT NORMAL, FASTED AND X-IRRADIATED RATS. John G. Coniglio, Donald B. McCormick and Granville W. Hudson (Vanderbilt Univ. School of Medicine, Nashville. Am. J. Physiol. 185, 577-82(1956).

A 72 hour fasting period affects intestinal incorporation of C¹⁴-acetate into fatty acids to a smaller extent than it does hepatic incorporation. Glycogen concentration and hepatic incorporation of acetate into fatty acids increases in irradiated, fasted rats (750 r total body x irradiation) compared to fasted controls. Intestinal incorporation of C¹⁴ acetate into fatty acids decreases in the irradiated rat. A direct relationship between the amount of liver glycogen present and the amount of incorporation of C¹⁴ into fatty acids was not observed at these levels of hepatic glycogen and lipogenesis. NSA 10-9963

7700

THE EFFECTS OF GRADED DOSES OF WHOLE-BODY X-IRRADIATION ON MAST CELLS IN THE RAT MESENTERY. F. P. Conte, G. S. Melville, Jr., and A. C. Upton (Oak Ridge National Lab., Tenn.). Am. J. Physiol. 187, 160-2(1956). NSA 11-838

7701

LETHAL AND STERILIZING EFFECTS OF GAMMA RADIATION ON INSECTS INFESTING CEREAL COMMODITIES. P. B. Cornwell, L. J. Crook, and J. O. Bull (Atomic Energy Research Est., Harwell, Berks). Nature 179, 670-2(1957). NSA 11-6203

7702

CONCERNING THE VARIABLE DAMAGE TO THE PULMONARY TISSUE BY THERAPEUTIC X-RADIATION. Hans Cottier. Strahlentherapie 100, 385-98(1956). (In German).

Experiments in rats have shown that a single irradiation of the right lung with 3000 r does not lead to diffuse, uniform pulmonary lesions, but to inconstant, localized processes with transition into fibrosis. The causes of the localized apneumatoses (atelectasis, chronic pneumonia) are, in general, bronchial occlusions on the base of bronchitis. Atelectases in the irradiated pulmonary tissue show a high tendency towards fixation by connective tissue. Even 4 months later 40% of the animals showed significant fibrosis. NSA 11-38

7703

INTEGRAL DOSE, BODY SIZE, AND THE SITE OF IRRADIATION AS FACTORS DETERMINING THE SEVERITY OF RADIATION SICKNESS. W. M. Court-Brown and R. F. Mahler. J. Fac. Radiologists 5, 200-209 (1954).

It has been suggested that one possible explanation of the findings is that radiation releases a diffusible metabolite or metabolites.

7704

EFFECTS OF RADIATION ON MAMMALS. E. P. Cronkite and V. P. Bond (Brookhaven National Lab., Upton, N. Y.). *Ann. Rev. Physiol.* 18, 483-526(1956). NSA 10-9946

7705

Naval Medical Research Inst., Bethesda, Md., Naval Radiological Defense Lab., San Francisco, and Brookhaven National Lab., Upton, N. Y.
SOME EFFECTS OF IONIZING RADIATION ON HUMAN BEINGS. A REPORT ON THE MARSHALLESE AND AMERICANS ACCIDENTALLY EXPOSED TO RADIATION FROM FALLOUT AND A DISCUSSION OF RADIATION INJURY IN THE HUMAN BEING. E. P. Cronkite, V. P. Bond, and C. L. Dunham. 1956. 114p. (TID-5358).

On March 1, 1954, an experimental thermonuclear device was exploded at the Eniwetok Proving Grounds in the Marshall Islands. Areas revealed injurious radiation levels. Degree of radiation injury was assessed, care and study of the injured was instituted. Initial data have been supplemented by field resurveys 6 and 24 months after original investigation and summaries prepared. NSA 11-834

7706

THE PROTECTIVE EFFECT OF GRANULOCYTES IN RADIATION INJURY. E. P. Cronkite and G. Brecher. *Ann. N. Y. Acad. Sci.* 59, 815-833(1955).

7707

Brookhaven National Lab., Upton, N. Y.
TWELVE-MONTH POSTEXPOSURE SURVEY ON MARSHALLESE EXPOSED TO FALLOUT RADIATION. E. P. Cronkite, C. L. Dunham, David Griffin, S. D. McPherson, and Kent T. Woodward. 1955. 15p. (BNL-384).

The Marshallese were studied for a one-week period 12 months after exposure. Complete physical examinations were made. Special eye examinations with photographic recording of the appearance of the lens were performed in addition to blood counts and selected laboratory studies. The skin of some casualties shows slight depigmentation and scarring at the site of previous beta burns. Eyes revealed no lesions attributable to radiation. The neutrophil counts were back to normal range. The platelets and lymphocytes showed a further increase above the six-month level but still were below the values for the control population. NSA 10-3968

7708

A SEX DIFFERENCE IN THE RESPONSE TO TITRATED IRRADIATION THERAPY (^{32}P) OF PATIENTS WITH CHRONIC GRANULOCYTIC LEUKAEMIA. William H. Crosby, Oscar L. Sapp, and Hjalmar Anderson, Jr. (Walter Reed Army Hospital, Washington, D. C.). *Brit. J. Haematol.* 2, 317-20(1956). NSA 10-9984

7709

CHEMICAL PROTECTION AGAINST X-RADIATION DEATH IN PRIMATES: A PRELIMINARY REPORT. B. G. Crouch and R. R. Overman (Univ. of Tennessee Coll. of Medicine, Memphis). *Science* 125, 1092(1957).

Studies indicate that AET in doses of 200 to 250 mg/kg of body weight is capable of protecting the primate from x radiation death when it is administered prior to radiation. NSA 11-7076

7710

California. Univ., Berkeley. Radiation Lab.
A COMPARISON OF THE METABOLISM OF PLUTONIUM (Pu^{238}) IN MAN AND THE RAT. J. Crowley, H. Lanz, K. Scott, and J. G. Hamilton. May 31, 1946. Changed

from ORO Nov. 13, 1956. Contract W-7405-eng-48-A. (CH-3589).

The distribution of Pu among the tissues of the body and the average daily rate of excretion of this element are compared in man and in rats. These experiments show a high degree of prolonged retention of Pu in the body, with selective deposition in the skeleton, especially in the region adjacent to the bone marrow in the endosteum and trabecular bone. The elimination of Pu from the body occurs at higher rates in rats than in man. NSA 11-2244

7711

Brookhaven National Lab., Upton, N. Y.
RADIATION MUTATIONS IN PLANT BREEDING. H. J. Curtis. 1956. 16p. (BNL-2827).

Applications of radiation induced mutations in practical plant breeding programs, the special facilities available for the research, and problems and recent findings in plant mutation research are discussed. NSA 11-8762

7712

Naval Radiological Defense Lab., San Francisco
UPTAKE, DISTRIBUTION, AND RETENTION OF FISSION PRODUCTS IN TISSUES OF MICE EXPOSED TO A SIMULANT OF FALLOUT FROM A NUCLEAR DETONATION. I. SIMULANT OF FALLOUT FROM A DETONATION UNDER SEAWATER. S. H. Cohn, W. B. Lane, J. K. Gong, J. C. Sherwin, R. K. Fuller, L. L. Wiltshire, and W. L. Milne. Dec. 5, 1955. 25p. Project No. NM-006-015. 04. (USNRDL-TR-77).

Authors discuss the influence of chemical agents on uptake, distribution, and retention of fission products. The relatively small uptake of fission products and rapid turnover in the tissues adds to the evidence that the internal radiation hazard following an acute inhalation exposure to fallout is very small. NSA 10-8152

7713

Johns Hopkins Univ., Chevy Chase, Md. Operations Research Office.
BIOLOGICAL EFFECTS OF WHOLE-BODY GAMMA RADIATION ON HUMAN BEINGS. Harold O. Davidson, Jr. 1956. (ORO-T-357).

The short-term effects on humans of chronic whole-body exposure to γ radiations are estimated. Results are organized in a form suitable for fall-out defense planning. NSA 11-8764

7714

THE IRRADIATION OF INDIVIDUAL PARTS OF SINGLE CELLS IN TISSUE CULTURE WITH A MICROBEAM OF α -PARTICLES. I. APPARATUS. Marguerite Davis and C. L. Smith (Univ. of Cambridge, Eng.). *Exptl. Cell Research* 12, 15-34(1957).

A method of irradiating parts of single cells in tissue culture on a microscope stage with beams of α -particles 1 μ to 1.5 μ in diameter is described with the necessary ancillary apparatus. Two examples are given of cell abnormalities produced by such irradiations. These are presented as a series of phase contrast photomicrographs taken from a cline film and photomicrographs of the stained cultures at the end. NSA 11-5146

7715

LETHAL EFFECTS OF GAMMA RADIATION UPON SEGMENTS OF A NATURAL MICROBIAL POPULATION. R. J. Davis, V. L. Sheldon and S. I. Auerbach (Health Physics Div., Oak Ridge National Lab., Oak Ridge, Tenn.). *J. Bacteriol.* 72, 505-10(1956).

Authors studied effects of γ radiation on the microflora in a tree-hole in a mature beech tree and found that if entire segment of the population were not eliminated, the population would in time return to equilibrium. NSA 11-847

7716

Mound Lab., Miamisburg, Ohio.

THE EFFECTS OF REPEATED POLONIUM INJECTIONS ON RATS. I. CROSS EFFECTS AND METABOLISM OF 2 μ c/Kg DOSES. R. K. Davis, W. T. Rockhold, and D. S. Anthony. April 9, 1954. 31p. Contract AT-33-1-GEN-53. (MLM-961).

A large number of rats were injected with multiple doses of polonium, averaging about 2.0 microcuries per kilograms of body weight, and these injections were repeated at 14 day intervals. The rats were serially sacrificed for tissue analysis. The blood and excreta of the living rats were analyzed periodically for polonium content. Food and water intake and body weight changes were recorded. Results of this experiment are presented in graphical form. NSA 11-4802

7717

RELATIVE BIOLOGICAL EFFECTIVENESS OF TRITIUM AND OF VARIOUS γ RADIATIONS Sylvie Davydoff. *Compt. rend.* **243**, 1455-7(1956). (In French).

A determination was made of the relative biological effectiveness of tritium and of various γ radiations with respect to a bacteria, *Serratia indica*. No matter what the intensity of the irradiation, the various radiations have had the same biological effectiveness, that of the tritium β ray being less, with a factor of relative biological effectiveness of 0.87. NSA 11-1733

7718

EFFECT OF NUTRITIVE FACTORS ON THE SURVIVAL OF *SERRATIA INDICA* AFTER GAMMA IRRADIATION. Sylvie Davydoff. *Compt. rend.* **243**, 1683-5(1956).

A comparison is made, after γ irradiation, of the survival portion of *S. indica* when the bacteria are scattered in a complete nutritive medium and a simple synthetic medium. NSA 11-1734

7719

QUANTITATIVE ASPECTS OF THE EFFECTS OF X-RAYS ON LYMPHATIC TISSUE. Peter P. H. De Bruyn and M. Marcella Tornova-Svehlik (Univ. of Chicago, Ill.). *Radiation Research* **6**, 573-84(1957).

Based on volumetric measurements *in vivo*, a quantitative study was undertaken regarding destructive and regenerative processes occurring in the lymphatic tissue of the rabbit appendix after x-radiation. The quantitative changes were studied in relation to various doses administered. NSA 11-8781

7720

Rochester, N. Y. Univ. Atomic Energy Project. THE ACUTE TOXICITY AND RETENTION OF INTRATRACHEALLY ADMINISTERED POLONIUM²¹⁰ IN THE RAT. R. J. Della Rosa. March 5, 1956. 10p. Contract W-7401-eng-49. (UR-431).

The acute toxicity of intratracheally administered Po²¹⁰ in the rat has been studied. It is concluded that there is no marked difference in the toxicity of Po after intratracheal intubation as compared with equivalent body burdens attained by gavage or intravenous administration. This is true despite differences in tissue distribution and in the kinetics of excretion, and indicates that acute radiation death from Po may be dependent more upon the total amount of energy released within the body than its site of concentration. NSA 10-3260

7721

HEREDITY AND VARIATION IN MICROORGANISMS. M. Demerco. Cold Spring Harbor Symposia Quant. Biol. **11**, 314(1947).

7722

RADIOACTIVE PHOSPHORUS. III. IN THE TREATMENT OF MALIGNANT LYMPHOMAS, PLASMA-CELL MYELOMA, EWING'S SARCOMA, AND OSTEOGENIC

SARCOMA. Henry D. Diamond, Lloyd F. Craver, and Helen Q. Woodard (Memorial Center for Cancer and Allied Diseases, N. Y.). *Cancer* **10**, 143-50(1957). NSA 11-6217

7723

California. Univ. Berkeley. Radiation Lab. THE EFFECT OF DIAGNOSTIC DENTAL RADIOGRAPHY ON THE LYMPHOCYTE COUNT AND ON THE DIURNAL TIDE OF HUMAN LEUKOCYTES. R. Lowry Dobson and Mary M. Chupp. Oct. 26, 1956. 12p. Contract W-7405-eng-48. (UCRL-3574).

Total leukocyte and differential counts were done on eleven normal persons at hourly intervals for 12 hours after full-mouth dental radiography. A diurnal tide (a rise) in granulocytes and lymphocytes was seen before irradiation. A depression in the lymphocyte count was observed following irradiation. NSA 11-5135

7724

Utah. Univ., Salt Lake City. Coll. of Medicine. ASPECTS OF THE RELATIONSHIP BETWEEN IRRADIATION INJURY AND MAMMALIAN HOST DEFENSE MECHANISMS: A REVIEW. David M. Donaldson and Stanley Marcus. Nov. 23, 1955. 22p. (AF-SAM-56-50).

This study reviews and evaluates the principal work, accomplished to date, pertaining to the effect of irradiation on the ability of the host to resist an infection. Included in the survey are sections on cellular defenses, humoral defenses, respiratory tract clearance and trauma, as related to irradiation. NSA 11-1724

7725

Utah. Univ., Salt Lake City. Coll. of Medicine. THE INFLUENCE OF TOTAL BODY X IRRADIATION AND IMMUNIZATION ON INTRACELLULAR DIGESTION BY PERITONEAL PHAGOCYTES. David M. Donaldson, Stanley Marcus, Ko Ko Gyi, and Eugene H. Perkins. July 22, 1955. 12p. (AF-SAM-56-8). NSA 11-2778

7726

RESTORATION FROM AN X-RAY INDUCED BLOCK IN DEOXYRIBONUCLEIC ACID SYNTHESIS IN *ESCHERICHIA COLI*. C. O. Doudney (Pennsylvania Univ., Philadelphia, School of Medicine). *J. Bacteriol.* **72**, 488-93(1956).

The x ray induced block in DNA synthesis is overcome by treatment prior to and during irradiation with the chemical cysteamine or by holding the cells in yeast extract - supplemented, minimal medium. The results suggest that new protein synthesis and new ribonucleic acid synthesis are involved in the bio-synthetic processes leading to restoration of the x-ray-induced lesion in DNA synthesis in *E. coli*. NSA 11-881

7727

PROTEOLYTIC ENZYME ACTIVITY IN IRRADIATION-STERILIZED MEAT. Maurice P. Drake, J. W. Giffey, Jr., Robert Ryer, III, and Hubert Harriman (Food Labs., QM Food and Container Inst. for the Armed Forces, Chicago, Ill.). *Science* **125**, 23(1957).

Data show that prolonged storage and storage at elevated temperatures will destroy meat structure and probably develop a bitter taste in it. The necessity for inactivating the enzymes responsible for this is indicated if radiation-sterilized meat is to become an acceptable food product. NSA 11-2794

7728

PROBLEMS OF RADIATION GENETICS. N. P. Dubinin. *Vestnik Akad. Nauk S.S.S.R.* **26**, No. **8**, 22-33(1956). (In Russian)

A general review of recent experiments in genetics is presented. Mutant and hereditary effects of the increase in natural radiation and that released by atomic and hydrogen tests were analyzed. Achievements and the possibilities of applying radiation in the induction of selective plant mutations are discussed. NSA 11-875

7729

A STUDY OF METHODS FOR INTERSTITIAL IMPLANTATION OF RADIOACTIVE MATERIALS. H. C. Dudley and T. G. Mitchell (U. S. Naval Hospital, St. Albans, N. Y.). *Am. J. Roentgenol. Radium Therapy Nuclear Med.* **75**, 1084-92(1956).

Results are described from *in vitro* and *in vivo* studies with various clinically promising isotopes incorporated into various types of radiation sources. Included are the dialysis of P^{32} preparations, a comparison of the distribution of P^{32} from colloidal chromic phosphate ($CrPO_4$), titanium phosphate ($Ti_3(PO_4)_4$) suspensions, and ground and fused Ti phosphate- Ge oxide (GeO_2) glass, tissue effects and distribution of Au^{198} , and P^{32} as $Ti_3(PO_4)_4$ applied in slowly soluble needles of fused GeO_2 , and the tissue effects and tissue distribution of Y^{90} , applied interstitially in soluble plastic filaments. NSA 10-9089

7730

CRITERIA FOR EVALUATING GAMMA RADIATION EXPOSURES FROM FALLOUT FOLLOWING NUCLEAR DETONATIONS. Gordon M. Dunning. (Division of Biology and Medicine, U. S. Atomic Energy Commission, Wash.). *Radiology* **66**, 585-94(1956).

The biological effects of γ radiation from fall-out incident to nuclear detonations are evaluated. The relationship between radiation doses and biological effects is discussed. Factors to be considered in applying the results of laboratory experiments to calculations of exposures under field conditions are considered. Contributions of weathering, shielding, time of dose, fall-out pattern, and protective measures the γ dose from fall-out are summarized. NSA 10-8154

7731

THE PROTECTIVE ACTION OF GLUCOSAMINE AGAINST THE LETHAL EFFECT OF TOTAL X RADIATION IN THE MOUSE. Jean-Francois Duplan and Albert-Jean Rosenberg. *Compt. rend.* **239**, 116-17(1954).

Modifications in response of rats due to variations in dose of glucosamine, irradiation dose, and exposure time are attributed to inactivation of certain enzymes by exposure to radiation. NSA 8-5478

7732

THE ABSORPTION OF CERTAIN ANTIBIOTICS FROM THE GASTRO-INTESTINAL TRACT INTO THE BLOOD DURING RADIATION SICKNESS. A. P. Duplishcheva (Gamalei Inst. of Epidemiology and Microbiology). *Med. Radiol.* **2**, 46-51(1956). (In Russian). NSA 10-9057

7733

A QUANTITATIVE STUDY OF THE RADIOSENSITIVITY OF CHRONIC LEUKAEMIA. E. C. Easson (The Christie Hospital and Holt Radium Inst., Manchester, Eng.). *Brit. J. Radiol.* **30**, 35-9(1957).

Since leukocyte counts of chronic leukemic patients fall exponentially with integral body dosage from P^{32} , the half value dose is a quantitative expression of leukopoietic sensitivity, for each individual. Data are tabulated in order of leukocyte sensitivity for 27 cases of chronic myeloid and 21 of chronic lymphatic leukemia. Hematological and clinical data tabulations show no clear correlations.

7734

VERTEBRATE RADIOBIOLOGY: PHYSIOLOGY. Abraham Edelman (Brookhaven National Lab., Upton, N. Y.). *Ann. Rev. Nuclear Sci.* **5**, 413-24(1955).

Recent advances in radiation protection and radiation effects in animals are reviewed. NSA 10-7404

7735

THE INDUCTION OF RECESSIVE LETHALS IN *DROSOPHILA MELANOGASTER* BY RADIATIONS OF DIFFERENT ION

DENSITY. Charles W. Edington (Oak Ridge National Lab., Tenn.). *Genetics* **41**, 814-21(1956).

Fast neutrons are 1.62 times as effective as gamma rays in inducing sex-linked recessive lethals. Any comparison of relative biological effectiveness involving x rays is dependent on dose. Frequency of recessive lethals induced by x rays departs from linearity as radiation dose increases, but neither the fast neutron nor gamma-ray dose curves depart significantly from linearity over the dose ranges studied. Frequency of recessive lethals induced by x rays in *In(1)EN* and *Xc* chromosomes were significantly different. (from author's summary). NSA 11-5148

7736

THE MOBILIZATION AND TURNOVER OF CELL POPULATIONS IN BLOOD AND BLOOD FORMING TISSUES. J. M. Yoffey. *J. Histochem. and Cytochem.* **4**, 516-30(1956).

Quantitative data concerning: (a) lymphocyte production as estimated by the lymphocyte content of thoracic duct lymph and (b) of the nucleated cells of bone marrow, measured by a special quantitative technique are presented. In a 400 g guinea pig, thoracic duct lymphocyte output over 24 hours is about 4x the lymphocyte content of the blood and about 1/8 of the total marrow lymphocyte population. Quantitative response of marrow to leucocytosis-promoting factor and to hypoxia is described. Lymphocyte increase in marrow and concomitant decrease in peripheral blood lymphocytes just before onset of marrow recovery in irradiated guinea pigs are described. BA 31-20943

7737

SPLEEN DPNH CYTOCHROME C REDUCTASE ACTIVITY IN X-IRRADIATED RATS. Herbert J. Eichel (Hahnemann Medical Coll., Philadelphia). *Proc. Soc. Exptl. Biol. Med.* **95**, 38-43(1957). NSA 11-7915

7738

ELECTRON MICROGRAPHS OF X-RAY-TREATED *ESCHERICHIA COLI* CELLS. A. Eisenstark and G. L. Clark. *Science* **105**, 553-555(1947).

Purpose: to examine irradiated, elongated cells under the electron microscope and study ways in which they might differ from normal bacterial cells. Irradiation (50 Kv and 20 ma) produced irregular morphology. Some of the irradiated *E. coli* showed definite "breaks" in the cell. "Breaks" may occur because the enzyme which is responsible for pinching off the cell wall in normal bacterial fission has been destroyed by x rays while other enzyme systems still function.

7739

ON THE MODE OF ACTION OF X-RAY PROTECTIVE AGENTS. I. THE FIXATION IN VIVO OF CYSTEAMINE TO PROTEINS. Lorentz Eldjarn and Alexander Pihl. *J. Biol. Chem.* **223**, 341-52(1956). (Norwegian Radium Hospital, Oslo).

The metabolism of the x-ray protective agents cystamine and cysteamine in mice has been investigated with the aid of S^{35} -labeled compounds of extremely high specific activity. In principle the same results were obtained whether cystamine or cysteamine was administered. The radiobiological significance of the data is discussed. NSA 11-1756

7740

RELEASE OF POTASSIUM FROM THE X-IRRADIATED MAMMALIAN HEART. L. E. Ellinwood, J. E. Wilson, and J. M. Coon (Univ. of Chicago, Ill.). *Proc. Soc. Exptl. Biol. Med.* **94**, 129-33(1957).

X irradiation caused release of K from isolated rabbit heart. Rate of release reached a peak after a dose of approximately 2500 r delivered at 500 r/min.

Greatest average increase in perfusate was 12% over control level. K is liberated from isolated rabbit heart in small amounts following exposure to as little as 500 r x ray. When exposed to 1000 r more than 4 x as much K is released into the perfusate in 1 hr. than is released by non-irradiated hearts. X irradiated (in situ) dog heart released K into coronary circulation. Magnitude of effect and radiation dose producing it were approximately the same as in isolated rabbit heart. NSA 11-3667

7741

EFFECT OF ANTIGONADOTROPHIC SERUM ON POST IRRADIATION CHANGES IN THE REPRODUCTIVE SYSTEM OF FEMALE MICE. Charles A. Ely (Columbia Univ., New York). *Endocrinology* 60, 718-28(1957).

Antigonadotrophic serum (produced in rabbits by prolonged administration of crude sheep pituitary extract) was given to mice at intervals ranging from 0-24 weeks after total body irradiation. Ovaries of mice receiving injections of antihormone were smaller in wt. and volume than were those treated with control materials, and the hypertrophied lutein-like cells, characteristic of ovaries of irradiated mice were missing or showed degenerative changes. Absence or reduction of gonadotrophic stimulation was reflected in weight and histological appearance of uteri of antihormone-injected animals. With the exception of pituitary there were no alterations observed in other viscera or in body weight which could be attributed to antigonadotrophic serum. NSA 11-8772

7742

ENZYMATIC ACTIVITY OF RADIATED EXTERIORIZED SALIVARY GLANDS. James A. English (National Naval Medical Center, Bethesda, Md.). *Am. J. Physiol.* 186, 245-9(1956).

Exteriorized salivary glands were exposed to 2000 r while the rest of the animal (rat) was shielded. There was no general effect on the animal, no effect on weight of the glands. Values for glucose-6-phosphate dehydrogenase were higher in the irradiated glands in 17 out of 18 animals, the increase being most marked during the 2nd post-exposure week. There was no change in the isocitric acid dehydrogenase of the irradiated glands. NSA 11-23

7743

CHANGES IN SERUM ALBUMIN DURING IRRADIATION BY γ RAYS (WITHIN THE ORGANISM AND OUTSIDE). Ya. A. Epshtein and E. A. Zabozaeva (Stalinabad State Med. Inst.). *Biokhimiya* 21, 499-502(1956). (In Russian).

Concentrations of Fe^{59} in the liver and other organs of dogs produced intensive emission of γ rays and less intensive β rays. Structure changes observed in serum albumin were similar to the radioinduced changes taking place in albumins *in vitro*. NSA 11-839

7744

CHANGES IN SERUM ALBUMIN ON IRRADIATION BY GAMMA RAYS *IN VITRO* AND *IN VIVO*. Ya. A. Epshtein and E. A. Zabozaeva. *Biochemistry (U.S.S.R.)* 21, 515-19(1956). (In Russian). NSA 11-6603

7745

HYPERPROTECTION AGAINST RADIATION BY COMBINING ADDITION OF CYSTEINE WITH LYOPHILIZATION. H. T. Epstein and D. Schardl (Brandeis Univ., Waltham, Mass.). *Nature* 179, 100(1957). NSA 11-4232

7746

Zurich. Universitat.
EFFECTS ON LIVING TISSUES OF PRIMARY COSMIC RAY PARTICLES. Jakob A. G. Eugster. Feb. 1956. 37p. (OSR-TR-56-19, AD-87528).

Results are presented from a series of experiments designed to determine the effects of cosmic rays on the living tissues of humans and animals. Excised tissues were exposed at the Junfraujoch at an altitude of 11,000 ft, in the Simplon Tunnel 8,000 ft below the mountain top, and during the flights of high-altitude and stratosphere balloons. Observations were made on the tissues following high-altitude exposures and following the reimplantation of the exposed tissues in the parent organisms. It is concluded that harmful effects occur extremely rarely. NSA 11-4782

7747

PHYSICAL, BIOLOGICAL, ADMINISTRATIVE PROBLEMS ASSOCIATED WITH THE TRANSPORTATION OF RADIOACTIVE SUBSTANCES, NUCLEAR SCIENCES SERIES, PRELIMINARY REPORT NO. II. R. D. Evans. National Research Council of the National Academy of Sciences, Publication 205(1951).

7748

EFFECT OF RADIOACTIVITY UPON EXPERIMENTAL POLIOMYELITIS. G. Comba Ezquerro. Translated from *Bol. radiactividad (Madrid)* 24, 18-33(1951). 16p. (AEC-TR-2860). NSA 11-5715

7749

EFFECTS OF X RADIATION UPON THE CELLULAR COMPOSITION OF BLOOD IN MICE DURING THE APPLICATION OF PROTECTIVE AGENTS. Z. N. Faleeva (Severtsov Inst. of Animal Morphology). *Doklady Akad. Nauk S.S.S.R.* 111, 1007-10(1956). (In Russian).

Author describes cytological changes observed in mice irradiated in an increased CO_2 atmosphere and in mice given injections of bone marrow emulsion before irradiation. The number of damaged red and white cells in the blood of animals treated by the protective agents was considerably smaller than in untreated control animals. NSA 11-5737

7750

THE GENETIC SIGNIFICANCE OF RADIATION EXPOSURE IN ATOMIC ENERGY WORK IN THE UNITED KINGDOM IN 1953 AND 1954. F. R. Farmer (U.K.A.E.A., Risley, Warrington, Lancs). *Brit. J. Radiol.* 30, 83-5(1957).

Information is summarized on whole-body x radiation exposures received by employees of the Atomic Energy Authority during 1953 and 1954. The total exposure per year received by employees of the Authority weighted according to their expectation of parenthood is accessed as 4357 roentgen-effective-genetic (reg) units. This is 0.09% of the reg exposure per year now received by the population of Great Britain due to natural radiation. NSA 11-4787

7751

PRODUCTION OF SEVERE PERICARDIAL INJURY BY DEEP ROENTGEN IRRADIATION OF THE PRECORDIAL AREA. H. Faust. *Strahlentherapie* 43, 749-756(1932). (In German).

7752

CONTENT OF CREATINE AND CREATININE IN THE URINE OF RATS EXPOSED TO X-RADIATION. T. A. Fedorova and M. A. Larina. *Med. Radiol.* 1, No. 6, 36-40(1956). (In Russian). NSA 11-3285

7753

INVESTIGATION OF THE ALKALINE PHOSPHATASE LEVEL IN RAT KIDNEY AFTER LOCAL IRRADIATION. Ulrich Feine and Georg Gerber. *Strahlentherapie* 102, 563-8(1957). (In German).

Rat kidneys, exposed surgically, were x irradiated and then studied serially by means of histochemical techniques (tissue sections) and biochemical analyses of cells and tissue homogenates. There was no initial decline in alkaline phosphatase in the kidney. The latent

period and the depression of alkaline-phosphatase levels were dose-dependent. Localization of enzyme within cells was altered only at doses causing necrosis. NSA 11-8788

7754

INTERPRETATION OF SOME ENZYME ACTIVITY INCREASES AFTER WHOLE-BODY X-IRRADIATION. Robert N. Feinstein (Argonne National Lab., Lemont, Ill.). *Radiation Research* 4, 217-20(1956).

Phosphoprotein phosphatase, the enzyme which hydrolyzes inorganic phosphorus from phosphoproteins without preceding proteolysis, appears to be increased in activity in the spleen and intestine after whole-body x irradiation, if the calculations are based on wet weight or protein content. It is pointed out that these data, like numerous other examples cited in the literature, are actually only mathematical artifacts due, in the case of spleen, to loss of organ weight and, in the case of intestine, to loss of protein. NSA 10-6481

7755

PROTECTION AGAINST X-IRRADIATION BY 3-AMINO-1,2,4-TRIAZOLE. Robert N. Feinstein and Sara Berliner (Argonne National Lab., Lemont, Ill.). *Science* 125, 936(1957).

Intraperitoneal injection of AT before whole body x radiation protects a large percentage of mice against 650 r of x rays and prolongs the survival of animals that receive 750 r or 850 r. If administered before a 1700 r dose, or after any dose of x rays, AT is without effect. The possibility cannot be excluded that a catalase mechanism is in some way relevant to the radiation protection. NSA 11-6619

7756

THE EFFECT OF X-RAYS ON *LEISHMANIA TROPICA* IN VITRO. B. Feldman-Muhsam and L. Halberstaedter. *Brit. J. Radiology*, 19, 41-43(1956).

Studies were carried out using 2 stages of *L. tropica*: L. D. Bodies and flagellate. Immediate lethal dose is 1,250,000 r. *In vitro* irradiation with 150,000 r destroys ability of flagellates to multiply in culture medium, 50,000 destroys infectivity for hamsters, 125,000 r destroys ability of L. D. bodies to multiply *in vitro* and 65,000 r destroys their infectivity for hamsters. Therapeutic effect of x-ray cannot be attributed to direct effect on parasite.

7757

A STUDY OF FACTORS AFFECTING X-RAY-INDUCED CHROMOSOME ABERRATIONS IN THE MICROSPORES OF *TRADESCANTIA PALUDOSA*. II. THE OXYGEN EFFECT. Robert H. Fetner (Emory Univ., Atlanta, Ga.). *Radiation Research* 5, 365-71(1956).

Microspores were x irradiated with 200 r and 400 r in atmospheres of helium, air and oxygen. Reduction in aberration frequencies with decreasing concentrations of atmospheric oxygen agreed with results of other workers. Data suggest that when radiations are performed in the absence of oxygen (in helium) there is less rejoining of initial breaks than when oxygen is present. (from authors' summary). NSA 11-861

7758

RELATIVE BIOLOGICAL EFFECTIVENESS OF INTERNAL EMITTERS. Miriam P. Finkel (Argonne National Lab., Lemont, Ill.). *Radiology* 67, 665-72(1956). NSA 11-869

Effectiveness of various internal emitters in inducing malignant bone tumors is estimated (Pu^{239} , Ra^{226} , Sr^{90} , Sr^{89} , Ca^{45}). NSA 11-869

7759

LOCALIZED AMYLOID IN THE BRAIN. A. W. Fischer and H. Holfelder. *Deut. Z. Chir.* 227, 475(1930). (In German).

7760

RADIATION DAMAGE DUE TO RADIOACTIVE SUBSTANCES. W. Flaskamp. *Strahlentherapie* 12

(Sonderbande) 1930 354 pages Urban and Schwarzenberg Publisher, Berlin (1930). (In German).

This is a long review article summarizing radiation effects on various tissues as well as generalized effects. First section considers skin reaction, theories of effects, reversibility and irreversibility of effects, acute and chronic damage and histological changes seen in both. Second section describes effects on internal organs; acute radiation syndrome. Prophylaxis and treatment are included. Internal organs include in review: muscle, bone, cartilage, teeth, serosal surfaces, lung, larynx, gastrointestinal tract urinary bladder and urogenital system, central nervous system, eyes, thyroid, thymus, hematopoietic tissues, hypophysis, prostate, liver, pancreas, salivary glands, breast, reproductive organs. Studies on animals are included along with the extensive material on man. Includes also consideration of effects on fertility, carcinogenesis and summary of methods to minimize adverse effects in therapy and methods of treatment available. Several hundred references (many not included in this bibliography) are appended. (Mostly in German).

7761

INTRAVENOUS APPLICATION OF RADIOACTIVE Au^{198} . Theodor Fliedner and Rudolf Stodtmeister. *Strahlentherapie* 101, 289-95(1956). (In German).

Intravenous application of colloidal radioactive gold (Au^{198}) causes destruction of the bone marrow of the rat by extinction of cells, edema, hemorrhage, and fat infiltration. The injury to the sinus system is of great pathogenic importance in this process. The findings underline the necessity of careful hematological control in the clinical use of gold colloid (Au^{198}). NSA 11-3290

7762

CYTOLOGICAL IDENTIFICATION OF RADIATION-CHIMAERAS. C. E. Ford, J. L. Hamerton, D. W. H. Barnes, and J. F. Loutit. (*Atomic Energy Res. Est.*, Harwell, Berks, Eng.). *Nature* 177, 452-4(1956).

Male mice were exposed to 950 r x radiation and then injected intravenously with a cell suspension prepared from the spleens of infant mice heterozygous for a marker chromosome. Possible application of the chromosome marker technique as a biological tracer are briefly discussed. NSA 10-7433

7763

ON THE EFFECT OF HARD ROENTGEN RAYS ON TYPHOID BACILLI. E. Forfota and A. Hamori. *Centr. Bakteriolog. Parasitenk. Abt. I. Orig.* 139, 163-167 (1937). (In German).

7764

Iowa State Coll., Ames. Agricultural Experiment Station. CHEMICAL CHANGES IN PROTEIN OF STERILIZED MEAT. TERMINATION REPORT NO. 7 (FOR) APRIL 1, 1954-SEPTEMBER 30, 1955. Sidney W. Fox. 21p. Project No. 7-84-01-002. Contract DA-44-109-gm-1762. (PB-121300).

Ionizing radiation does not destroy the amino acids in a protein extensively, nor does extensive peptide bond cleavage appear. Casein undergoes loss of a small proportion of methionine and tyrosine. Hamburger does not break down or lose any of the amino acids studied to a measurable degree. NSA 11-3650

7765

ON THE PROCESSES ORGANISM ACCUMULATION AND EXCRETION OF RADIOISOTOPES OF ALKALI EARTHS, RARE EARTHS, AND HEAVY ELEMENTS. G. E. Fradkin. *Med. Radiol.* 2, No. 2, 13-8(1957). (In Russian).

A report is made on effects of radioactive elements of Th, Po, Sr, Ba, Y, Ce, and Pu interactions with tissue formations and metabolic products in animal organisms. NSA 11-7055

7766

EFFECT OF WHOLE BODY X-IRRADIATION ON PLASMA AND INTESTINAL CHOLINESTERASE AND ON DRUG RESPONSES OF ISOLATED INTESTINAL LOOPS IN THE RHESUS MONKEY, RAT AND GUINEA PIG.

Arthur B. French and Patricia E. Wall (Univ. of Utah Coll. of Medicine, Salt Lake City). *Am. J. Physiol.* **188**, 76-80(1957). NSA 11-5141

7767

THE EFFECT OF X-RADIATION OF THE YOSHIDA ASCITES TUMOR. I. INHIBITION OF MITOSIS BY A SINGLE IRRADIATION. John Gordon Freymann.

(Massachusetts General Hospital, Boston). *Cancer Research* **16**, 930-6(1956).

Total body x radiation with 425 r completely inhibits mitosis in Yoshida ascites tumor in one hour, this effect is sustained for another three hours. There is no inhibition of cells already dividing when radiation occurs. With moderate dosages most of the cells radiated in interphase have mitosis delayed. There is slow recovery from radiation. Normal mitotic rate is regained about twenty hours after radiation. (from authors' summary). NSA 11-1732

7768

EFFECT OF REDUCED LIVER AND KIDNEY CATALASE CONCENTRATIONS ON LETHALITY OF X IRRADIATION IN RATS. Wallace Friedberg (Oak Ridge National Lab., Tenn.). *Proc. Soc. Exptl. Biol. Med.* **93**, 52-3(1956).

Liver and kidney catalase was markedly reduced in rats by the injection of 3-amino-1, 2, 4-triazole. X irradiation of these animals did not cause more deaths than in saline-injected control groups. It was concluded that differences in liver and kidney catalase levels cannot account for differences in sensitivity to the lethal effects of x irradiation. NSA 11-54

7769

THE QUESTION OF THE EFFECT OF RADIATION ENERGY ON THE GROWTH OF TUBERCLE BACILLI IN VITRO. M. Friedland. *ZENTR. BAKTERIOL. PARASITENK., ABT. I. Orig.* **95**, 404-412(1925).

7770

MITOSIS ACTIVITY AND PHASE FREQUENCY AFTER RADIATION OF *VICIA FABA* WITH 31 MEV AND 180 KEV X RADIATION. Hedi Fritz-Niggel. *Naturwissenschaften* **43**, 112-13(1956). (In German). NSA 10-7418

7771

RADIATION INJURY AND PROTECTIVE MEASURES FOR MEDICAL USE OF RADIOISOTOPES. Hedi Fritz-Niggel. *Strahlentherapie* **102**, 355-69(1957). (In German).

The report presents a discussion on the physical and biological fundamentals of injuries due to incorporated radioisotopes. The statements are based on clinical and experimental examples. The necessary protective measures are explained. The tolerance doses have been set up in conformance with the special literature. NSA 11-6620

7772

SOME MICROBIOLOGICAL ASPECTS OF RADIATION STERILIZATION. George J. Fuld, Bernard E. Proctor and Samuel A. Goldblith (Massachusetts Inst. of Tech., Cambridge). *Intern. J. Appl. Radiation and Isotopes* **2**, 35-43(1957). NSA 11-7054

7773

ON RETENTION OF THE PROLIFERATIVE ABILITY OF SKIN EPITHELIUM DURING EXPOSURE TO LOCAL RADIATION. L. V. Funshtein (Central Research Inst. of Roentgen-Radiology). *Med. Radiol.* **1**, No. 6, 31-5 (1956). (In Russian). NSA 11-3661

7774

RELATIVE BIOLOGICAL EFFECTIVENESS OF TRITIUM

BETA-PARTICLES AND Co^{60} GAMMA-RAYS MEASURED BY LETHALITY IN CF1 MICE. John E. Furchner (Los Alamos Scientific Lab., N. Mex.). *Radiation Research* **6**, 483-90(1957).

The γ -radiation was delivered at a rate comparable to the exponentially decreasing dose rate of tritium resulting from the elimination of tritium water. Tritium β -particles were 1.7 times as effective as Co^{60} γ -radiation in producing mortality in 30 days. Calculation of the maximum permissible body concentration for tritium in man, with 1.7 taken for the RBC of tritium β -radiation, gave a value of 3.7 μc and maximum permissible concentrations of 5×10^{-6} and 0.1 $\mu\text{c}/\text{cc}$ for air and water, respectively. (from authors' summary). NSA 11-6609

7775

Children's Cancer Research Foundation, Boston and New England Deaconess Hospital. *Cancer Research Inst.*, Boston.

CARCINOGENESIS BY RADIOACTIVE SUBSTANCES.

Jacob Furth and John L. Tullis. 1955. 60p. (AECU-3080).

A review is presented of factors influencing carcinogenesis in man induced by naturally occurring and artificially produced radioactive substances. Some of the experimental work which indicates the extensiveness, the limitations, and the problems and prospects associated with the use of radioisotopes as carcinogenic agents are also reviewed. The external use of radioisotope and the immediate and long-term hazards of radioactivity due to fall-out from nuclear tests are also discussed. NSA 11-1392

7776

ELECTROCARDIOGRAPHIC STUDIES OF IRRADIATED RABBITS. G. Gabriel. *Strahlentherapie* **34**, 813(1929).

7777

IONIZING RADIATIONS AS A STIMULANT OF ERGOSTEROL BIOSYNTHESIS. R. D. Galtsova. p. 107-12 of Conference of the Academy of Sciences of the USSR on the Peaceful uses of Atomic Energy, July 1-5, 1955. Session of the Division of Biological Science. (Translation). 6p. (AEC-tr-2435(Pt. 4)).

This paper was originally abstracted from the Russian and appeared in Nuclear Science Abstracts as NSA 9-7620. Ergosterol content of yeast increased by 8-10% even after relatively light irradiation (2000 r). Greatest increase was observed following 80,000-90,000 r, the values being 180-200% of pre-exposure value. NSA 10-3978

7778

EFFECTS OF VAGOSYMPATHETIC NOVOCAINE BLOCKAGE OF THE NECK ON THE COURSE OF ACUTE RADIATION SICKNESS OF DOGS. A. N. Gamaleya, A. A. Gyurdzhian, A. A. Zhgun and P. V. Simonov (Burdenko Military Hospital, Ministry of Defense). *Med. Radiol.* **1**, No. 6, 3-5(1956). (In Russian). NSA 11-3312

7779

Naval Radiological Defense Lab., San Francisco. SPATIAL AVOIDANCE BEHAVIOR IN THE RAT AS A RESULT OF EXPOSURE TO IONIZING RADIATION. J. Garcia, D. J. Kimeldorf, and E. L. Hunt. June 20, 1956. 14p. Project NM 0006-015. 04. (USNRDL-TR-96).

The use of radiation as a stimulus to motivate a spatial avoidance response is under investigation. Following a series of four confinements in the exposure compartment, the partition between the compartments was removed and each animal was allowed a free choice of residence in the alley as a test of conditioning. With but one exception, all the irradiated animals demonstrated a decreased preference for the compartment in which they had been exposed. Both gamma and x

rays can serve as stimuli to establish spatial avoidance behavior in the rat. NSA 10-8142

7780

BIOLOGICAL EFFECTS OF FAST ELECTRONS AND ULTRA-HARD X RADIATION FROM A 15-MEV BETATRON COMPARED WITH X RADIATION OF USUAL HARDNESS. H. Gartner. *Strahlentherapie* 96, 378-95(1955). (In German).

The experimental results found after irradiation of tissue cultures with high-speed electrons and ultra-hard roentgen rays are compared to those obtained after roentgen irradiation (184 kv) of equal dose and equal dose output. The quantitative and qualitative differences with respect to the effect produced by these irradiations as well as the clinical applicability of energetic radiations are discussed. NSA 10-6484

7781

THE AUTOPSY OF A ROENTGENOLOGIST. S. Gavazzoni and S. Minelli. *Strahlentherapie* 5, 309(1915). (In German).

7782

ANTIBODY RESPONSE OF LETHALLY X-IRRADIATED MICE TREATED WITH RAT BONE MARROW. (Oak Ridge National Lab., Tenn.). *J. Immunol.* 77, No. 6, 430-6(1950). NSA 11-5151

7783

NUCLEIC ACID AND SUCCINIC DEHYDROGENASE OF RAT LIVER AFTER X-IRRADIATION. Leon L. Gershbein and Boguslaw K. Krotoszyński (Illinois Inst. of Tech., Chicago). *Science* 124, 81-2(1956).

No remarkable alterations were observed in the succinic dehydrogenase and nucleic acid levels of x-irradiated intact rat liver. NSA 10-9958

7784

EFFECT OF HIGH-INTENSITY X-RADIATION ON THE A GROUP FIBERS OF THE FROG'S SCIATIC NERVE. Herbert B. Gerstner (U. S. A. F. School of Aviation Medicine, Randolph AFB, Tex.). *Am. J. Physiol.* 184, 333-7(1956). NSA 10-6472

7785

EFFECT OF HEAD X-IRRADIATION IN RABBITS ON AORTIC BLOOD PRESSURE BRAIN WATER CONTENT AND CEREBRAL HISTOLOGY. Herbert B. Gerstner, Phillips M. Brooks, F. Stephen Vogel, and Sidney A. Smith. (U.S.A.F. School of Aviation Medicine, Randolph Field, Tex.). *Radiation Research* 5, 318-31(1956).

Rabbits received 14 Kr of x radiation to the head at a dose rate of 0.24 Kr/min. During the 3 hour post-radiation period, severe epileptoid seizures appeared in unanesthetized animals. Marked hypotension developed early during radiation and frequency progressed to circulatory collapse during the first post-radiation hour. Histologic studies showed early stages of developing meningitis, vasculitis, and pyknosis of the granule cells of the cerebellum. (from authors' summary). NSA 11-858

7786

EFFECTS OF IONIZING RADIATIONS ON PLANT TISSUES. I. QUANTITATIVE MEASUREMENTS OF THE SOFTENING OF APPLES, BEETS, AND CARROTS. R. E. Glegg, Frank P. Boyle, L. W. Tuttle, D. E. Wilson, and Z. I. Kertesz (Cornell Univ., Ithaca, N. Y.). *Radiation Research* 5, 127-33(1956).

The pressure required to crush small cylinders of plant tissues was measured objectively. Up to a certain level of γ -irradiation no measurable softening occurs in apple, beet, and carrot cylinders. Beyond this level of irradiation, progressive softening of the tissues takes place. The crushing loads obtained in the softening phase plotted against log roentgens give straight lines.

These straight-line plots allow graphical interpolation of threshold dosages of irradiation, which were 34,700, 166,000, and 316,000 for the varieties of apples, carrots, and beets investigated. NSA 10-9953

7787

THE INFLUENCE OF HISTOLOGICAL STRUCTURE ON THE RADIOSENSITIVITY OF TUMOURS: A SYMPOSIUM. II. THE INFLUENCE OF SYSTEMIC FACTORS ON THE DIFFERENTIATION AND RADIOCURABILITY OF CERVICAL CANCERS. A. Glucksmann (Strangeways Research Lab., Cambridge, England). *Brit. J. Radiol.* 29, 483-7(1956). NSA 11-26

7788

EFFECT OF PERITUMORAL TISSUE INFILTRATION WITH RADIOACTIVE YTTRIUM ON GROWTH AND SPREAD OF MALIGNANT CELLS. Horace Goldie and Harold D. West (Meharry Medical Coll., Nashville, Tenn.). *Cancer Research* 16, 484-9(1956).

Radioactive yttrium was injected into peritumoral subcutaneous tissue of mice bearing Sarcoma 180 or Sarcoma 37 on abdomen, leg, or scalp. It is concluded that peritoneal treatment of large tumors affects (through necrosis) consistently only their periphery, but malignant cells scattered in normal tissue can be easily reached and inactivated by infiltrated Y^{90} before the tumor becomes organized. (from authors' summary).

7789

EFFECTS OF SMALL DOSES OF IONIZING RADIATION ON THE BLOOD PICTURE OF PERSONNEL; THE ASPECTS OF PROFESSIONAL HAZARD. M. B. Golubitskaya (Inst. of Oncology). *Med. Radiol.* 1, No. 6, 6-13(1956). (In Russian). NSA 11-3304

7790

SURVIVAL STUDIES ON X-IRRADIATED MICE MEDICATED WITH SPLEEN-PREPARATIONS. Anna Goldfeder and Grace E. Clarke. (New York Univ.). *Radiation Research* 6, 318-28(1957).

Protein-free calf spleen preparations were tested for their efficacy in protecting mice against radiation induced injury. One preparation consisted of lipids alone and one of deoxyribonucleic acid (DNA). Mice were irradiated with 700 r. In some cases protection was observed. Preparations designated "total lipids" exerted a harmful effect. Whether or not a "humoral" factor is involved in protection by spleen or bone marrow is discussed. (from authors' summary). NSA 11-5740

7791

THE EFFECTS OF X-RAYS ON THE GROWTH OF SPINAL GANGLIA FROM 6- AND 12-DAY CHICK EMBRYOS IN TISSUE CULTURE. Irene Plactere Goldring (New York Univ., N. Y. and Brookhaven National Lab., Upton, N. Y.). *Radiation Research* 5, 390-403(1956).

Comparison of growth activities of spinal ganglia in tissue culture irradiated *in ovo* and *in vitro* reveals the greater sensitivity of spinal ganglia to x radiation *in ovo* than *in vitro*. The circulatory system is involved in the difference. Differential sensitivity of the three main cell types present in spinal ganglia was observed. Ganglia from 6-day embryos succumb more rapidly to x radiation *in ovo* than ganglia from 12-day embryos; 12-day ganglia withstand higher radiation doses than 6-day ganglia when irradiated *in vitro*. (from authors' summary). NSA 11-863

7792

Naval Radiological Defense Lab., San Francisco. ON THE NATURE OF SERUM PROTEIN CHANGES IN THE X-IRRADIATED DOG. W. H. Goldwater and C. Entenman. May 9, 1956. 20p. Project NM 006-015. (USNRDL-TR-91).

Paper electrophoresis techniques have been applied to the study of serum protein, lipoprotein, and glyco-

protein changes in irradiated dogs. The loss of alpha-4 and gain of alpha-3 glycoproteins have been found as early as ten days prior to irradiation death, and the absence of lipoprotein or body temperature abnormalities. In dogs surviving irradiation doses near the LD₅₀, transitory lipoprotein changes were less pronounced than those found in the glycoprotein components. Possible mechanisms underlying these various serum protein changes are discussed. NSA 10-8140

7793

RADIATION SIALITIS FOLLOWING RADIOIODINE THERAPY. A. W. G. Goolden, J. R. Mallard, and H. E. A. Farran (Hammersmith Hospital, London and New End Hospital, London). *Brit. J. Radiol.* 30, 210-12(1957). NSA 11-6216

7794

PROBLEMS IN PATHOGENESIS OF RADIATION SICKNESS. P. D. Gorizontov. *Med. Radiol.* 1, 9-19(1956). (In Russian). NSA 10-9080

7795

ULTRAVIOLET SPECTROGRAPHIC DETERMINATION OF EARLY MODIFICATIONS IN BLOOD SERUM RESULTING FROM X RADIATION. B. M. Graevskaya and B. A. Orlov (Central Roentgen, Radiological, and Cancer Inst.). *Doklady Akad. Nauk S. S. R.* 108, 623-5(1956). (In Russian). NSA 11-29

7796

RADIOSENSITIVITY OF PITUITARY GLANDS IN TOTAL BODY IRRADIATION OF AMPHIBIANS. E. Ya. Graevskii and A. A. Neifakh (Severtsov Inst. of Animal Morphology). *Doklady Akad. Nauk S. S. R.* 111, 1004-6(1956) (In Russian).

Frogs (*Rana temporaria*) were gamma irradiated (Co⁶⁰) with 7000 r and 14 days later the hypophyses were removed and injected into females. Both irradiated and nonirradiated hypophysis material was injected to irradiated frogs were about half as numerous as from nonirradiated, but irradiation of the hypophysis had no effect on either group. In further experiments with 10,000 r to the hypophyses and 21-30 days delay before injection, results were similar. The viable offspring are classified into groups according to developmental stage. A dose of 10,000 r is considered not to affect the function of the frog hypophyses. NSA 11-4790

7797

EFFECTS OF SMALL DOSES OF IONIZING RADIATION ON THE PARAMAECIUM CAUDATUM (CONTRIBUTION TO THE PROBLEM OF RADIOSTIMULATION). E. Ya. Graevskii and E. G. Zinoveva (Severtsov Inst. of Animal Morphology). *Doklady Akad. Nauk S. S. R.* 100, 379-82 (1956). (In Russian).

The data obtained indicated that the increase in the rate of infusoria division was caused by the salts and admixtures and not by radiation effects. The ionizing radiation used in small quantities in the experiment did not produce any stimulating effects but slowed down the rate of division in paramecium. NSA 11-1738

7798

COMPARATIVE EFFECTIVENESS OF SEVERAL X-RAY QUALITIES FOR ACUTE LETHALITY IN MICE AND RABBITS. Douglas Grahn, George A. Sacher, and Howard Walton, Jr. (Argonne National Lab., Lemont, Ill.). *Radiation Research* 4, 228-42(1956).

The comparative acute lethal effect for mice and rabbits of x rays in the range of 80 to 250 kvp has been studied. NSA 10-6483

7799

CELLULAR RADIOBIOLOGY. L. H. Gray. (Mount Vernon Hospital, Northwood, Middlesex, Eng.). *Ann. Rev. Nuclear Sci.* 6, 353-422(1956).

Cellular radiobiology has been considered to in-

clude a study of the effects of irradiating organized tissues as well as cells, but not the whole organism, at least when this is a mammal. NSA 11-5144

7800

METHIONINE AND CHOLINE LEVELS IN RAT LIVERS. U. S. Kumta, S. U. Gurnami and M. N. Sahasrabudhe. *Current Sci. (India)* 24, 362(1955). BA 56-3957

7801

Wisconsin Univ., Madison. Inst. for Enzyme Research. INHIBITION OF ENZYMIC ACTIVITY IN IRRADIATED FOODSTUFFS. REPORT NO. 6 (FINAL) (FOR) JANUARY 1-DECEMBER 15, 1955. David E. Green. 26p. Project No. 7-84-01-002. Contract DA 19-129-gm-257. (PB-121306).

Author emphasized importance of enzymes concerned with energy production, intermediate metabolism, and degradation of food products. The enzymes have been found to be highly resistant to ionizing radiations. The production of a disagreeable taste, offensive odors, and undesirable color changes accompanied the irradiation of food products. NSA 10-9917

7802

THE INFLUENCE OF IONIZING RADIATION ON THE BODY COMPOSITION OF PATIENTS WITH MALIGNANT LYMPHOMA. Joseph Greenberg and Daniel Laszlo (Montefiore Hospital, New York). *J. Lab. Clin. Med.* 49, 514-25(1957).

In sharp contrast to patients receiving a normal diet, patients receiving a diet adequate in calories, low in protein and deficient in B-vitamins and certain minerals, showed reduction in their lean body components, and a negative nitrogen balance following exposure to ionizing radiation. Their body fat, however, increased. NSA 11-5152

7803

Food and Drug Administration, Washington, D. C. and Federal Civil Defense Administration, Battle Creek, Mich. EFFECTS OF NUCLEAR EXPLOSIONS ON CANNED FOODS. Carlos A. Greenleaf, James M. Reed, George O. Sampson, E. Rolland McConnell, and John M. Sharf. Mar. 1956. 89p. Project 32.2 (of) Operation Teapot. (WT-1212).

Heat-sterilized foods canned in both tin and glass containers, 60 different commercial products covering all categories, were exposed to shot about one and one-half times the 20-kt yield considered as nominal. Exposures covered a wide range of civilian handling conditions to determine the suitability of canned foods for use. Results of radiological, chemical, bacteriological, and organoleptic tests are presented. NSA 11-7070

7804

FURTHER STUDIES ON THE EFFECTS OF X-RADIATION ON THE MULTIPLICATION OF *RICKETTSIA MOORSERI* IN EMBRYONATE EGGS. Donald Greiff, E. L. Powers, and Henry Pinkerton (St. Louis Univ., Mo. and Argonne National Lab., Lemont, Ill.). *J. Exptl. Med.* 105, 217-22 (1957).

Effect of x-rays on growth of rickettsiae in embryonate egg was studied. Intensifying effect of x radiation of the host on rickettsiae growth can be attributed to alterations of cells of host that persist at least 7 days. Greatest enhancement of growth of rickettsiae occurred when moderately infected cells were irradiated. Experiment indicates that x-rays may neutralize or reverse changes in the host that are unfavorable to growth of rickettsiae. Explanations of phenomena in terms of biochemical and biological alterations of cells of the host are presented. NSA 11-6199

7805

THE EFFECT OF X-RAYS ON THE RICKETTSIOSTATIC

ACTIVITY OF STREPTOMYCIN, AUREOMYCIN, AND PENICILLIN. Donald Greiff, E. L. Powers, and Henry Pinkerton (St. Louis Univ., Mo. and Argonne National Lab., Lemont, Ill.). J. Exptl. Med. 105, 223-32 (1957). (In Russian) NSA 11-6200

7806

ABOUT THE USE OF BLOOD-FORMING STIMULANTS IN RADIATION LEUKOPENIA. Yu. G. Grigor'ev. Med. Radiol. 1, No. 6, 57-61(1956). NSA 11-3313

7807

SOME DATA ON THE USES OF TANNIC ACID IN RADIATION SICKNESS THERAPY. Yu. G. Grigor'ev. Med. Radiol. 1, No. 4, 67-9(1956). (In Russian). NSA 11-889

7808

BLOOD PRESSURE REACTIONS TO IRRADIATION. Yu. G. Grigor'ev. Med. Radiol. 2, 47-54(1957). (In Russian). NSA 11-5724

7809

BIOLOGICAL ACTION OF ROENTGEN RAYS. F. M. Grodel and E. Schneider. Strahlentherapie 23, 411-446 (1926). (In German).

Effects of x irradiation on paramecia vary with pH and are different for NaOH, Na₂CO₃ and NaHCO₃ in media when pH is maintained at 7. Dry seed cells are sensitive to x rays. Irradiated foods are toxic, presumably as a result of vitamin destruction. CA 21-2324

7810

EFFECT OF RADIOACTIVE COLLOIDAL GOLD ON THE MAST CELLS OF BONE MARROW. J. P. Gumaraes (Instituto Oswaldo Cruz, D. Federal, Brazil) and D. M. Taylor (Royal Cancer Hospital, London). Nature 179, 914-15(1957). NSA 11-7062

7811

IONOMETRIC DOSIMETRY AT THE ANTICANCER CENTER OF STRASBOURG. A. Gunsett and Ch. Spack. Arch. Elec. Med. 36(538), 273-84(1928). (In French).

Includes data comparing effects of hard and soft x rays on root growth in germinating beans. BA 6-18471

7812

THE EFFECT OF X-RAYS ON THE SURVIVAL OF BACTERIA AND YEAST. I. A COMPARATIVE STUDY OF THE DOSE-SURVIVAL CURVES OF AZOTOBACTER AGILE, ESCHERICHIA COLI, PSEUDOMONAS FLUORESCENS, RHODOPSEUDOMONAS SPHEROIDES, AND SACCHAROMYCES CEREVISIAE IRRADIATED IN THE RESTING STATE. Shirley E. Gunter and Henry I. Kohn (Univ. of California School of Medicine, San Francisco). J. Bacteriol. 71, 571-81(1956). NSA 10-9961

7813

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF 180-KEVP AND 22.5-MEVP X-RAYS DETERMINED FROM THE DOSE-SURVIVAL CURVE OF SACCHAROMYCES CEREVISIAE. Shirley E. Gunter, Henry I. Kohn, Ella B. Tyree, John S. Laughlin, Jacques Ovadia, Gerald Shapiro, and Patricia Thomsen. Radiation Research 4, 326-38(1956).

Based on the absorbed dose in yeast suspension, the RBE was 1.06 ± 0.04 , a value not significantly different from 1. An RBE differing from 1.00 by 0.09 or more would have been considered a significant difference between the two radiations. (from authors' summary). NSA 10-7423

7814

NOTE ON FITTING THE MULTI-HIT SURVIVAL CURVE. Joan M. Gurian. Biometrics 12, (No. 2) 123-6(1956). NSA 10-9936

7815

TWO CASES OF ACUTE RADIATION DISEASE IN MAN. A. K. Guskova and G. D. Baisogolov Intern. Conf. on

the Peaceful Uses of Atomic Energy, Geneva, 1955 11, 35-44(1956). A/Conf. 8/11.

7816

A CASE OF ACCIDENTAL PUNCTURE CONTAMINATED WITH Th²³⁷. STUDIES ON ELIMINATION AND RESIDUAL BODY ACTIVITY. P. F. Gustafson, L. D. Marinelli and E. A. Hathway (Argonne National Lab., Lemont, Ill.). Radiology 68, 358-66(1957). NSA 11-5175

7817

MUTANTS RECOVERED AFTER EXPOSURE OF STREPTOMYCES VENEZUELAE TO X-RAYS. Ralph B. Gwathkin and David Gottlieb (Univ. of Illinois, Urbana, Ill.). J. Bacteriol. 71, 328-32(1956).

Readily recognized mutants were those involving loss of spore-bearing aerial mycelium, loss of brown melanin-like-pigment, colony irregularity, diminution in colony size, as well as loss of chloramphenicol production. NSA 10-7411

7818

THE EFFECT OF IRRADIATION ON RECOMBINATION IN ESCHERICHIA COLI. F. Haas, O. Wyss, and W. S. Stone. Proc. Natl. Acad. Sci. U. S. A. 34, 229-32(1948).

Two points are of particular interest. The first is the demonstration of regular recombination in E. coli, K12. The second is the marked increase in rate of recombination due to the radiation. Reasons for this increase are unknown, but they may represent an interesting adaptation, perhaps connected with the abnormal growth pattern of the irradiated cells.

7819

THE EFFECT OF ROENTGEN RAYS ON TUBERCLE BACILLI (TYP. HUMANUS, "CHELONIN", FRIEDMANN-STAMM). H. F. O. Haberland and K. Klein. Munch. med. Wochschr. 68, 1049-50(1921).

7820

INFLUENCE OF AGE, DOSAGE AND SURVIVAL ON EFFECTS OF MULTIPLE INTRAVENOUS INJECTIONS OF RADIOACTIVE GOLD COLLOIDS IN DOGS. P. F. Hahn, E. L. Carothers, Andrew H. Jackson, Frank E. Stagers, and Marvin A. Jackson (Meharry Medical Coll., Nashville, Tenn.). Am. J. Roentgenol. Radium Therapy Nuclear Med. 77, 476-85(1957). NSA 11-4784

7821

ACUTE RADIATION DEATH OF DOGS RECEIVING A SINGLE MASSIVE DOSE OF INTRAVENOUS RADIOACTIVE GOLD. P. F. Hahn, Andrew H. Jackson, Frank E. Stagers, Marvin A. Jackson, and E. L. Carothers (Meharry Medical Coll., Nashville, Tenn.). Am. J. Roentgenol. Radium Therapy Nuclear Med. 75, 1139-43(1956).

Case histories of nine young dogs dying from acute radiation injury resulting from one massive intravenous dose of radioactive colloidal gold are presented. Most of the animals survived less than 11 days. Some histologic changes are noted and discussed. In addition to the marked leukopenia and lymphopenia, the monocytic series of cells was significantly depressed in these dogs. The anemia appeared early and was severe. Histologic evidence of liver damage was minimal in most animals. Marked hypoplasia or aplasia of the bone marrow was found in all animals. NSA 10-9040

7822

EFFECTS OF A SINGLE SESSION OF WHOLE BODY IRRADIATION IN THE RHESUS MONKEY. Mary V. Haigh and Edith Paterson (Christie Hospital and Holt Radium Inst. Manchester, Eng.). Brit. J. Radiol. 29, 148-57 (1956).

Effects of different dose levels of x irradiation given at a single session were studied in Rhesus monkeys. The data yielded an LD₅₀ (30 days) of 570 ± 25 r and a

time of death of 14.7 ± 2.2 days for those animals dying after irradiation in the LD_{50} range of doses. NSA 10-6473

7823

RETICULOCYTIC CRISIS IN THE NEWBORN RAT AFTER X-IRRADIATION. S. Hajdukovic and Lj. Stosic (Boris Kidrich Inst. for Nuclear Sciences, Belgrade). Nature 179, 821-2(1957). NSA 11-7061

7824

THE EFFECT OF COBALT-60 GAMMA RADIATION ON TETANUS ANTITOXIN FORMATION IN MICE. William M. Hale and Richard D. Stoner (Univ. of Tennessee, Memphis and Brookhaven National Lab., Upton, N. Y.). J. Immunol. 77, 410-17(1956). NSA 11-5150

7825

General Electric Co. Hanford Atomic Products Operation, Richland, Wash.

BIOLOGY RESEARCH-ANNUAL REPORT FOR 1955. BIOLOGY SECTION. Feb. 16, 1956. 188p. Contract W-31-109-Eng-52. (HW-41500).

Progress is reported on the effects of Ca and Sr on the uptake of Sr^{90} , effects of carrier on distribution of Ca^{45} and Sr^{90} effects of flow on isotopic dilution, salmon spawning for 9 yrs., exposure to chromates, build-up of radioisotopes in rats drinking reactor water, monitoring after exposure to fission products, Pu and Ru^{103} following injection, autoradiographs of Ru^{103} , foliar sorption of I^{131} , uptake of Sr^{90} , glutathione in maintaining uniform suspensions of Po^{210} in yeast, S^{35} and Po^{210} for yeast, absorption of Pu and Ru^{103} radiation damage from Ru^{105} , absorption and design of two-probe scintillation detector. (HW-35917). NSA 10-6461

7826

SCIENTIFIC AND TECHNOLOGY PROBLEMS INVOLVED IN USING IONIZING RADIATIONS FOR THE PRESERVATION OF FOOD. DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH FOOD INVESTIGATION SPECIAL REPORT NO 61. R. S. Hannan. London, Her Majesty's Stationery Office, 1955. 192p.

Scientific and technological problems involved in using ionizing radiations for the preservation of food are reviewed. NSA 10-7424

7827

THE FOOD SCIENTIST LOOKS AT RADIATION PRESERVATION. R. S. Hannan and B. Coleby (Food Investigation Organization of the Dept. of Scientific and Industrial Research, Univ. of Cambridge). Nuclear Power 2, 8-11(1957).

A survey was made on the use of ionizing radiation for processing foodstuffs comparing existing food processing methods and ionizing radiation methods as applied to meat, fruits, vegetables, and package materials.

NSA 11-3287

7828

Naval Dental School, National Naval Medical Center, Bethesda, Md. and Naval Medical Research Inst., Bethesda, Md.

HISTOLOGIC CHANGES IN THE INCISOR TEETH OF RATS SERIALLY SACRIFICED AFTER RECEIVING 1500 r OF 200 Kv X-RAY IRRADIATION. Louis S. Hansen and James A. English. Dec. 27, 1955 13p. (NM-006-012.04).

Fifty white rats were irradiated locally to the head with 1500 r of 200 kv x-ray. These rats were serially sacrificed simultaneously with 50 littermate control rats at various intervals beginning at 16 hr following exposure. NSA 10-9036

7829

PHYSICAL AND CLINICAL ASPECTS OF SUPER-VOLTAGE ROTATIONAL THERAPY H L Hare, S W Lippincott, Jr., D Sawyer, J G Trump, E W Webster, K A Wright, W W Evans, and R C Granke Radiology 57, 157-168(1951)

7830

EFFECT OF IRRADIATION ON IN VIVO P^{32} INCORPORATION BY FOUR TYPES OF ASCITES TUMORS. Helen Harrington, Diana Rauschkolb, and Paul S. Lavik (Western Reserve Univ., Cleveland) Cancer Research 17, 34-7(1957).

Of the four types of ascites tumors, only the Ehrlich tetraploid ascites tumor was affected by 1,000 r which reduced P^{32} incorporation to about 65% of normal. The lymphosarcoma 6C3HED cells were affected slightly by 2,000 r but the Lettre hyperdiploid Ehrlich ascites tumor cells and the TA 3 adenocarcinoma cells were not affected significantly by doses as high as 5,000 r. (from authors' summary). NSA 11-3653

7831

A STUDY OF DIRECT AND INDIRECT EFFECTS OF IRRADIATION ON P^{32} INCORPORATION BY EHRlich ASCITES TUMOR CELLS IN VIVO AND IN VITRO. Helen Harrington and Paul S. Lavik (Western Reserve Univ., Cleveland). Cancer Research 17, 38-42(1957).

An inhibition of P^{32} incorporation into DNA occurred only when irradiated cells were exposed to irradiated tumor tissue. Exposure to irradiated non-tumor tissue was not necessary during the actual incorporation period. P^{32} incorporation into DNA of tumor cells irradiated in vivo was inhibited only when the incorporation was carried out in vivo and not when carried out in vitro. (from authors' summary). NSA 11-3654

7832

EFFECTS OF MILLION VOLT IRRADIATION ON THE GASTROINTESTINAL TRACT. I. B. Brick. Arch. Internal Med. 96, 26-31(1955).

A dose greater than 4500 r is required to cause gastric ulceration in man. Ulceration may occur as a late complication of radiotherapy secondary to vascular sclerosis. Case histories of 9 young men who received 5000 r local doses of mid-line of abdomen for malignancy are presented.

7833

EFFECT OF CYSTEINE ON THE RESULT OF THE RADIATION REACTION ON BONE MARROW AFTER LOCAL IRRADIATION. Helmut Hartweg. Strahlentherapie 102, 65-72(1957). (In German). NSA 11-5168

7834

HEMATOLOGICAL INVESTIGATION OF THE EFFECT OF PROTECTIVE MATERIAL. PART III. THE EFFECT OF RUTIN ON THE RESULTS OF RADIATION REACTION ON BONE MARROW. Helmut Hartweg. Strahlentherapie 102, 305-10(1957). (In German). NSA 11-5744

7835

HEMATOLOGICAL INVESTIGATION OF THE EFFECT OF PROTECTIVE MATERIAL. PART IV. ON THE CONDITION OF PERIPHERAL BLOOD PICTURE IRRADIATED AFTER TREATMENT WITH PROTECTIVE SUBSTANCES. Helmut Hartweg. Strahlentherapie 102, 311-14(1957). (In German). NSA 11-5745

7836

BETATRON CANCER THERAPY. Roger A. Harvey, Louis L. Haas, and John S. Laughlin. Radiology 58, 23-33(1952).

Clinical trials of the 24-mev betatron have shown advantageous dosage distribution. The extreme penetration and distribution of intensity of the x ray beam from the betatron require special attention in treatment planning. The betatron is not a substitute for early diagnosis and prompt treatment of cancer and does not prevent the appearance of metastases from disease already disseminated outside the treated area. (from authors' summary).

7837

CLINICAL REPORT OF FOUR INDIVIDUALS ACCIDENT-

ALLY EXPOSED TO GAMMA RADIATION AND NEUTRONS (REACTOR ACCIDENT AT ARGONNE). R. S. Hasterlik. Argonne National Laboratory Report (1953). ANL-4932.

Urinary amino-acid excretion was studied by paper partition chromatography in 4 humans exposed to γ rays and neutron radiation at levels below 200 r. All showed daily increase in amount of amino acid excreted after the accident.

7838

Brown Univ., Providence.

PENETRATION OF THE GUT WALL BY INTESTINAL BACTERIA AFTER X-IRRADIATION. PROGRESS REPORT FOR JUNE 1, 1955 TO JANUARY 31, 1956. M. H. Hatch. 9p. (AECU-3169).

Factors affecting bacterial invasion from the intestinal tract in x irradiated mice were investigated. *P.morganii* was administered in the drinking water on the seventh day following exposure to 600 r total-body x irradiation. Mortality increased from about 40% following irradiation alone to about 62% after radiation and bacterial challenge together. No effect on mortality was produced by immunization with *P. morganii* prior to irradiation or injection of spleen homogenates from normal mice shortly after irradiation. NSA 10-3250

7839

THE HAZARDS TO MAN OF NUCLEAR AND ALLIED RADIATIONS. London, Her Majesty's Stationery Office, 1956. 128p.

Existing scientific information on the biological effects of nuclear radiations is reviewed. The consequences to the individual and to society of increased environmental radioactivity are considered. It was concluded that the use of ionizing radiation entails risk, but the risk is controllable within limits that man can accept. The nature of the risk and the extent to which they can be controlled are discussed. NSA 11-55

7840

Hanford Atomic Products Operation, Richland, Wash. PROPOSED REVISION IN COMPUTATIONS OF MPC'S FOR LONG-LIVED RADIOISOTOPES. J. W. Healy. Mar. 1, 1955. Changed from OFFICIAL USE ONLY Nov. 26, 1956. 10p. Contract W-31-109-Eng-52. (HW-35663).

The computational techniques and basic concepts for finding the MPC's of Pu, Ra, U, and Sr longlived isotopes are illustrated. It is assumed that the excretion or retention follows a power law rather than an exponential law. NSA 11-2234

7841

Hanford Atomic Products Operation, Richland, Wash. A REVIEW OF THE MPC'S FOR NATURAL THORIUM. J. W. Healy. Nov. 21, 1955. 15p. Contract W-31-109-Eng-52. (HW-40105).

Since the chemical toxicity of Th is low by any route of administration, the radiation effects will limit the permissible levels. Data available on thorotrast administrations give little information on the hazards of other methods of exposure since the metabolism of thorotrast is different from that of thorium accumulated by ingestion or inhalation. The body deposition of thorium from intramuscular or oral administration is mostly in bone indicating bone as the critical organ for the more probable routes of accumulation. A review of excretion data for thorium indicates that it is too limited at this time to permit valid estimation of body burden. NSA 11-877

7842

THE CALCULATION OF MAXIMUM PERMISSIBLE CONCENTRATIONS FOR LONG-LIVED RADIOISOTOPES. J. W. Healy (General Electric Co., Richland, Wash.). Radiation Research 4, 367-72(1956). NSA 10-9076

7843

EFFECTS OF IONIZING RADIATION ON THE SEX CELLS

OF MISGURNUS FOSSILIS. A. A. Neifakh. (Severtsov Inst. of Animal Morphology). Doklady Akad. Nauk S. S. S. R. 111, 585-8(1956). (In Russian).

The percentages of living embryos hatched from irradiated Misgurnus gametes were determined. The ϕ gametes were somewhat less radiation sensitive than the σ , although the curves for percentage of living embryos vs. dose were similar. Viability was minimum (20 per cent for σ , 35-48 per cent for ϕ) at 2000-3000 r, increasing to 70-85 per cent at 96,000 and 40,000 r, respectively. When both gametes were irradiated, the viability of the embryos became a probability function. Individual theoretical curves are similar but different from the experimental. The difference is explained by the fact that average values are plotted and by failure to take recessive lethal characteristics into account. NSA 11-3657

7844

THE ACTION OF RADIATIONS ON LIVING PROTOPLASM. L. V. Heilbrunn and D. Mazia. p. 625-76 of BIOLOGICAL EFFECTS OF RADIATION (REVIEW) VOL. I. B. M. Duggar, ed. New York, McGraw-Hill. 1936.

7845

Rochester, N. Y., Univ. Atomic Energy Project EFFECT OF HIGHLY IRRADIATED FOOD MEDIUM ON LIFE SPAN AND DEVELOPMENT OF *DROSOPHILA MELANOGASTER*. Betty Jo Henderson, R. C. Baxter, and L. W. Tuttle. Mar. 26, 1957. 86p. Contract W-7401-eng-49. (UR-483).

Five successive generations of *Drosophila melanogaster* were grown on a brewers yeast medium irradiated with one million rep of γ rays from a Co^{60} source. The irradiation dose selected lies between the pasteurizing dosage range and the so called sterilizing dose for most microorganisms. Studies of longevity, fecundity, egg-hatchability and body weights of several thousand flies are discussed. NSA 11-6597

7846

RADIATION GENETICS CONDUCTED ON CEREALS. S. Matsumura. Ann. Rept. Natl. Int. Genet., Mishima, Japan 1, 22-23(1951).

In experiments on induction of chromosomal aberrations in *Triticum monococcum* by irradiating the seeds, a study was made of the cytology of the induced reciprocal translocations and of the relationship of the frequency of chromosome aberrations to dosage and wave length. (from abstract). PBA 23-171

7847

MORTALITY OF RHESUS MONKEYS AFTER SINGLE TOTAL BODY IRRADIATION. Ulrich K. Henschke and Joseph L. Morton. Am. J. Roentgenol. Radium Therapy Nuclear Med. 77, 899-909(1957). NSA 11-6602

7848

INDUCED CHANGES IN FEMALE GERM CELLS OF *DROSOPHILA*. I. DEPENDENCE OF HALF-TRANSLOCATION FREQUENCY UPON X-RAY DELIVERY RATE. Irwin H. Herskowitz and S. Abrahamson (Indiana Univ., Bloomington). Genetics 41, 420-8(1956). NSA 10-9047

7849

INVESTIGATION OF THE EFFECT OF AN INTEGRAL DOSE DISTRIBUTION ON THE LIFETIME OF WHITE MICE AFTER TOTAL-BODY IRRADIATION (1200 r). Kurt Heub and Irmgard Wolf. Strahlentherapie 102, 539-42(1957). (In German).

White mice were irradiated with a surface integral dose of 1200 r. The dose distribution within the mouse was of rotational symmetry with respect to the axis of its trunk. The qualities of radiation used were between 2.5 and 30 mm HVL of tissue. The dose distribution was calculated and measured by the radiation-induced discoloration of plastics. There was a difference only

at a very inhomogeneous dose distribution. This effect may be explained by the peripheral position of the organs sensitive to radiation. NSA 11-8784

7850

THE HAZARD OF RADIATION. Albert E. Heustis and Donalds Van Farowe. *Radiology* 57, 832-836(1951).

7851

ON THE EFFECT OF ROENTGEN RAYS ON CELLULAR DIVISION. G. Hevesy. *Rev. Mod. Phys.* 17, 102-11(1945).

7852

THE IMPORTANCE OF RADIO ISOTOPE RESEARCH IN MEDICINE AND BIOLOGY. Georg v. Hevesy. *Strahlentherapie* 102, 341-54(1957). (In German).

NSA 11-6629

7853

THE LETHAL ACTION OF RADIANT ENERGY ON LIVING CELLS. F. F. Heyroth and H. R. Loofbouroow. *Phys. Rev.*, 45, 126(1934).

7854

TIME-INTENSITY FACTORS IN RADIATION RESPONSE. I. THE ACUTE EFFECTS OF MEGAVOLT ELECTRONS (CATHODE RAYS) AND HIGH- AND LOW-ENERGY X-RAYS WITH SPECIAL REFERENCE TO THE BRAIN. Samuel P. Hicks, Kenneth A. Wright and Kenneth E. Leigh (New England Deaconess Hospital, Boston, Harvard Medical School, Boston, and Massachusetts Inst. of Tech., Cambridge, Mass.). *A. M. A. Arch. Pathol* 61, 226-38(1956). NSA 10-9043

7855

METABOLISM OF GLUCOSE AND FRUCTOSE IN LIVER OF THE RAT SUBJECTED TO WHOLE-BODY X-IRRADIATION. R. Hill, J. Kiyasu, and I. D. Chaikoff (Univ. of California School of Medicine, Berkeley) *Am. J. Physiol.* 187, 417-21(1956). NSA 11-4230

7856

COMPARATIVE ACTIVITY OF ISOLOGOUS VS. HOMOLOGOUS OR HETEROLOGOUS MOUSE BONE MARROW IN PROMOTING REGENERATION OF THE IRRADIATED MOUSE THYMUS. Barbara B. Hirsch, Mary B. Brown, C. Susan Nagareda, and Henry S. Kaplan (Stanford Univ. School of Medicine, San Francisco). *Radiation Research* 5, 52-7(1956).

Either the shielding of one thigh during periodic whole-body radiation or intravenous injection of isologous bone marrow after the last radiation promotes early recovery of thymic weight. The factor in bone marrow responsible for thymic weight regeneration is highly strainspecific. Isologous marrow is consistently effective, whereas homologous and heterologous marrow give no evidence of activity. (from authors' summary). NSA 10-9968

7857

THE LOCAL EFFECTIVENESS OF CYSTEINE IN RADIATION PROTECTION. D. Hofmann. *Strahlentherapie* 96, 396-402(1955). (In German). NSA 10-6499

7858

THE PROBLEM OF VARIABLE RADIOSENSITIVITY. D. Hofmann. *Strahlentherapie* 97, 231-8(1955). (In German).

This is a cumulative report on literature on this subject. Investigations to date seem to indicate that high-speed electrons and ultrahard x rays have greater therapeutic electivity than hard x rays. NSA 9-6568

7859

REPORT ON FURTHER RESEARCH OF THE BIOLOGICAL EFFECTS OF ULTRAFRACTIONATED IRRADIATIONS. D. Hofmann and K. Muller. *Strahlentherapie* 96, 403-7 (1955). (In German).

By means of stroboscopic disks with a great number of revolutions, the authors made more extensive investigations regarding the dependence of the biological

effect on the conditions of ultrafractionated irradiations (β -rays of radium). The eggs of *Drosophila melanogaster*, 1.5 and 4.5 hours old, were used in these experiments. The authors found complicated relations between frequency and effect which generally had at least one pronounced maximum of action. Their formation seems to be attributable to reciprocal actions between the radiation impulse and the restitutional pause. NSA 10-6485

7860

PROTEIN SYNTHESIS AND RIBONUCLEIC ACID METABOLISM IN MOUSE PANCREAS IN VITRO AFTER WHOLE BODY IRRADIATION WITH X-RAYS. Mabel R. Hokin and Lowell E. Hokin. (Montreal General Hospital, Canada). *J. Biol. Chem.* 219, 85-94(1956). NSA 10-7412

7861

MODIFICATION OF RADIATION-INDUCED GENETIC DAMAGE. Alexander Hollaender and R. F. Kimball (Oak Ridge National Lab., Tenn.). *Nature* 177, 726-30 (1956).

A review article of recent developments and present-day research on the genetic effects of radiation is presented. NSA 10-8149

7862

THE INFLUENCE OF CHEMICAL PRE- AND POST-TREATMENTS ON RADIOSENSITIVITY OF BACTERIA, AND THEIR SIGNIFICANCE FOR HIGHER ORGANISMS. Alexander Hollaender and George E. Stapleton (Oak Ridge National Lab., Tenn.). *Ciba Foundation Symposium on Ionizing Radiations and Cell Metabolism*, 120-35(1956). NSA 11-5736

7863

DELAYED EFFECTS IN MICE FOLLOWING ACUTE TOTAL-BODY X-IRRADIATION; MODIFICATION BY EXPERIMENTAL TREATMENT. Joanne Hollcroft, Egon Lorenz, Eliza Miller, Charles C. Congdon, Robert Schweisthal, and Delta Uphoff (National Cancer Inst. Bethesda, Md., Oak Ridge National Lab., Tenn., and Argonne National Lab., Lemont, Ill.). *J. Natl. Cancer Inst.* 18, 615-40 (1957). NSA 11-8799

7864

THE ROLE OF TRANSFUSED LEUKOCYTES IN EXPERIMENTAL BACTEREMIA OF IRRADIATED RATS. J. W. Hollingsworth, Stuart C. Finch, and Paul B. Beeson (Yale Univ. School of Medicine, New Haven). *J. Lab. Clin. Med.* 48, 227-36(1956).

Irradiated rats exhibited higher levels of bacteremia than normal rats following intravenous inoculation of a culture of *E. coli*. Cross-circulation between irradiated and normal rats lowered bacteremia in irradiated rats. Replacement transfusion of irradiated rat with normal blood caused some diminution of bacteremia, but most probable explanation for this seemed to be incomplete leucocyte removal from normal blood. (from authors' summary). NSA 10-9973

7865

STUDY OF THE RADIOSENSITIVITY OF *BACILLUS PRODIGIOSUS* TO SOFT X RAYS. F. Holweck and A. Lacassagne. *Compt. rend. soc. biol.* 100, 1101-03 (1929). (In French).

7866

PRODUCTION OF MONOCHROMATIC X RAYS OF LONG WAVE LENGTH. QUANTITATIVE EFFECT ON MICROBES. F. Holweck. *Compt. rend. acad. sci. Paris* 188, 197-200 (1929). (In French).

7867

STUDIES ON THE BIOLOGICAL ACTION OF VARIOUS RADIATIONS. F. Holweck. *Compt. rend. acad. sci. Paris* 190, 527-29(1930) (In French)

7868

THE EFFECT OF X-IRRADIATION ON THE LENGTH OF THE MITOTIC CYCLE IN *VICIA FABA* ROOTS.

Shirley Hornsey (Medical Research Council, Experimental Radiopathology Research Unit, Hammersmith Hosp., London, Eng.). Exptl. Cell Research 11, 340-5(1956).

Length of the mitotic cycle after irradiation is assessed by the interval elapsing between a second exposure and the highest count of cells containing micronuclei. Three days after bean roots have been irradiated with 140 r x rays, the length of the mitotic cycle is the same as that of unirradiated roots. (from authors' summary). NSA 11-843

7869

PROTECTION FROM WHOLE-BODY X-IRRADIATION AFFORDED TO ADULT MICE BY REDUCING THE BODY TEMPERATURE. Shirley Hornsey (Hammersmith Hosp., London). Nature 178, 87(1956).

The survival rate after whole-body irradiation of newborn rats and mice was increased by reducing the body temperature to 2 to 5°C at irradiation. Adult rats had a slight reduction in sensitivity to whole-body irradiation by reducing their body temperature to 18 to 19°C. Higher doses than 1500 r at reduced body temperature were not attempted so the degree of protection given by this treatment has not been established. NSA 10-9948

7870

THE HAZARDS FOR THE INCREASING USE OF IONIZING RADIATIONS: A SYMPOSIUM. II. AN ATTEMPT TO ASSESS THE GENETIC CHANGES RESULTING FROM THE IRRADIATION OF HUMAN POPULATIONS. Alma Howard (Mount Vernon Hosp., Northwood, Middlesex, Eng.). Brit. J. Radiol. 29, 270-3(1956). NSA 10-9074

7871

INVESTIGATIONS ON STERILITY AND DEFORMITIES OF ONTHOPHAGUS (COLEOPTERA, SCARABAEIDAE) INDUCED BY GAMMA RADIATION. Henry F. Howden. (Univ. of Tennessee, Knoxville and Oak Ridge National Lab., Tenn.). Ann. Entomol. Soc. Am. 50, 1-9(1957).

Adult *O. texanus* given doses of 3000 and 5000 r gamma rays failed to reproduce. Although 2nd stage larvae irradiated with 2000 r showed normal development, the resulting adults failed to produce offspring, 90% of larvae receiving 4000 r failed to complete development and died within 1-3 weeks. Irradiation had no effect on life expectancy of larvae or adult beetles. NSA 11-5143

7872

THE PROBLEM OF CONTROL OF HAZARDS FROM STRAY RADIATIONS. Joe W. Howland (Univ. of Rochester School of Medicine and Dentistry, N. Y.). N. Y. State J. Med. 56, 668-71(1956). NSA 10-7434

7873

EFFECT OF TOTAL BODY X-IRRADIATION ON PLASMA VOLUME, RED CELL VOLUME, BLOOD VOLUME AND THIOCYANATE SPACE IN NORMAL AND SPLENECTOMIZED RATS. Kee-Chang Huang and James H. Bondurant (Univ. of Louisville School of Medicine, Ky.). Am. J. Physiol. 185, 446-9(1956). NSA 10-9962

7874

INVESTIGATION OF RADIOINDUCED TUMORS. Otto Hug. Strahlentherapie 102, 546-58(1957). (In German). NSA 11-8786

7875

RADIATION GENETICS IN EINKORN WHEAT. S. Matsumura. Ann. Rept. Natl. Inst. Genet., Mishima, Japan 2, 24-26(1952).

Dormant grains of *Triticum monococcum* were exposed to 5400-13500 r of 180 KVP x rays. The frequency of chromosome aberrations rose parabolically with dose but decreased with increasing wave length. Mutation rate appeared to depend both on dose and wave length. (from abstract). PBA 27-196

7876

EFFECT OF X-RAY IRRADIATION ON CHOLESTEROL AND ITS FATTY ACID ESTERS IN VITRO AND IN VIVO. R. Hummel. Strahlentherapie 41, 142-4(1931). CA 25-4289

7877

Rochester, N. Y., Univ. Atomic Energy Project. SOME LATE EFFECTS OF EXTERNAL RADIATION ON GROWING AND ADULT MAMMALS. J. B. Hursh and T. R. Noonan. Aug. 16, 1956. 15p. Contract W-7401-eng-49. (UR-445).

A survey has been made of reports dealing with the changes in post-natal growth and development and the persistent morphological effects (other than carcinogenesis and cataract induction) associated with exposure of mammals to external ionizing radiation. The most pertinent data have been presented in tabular form. NSA 10-9923

7878

Hanford Works, Richland, Wash. RADIOLOGICAL SCIENCES DEPARTMENT RESEARCH AND DEVELOPMENT ACTIVITIES FOR OCTOBER-DECEMBER 1951. QUARTERLY PROGRESS REPORT. Jan. 24, 1952. Decl. Feb. 20, 1959. 30p. Contract W-31-109-Eng-52. (HW-23332).

Progress is reported on research and development activities in biology and biophysics. NSA 11-8261

7879

Hanford Works, Richland, Wash. RECAPITULATION OF TOLERABLE CONCENTRATION OF RADIOIODINE ON EDIBLE PLANTS. Aug. 4, 1952. Decl. Dec. 6, 1955. 5p. (HW-25239).

Preliminary results from a two-year study led to the conclusion that sheep will be undamaged if fed 5 μC I^{131} /day. The corresponding limit on vegetation consumed is $6 \times 10^{-5} \mu\text{C}^{131}/\text{gm}$. NSA 10-3410

7880

Rochester, N. Y., Univ. Atomic Energy Project. LATE HEMATOLOGICAL EFFECTS OF EXPOSURE TO IONIZING RADIATION. M. Ingram. May 22, 1956. 24p. Contract W-7401-eng-49. (UR-444).

The literature relative to late effects of irradiation on the blood of man and experimental mammals is summarized in tabular form. NSA 10-6467

7881

CHANGES IN ORGANISM REACTIONS TO BARBITURATES AND OTHER DRUGS DURING THE TOTAL BODY IRRADIATION. V. B. Isachenko (Inst. of Experimental Medicine). Med. Radiol. 1, No. 5, 59-64(1956). (In Russian). NSA 11-3282

7882

TISSUE CULTURE METHOD IN INVESTIGATION OF X-RADIATION EFFECTS ON THE HEMATOPOIETIC ORGANS (SPLEEN) OF MICE. A. F. Ivantskaya (Severtsov Inst. of Animal Morphology). Doklady Akad. Nauk S. S. R. 110, 978-81(1956). (In Russian).

The viability of the reticular tissue cells after total body irradiation (up to 5000 r), the cytology of various cell elements composing the spleen, and the nature of the destructive processes were studied. NSA 11-3277

7883

REACTION OF AXOLOTL CELL ELEMENTS TO THE TOTAL X-RADIATION. A. F. Ivantskaya (Severtsev Inst. of Animal Morphology). Izvest. Akad. Nauk S. S. R. Ser. Biol. No. 5, 85-97(1956). (In Russian).

Cultures were made of livers from axolotls after exposure to 500, 100, 200 or 4000 r dose of x rays, the culture media containing serum from hens and extracts of axolotl spleens. Cytological changes and phagocytic activity were studied, cellular changes included: vacuoles,

pigmentation, nuclear pyknosis, fragmentation and karyokinesis; altered cytoplasmic structure. (liver "border" cells). Similar changes occurred in parenchymal cells. Leukocytes showed similar changes: fragmentation, heterochromatosis, nuclear pyknosis. No mitoses were found on cultures or fresh preparations after about the second post-exposure day. NSA 11-1739

7884
CHARACTERISTICS OF INFLAMMATORY SKIN RESPONSE OF IRRADIATED ANIMALS. A. E. Ivanov and V. F. Sosova. Med. Radiol. 1, No. 6, 24-30(1956). (In Russian).

Studies were made of the pathological anatomic changes in the skin after injections of living intestinal bacilli into rabbits exposed to total-body irradiation. NSA 11-3660

7885
ON THE GERMINATION OF IMMATURE SEEDS OF CERTAIN VARIETIES OF TOBACCO IN THE PRESENCE OF LIGHT AND URANIUM SALTS. Camille Izard. Compt. rend 242, 2027-30(1956). (In French).

The grains of certain varieties of tobacco germinate with difficulty in the course of the first months which follow the harvest. The inhibition is due, very probably, to an excess of free auxin and can be removed either by light or by treatment with uranium salts; these last accelerate the photoinactivation of indol- β -acetic acid. NSA 10-8136

7886
INDEX TO THE TWENTIETH SEMI-ANNUAL REPORT TO CONGRESS OF THE U. S. ATOMIC ENERGY COMMISSION. Washington, U. S. Government Printing Office, 1956. 26p.

Subject and author indexes to the United States Atomic Energy Commission's Twentieth Semiannual Report to Congress are given. This index supplements a cumulative index to the first fifteen Semiannual Reports of the Commission and a separate index to the Sixteenth, Seventeenth, Eighteenth, and Nineteenth Semiannual Reports. NSA 11-824

7887
CHANGES IN THE HYPOPHYSIS FOLLOWING ROENTGEN IRRADIATION OF THE TESTES. C. A. Joel. Sweiz. Med. Wochschr. 72, 795-6(1942). (In German). NSA 11-5174

7888
THE RESPONSIBILITIES OF THE MEDICAL PROFESSION IN THE USE OF X-RAYS AND OTHER IONIZING RADIATION STATEMENT BY THE UNITED NATIONS SCIENTIFIC COMMITTEE ON THE EFFECTS OF ATOMIC RADIATION. J. Natl. Cancer Inst. 18, 481-5(1957). NSA 10-6478

7889
PUBLIC HEALTH SERVICE STUDY OF HAZARDS TO URANIUM MINERS. J. Am. Med. Assoc. 143, 903(1950).

7890
INACTIVATION OF SOME ANIMAL VIRUSES WITH GAMMA RADIATION FROM Co⁶⁰. Russell T. Jordan and Lloyd L. Kempe (Univ. of Michigan, Ann Arbor and City of Hope Med. Center, Duarte, Calif.). Proc. Soc. Exptl. Biol. Med. 91, 212-15(1956).

Gamma radiation from Co⁶⁰ proves to be an effective method for inactivation of Lansing poliomyelitis, St. Louis encephalitis, Western equine encephalomyelitis and vaccinia viruses. Partially purified suspensions of viruses tested were more vulnerable to lethal effects of γ radiation than were crude suspensions. In crude and partially purified suspensions the smaller viruses required larger doses of radiation for inactivation than did the larger viruses. The rate of inactivation for viruses tested is an exponential function of the dosage of gamma radiation. NSA 10-6478

7891
THE MODIFICATION OF DAMAGE CAUSED BY PRIMARY

IONIZATION OF BIOLOGICAL TARGETS. T. Alper. Radiation Research 5, 573-86(1956).

7892
EFFECT OF BONE MARROW THERAPY ON THE VOLITIONAL ACTIVITY OF WHOLE-BODY X-IRRADIATED RATS. D. C. Jones, D. J. Kimeldorf, T. J. Castanera, D. O. Rubadeau, and G. K. Osborn (U. S. Naval Radiological Defense Lab., San Francisco). Am. J. Physiol. 189, 21-3(1957). Project NM-006-015. (USNRDL-TR-100). NSA 11-8795

7893
VOLITIONAL ACTIVITY RESPONSE OF RATS TO PARTIAL-BODY X-IRRADIATION. D. C. Jones, D. J. Kimeldorf, G. K. Osborn, T. J. Castanera, and D. O. Rubadeau (U. S. Naval Radiol. Defense Lab., San Francisco). Am. J. Physiol. 189, 15-20(1957). NSA 11-8768

7894
THE ACTION OF RADIATIONS ON VIRUSES AND BACTERIA. D. E. Lea, in APPLIED BIOPHYSICS. N. Howard Jones, ed. Chemical Publ. Co., Inc., Brooklyn, New York, p.155-162(1949).

7895
CONTRIBUTION TO THE STUDY OF THE EFFECT OF X-RAYS ON BACTERIA. A. J. Jolkevitch. Ann. roentgenol. et radiol. (U. S. S. R.). 2, 278-97(1927). (In German).

7896
STIMULATION OF HAIR GROWTH IN RABBITS BY IONIZING RADIATIONS. B. Jolles and S. G. Greening (General Hosp., Northampton). Nature 179, 1082(1957). NSA 11-8778

7897
RADIATION BIOLOGY OF BACTERIA. EXPERIMENT AND THEORY. P. Jordan. Protoplasma 32, 464-80(1939). (In German).

A review and critical analysis of irradiation phenomena in bacteria leads to the following conclusions: Approximately the same lethal spectrum (2200 Å and below) characterizes a large series of bacteria and several other forms and this spectrum of nucleic acid. Where the author concluded from Wyckoff's findings that μ mortality is effected through a single hy absorption, he is now in position to localize the lethal hy absorption more closely. The effect works in the nucleic acid of cell nuclei (or nucleus like bodies) and the lethal unit ionization has been localized there, too. BA 14-7220

7898
RETENTION OF RADON DECAY PRODUCTS IN HUMAN LUNGS. Cestmir Jech (Czechoslovak Academy of Science Prague). A. M. A. Arch. Ind. Health 13, 475-9(1956). NSA 10-9071

7899
THE RESTORATION OF HEMOLYSIN-FORMING CAPACITY IN X-IRRADIATED RABBITS BY TISSUE AND YEAST PREPARATIONS. Bernard N. Jaroslow and William H. Tahaferro (Argonne National Lab., Lemont, Ill. and Univ. of Chicago). J. Infectious Diseases 98, 75-81(1956).

Restoration of antibody-forming capacity occurred in rabbits when injected a day after radiation (400 r) with a mixture of sheep red cell antigen and one of several preparations, viz, normal unimmunized rabbit spleen mince or extract, normal mouse spleen extract, HeLa cell mince or extract, or yeast autolysate. Normal rabbit kidney mince or extract and normal rabbit muscle mince or extract were ineffective when injected similarly. (from authors' summary). NSA 10-8148

7900
THE FATE OF RADIATION-INDUCED LETHALS IN A

YEAST POPULATION. A. P. James and C. E. Chaplin (Atomic Energy of Canada, Ltd., Chalk River, Ont. and Bacteriology Div., Science Service, Ottawa). Radiation Research 5, 162-6(1956).

The effect of radiation-induced recessive lethals on the well-being of heterozygotes in an asexually multiplying population of diploid yeast is described. Frequency of heterozygotes serves as a measure of phenotypic effect of a sample of induced lethals only in early postirradiation generations. Much of the decreased frequency of heterozygotes in the first five generations is attributed to partial dominance of recessive lethals. NSA 10-9956

7901

Argonne Cancer Research Hospital, Chicago. SEMIANNUAL REPORT TO THE ATOMIC ENERGY COMMISSION. Leon O. Jacobson and Antreen Pfau. Sept. 1956. 116p. (ACRH-6).

Progress is reported in the following studies: histochemical studies on normal dog hearts and hearts following the experimental production of well-defined defects in the cardiac conduction system produced by radiation from x-ray point sources, the catabolism of urea by rats following total-body irradiation, tracer studies on the iodination of serum proteins and thyroid metabolism, and the mechanism of tritium labeling of organic compounds by recoil tritons generated in the $\text{Li}(n, \alpha)\text{T}$ reaction. Data are presented on the preparation of tritium-labeled substituted benzenes. NSA 11-5132

7902

Naval Radiological Defense Lab., San Francisco. URINARY PURINE EXTRACTION IN THE X-IRRADIATED DOG. K. Jackson and C. Entenman. June 7, 1956. 25p. Project NM-006-015. (USNRDL-TR-99).

Changes in the excretion of uric acid and xanthine were noted during the first 24 hr after exposure. Uric acid excretion was increased following doses between 150 and 500 r. Xanthine excretion increased markedly following supralethal doses but not midlethal doses. Total purine excretion (allantoin plus uric acid) was increased following irradiation and the degree of the increase was not related to the radiation dose. NSA 10-9925

7903

Argonne Cancer Research Hospital, Chicago. SEMIANNUAL REPORT TO THE ATOMIC ENERGY COMMISSION. Leon O. Jacobson. Sept. 1955. 110p. (ARCH-4).

Data presented from studies on the effect of non-cellular and heterologous tissue preparations on survival of mice after lethal doses of x radiation. NSA 10-3167

7904

Mound Lab., Miamisburg, Ohio. THE EFFECTS OF CELL DIVISION INHIBITION ON PHOSPHORUS METABOLISM OF *ESCHERICHIA COLI*. B. J. Katchman, E. S. Spoerl and H. E. Smith. May 24, 1954. 10p. Contract AT-33-1-gen-53. (MLM-976).

The effects of cell division inhibition on P metabolism of *Escherichia coli* due to treatment by radiation and certain organic compounds are reported. Filamentous cell forms are produced by treating the cells with the radiations and compounds cited. A method for partitioning and analyzing phosphorus compounds of normal and filamentous forms of *Escherichia coli* is described. Comparison between both types of cells shows no change in intracellular phosphorus content, except for some variation in those cells exposed to α radiation. NSA 10-3252

7905

X-RADIATION EFFECTS ON DEVELOPMENT OF DIPHTHERIA ANTITOXIN. D. R. Kaulen (Gamalei Inst. of Epidemiology and Microbiology). Med. Radiol. 2/4 51-58(1957). (In Russian).

Irradiated rabbits (450r) and guinea pigs (250-300r)

were given three (immunizing) doses of diphtheria antitoxin. Irradiation sharply depresses the antitoxin production in response to a 2 stage immunization but this depression is reversed after 50 days. Adsorbed antitoxin elicited a better response than did native antitoxin. NSA 11-3662

7906

REGENERATION OF PASSIVE IMMUNITY IN IRRADIATED ANIMALS. D. R. Kaulen (Gamalei Inst. of Epidemiology and Microbiology, Acad. of Med. Sciences U.S.S.R.). Med. Radiol. 2, No. 2, 65-70(1957). (In Russian). NSA 11-7060

7907

EFFECTS OF CORTISONE ACETATE UPON THE DISTRIBUTION AND EXCRETION OF RADIOYTRIUM. Bergene Kavin (Michigan State Univ., East Lansing). Nature 179, 871-2(1957). NSA 11-7085

7908

THE ADRENOCORTICOTROPIC HORMONE EFFECTS ON THE SURVIVAL AND SH CONTENT IN THE SOLUBLE ALBUMEN IN THE LIVER OF IRRADIATED RATS. E. M. Kedrova (Inst. of Biological and Medical Chemistry, Acad. of Med. Sciences U.S.S.R.). Med. Radiol. 2, No. 2, 42-6(1957). (In Russian). NSA 11-7072

7909

THE TIME FUNCTION OF P^{32} INCORPORATION INTO DNA OF REGENERATING LIVER: THE EFFECT OF IRRADIATION. Lola S. Kelly, J. Dorothy Hirsch, Genevieve Beach, and Wynne Palmer. Cancer Research 17, 117-21(1957).

An increase in P^{32} incorporation began 30 hours after a massive dose of CCl_4 , with a maximum at about 40 hours. DNA synthesis was depressed when mice were irradiated 0, 12, 72, or 96 hours after administration of CCl_4 , it was not affected when radiation was given between 24 and 48 hours after CCl_4 . Mitotic activity was absent 5 hours after radiation, began to return at 14 hours and reached the control value at 26 hours. (from authors' summary).

7910

DNA SYNTHESIS AND INCORPORATION OF P^{32} IN IRRADIATED EHRLICH ASCITES CELLS. Lola S. Kelly, J. Dorothy Hirsch, Genevieve Beach, and Nicholas L. Petrakis (Univ. of Calif., Berkeley and Univ. of Calif. Med. Center, San Francisco). Proc. Soc. Exptl. Biol. Med. 94, 83-6(1957). NSA 11-3665

7911

Michigan. Univ., Ann Arbor. Engineering Research Inst. COMBINED EFFECTS OF HEAT AND RADIATION IN FOOD STERILIZATION. REPORT NO. 9 (TERMINATION) (FOR) JUNE 7, 1954-OCTOBER 6, 1955. Lloyd L. Kempe. 48p. Project No. 7-84-01-002. Contract DA 44-109-gm-1826. (PB-121308).

An investigation was made on the combined effects of heat and radiation in food sterilization. Spores of several strains of *Clostridium botulinum* were tested for resistance to the killing effects of heat and radiation alone, in various combinations, and in the presence of various chemical agents. NSA 10-9919

7912

THE EFFECT OF X-RAYS UPON DISEASES OF BACTERIAL ORIGIN. C. Kempster. Lancet 2, 423-424(1917).

Tuberculous glands, subjected to x rays, atrophy and become sterile of tubercle bacilli. Similar glands exposed to stimulation, such as fomentations and iodine do not atrophy and become sterile, but increase in size and bacillary virulence. Conclusion: x rays acting upon diseases of bacterial origin do not have germicidal powers, but do have an inhibitory effect upon reproduction of bacteria. They stimulate living tissue, causing increased phagocytosis and destruction of unproductive colonies of micro-organisms.

7913

School of Aviation Medicine, Randolph AFB, Tex.
EFFECTS OF HIGH INTENSITY X-IRRADIATION ON THE RETINA. A HISTOLOGICAL, HISTOCHEMICAL, AND CHEMICAL STUDY IN THE RABBIT. Sidney P. Kent and Arnold A. Swanson. 1956. 10p. (AF-SAM-56-85). Rad. Research 6, 111-20(1957).

Retinae of 90 rabbits were examined chemically, histochemically and histologically for succinic dehydrogenase and glycogen. Forty-five received 6000 r to the eyes and 45 were nonirradiated controls. Five irradiated and five control animals were decapitated. Changes were noted 4 hr postirradiation and at all subsequent intervals in irradiated rabbits. Glycogen content increased, succinic dehydrogenase activity decreased. NSA 11-1395

7914

THE EFFECT OF OXYGEN CONCENTRATION ON THE DOSE-ACTION SURVIVAL CURVES OBTAINED FOR HABROBRACON EGGS IRRADIATED DURING MEIOTIC PROPHASE AND METAPHASE. Walter Kenworthy (Univ. of Pennsylvania, Philadelphia and Brown Univ., Providence, R. I.). Am. Naturalist 90, 119-26(1956). NSA 11-5173

7915

EFFECTS OF X RAYS IN THE EARLY STAGES OF EMBRYOGENESIS. V. I. Kheisina (Pavlov Leningrad Med. Inst.). Doklady Akad. Nauk S.S.S.R. 110, 57-60(1956). (In Russian). NSA 11-1735

7916

EFFECTS OF THE AGE AND THE EXPOSURE DOSE ON THE SENSITIVITY OF RATS TO X RADIATION. V. V. Kholin (Kirov Inst. of Med. Radiology). Med. Radiol. 1, No. 4, 22-5(1956). NSA 11-850

7917

Kyoto Univ., Japan.
STUDIES ON THE ATOMIC BOMB INJURIES IN HIROSHIMA CITY. Takehiko Kikuchi, Tadatsugu Okubo, Shinsei Nishiyama, et al Feb. 13, 1950. 28p. (NP-6436).

7918

BEHAVIOR OF NUCLEI AT CONJUGATION IN PARAMECIUM AURELIA. II. THE EFFECTS OF X-RAYS ON DIPLOID AND HAPLOID CLONES, WITH A DISCUSSION OF DOMINANT LETHALS. R. F. Kimball and Nenita Gaither (Oak Ridge National Lab., Tenn.). Genetics 41, 715-28(1956).

Crosses were made between x irradiated and unirradiated *P. aurelia*. Radiation influences the choice of a meiotic product to form the gamete nuclei. Comparison of irradiated diploids with unirradiated and irradiated haploids shows that disturbances in nuclear behavior in the former can be attributed only in part to induced deficiencies. Anaphase bridges are not important factors. (from authors summary). NSA 11-845

7919

STUDIES OF DIFFERENT CLASSES OF MUTATIONS INDUCED BY RADIATION OF *DROSOPHILA MELANOGASTER* FEMALES. R. C. King, Jean B. Darrow, and Nancy Weber Kaye (Brookhaven National Lab., Upton, N. Y.). Genetics 41, 890-900(1956).

In *D. melanogaster* sensitivity of the germ cells to radiation-induced chromosome breakage varies during oogenesis. These changes are correlated with the cytology of the developing primary oocytes. Following a single exposure to 2000 r of Co⁶⁰ γ -rays such gross chromosomal aberrations are quickly eliminated, but recessive, lethal mutations appear never to be completely eliminated from the germ tract. (from authors' summary) NSA 11-5149

7920

INFLUENCE OF TESTIS ON INDUCTION OF OVARIAN TUMORS OF MICE BY X-RAYS. Arthur Kirschbaum,

Annabel G. Liebelt, and Gilbert H. Fletcher (Baylor Univ. Coll. of Medicine, Univ. of Texas M. D. Anderson Hospital and Tumor Inst., and Texas Med. Center, Houston). Proc. Soc. Exptl. Biol. Med. 92, 221-2 (1956).

When irradiated ovaries were grafted into intact and into castrated male Balb/c mice, ovarian tumorigenesis proceeded. Functional normal ovarian grafts into previously irradiated Balb/c females inhibited tumorigenesis in the irradiated ovary. It appears that irradiation-induced ovarian tumorigenesis in this inbred strain is inhibited almost completely by ovarian, but only to a minor degree by testicular secretion. NSA 10-9941

7921

IMMUNOLOGICAL ANALYSIS OF INCREASED STATE OF ORGANISM RESISTANCE TO IONIZING RADIATION. P. N. Kiselev, P. A. Busini, and K. I. Nikitina (Central Res. Inst. of Roentgen-Radiology). Med. Radiol. 1, 43-9(1956). AEC-TR-2964. (In Russian).

Mice were irradiated with small doses of x rays and 14 days later with a lethal dose. Preliminary irradiation significantly lowered the percentage of animals killed by a lethal x ray dose. Similar results were obtained if 2 large single x ray doses were administered. Authors cite data from other experiments showing that irradiated animals form antibodies against their own radiation-altered proteins, and suggest that the protective effect of prior irradiation may be due to an immune phenomenon. NSA 10-9049

7922

SPECIAL PROPHYLACTIC MEASURES AGAINST BACTERIAL TOXINS DURING ACUTE RADIATION SICKNESS. P. N. Kiselev and E. V. Karpova (Central Res. Roentgen-Radiological Inst.). Med. Radiol. 1, No. 4, 31-5(1956). (In Russian). NSA 11-886

7923

EFFECTS OF PRELIMINARY EXPOSURE OF ORGANISM TO PENETRATING RADIATION ON THEIR IMMUNITY TO BACTERIAL TOXICOSIS. P. N. Kiselev and E. V. Karpova (Central Res. Inst. of Roentgen Radiology). Med. Radiol. 2, 23-9(1956). (In Russian).

Irradiation produced an increase in sensitivity to bacterial toxin, the extent depending on the radiation dose and the duration of radiation sickness. Experiments in which the toxin of *B. perfringens* was used gave analogous results and slightly less increase in sensitivity. Results are considered to be relevant to problems of therapy of radiation injury. NSA 10-9099

7924

ANTIBIOTICS AND RADIATION SICKNESS. G. Ya. Kivman. Priroda 45, 105-7(1956). (In Russian).

Studies on the protective effects of penicillin, streptomycin, aureomycin, and terramycin in rats exposed to lethal doses of x rays. Differences in type of protection conferred by the various antibiotics evaluated in terms of percent surviving for a given period (20 or 30 days). NSA 10-9085

7925

METHEMOGLOBINEMIA INDUCED BY X-IRRADIATION. J. Raymond Klein (Brookhaven National Lab., Upton, N. Y.). Proc. Soc. Exptl. Biol. Med. 91, 630-2 (1956). NSA 10-9062

7926

THE RELATION BETWEEN THE RADIUM SENSITIVENESS AND THE HISTOLOGY OF UTERINE CANCER. H. O. Kleine. Arch. Gynakol. 143(1), 166-75(1930).

Investigations shows that immature carcinoma responds favorably to radium. Immature rapidly growing carcinoma is the most and mature highly differentiated ones least radiosensitive, substantiating Bergonie's law. BA 6-19199

7927

INFECTION AND IMMUNITY IN RADIATION SICKNESS. N. N. Klemparskaya. Med. Radiol. 1, No. 5, 3-10(1956). (In Russian). NSA 11-7782

7928

CYTOLYTIC REACTIONS OF BLOOD AND ORGANS IN IRRADIATED ANIMALS. N. N. Klemparskaya. Med. Radiol. 2, No. 2, 18-26(1957). (In Russian).

White mice, guinea pigs, rabbits, dogs, and rats were irradiated with a lethal dose (Co^{60} gamma and x rays) and the cytolytic activity of the various organs was determined. This activity increased in both blood and other organs, beginning with the 3rd day of radiation sickness. Leucocytes also appeared in the internal organs. Leukopenia is attributed to lysis of leucocytes in the peripheral blood and the bloodforming organs. NSA 11-7056

7929

THE EFFECT OF ROENTGEN RAYS ON BACTERIA. H. Klovekorn. Strahlentherapie 20, 354-77(1925). (In German).

Bacteria were not killed, even by very large x-ray doses. Major changes observed were in colony form, size and color and in staining reaction. A review of x ray effects on bacteria is included.

7930

THE EFFECT OF ROENTGEN RAYS ON UNICELLULAR ORGANISMS. G. H. Klovekorn and O. Gaertner. Strahlentherapie 23, 148-154(1926). (In German).

A ten minute x ray exposure was lethal for Hyphomycetes. In contrast, amoebae were very little effected by 45-75 min. exposure.

7931

RELATIVE BIOLOGICAL EFFICIENCY OF 1000-KVP AND 250-KVCP X-RAYS. I. GENERAL INTRODUCTION. DETERMINATIONS BASED ON THE DOSE-SURVIVAL CURVE OF *SACCHAROMYCES CEREVISIAE*, HAPLOID AND DIPLOID. Henry I. Kohn and Shirley E. Gunter (Univ. of Calif. School of Med., San Francisco). Radiation Research 5, 674-87(1956).

The relative biological efficiency ranged from 0.86 to 0.89. When the ED_{50} of the haploid yeast was increased by 35%, relative biological efficiency remained unchanged. For x rays of 1.6 mm CuHVL the value of relative biological efficiency was unity (standard x ray beam, 0.6 mm CuHVL). The standard error of the relative biological efficiency was less than 0.03 in all the experiments with haploid cells. (from authors' summary). NSA 11-2793

7932

RELATIVE BIOLOGICAL EFFICIENCY OF 1000 KVP AND 250 KVCP X RAYS. II. SUPPLEMENTAL DETERMINATION BASED ON THE DOSE-SURVIVAL CURVES OF *ESCHERICHIA COLI* AND *RHODOPSEUDOMONAS SPHEROIDES*. Henry I. Kohn and Shirley E. Gunter (Univ. of Calif. School of Med. San Francisco). Radiation Research 5, 688-92(1956).

The values of the relative biological efficiency ranged from 0.89 to 0.91. NSA 11-2793

7933

RADIATION EFFECTS ON WATER SOLUBLE VITAMINS IN RAW BEEF. H. D. Alexander, E. J. Day, H. E. Sauberlich and W. D. Salmon. Federation Proc. 15, 921(1956).

7934

THE INFLUENCE OF STRAIN ON ACUTE X-RAY LETHALITY IN THE MOUSE. I. LD_{50} AND DEATH RATE STUDIES. Henry I. Kohn and Robert F. Kallman (Univ. of Calif. School of Med., San Francisco). Radiation Research 5, 309-17(1956).

Adult mice were irradiated with x rays. $\text{LD}_{50(19)}$ was the same as $\text{LD}_{50(28)}$. Females were slightly more resistant than males. Slope function of the probit-transformed dose-effect (killing) curve was the same for all strains. $\text{LD}_{50(28)}$ and death-rate curves for different strains are presented. (from authors' summary). NSA 11-857

7935

THE INFLUENCE OF STRAIN ON ACUTE X-RAY LETHALITY IN THE MOUSE. II. RECOVERY RATE STUDIES. Henry I. Kohn and Robert F. Kallman (Univ. of Calif. School of Med., San Francisco). Radiation Research 6, 329-38(1957).

Rate of recovery from a single, whole-body exposure to x rays (250 Kvcp, HVL 1.6 mm Cu, tissue-dose rate r 35 r/min) was determined with two-fraction technique for five types of adult mice (100 to 200 days old). Initial dose was 350 r. A 12-hour latent period preceded exponential recovery. Half-recovery times (RT_{50}) were influenced by constitutional factors, presumably genetic in origin. Fractionation did not fundamentally change the distributions of death, although it did perturb them. (from authors' summary). NSA 11-5728

7936

RELATIVE BIOLOGICAL EFFICIENCY OF 1000-KVP AND 250-KVCP X-RAYS. III. DETERMINATIONS BASED ON THE $\text{LD}_{50/28}$ AND THE KILLING TIME OF THE MOUSE. Henry I. Kohn and Robert F. Kallman (Univ. of Calif. School of Med., San Francisco). Radiation Research 5, 693-9(1956).

For the $\text{LD}_{50/28}$ relative biological efficiency (tissue dose) and its 95% confidence limits were 0.839 (0.807 to 0.873). Relative biological efficiency based on the killing time (range, 4 to 16 days) was the same as relative biological efficiency based on the $\text{LD}_{50/28}$. No difference in the biological mode of action of the two beams was noted. (from authors' summary). NSA 11-2793

7937

AGE, GROWTH, AND THE LD_{50} OF X-RAYS. Henry I. Kohn and Robert E. Kallman (Univ. of Calif. School of Med., San Francisco). Science 124, 1078(1956).

Radiation factors were 250-Kvcp x rays; half-value layer, 1.6 mm Cu; tissue-dose rate, approximately 35 r/min. Results: LD_{50} was a linear function of log age from 37 to 105 days, but was practically constant from 115 to 709 days. The diphasic dependence of the LD_{50} on log age was similar to that for log body weight, a parameter of growth. For the first 80% of the lifespan, LD_{50} increased until growth rate fell to its fully mature level, after which it remained constant. NSA 11-874

7938

RELATIVE BIOLOGICAL EFFICIENCY OF 1000 KVP AND 250-KVCP X-RAYS. IV. DETERMINATIONS BASED ON THE DOSE-RESPONSE CURVES FOR TESTICULAR WEIGHT IN THE MOUSE. Henry I. Kohn and Robert F. Kallman (Univ. of Calif. School of Med., San Francisco). Radiation Research 5, 700-9(1956).

Dose estimated was the tissue dose in the testes. Results of partial-body and whole-body exposures differed by less than 5% and their average was therefore considered to be practically independent of abscopal effects and of integral dose. From the combined results it was concluded that the relative biological efficiency lies between 0.78 and 0.87, the most likely value being 0.82. (from authors' summary). NSA 11-2793

7939

RELATIVE BIOLOGICAL EFFICIENCY OF 1000-KVP

AND 250-KVCP X-RAYS. V. DETERMINATIONS BASED ON THE LD₅₀ OF THE 4-DAY-OLD CHICK EMBRYO. Henry L. Kohn and Robert F. Kallman (Univ. of Calif. School of Med., San Francisco). *Radiation Research* 5, 710-14(1956).

Survival was judged by the number of surviving 7 hours after radiation. Value of the relative biological efficiency was 0.897 ± 0.019 . This value fell in the range 0.82 to 0.91. (from authors' summary). NSA 11-2793

7940

ALTERATIONS IN BLOOD PICTURE OF HEMORRHAGING RABBITS EXPOSED TO BETA-RADIATION. O. I. Komarova (Sverdlovsk Inst. of Sanitation and Professional Pathology). *Med. Radiol.* 1, No. 6, 21-4(1956). (In Russian). NSA 11-3284

7941

EARLY CYTOLOGICAL CHANGES IN THE BONE MARROW OF ANIMALS EXPOSED TO PENETRATING RADIATION. T. M. Kondrat'eva (Central Res. Inst. of Roentgen-Radiology). *Doklady Akad. Nauk S.S.S.R.* 111, 89-91(1956). (In Russian).

Rats and rabbits were exposed to doses ranging from 300 to 900 r. Almost immediately after radiation with 600-900 r, changes were observed in a significant proportion of the cells and after doses of 300 r approximately one fifth of all cells showed change. Changes: 1) the nuclear structures became coarser, they showed yellow shades; 2) the structural nuclear matter concentrated near the nuclear membrane; 3) the luminescence in the central part of nucleus gradually grew dim. Other changes are also described. NSA 11-3656

7942

School of Aviation Medicine, Randolph AFB, Texas. SURVIVAL OF ALTITUDE-ACCLIMATIZED RATS FOLLOWING 800 r WHOLE-BODY X-IRRADIATION. Eugene B. Konecni, Dominic Criscuolo, and M. B. Danford. *Jan. 13, 1956*, 5p. (AF-SAM-56-65).

This study indicates that 6-month altitude acclimatized rats are in a better physiologic state to withstand on 800 r radiation exposure than are otherwise comparable ground level controls. NSA 11-876

7943

School of Aviation Med., Randolph AFB, Tex. BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION. SPINAL REFLEX ACTIVITY AND LOCAL X-IRRADIATION. Eugene B. Konecni and M. B. Danford. **1956. 10p.** (AF-SAM-56-90).

The normal rat tail withdrawal reflex was determined by a water bath stimulus (42° to 56°C). Latency of response was found to be exponential with respect to temperature. Control animals gave a relatively constant reflex response while local spin (T-9) irradiated animals (15, 20, 30 kr) showed first decreased and then increased response time until reflex was abolished. In the local tail irradiated animals, response time varied but response never disappeared. Spinal cord damage is believed secondary to local vascular damage. NSA 11-3648

7944

A NOTE ON THE USE OF RADIATION FOR THE PRODUCTION OF MUTATIONS FOR VICTORIA-BLIGHT RESISTANCE IN OATS. Calvin F. Konzak (Brookhaven National Lab., Upton, N. Y.). *Phytopathology* 46, 177-8 (1956). NSA 10-8145

7945

THE INFLUENCE OF OXYGEN ON THE MUTAGENIC EFFECTS OF X-RAYS ON MAIZE ENDOSPERM LOCI. Calvin F. Konzak (Brookhaven National Lab., Upton, N. Y.). *Radiation Research* 6, 1-10(1957).

Influence of anoxia during x radiation on the induction of mutations of linked endosperm factors in maize was

studied. The number of mutants in all classes was greater when the same dose of x rays was applied in air or pure oxygen rather than in a nitrogen atmosphere. specific chromosomal regions marked by genetic loci may respond differently depending on the atmosphere during radiation exposure. (from authors' summary). NSA 11-4242

7946

STRIPE RUST RESISTANT MUTANTS OBTAINED FROM IRRADIATION OF GABO WHEAT. C. F. Konzak, N. E. Borlaug, Aristeo Acosta, and John Gibler (Brookhaven National Lab., Upton, N. Y.). *Phytopathology* 46, 525-6(1956). NSA 11-1399

7947

THE MUTATION OF LINKED MAIZE ENDOSPERM LOCI INDUCED BY THERMAL-NEUTRON, X, GAMMA AND ULTRAVIOLET RADIATION. Calvin F. Konzak and W. Ralph Singleton (Brookhaven National Lab., Upton, N. Y.). *Proc. Natl. Acad. Sci. U. S.* 42, 239-45(1956). NSA 10-9061

7948

COMPARATIVE STUDIES ON THE THERAPY OF CHRONIC LEUKAEMIA WITH URETHANE, EMBEKHIN, RADIO-ACTIVE PHOSPHORUS, AND WITH X-RAY IRRADIATION. V. I. Kostuk and S. B. Iaes. *Problems Hematol. Blood Transfusion* 2, No. 1, 39-41(1957). NSA 11-8808

7949

ON THE SPECIFIC BIOLOGICAL EFFECTS OF IONIZING RADIATION. I. F. Kovalev (Filatov Ukraine Res. Inst. of Ocular Sickness and Tissue Therapy). *Med. Radiol.* 1, No. 4, 7-14(1956). (In Russian).

A literature review with 17 references. NSA 11-848

7950

RADIOINDUCED OLFACTORY DISTURBANCES IN PEOPLE. L. B. Koznova. *Med. Radiol.* 2, No. 2, 26-30 (1957). (In Russian). NSA 11-7657

7951

THE NATURE OF BIOLOGICAL RADIATION EFFECT FOLLOWING APPLICATION OF PROTECTIVE MATERIAL AFTER RADIATION EXPOSURE. Matthias Krahe, Hans A. Kunkel, and Hans-Joachim Schmermund. *Strahlentherapie* 102, 288-90(1957). (In German).

Forty-one hours after a roentgen irradiation with 3000 r, dry seeds of *Vicia faba* were put into a nutrient bouillon containing cysteine. The rate of mitosis corresponded to normal values, whereas the mitosis rate of seeds equally treated but without addition of cysteine was diminished by 50% compared to non-irradiated control seeds. By adding cysteamine after the irradiation, a protective effect of 100% could be reached. NSA 11-5741

7952

THE EFFECT OF RADIUM ON OXYGEN CONSUMPTION OF EXPLANTED AND TRANSPLANTED TISSUE. A. A. Krontowski and E. G. Lebensohn. *Arch. exptl. Zellforsch. Gewebezucht.* 13, 407(1932). (In German).

Rate of glycolysis of tissue cultures of tumor tissue was unaltered even after growth of culture was completely inhibited by irradiation. Authors suggest that the selective biological action of rays is completely independent of the glycolytic mechanism

7953

ON THE ORIGIN AND MODE OF ACCUMULATION OF THE HEMOLYTIC FACTOR OBSERVED IN THE LIVER OF X-RAYED RATS. Yu. B. Kudryashov. *Doklady Akad. Nauk S.S.S.R.* 109, 515-18(1956). (In Russian).

The capacity of the liver for hemolysis appeared in the first hours after irradiation with 500 and 1000 r and increased with increasing duration of radiation sickness of the animals. The maximal hemolytic effect coincided with death of the animals after radiation. In surviving rats, however, (e.g. beginning on the fourteenth

day after 500 r) activity of the hemolytic factor gradually decreased, ultimately reaching zero. NSA 11-841

7954

STRONTIUM-90 IN MAN. J. Lawrence Kulp, Walter R. Eckelmann, and Arthur R. Schuler (Columbia Univ., Palisades, N. Y.). Science 125, 219-25 (1957).

The world wide average Sr^{90} content of man was about 0.12 micromicrocurie per gram of calcium (1/10,000 of the maximum permissible concentration) in the fall of 1955. A few values as high as 10 times the average have been obtained. This value is in accord with the predicted value based on fallout measurements and fractionation through the soil-plant-milk-human chain. With the present burden of Sr^{90} this average level should rise to 1 to 2 micromicrocuries of Sr^{90} per gram of calcium by 1970. NSA 11-4257

7955

PRESERVATION OF FOODSTUFFS BY IONIZING BETA- AND GAMMA-RAYS. J. Kuprianoff. Translated by N. Willis from Z. Lebensm.-Untersuch. u. -Forsch. 100, 275-303 (1955). 35p.

An evaluation was made of the effectiveness of radiation exposure for the preservation of rapidly perishable foodstuffs. The bactericidal action of ultra-violet radiation, β particles, x radiation, and γ radiation are reviewed. NSA 11-837

7956

THE QUESTION AS TO WHETHER FOODSTUFFS AFFECTED BY IONISING RADIATIONS ARE DANGEROUS TO HEALTH. J. Kuprianoff. Translated by E. Wait from Deut. Lebensm.-Rundschau 1, 1-7 (1956). 13p. (AEC-tr-2681).

A review of the literature was made on the effects of irradiation on foodstuffs. Hazards from the accidental contamination of natural and stored foodstuffs by fission products due to fall-out from nuclear explosions are considered. Factors affecting the wholesomeness of foodstuffs preserved by exposure to irradiation are discussed. NSA 11-1396

7957

RADON DAUGHTERS IN MINE ATMOSPHERES - A FIELD METHOD FOR DETERMINING CONCENTRATIONS. Howard L. Kusnetz (Public Health Service, Salt Lake City, Utah). Am. Ind. Hyg. Assoc. Quart. 17, 85-8 (1956).

A new concept of describing the tolerance level of radon daughters in terms of the alpha-energy dose resulting from the complete decay of the daughters is presented. A rapid field method for determining atmospheric concentrations of radon daughters in terms of Mev of alpha energy/liter is described. No attempt has been made to set a maximum allowable concentration for radon and/or its daughters. NSA 10-6496

7958

THE EFFECT OF X-RAYS UPON PROTOPLASMIC STREAMING MOVEMENT. A. Kuster. Fortschr. Geb. Roentgenstrahlen 40 (2): 242-8 (1929). (In German).

X rays produce permanent paralysis of pulvini of mimosa and phaseolus leaves the duration being proportional to dose. Hard rays are more effective than soft. BA 6-15623

7959

THE QUESTION OF THE POSSIBILITY OF "RADIO-SYNTHESIS." S. I. Kuznetsov. Translated by V. Beak from Mikrobiologiya 25, 195-9 (1956). 12p. (AEC-tr-2884).

The thermal effect of radioactive decay is compared with the energy requirements for biosynthesis of organic matter from $\text{CO}_2 + \text{H}_2\text{O}$. The impossibility of naturally occurring "radiosynthesis" is shown. NSA 11-6191

7960

EFFECTS OF IONIZING RADIATION ON THE FUNCTIONAL AND MORPHOLOGICAL ALTERATION IN THE ENCEPHA-

LON. K. A. Kyandaryan, S. A. Papoyan, A. G. Beglaryan, A. A. Zagatskaya, and P. K. Arutyunyan (Armenian Ministry of Health, Research Inst. of Roentgenology and Oncology). Doklady Akad. Nauk S.S.S.R. 112, 249-52 (1957). NSA 11-5718

7961

Texas. Univ., Austin. Radiobiological Lab. URINARY COPROPORPHYRIN EXCRETION OF RATS FOLLOWING GAMMA IRRADIATION. Elwood H. LaBrosse and Joe E. Smith. June 8, 1955. 6p. (AF-SAM-55-135).

Daily urinary coproporphyrin excretion of 1-year-old female Sprague-Dawley rats was determined for 4 days pre-irradiation and 4 days post-irradiation. The rats were divided into 5 groups of 4 animals each and were exposed to gamma irradiation from a Co^{60} source at a dose rate of 100 r/min. Total doses were 100 r, 250 r, 500 r, 750 r, and 1,000 r. No relationship was observed between dose and post-irradiation coproporphyrin excretion. Urinary coproporphyrin excretion does not appear to offer promise as a biologic dosimeter. NSA 11-1394

7962

ACTION OF K RAYS OF ALUMINUM ON SOME MICROBES. A. Lacassagne. Compt. rend. acad. sci. Paris 188, 197-200 (1929). (In French).

7963

ACTION OF X RAYS OF LONG WAVE LENGTH ON MICROBES. ESTABLISHMENT OF PRECISE STATISTICS ON THE MORTALITY OF IRRADIATED BACTERIA. A. Lacassagne. Compt. rend. acad. sci. Paris 188, 200-2 (1929). (In French).

7964

ON SOME POSSIBLE HUMAN CONSEQUENCES OF THE EXTENSION OF THE USE OF IONIZING RADIATIONS. A. Lacassagne and H. Marcovich (Institut du Radium, Paris). J. belge radiol. 39, No. 4, 535-45 (1956). (In French). NSA 11-32

7965

ACTION OF IONIZING RADIATION ON THE ORGANISM. A. Lacassagne and G. Gricouff. Paris, Masson and Cie, 1956. 201p. (In French). English translation by C. C. Lushbaugh and G. R. Riese, Grune and Sutton Co., N. Y., London (1958). NSA 11-6207

7966

SOME EXAMPLES OF THE APPLICATION OF ROENTGEN RAYS TO ULTRAMICROSCOPIC BIOLOGICAL STUDIES. A. Lacassagne. Experientia 1, 296-8 (1945). (In French).

The principle of the statistical method describing radiolesions in elementary living forms is briefly described. Certain results obtained in recent years by application of this method in studies of bacteriophages, virus and cellular parts of bacilli and yeasts are reported. (from summary).

7967

THE EFFECTS OF ROENTGEN RAYS ON TUBERCLE BACILLI. L. Lange and M. Fraenkel. Klin. Wochschr. 2, 1161-2 (1923). (In German).

7968

Army Medical Research Lab., Fort Knox, Ky. THE PROTECTIVE EFFECT OF SODIUM DIPHENYLHYDANTOIN IN THE HYPERACUTE RADIATION SYNDROME. Robert D. Laird and R. L. Fonner. 1956. 16p. Project No. 6-59-08-014. (AMRL-262).

Administration of sodium diphenylhydantoin ($\text{Dilantin}^{\text{R}}$) to CF_1 mice prior to exposure to 250 KVP x rays controlled convulsive activity and increased median survival time several-fold between 55,000 and 150,000 r, as determined by decreased incidence and severity of convulsions and delay in onset of convulsions. Results obtained with diphenylhydantoin suggest that convulsive activity in experimental animals exposed to massive doses of

radiation either originates in or is mediated through the motor cortex of the cerebrum. NSA 11-7919

7969

EFFECTS OF RAPID MASSIVE DOSES OF GAMMA-RAYS ON THE TESTES AND GERM CELLS OF THE RAT. J. F. Spalding, J. M. Wellnitz and W. H. Schweitzer. Radiation Research 7, 65-70(1957).

Mature sperm of rats showed no morphological evidence of damage after x ray doses of more than 50,000 r. Other tubular germinal cells, however, showed rapidly progressive degenerative changes. Histological changes in interstitial cells were observed within 48 hours after 10,000 r dose in the rats.

7970

California. Univ., Los Angeles. Atomic Energy Project and California. Univ., Los Angeles. School of Medicine. LATE EFFECTS OF TOTAL BODY ROENTGEN IRRADIATION. II. THE INFLUENCE OF FRACTIONATED AND SINGLE RADIATION DOSES ON THE INCIDENCE OF TUMORS, NEPHROSCLEROSIS AND ADRENAL VACUOLATION IN WISTAR RATS DURING VARIOUS PERIODS OF POSTIRRADIATION SURVIVAL. Baldwin G. Lamson, Raymond A. Meck, and Leslie R. Bennett. June 29, 1956. 75p. Contract AT-04-1-Gen-12. (UCLA-370).

Late sequelae following 250 to 1600 r total-body x irradiation delivered under conditions of 5% and 20% oxygen to young female Wistar rats were studied. NSA 10-6463

7971

INVESTIGATION OF BIOLOGICAL PROTECTIVE AGENTS. PART XVI. ON THE PROTECTIVE EFFECTS OF CYSTEAMINE ON ACUTE RADIATION MORTALITY OF MICE. Hanns Langendorff and Alexander Catsch. Strahlentherapie 101, 536-41(1956). (In German).

The influence of a preliminary application of cysteamine on the acute radio-mortality of mice is less pronounced in the case of fractionated irradiation than in the case of single irradiation. Cysteamine and/or fractionation of the radiation dose cause an increase of the LD₅₀ values and a change of the shape of the dose effect curves. NSA 11-3309

7972

INVESTIGATION ON A BIOLOGICAL PROTECTIVE SCREEN. XVII. THE EFFECT ON RADIATION PROTECTION OF CYSTEAMINE ADMINISTERED AFTER PARTIAL BODY IRRADIATION. Hanns Langendorff, A. Catsch, and R. Koch. Strahlentherapie 102, 51-7(1957). (In German).

Cysteamine administered to rats within the first 24 hours after a partial irradiation entails a reduction of the 30-days-mortality. The protective effect can be observed only in the range of medium ray doses and is less distinct than in an irradiation preceded by cysteamine treatment. The combined application of cysteamine and liver homogenate or liver hydrolysate respectively, has no effect. A proved explanation of the observed effect cannot yet be given. NSA 11-5176

7973

INVESTIGATION OF A BIOLOGICAL PROTECTIVE SCREEN. PART XIX. FURTHER RESEARCH ON SENSITIVITY TO RADIATION AND CYSTEAMINE PROTECTION OF MALE MICE AFTER GONADECTOMY. Hanns Langendorff, A. Catsch, and R. Koch. Strahlentherapie 102, 291-7(1957). (In German). NSA 11-5742

7974

THE INFLUENCE ON SURVIVAL RATE OF X-IRRADIATED RATS AND MICE OF LIVER AND SPLEEN AUTOLYSATES, SPLEEN HOMOGENATES, AND SPLEEN IMPLANTATION. Hanns Langendorff, R. Koch, A. Catsch, and U. Hagen. Strahlentherapie 102, 298-304(1957). (In German). NSA 11-5743

7975

INVESTIGATION ON A BIOLOGICAL PROTECTIVE SCREEN. PART XVIII. THE EFFECT OF CENTRAL NERVOUS SYSTEM ON THE IRRADIATED ANIMAL. Hanns Langendorff and R. Koch. Strahlentherapie 102, 58-64(1957). (In German).

The radioprotective effect of oxytryptamine (serotine), benzedrine, d, 1-ephedrine (ephetonine) and cardiazol (pentamethylene tetrazol) were tried in mice which had been exposed to a total roentgen dose of 500 r. In keeping with a former observation with tryptamine, a protective effect was found with oxytryptamine and benzedrine; d, 1-ephedrine and cardiazol were ineffective. The existence of this phenomenon is attributed to a special central nervous mechanism. This theory is supported by the observation that, contrary to the increased central effect of benzedrine in the irradiated animal, the convulsion threshold of cardiazol remains invariable up to x ray doses capable in themselves of provoking central excitation. NSA 11-5167

7976

RESEARCH ON BIOLOGICAL PROTECTIVE SCREEN. PART XIII. THE EFFECT OF ENERGY-RICH PHOSPHATE AND PHOSPHORYLATED VITAMIN ON THE RADIATION SENSITIVITY OF RATS AND MICE. Hanns Langendorff, R. Koch, and U. Hagen. Strahlentherapie 99, 375-82 (1956). (In German). NSA 10-9078

7977

INVESTIGATION ON A BIOLOGICAL PROTECTIVE SCREEN. II. RADIOSENSITIVITY EFFECTS OF CARBOHYDRATES. H. Langendorff, R. Koch, U. Hagen, and H. Scharnbeck. Strahlentherapie 99, 121-8(1956). (In German).

Diverse hexoses and pentoses have no influence on the sensibility towards x-rays of rats and mice. Pyruvate, oxy-butyrate, and ketoglutarate increase the resistance. An acid coma provoked by pyruvic acid or β -oxybutyric acid and the entailed hypoxia have no effect on the resistance. The influence of alloxan diabetes is not considerable. NSA 10-6502

7978

STUDIES OF THE EFFECT OF RAPIDLY DELIVERED, MASSIVE DOSES OF GAMMA-RAYS ON MAMMALS. Wright Langham, K. T. Woodward, S. M. Rothermel, P. S. Harris, C. C. Lushbaugh, and John B. Storer (Los Alamos Scientific Lab., N. Mex.). Radiation Research 5, 404-32(1956).

Syndrome of hyperacute radiation illness in mice and rats after Ba-La γ ray doses of 1000 to 200,000 r was studied. Dose-response curves for median survival times of rats, mice and monkeys after massive rapid dose of γ radiation were qualitatively similar. Dose-response curve for monkeys differed quantitatively in one respect from that for rats and mice, at doses above 5000 r, monkeys showed decreased survival times with increasing doses, but mice and rats did not show same effect until above 10,000 r. Effects on body tissues and organs are described. (from authors' summary). NSA 11-2789

7979

STRONTIUM-90 IN MAN. Ralph E. Lapp. Science 125, 933-4(1957).

Biological hazards from fall-out Sr⁹⁰ following nuclear explosions are discussed. NSA 11-6618

7980

MECHANISM OF INACTIVATION OF TOBACCO MOSAIC VIRUS BY X-RAYS. Max A. Lauffer, David Trkula, and Anne Buzzell (Univ. of Pittsburgh). Nature 177, 890 (1956).

Lethal action of x rays on tobacco mosaic virus is the breaking of a single molecular chain anywhere in

the nucleic acid. A possible reason for the discrepancy between the lethal dose and the dose required to break the rod is that the structure of ribose nucleic acid may be a coil of several strands. NSA 10-9058

7981

CARDIO-VASCULAR REACTIONS PROVOKED BY X-RAYS. J. Lavedan. *Paris med.* 1, 137-41(1925). (In French).

7982

CARDIOVASCULAR DISEASE DUE TO RADIATION TREATMENT OF NEOPLASMS. J. Lavedan and O. Monod. *Compt. rend. soc. biol.* 87, 153-4(1922).

7983

THE BEHAVIOR IN TRANSPLANT OF LYMPHOCYTIC NEOPLASMS ARISING FROM PARENTAL THYMIC GRAFTS IN IRRADIATED, THYMECTOMIZED HYBRID MICE. L. W. Law and Michael Potter (National Cancer Inst., Bethesda, Md.). *Proc. Natl. Acad. Sci. U. S.* 42, 160-7(1956). NSA 10-6477

7984

THE ACTION OF RADIATIONS ON VIRUSES AND BACTERIA. D. E. Lea. *Brit. Med. Bull.* 4, 24-26 (1946-1947).

Chemical effects of radiation on inorganic and organic solutes are described. Inactivation of phage 5-13, a macro-molecular virus, is explained and calculations of inactivation dose in millions of r and inferred "target" diameter in $m\mu$ are presented for phage exposed alpha, beta, gamma rays. Inactivation of vaccinia virus is also discussed. Effects of radiations on bacteria are mutations (permanent changes in form or color of colonies) reduction of motility, temporary inhibition of division and lethal action. Bacteria grown on a nutrient medium exposed to a suitable intensity of radiation fail to divide but continue to grow in the sense of increasing in volume. Hence, rod shaped bacteria grow into long filaments. BA 20-15791

7985

THE MECHANISM OF THE BACTERICIDAL ACTION OF RADIOACTIVE RADIATIONS. I. THEORETICAL. D. E. Lea, R. B. Haines, and C. A. Coulson. *Proc. Roy. Soc. (London)* 120B, 47-76(1936).

A technique is described for the preparation of bacteria in thin gelatin films for exposure to corpuscular radiations of low penetrating power. Results are expressed in terms of mean ionization dosage required to produce death and also in terms of the target size.

7986

THE ACTION OF RADIATIONS ON BACTERIA. III. γ -RAYS ON GROWING AND ON NON-PROLIFERATING BACTERIA. D. E. Lea, R. B. Haines, and C. A. Coulson. *Proc. Roy. Soc. (London)* 123B, 1-21(1937).

Authors describe lethal action of γ radiation on aqueous suspensions of *B. coli* and spores of *B. mesentericus*. Conclusion: the production of long forms is due to inhibition of division, while growth, in the sense of increase of volume, is unaffected.

7987

REACTION OF THE HEART-VASCULAR SYSTEM TO THE EFFECTS OF IONIZING RADIATION. A. V. Lebedinski. *Med. Radiol.* 2, 3-9(1956). (In Russian). NSA 10-9053

7988

DISTRIBUTION AND EFFECT OF COLLOIDAL CHROMIC PHOSPHATE (P^{32}) INJECTED INTO THE HEPATIC ARTERY AND PORTAL VEIN OF DOGS AND MAN. Bennett Levine, Henry Hoffman, and Samuel O. Freedlander (Mount Sinai Hospital, Cleveland, Ohio). *Cancer* 10, 164-72(1957).

P^{32} is retained by the liver. Large doses can be delivered to the liver without deleterious effects to

the animal. Human liver can tolerate large doses to the liver without ill effects. NSA 11-6218

7989

LEUKEMIA AND IONIZING RADIATION. L. B. Lewis (Calif. Inst. of Tech., Pasadena). *Science* 125, 965-72 (1957).

For the average individual in a population, probability of developing radiation-induced leukemia is estimated 2×10^{-6} per rad (unit of absorbed dose of radiation) per year. Available data suggest that this estimate is valid within a factor of about 3, giving a range from 0.7×10^{-6} to 6×10^{-6} /rad/year. Author suggests that 10 to 20% of the spontaneous incidence of leukemia may result from radiation from natural background sources and estimates a 5- to 10% increase in the current spontaneous incidence of leukemia if the population were to reach and maintain a body level of Sr^{90} equal to 0.1 M. P. C. NSA 11-7064

7990

RADIOACTIVE STRONTIUM FALLOUT. W. F. Libby (U. S. Atomic Energy Commission, Washington, D. C.) *Proc. Natl. Acad. Sci. U. S.* 42, 365-90(1956).

Hazards from Sr^{90} deposited in fall-out following nuclear explosions are reviewed. Data are summarized on Ca, Sr, and Sr^{90} concentration in samples of soil, animal, and plant material collected throughout the world before and after the thermonuclear explosions during Operation Castle. Factors influencing the transfer of Sr^{90} from soil to plants, animals and milk and human skeleton are discussed. NSA 10-6497

7991

DOSAGES FROM NATURAL RADIOACTIVITY AND COSMIC RAYS. W. F. Libby *Science* 122, 57-8(1955)

Radiation dosage from natural radioactivities and cosmic rays were calculated. Data are tabulated on the total radiation dosage expressed in mr/yr for exposures at various altitudes directly over ordinary granite, typical sedimentary rock, and open oceans, cosmic ray dosages at various altitudes, radiation dosage from the natural radioactivity of the human body, and radiation dosages received in various ordinary circumstances. Comparison is made with data compiled by various investigators throughout the world and the average exposure rate from total fall-out from atomic tests on the United States on 1 January 1955. NSA 10-9971

7992

X-RAY IRRADIATION OF PREGNANT RATS: ATTEMPTS TO PRODUCE CONGENITAL CARDIAC ANOMALIES IN OFFSPRING. Ake Liljestrand and Jesse E. Edwards (Mayo Clinic and Mayo Foundation, Rochester, Minn.). *Proc. Soc. Exptl. Biol. Med.* 94, 111-12(1957). NSA 11-3666

7993

THE EFFECT OF WHOLE BODY ROENTGEN IRRADIATION ON THE MEGAKARYOCYTIC SYSTEM IN RAT FEMUR. Bo Lindell and J. Zajicek (Inst. of Radiophysics and Inst. of Radiopathology, Stockholm). *Experientia* 13, 27-9 (1957).

Study concerns effect of whole body radiation on megakaryocytic system of young albino rats, as reflected in femoral content of megakaryocytes during first seven days after radiation. Twenty-four hours after radiation only rats which received 600 r or more had markedly reduced megakaryocyte counts. On next day 200 r gave same reduction. On fifth day about 100 r reduced femoral megakaryocyte count. Similar results were observed on seventh day. NSA 11-4791

7994

ELECTRON MICROSCOPIC DETECTION OF COAGULATION IN P^{32} LABELED ERYTHROCYTES. Bruno Lindemann. *Strahlentherapie* 101, 3-10(1956). (In German).

Electron microscope observations of In Vitro experiments utilizing P^{32} labeled erythrocytes reveal spontaneously hemolysing cells and cells showing coagulation centers which might correspond to inter-cellular hit regions. Coagulation centers are first seen at 48 hours, enlarge to 1μ after four days, include entire cell after 6 days. Occasional cells with coagulation centers are found in blood drawn from polycythemia patients after treatment with P^{32} . NSA 11-1400

7995

THYROID NEOPLASMS IN THE RAT, A COMPARISON OF NATURALLY OCCURRING AND I^{131} -INDUCED TUMORS. Stuart Lindsay, G. D. Potter, and I. L. Chaikoff (Univ. of California School of Medicine, Berkeley). *Cancer Research* 17, 183-9(1957).

Radiation injury of thyroid glands of rats following single injections of $10-400 \mu c I^{131}$ is described. Single or multiple benign thyroid adenomas, follicular and papillary carcinomas, benign and malignant thyroid neoplasms, follicular and papillary thyroid carcinomas were observed. (from authors' summary). NSA 11-6197

7996

EFFECT OF IRRADIATION ON ELECTROKINETIC POTENTIAL AGGLUTINABILITY, LYSIS AND pH OF ESCHERICHIA COLI SUSPENSIONS. M. W. Lesse and R. P. Tittsler. *Proc. Soc. Exptl. Biol. Med.* 28, 811-813(1931).

7997

PERIPHERO-CENTRAL RELATIONS IN RADIATION SICKNESS. M. N. Livanov. *Med. Radiol.* 1, 19-27(1956). (In Russian). NSA 10-9081

7998

LACTIC ACID IN THE BLOOD OF CANCER PATIENTS TREATED WITH X-RAYS AND WITH RADIUM. E. Liverani. *Arch. farmacol. sper.* 51, 177-88(1931).

Blood lactic acid decreased in 15 cancer patients after treatment with x ray or radium. This decrease did not occur in 8 non-cancer cases. CA 25-4928

7999

RADIOIRON TRACER STUDIES FOR THE EVALUATION OF RADIATION DAMAGE. R. Kenneth Loeffler (Temple Univ. Medical School and Hosp., Philadelphia). *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 77, 836-46(1957). NSA 11-6600

8000

THE IRON CONTENT OF MALIGNANT TUMORS AND ITS SIGNIFICANCE IN X-RAY THERAPY. S. Loewenthal and H. Probst. *Z. Krebsforsch* 42, 222-40(1935). (In German). CA 29-8120

8001

LATE SKELETAL ROENTGENOGRAPHIC, HISTO-PATHOLOGICAL, AUTORADIOGRAPHIC AND RADIO-CHEMICAL FINDINGS FOLLOWING RADIUM DEPOSITION. W. B. Looney (Argonne National Lab., Lemont, Ill.). *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 75, 559-72(1956).

It has been possible to demonstrate by autoradiographic studies the manner of deposition of radium in the skeleton; by histologic studies, the histopathologic changes that have taken place; and by roentgenographic studies, changes that have occurred as a result of the histopathologic changes. The material for this study was obtained at autopsy from a patient who died in 1951 from an osteogenic sarcoma of the foot (age forty-eight years). NSA 10-6506

8002

THE ARTIFICIAL KIDNEY AND ION-EXCHANGE RESINS AS POSSIBLE METHODS OF REMOVING RADIOELEMENTS FROM THE BODY. W. B. Looney, C. J. Maletskos, Marie Helmick, John Reardon, Jonathan Cohen, and Warren Guild (Mass. Inst. of Tech., Cambridge, Peter

Bent Brigham Hosp., Boston, Mass., and Mass. General Hosp., Boston). *Radiology* 68, 255-6(1957). NSA 11-4255

8003

Texas. Univ., Austin. Radiobiological Lab. AN ATTEMPT TO DEMONSTRATE A LETHAL TOXIN IN THE BLOOD OF IRRADIATED RATS. James R. Lott and James L. Wilding. May 4, 1955. 5p. (AF-SAM-55-110).

A series of experiments was conducted in an attempt to demonstrate a circulating toxin in the blood of irradiated rats. At 1, 6, and 24 hr postradiation, 5 ml of blood from irradiated animals were transfused into normal animals which had been simultaneously exsanguinated by identical amounts. A total of 101 rats was irradiated by Co^{60} radiation in doses of 1000 r through 20,000 r and their blood transfused into normal rats. It was found that after an initial weight loss all surviving animals gained weight over a 30-day period and no deleterious effects of the transfused irradiated blood were observed. NSA 11-831

8004

New York Operations Office. Health and Safety Lab., AEC BACKGROUND RADIATION: A LITERATURE SEARCH. Wayne M. Lowder and Leonard R. Solon. July 1956. 45p. (NYO-4712).

Information was abstracted from a representative group of scientific papers published within recent years which deal with the various aspects of natural radiation and with radioactive materials comprising various components of background. The information is classified into sections covering cosmic radiation, terrestrial radiation sources, and radiation from internal emitters. NSA 11-50

8005

DESTRUCTION OF MICROORGANISMS IN WATER, SEWAGE, AND SEWAGE SLUDGE BY IONIZING RADIATIONS. Harry N. Lowe, Jr., William J. Lacy, Bernard F. Surkiewicz and Robert F. Jaeger. *J. Am. Water Works Assoc.* 48, 1663-72(1956). NSA 11-4236

8006

EXPERIMENTAL STUDY OF THE ACTION OF ROENTGEN RADIATION ON THE RESPIRATORY SYSTEM AND THE HEART. G. Lucarelli. *Tumori* 9, 85-105(1935). (In Italian).

8007

ALCOHOL AND THE BIOLOGICAL EFFECTS OF IONIZING RADIATION. N. V. Luchnik. *J. Nuclear Energy* 5, No. 1, 163-5(1957).

Mice were given alcohol before irradiation. Figures are given on the increased survival of mice given alcohol. It is concluded that its protective action results from an altered metabolism. NSA 11-8800

8008

EFFECTS OF PRELIMINARY RADIATION UPON THE SUBSEQUENT RADIORESISTANCE OF MICE. N. V. Luchnik and V. G. Kulikova. *Doklady Akad. Nauk S. S. S. R.* 110, 982-4(1956). (In Russian). NSA 11-3276

8009

THE RESPONSE OF THE FOLLICULAR HORMONE AFTER IRRADIATION WITH ROENTGEN, INFRA-RED AND ULTRAVIOLET RAYS. F. Ludwig and J. vonRies. *Zentra. Gynakol.* 55(3), 137-9(1931).

Effects of various radiations upon action of the follicular hormone, progynone-P, as observed in mouse testes described. BA 6-15867

8010

POSSIBLE USE OF THE NEUTRON CAPTURING ISOTOPE LITHIUM⁶ IN THE RADIATION THERAPY OF BRAIN TUMORS. Alfred J. Lucszenhop, William H. Sweet, and Janette Robinson (Harvard Medical School and Mass. General Hosp., Boston). *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 76, 376-92(1956). NSA 10-9985

8011

EFFECT OF FAST NEUTRONS ON DIFFERENT STAGES OF SPERMIOGENESIS IN *DROSOPHILA MELANOGASTER*.

K. G. Luning and Sten Jonsson (Univ. of Stockholm, Sweden). *Nature* 178, 1123-4(1956). NSA 11-1743

8012

ACTION OF X-RAYS AND α RAYS ON BACTERIA

S. Luria. *Compt. rend. acad. sci. Paris*. 209, 604-6 (1939). (In French).

8013

Los Alamos Scientific Lab., N. Mex.

COMPARATIVE STUDY OF EXPERIMENTALLY PRODUCED BETA LESIONS AND SKIN LESIONS IN UTAH RANGE SHEEP.

C. E. Lushbaugh, J. F. Spalding, and D. B. Hale. *Nov.* 30, 1953. 22p. (LADC-1570).

8014

EFFECT OF X-RAYS ON THE LIVING CELL. W. Luther. *Forsch. u. Fortschr.* 28, 357-59(1939).

8015

DISINFECTION AND STERILIZATION: 2ND ED. E. C.

McCulloch. Lea and Febiger, Philadelphia, Chap 4, 57-68 (1945).

8016

ANNUAL REPORT OF THE BIOCHEMICAL RESEARCH FOUNDATION OF THE FRANKLIN INSTITUTE (1946).

E. McDonald. *J. Franklin Inst.* 241, 23-30.

8017

PROGRESS OF THE BIOCHEMICAL RESEARCH FOUNDATION. E. McDonald. *J. Franklin Inst.* 242, 435-448.

(1946).

8018

EFFECTS OF X-IRRADIATION OF GLYCOGENOLYSIS, GLYCOGENESIS AND GLUCONEOGENESIS IN THE RAT. Ralph W. McKee and Myron Brin. *Arch. Biochem. Biophys.* 61, 390-6(1956). NSA 10-7407

8019

COMPARATIVE STUDY OF THE PHYSIOLOGICAL EFFECTS OF X-IRRADIATION AND RESISTANCE TO TRAUMATIC SHOCK. J. M. McKenna and B. W. Zweifach (New York Univ. Bellevue Medical Center and Beth Israel Hospital, New York). *Radiation Research* 6, 126-36 (1957).

Total body x irradiation predisposes rats to subsequent traumatic shock. Effect is both time and dose dependent. Sublethal exposure (350 r, 500 r) leads to transient period (5-10 days) of increased susceptibility to trauma. Lethal doses (650 r, 750 r, 900 r) predispose rats for periods up to 50-60 days. No apparent relationship of predisposition to radiation induced leukopenia or bacteremia was demonstrated. Adaptation to trauma has no protective carryover against lethal effects of x irradiation. Mechanisms responsible for resistance to trauma could not be determined by exposure to x ray. Previously irradiated rats could be made resistant to trauma by a training regime. NSA 11-5159

8020

HEALTH AND SAFETY IN A NUCLEAR POWER INDUSTRY.

A. S. McLean and W. G. Marky. *J. Brit. Nuclear Energy Conf.* 1, 24-34(1956).

A short review of general effects of radioactivity and ionizing radiation on human beings is presented, and basic problems of radiation protection are stated. Various features of nuclear development, chemical separation plants, and waste-disposal facilities are examined in relation to potential occupational and public health hazards and compared with health and safety problems elsewhere in industry. Experience of the Atomic Energy Authority is reviewed and used to indicate types of protective measures and procedures most likely to be effective in ensuring safe development in the industry. NSA 10-9976

8021

RADIUM CATHODE, AND X-RAY MUTANTS. J. W.

MacArthur and E. W. Lindstrom. *Proc. Sixth Intern. Congr. Genet.*, Ithaca 2, 336(1932).

8022

BIOLOGICAL EFFECTS AND POSSIBILITIES OF BIOLOGICAL APPLICATION OF NEUTRONS. L. Mallet. *Bull. soc. france. electriciens* (6) (Review), 2, 25-41 (1942).

8023

California. Univ., Berkeley.

EFFECT OF IONIZING RADIATION ON CAROTENOID STABILITY. REPORT NO. 3 (FINAL) (FOR) NOVEMBER 15, 1954 TO FEBRUARY 29, 1956. 10p. Project No. 7-84-01-002. Contract DA-19-129-gm-254. (PB-121313).

Destruction of carotenoid pigments by gamma-radiation depends upon the extent to which the free radicals of peroxides formed in surrounding medium are available for reaction. Loss of carotenoids in irradiated whole tomatoes is small even at dosages of several million rep, but the internal structure of the tomato is destroyed. The problem is therefore one of pectin and carbohydrate instability. NSA 10-9922

8024

California. Univ., Berkeley. Radiation Lab.

MERCAPTOETHYLAMINE AND LIVER SHIELDING IN IRRADIATED RATS. STUDY OF ERYTHROPOIESIS WITH IRON-59. H. Maisin and Ray Wolfe. March 7, 1956. Contract W-7405-eng-48. (UCRL-3328). NSA 10-3772

8025

CIRCULATING RAT CELLS IN LETHALLY IRRADIATED MICE PROTECTED WITH RAT BONE MARROW. Takathi Makinodan. (Oak Ridge National Lab., Tenn.). *Proc. Soc. Exptl. Biol. Med.* 92, 174-9(1956). NSA 10-9978

8026

AGGLUTININ PRODUCTION IN NORMAL, SUBLETHALLY IRRADIATED, AND LETHALLY IRRADIATED MICE TREATED WITH MOUSE BONE MARROW. Takathi Makinodan, Nazareth Gengozias, and Charles C. Congdon. (Oak Ridge National Lab., Tenn.). *J. Immunol.* 77, 250-6(1956). NSA 11-5720

8027

STUDY OF THE ADENOSINETRIPHOSPHATIC AND HEXOKINASIC ACTIVITY OF THE CRYSTALLINE LENS OF RABBITS SUBJECTED TO LOCAL X IRRADIATION. P. Mandel and M. L. Schmitt (University de Strasbourg). *Experientia* 12, 223-4(1956). (In French with English Summary). NSA 10-9938

8028

EFFECTS OF X RAYS EMITTED FROM VARIOUS ANODES UPON THE WORK OF ISOLATED HEART OF A FROG. S. E. Manoilov, A. V. Lazovskaya and B. A. Orlov (Central Research Inst. of Roentgen-Radiology). *Doklady Akad. Nauk S.S.S.R.* 110, 305-7(1956). (In Russian). NSA 11-1737

8029

EFFECTS OF LOW-LEVEL X-IRRADIATION ON OXYGEN CONSUMPTION OF BULLFROG ERYTHROCYTES. W. S. Martin, R. C. Grubbs, and M. A. Lessler. (Ohio State Univ. Coll. of Medicine, Columbus). *Am. J. Physiol.* 187, 505-8(1956).

Rate of oxygen consumption by 50% cell suspension of the nucleated erythrocytes (rbcs) of bullfrogs was determined at 25°C and at 30°C, the studies including irradiated cells (25 r or 60 r of x rays) as well as unirradiated cells. The 5° temperature drop (from 30° C to 25° C) decreased oxygen consumption of both types of cells by about 20%. Oxygen consumption was inhibited by 10-15% at 30°C following exposure to 25 r or 60 r and was inhibited by about 14% following 60 r but not 25 r at 25°C. Consistent correlations between dose and radiation effects were established. NSA 11-4231

8030

ON THE BIOLOGICAL AND BIOCHEMICAL EFFECT OF IONIZATION ON RATS. PART IV. URIC ACID EXCRETION OF RATS AFTER TOTAL X IRRADIATION UNDER THE INFLUENCE OF ADENOSINE TRIPHOSPHORIC ACID. Hans-Joachim Maurer and Peter Schwarzmann. *Strahlentherapie* 100, 463-76(1956). (In German).

After total roentgen irradiation of 625 r the uric acid excretion of rats shows a wave-like course. After Doca the same changes can be stated. Here, however, the normalization seems to occur already after a shorter period. After administration of doses of adenosine triphosphoric acid an increased uric acid excretion before and after the irradiation could be observed. An influence on the radio-sensibility could not be found. NSA 11-42

8031

EFFECTS OF X-IRRADIATION ON ANDROGENIC RESPONSE OF SEMINAL VESICLES OF THE CASTRATE RAT. R. M. McLampy, I. W. Gowen, and J. W. Wacasey (Iowa Agricultural Experiment Station, Ames). *Proc. Soc. Exptl. Biol. Med.* 92, 313-15(1956). NSA 10-9943

8032

ACUTE LETHALITY OF MICE AS INFLUENCED BY THE PERIODICITY OF PAIRED EXPOSURES TO FAST NEUTRONS OR X RAYS. G. S. Melville, Jr., F. P. Conte, M. Slater, and A. C. Upton (Oak Ridge National Lab., Tenn.). *Brit. J. Radiol.* 30, 196-9(1957). NSA 11-6195

8033

A CLINICAL STUDY OF RADIATION CATARACTS AND THE RELATIONSHIP TO DOSE. George R. Merram and Elizabeth F. Focht (Memorial Center and Columbia-Presbyterian Medical Center, New York). *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 77, 759-85 (1957). NSA 11-6599

8034

A FORMULA FOR CHRONIC RADIATION DOSAGE VERSUS SHORTENING OF LIFE SPAN: APPLICATION TO A LARGE MAMMAL. D. J. Mewissen, C. L. Comar, Bernard F. Trum, and John H. Rust (Oak Ridge Inst. of Nuclear Studies, Tenn.). *Radiation Research* 6, 450-9(1957).

An equation has been developed relating life shortening to dosages of whole-body irradiation and applicable to large mammals even with short survival. Transformation of latent injury into actual injury accounts for wasted radiation. Application of this formula to life shortening in the burro is demonstrated. The exponential curve could be accounted for by a linear dose-damage relationship. A lethal dose of 660 r was calculated for the γ -irradiation of burros. NSA 11-6607

8035

LATE EFFECTS OF GAMMA RADIATION ON MICE PROTECTED WITH CYSTEAMINE OR CYSTAMINE. D. J. Mewissen and Marshall Brucer (Oak Ridge Inst. Nuclear Studies, Tenn). *Nature* 179, 201-2(1957). NSA 11-4253

8036

THE EFFECT OF MERCAPTOETHYLAMINE ON SURVIVAL OF MICE IRRADIATED WITH COBALT 60. D. J. Mewissen (Oak Ridge Inst. of Nuclear Studies, Tenn.). *Radiation Research* 6, 85-97(1957). NSA 11-4254

8037

EFFECTIVE ROENTGEN REDUCTION; AN INDEX OF ANTIBIOTIC THERAPY OF THE ACUTE RADIATION SYNDROME. Sol M. Michaelson and Joe W. Howland (Univ. of Rochester, N. Y.). *Antibiotics Annual*. 936-41 (1956-1957). NSA 11-6214

8038

Rochester, N. Y. Univ. Atomic Energy Project. THE USE OF VITAMIN FORTIFIED ANTIBIOTICS IN

THE THERAPY OF THE ACUTE RADIATION SYNDROME IN DOGS. Sol M. Michaelson, Joe W. Howland, Janet M. Koszalka, Donald J. DeBottis, and Andrew Konnerth. *Feb.* 29, 1956. 29p. Contract W-7401-eng-49. (UR-434).

The supplementation of a broad spectrum antibiotic with vitamins and other nutritional factors was found to enhance the increase in survival of the irradiated animal over that obtained from the use of the antibiotic therapy alone. NSA 10-3255

8039

SERUM TRANSAMINASE ACTIVITY IN X-IRRADIATED RABBITS. Lawrence J. Milch and Harry G. Albaum (School of Aviation, Medicine, Randolph AFB, Texas and Brooklyn College, New York). *Proc. Soc. Exp. Biol. Med.* 93, 595-6(1956). NSA 11-2788

8040

PLASMA LIPROTEINS AND MUSCLE ADENOSINE TRIPHOSPHATE IN RABBITS AFTER LOCAL IRRADIATION. Lawrence J. Milch, James V. Stinson, and Harry G. Albaum (USAF, Randolph Field, Texas, and Brooklyn College, Brooklyn, New York). *Radiation Research* 4, 321-5(1956).

Rabbits were subjected to local irradiation of the hind limb with three dose levels of x irradiation and with 30,000 r of γ irradiation at varying dose rates up to 3800 r/min. The x-irradiated animals were sacrificed at 24 hr after exposure, separate groups of γ -irradiated rabbits were sacrificed at 24 and 96 hr postexposure. Analyses revealed that plasma lipid and lipoprotein concentrations were significantly increased in all irradiated rabbits and that the lipoprotein change was independent of dose, radiation type, and, in the instance of γ -radiation, dose rate and time after exposure up to 4 days. The ATP concentrations of the irradiated muscles, on the other hand, were consistently unaltered by 30,000 r of γ -rays and by all dosages of x rays except 25,000 r. NSA 10-7422

8041

Chicago, Univ., Dept. of Medicine THE ROLE OF BACTERIAL INFECTION IN RADIATION INJURY. C. Phillip Miller. *Dec.* 28, 1955 16p. (AECU-3351; M-5828). NSA 11-18

8042

THE ROLE OF INFECTION IN RADIATION INJURY. C. P. Miller, C. W. Hammond and M. Tompkins. *J. Lab. Clin. Med.* 38, 331-343(1951).

8043

DELAYED EFFECTS OCCURRING WITHIN THE FIRST DECADE AFTER EXPOSURE OF YOUNG INDIVIDUALS TO THE HIROSHIMA ATOMIC BOMB. Robert W. Miller (Atomic Bomb Casualty Commission, San Francisco). *Radiation* 18, 1-18(1956).

Thirty-three children exposed *in utero* to the Hiroshima atomic bomb have head circumferences 2 or more standard deviations below normal. Mental retardation occurred in 15. Nineteen within 2100 meters of the hypocenter developed leukemia. No cataracts were found among the group. A mild visual disability occurs among those within 1800 meters of the center. Otitis media is the same for the two exposure groups. No increase in tumors was observed. Twenty-four of 2771 children within 3000 meters of the hypocenter had sequelae of blast or thermal effects other than well-healed scars. NSA 11-36

8044

THE QUESTION ABOUT THE INFLUENCE OF ROENTGEN-RAYS ON BACTERIA AND ITS PROBABLE THERAPEUTIC VALUE. F. Minck. *Munch. med. Wochschr.* 5, 101-102 (1896).

8045

THE QUESTION ABOUT THE INFLUENCE OF ROENTGEN-RAYS ON BACTERIA AND ITS PROBABLE THERAPEUTIC VALUE. F. Minck. *Munch. med. Wochschr.*, 9, 202(1896).

8046

ON THE FACTORS INDUCING HEMORRHAGES IN GROWING ANIMALS EXPOSED TO TOTAL-BODY X IRRADIATION. T. D. Mirimova (Inst. of Pediatrics, Acad. of Medical Science). *Med. Radiol.* 1, No. 4, 56-61(1956). (In Russian).

White rats from 1 day to 1.5 months old were whole-body x-irradiated with 250, 500 and 1000 r, sacrificed 4 hr to 80 weeks later and the number of thrombocytes determined. No close relation was observed between thrombocytopenia following irradiation and bleeding. NSA 11-854

8047

PROGRESS IN RADIOBIOLOGY, PROCEEDINGS OF THE FOURTH INTERNATIONAL CONFERENCE ON RADIOBIOLOGY HELD IN CAMBRIDGE ON 14TH TO 17TH AUGUST 1955. Joseph S. Mitchell, Barbara E. Holmes, and Cyril L. Smith, eds. London, Oliver and Boyd, 1956. 557p.

Recent studies in radiobiology and closely related studies are reviewed. Emphasis is placed on the importance of human data and the needs for continued study of the fundamental basis of the biological action of radiations on living cells. The value of collaboration between investigators trained in a wide range of scientific disciplines is stressed as a necessity for progress in this field of scientific inquiry. NSA 11-45

8048

Mound Lab., Miamisburg, Ohio.
BIOLOGICAL RESEARCH QUARTERLY REPORT FOR JULY, AUGUST, SEPTEMBER, 1949. Oct. 1, 1949. Decl. Jan. 10, 1956. 73p. (MLM-381). Contract AT-33-1-Gen-53.

Progress is reported in the following studies, the tissue distribution of Po in laboratory animals; the effect of different levels of Po on colony-producing organisms in sewage; hematological and pathological effects of Po on rats, and the development of techniques for assay of biological materials for Po. NSA 10-6101

8049

Mound Lab., Miamisburg, Ohio.
BIOLOGICAL RESEARCH QUARTERLY REPORT FOR JANUARY, FEBRUARY, MARCH 1950. Apr. 1, 1950. Decl. Jan. 10, 1956. 82p. Contract AT-33-1-GEN-53. (MLM-442).

Progress is reported in the following studies; the tissue distribution of injected Po in rats; the effects of intravenous Po injections of 8.9, 19.7 and 29.5 μ c upon the estrus cycle of adult rats, the effects of Po upon growth, respiration, and cell division of yeast cells, and pathological effects of particles from injected Po in rats. NSA 10-6102

8050.

Mound Lab., Miamisburg, Ohio.
TOXICITY OF LIPID PEROXIDES IN THE RAT. J. S. Andrews, J. F. Mead and W. H. Griffith. *Federation Proc.* 15, 918(1956).

It was assumed that products of fat oxidation initiated by irradiation are essentially the same as products of autooxidation. Degree of oxidation was estimated by measuring peroxide content of fat. Rats were fed on diets which contained fat with peroxide numbers (PN) of 400, 800 and 1200. The 400 PN diet resulted in reduction in growth, increasing dietary PN increasing the growth depression until 1200 PN diet which caused death in about 3 weeks. The 800 PN diet caused moderate to severe diarrhea which subsided during the 8th week. Rats consuming the 100 PN diet for 8 weeks received total body x-irradiation of 600 r. After 30 days, 3 controls died and 7 rats on 100 PN

diet also died. Consumption of 100 PN diet caused slower than normal recovery from stress of radiation.

8051

REDUCED GENE TRANSMISSION IN RADIATION-INDUCED MUTANT BARLEY. C. C. Moh and R. A. Nilan (Smithsonian Institution, Washington, D. C. and State Coll. of Washington, Pullman). *J. Heredity* 47, 129-31 (1956) NSA 10-9934

8052

EFFECTS OF RADIATION SICKNESS ON INTESTINES AFTER TRAUMA. S. P. Mokrovskaya (Kirov State Inst. of Physician Training and Clinic of Medical Radiology). *Med. Radiol.* 2, 64-70(1957). (In Russian). NSA 11-5726

8053

QUANTITATIVE OBSERVATION ON RECOVERY FROM WHOLE BODY IRRADIATION IN MICE. I. RECOVERY AFTER SINGLE LARGE DOSES OF RADIATION. R. H. Mole. Atomic Energy Research Establishment, Harwell, Berks, England. *Brit. J. Radiol.* 29, 563-9(1956).

Delayed deaths, 30-150 days post-irradiation, contribute significantly to the lethality following 2 doses at spaced intervals and to lethality following single exposure of older mice. Delayed deaths are associated with chronic wasting, moist feces and an excoriated anus. Recovery after radiation is an exponential function only if delayed deaths and very early deaths are ignored. Author discusses possible explanations for the two exceptional periods (very early; very late) including production of a toxic substance and altered radiosensitivity of normally dormant and radioresistant cell populations that are necessary for recovery. NSA 11-27

8054

QUANTITATIVE OBSERVATIONS ON RECOVERY FROM WHOLE BODY IRRADIATION IN MICE. II. RECOVERY DURING AND AFTER DAILY IRRADIATION. R. H. Mole. (Atomic Energy Research Establishment, Harwell). *Brit. J. Radiol.* 30, 40-6(1957). NSA 11-4786

8055

ALKALINE PHOSPHATASE ACTIVITY IN VARIOUS MOUSE TISSUES FOLLOWING TOTAL BODY X-IRRADIATION. Joseph L. Mollura and Anna Goldfeder (Dept. of Hospitals, New York and New York Univ.). *Am. J. Physiol.* 186, 224-6(1956).

Distribution of alkaline phosphatase in mouse tissues (duodenum, spleen, liver, kidney, and mammary glands) and effects of ionizing radiation on the activity of this enzyme were studied by the Gomori method. A total-body dose of 700 r, known to kill 50% of the mice of the C₅₇/BL6 strain in about 9 days, as well as doses up to 10,000 r, failed to produce any apparent change in alkaline phosphatase activity of the tissues removed from 2 hours to 14 days after exposure. NSA 11-22

8056

THE EFFECTS OF CONVENTIONAL AND HIGH-ENERGY X-RAYS AND ELECTRONS IN FRACTIONATED DOSAGE ON RATS. Walter S. Moos, John B. Fuller, Walter J. Henderson, and Roger A. Harvey (Univ. of Illinois Coll. of Medicine, Chicago). *Radiology* 67, 697-703 (1956).

The relative biological effectiveness (with respect to survival of irradiated rats) of 400 Kv and 22 Mev x rays was of the order of 0.56 to 0.75, the lower value pertaining to smaller daily doses (50-100 r/day). There was virtually no difference in effectiveness of 20 Mev electrons and 22 Mev x rays. NSA 11-872

8057

THE EFFECTS OF IRRADIATION ON THE ABSORPTION AND DISTRIBUTION OF DIOLEYLPALMITIN-C¹⁴ IN THE

RAT. Margaret G. Morehouse and Ronald L. Searcy (Univ. of Southern California School of Medicine, Los Angeles). *Radiation Research* 4, 175-85(1956). NSA 10-6479

8058
RADIATION-INDUCED FECAL FAT FORMATION IN THE RAT. Margaret G. Morehouse and Ronald L. Searcy (Univ. of Southern California, Los Angeles). *Science* 123, 1032(1956). NSA 10-9065

8059
Rochester, N. Y. Univ. Atomic Energy Project. THE FATE OF POLONIUM COLLOID AND POLONIUM²¹⁰ TAGGED SILVER PARTICLES FOLLOWING INTRA-TRACHEAL ADMINISTRATION TO RABBITS P. E. Morrow and R. J. Della Rosa. Nov. 26, 1956. 23p. Contract W-7401-eng-49. (UR-478).

Rabbits were subjected to intratracheal administration of distilled water containing Po hydroxide colloid or Po adsorbed onto microscopic silver particles. The pharmacodynamics of the suspensions were studied to elucidate the fate of particles in the lung airways. Silver particles were eliminated more rapidly but no marked differences were found in redistribution despite large differences in their particle sizes. NSA 11-2808

8060
TEMPERATURE MEASUREMENTS ON MICE IRRADIATED WITH VERY HIGH X-RAY INTENSITIES. W. S. Moos. (Univ. of Illinois, Chicago). *Experientia* 12, 101-2(1956). (In English, with German summary). NSA 10-7432

8061
EFFECTS OF CHRONIC INDUCTION OF RADIOACTIVE CERIUM INTO THE GASTROINTESTINAL TRACT OF RATS. Yu. I. Moskalev and V. I. Strel'tsova. *Med. Radiol.* 1, No. 6, 14-20(1956). NSA 11-3283

8062
STUDIES ON THE MECHANISM OF ACTION OF IONIZING RADIATIONS. III. THE PLASMA PROTEIN OF DOGS AFTER X-RAY IRRADIATION, AN ELECTROPHORETIC STUDY. J. A. Muntz, E. S. Guzman Barron and C. L. Porter. *Arch. Biochem.* 23(3), 434-45(1949).

Lethal x-ray dose produced no characteristic change in plasma protein pattern of dogs for 1 wk. after treatment. From 7th day after exposure until death, albumin diminished steadily. Effects on α_2 -globulin, β -globulin, fibrinogen fraction, blood volume, total protein N, and plasma globulin are described. BA 24-26048

8063
INFLUENCE OF IONIZING RADIATION ON THE APPEARANCE IN THE SERUM OF RABBITS OF HUMORAL FACTORS SLOWING DOWN CELL DIVISION. J. Miller (Inst. of Industrial Hygiene and Occupational Diseases, Prague). *Nature* 178, 43-4(1956). NSA 10-9947

8064
A NEW CASE OF INDUSTRIAL RADIUM POISONING WITH FATAL RESULT. Hermann Muth and Alfred Schraub. *Strahlentherapie* 102, 575-81(1957). (In German).

A report is given on the results of physical measurements in a case (chemist) of poisoning with fatal outcome after incorporation of natural radioactive substances. The body burden of radium 226 amounted to 0.6×10^{-7} g of radio-thorium or 0.3×10^{-7} Curie. This is not to be considered extremely high and keeps within the limits of maximum permissible amount of deposit. However the totally stored alpha-activity was found to be 4 μ C. It could be proved that this excess of alpha activity originates from polonium 210. (auth). NSA 11-8814

8065
BIOLOGICAL EFFECTS OF RADIATION WITH SPECIAL REFERENCE TO MUTATION. H. J. Muller. *Act. Sci. Ind.*, 477(1938).

8066
PROCESSES OF TISSUE RESPIRATION AND CONJUGATED OXIDIZING PHOSPHORYLATION IN EXPERIMENTAL ANIMALS DURING RADIATION SICKNESS. L. V. Mytareva (Central Research Inst. of Roentgen-Radiology). *Med. Radiol.* 1, 35-9(1956). (In Russian). NSA 10-9082

8067
National Academy of Sciences. THE BIOLOGICAL EFFECTS OF ATOMIC RADIATION: A REPORT TO THE PUBLIC. 1956. 42p. (NP-6016).
A group of scientists was appointed to investigate the effects of high-energy radiation on living things. The study was divided into six parts, each assigned to a separate committee. The areas considered include genetics, pathology, agriculture and food supplies, meteorology, oceanography and fisheries, and disposal of radioactive wastes. The nature of radiation is discussed briefly. Preliminary findings and recommendations are summarized. A list of the membership of each committee is included. (See also NP-6017). NSA 10-6462

8068
National Academy of Sciences. THE BIOLOGICAL EFFECTS OF ATOMIC RADIATION: SUMMARY REPORTS. 1956. 123p. (NP-6017).

Separate abstracts have been prepared on six sections of this report. (see also NP-6016). NSA 10-7391

8069
National Academy of Sciences. REPORT OF THE COMMITTEE ON GENETIC EFFECTS OF ATOMIC RADIATION: SUMMARY REPORTS, 1956. 123p. (NP-6017(p. 1-31)).

Radiations produce harmful mutations. It is difficult to estimate how much harm will appear in future generations. Geneticists agree the potential danger is great. A dose of not more than 10 r of manmade radiation to the reproductive cells in a maximum safe lifetime dose. The average person now receives some 3 or 4 r from x rays, roughly the same as the dose received from background radiation. The fall-out from nuclear weapons testing has, so far, led to considerably less irradiation than have the medical uses. NSA 10-7392

8070
National Academy of Sciences. REPORT OF THE COMMITTEE ON PATHOLOGICAL EFFECTS OF ATOMIC RADIATION. p. 32-44 of THE BIOLOGICAL EFFECTS OF ATOMIC RADIATION: SUMMARY REPORTS. 1956. 123p. (NP-6017(p. 32-44)).

A review was made of acute and chronic effects of radiation on animals and of such data on human beings as are available. The sequence of pathological changes is quite similar in man and in animals, although man has certain definable peculiarities. Some success has been achieved in the therapy of radiation injuries using antibiotics and properly timed blood transfusions. Shielding of a portion of the body seems to give a degree of protection disproportionately large for the mass shielded. NSA 10-7393

8071
National Academy of Sciences. REPORT OF THE COMMITTEE ON THE EFFECTS OF ATOMIC RADIATION ON AGRICULTURE AND FOOD SUPPLIES. p. 85-98 of THE BIOLOGICAL EFFECTS OF ATOMIC RADIATION: SUMMARY REPORTS. 1956. 123p. (NP-6017).

No drastic changes in agricultural production are imminent as a result of radiation. Few varieties of plants have been developed from radiation-induced mutants, but potentialities are recognized. Fields of interest include plant uptake and fixation of fission products, use of domestic animals in radiation studies;

radioisotopes as tracers in studies of insecticides; control of insects by irradiation; and radiation for preservation of foodstuffs. NSA 10-7394

8072

National Academy of Sciences and National Research Council.

PATHOLOGIC EFFECTS OF ATOMIC RADIATION.

Publication 452. 1956. 208p. (NP-6060).

Data include acute and chronic radiation effects on many animals, and human data including the effects of excessive exposure to x irradiation and radium used for therapy; moderate exposure to radiation by cyclotron workers, introduction of naturally occurring radioelements, effects of exposure to radiations by inhabitants of Hiroshima and Nagasaki, and observations from clinical radiotherapy, use of artificial isotopes in therapy, and a limited number of accidents in atomic energy work. (938 references). NSA 10-8137

8073

FIRST REPORT FROM NORSK HYDRO'S INSTITUTE FOR CANCER RESEARCH FOR THE PERIOD FROM ITS OPENING IN 1954 TO JULY 1, 1956. Oslo. Norsk Hydro's Inst. for Cancer Research. 1956. 51p. (NP-6318).

In addition to routine studies at the Institute a 31-Mev betatron was employed for comparative studies of high energy and conventional x radiation on various biological test systems. Cysteamine and cystamine labeled with S^{35} were employed in investigations on the radio-protective effects of these chemicals. A list of publications from 1954 to 1956 is included. NSA 11-8806

8074

SAFE HANDLING OF RADIOACTIVE ISOTOPES. National Bureau of Standards. Superintendent of Documents, Washington 25, D. C. Handbook 42(1949).

8075

RECOMMENDATIONS OF THE INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION AND OF THE INTERNATIONAL COMMISSION ON RADIOLOGICAL UNITS ARE PRESENTED. National Bureau of Standards. U. S. Dept. of Commerce, Handbook 47 (1950).

8076

RECOMMENDATIONS FOR WASTE DISPOSAL OF PHOSPHORUS 32 AND IODINE FOR MEDICAL USERS. National Bureau of Standards. Superintendent of Documents, Washington 25, D. C. Handbook 49(1951).

8077

INTRODUCTION TO RADIOISOTOPES. National Safety Council. National Safety News, p. 20(1951).

8078

MITOTIC DELAY INDUCED BY GAMMA RADIATION IN BROAD BEAN ROOT MERISTEMS. G. J. Neary, H. J. Evans, and S. M. Tonkinson (Atomic Energy Research Establishment, Harwell, Berks). *Nature* 179, 917-18 (1957). NSA 11-7063

8079

THE EFFECT OF EXPOSURE TO THE ATOMIC BOMBS ON PREGNANCY TERMINATION IN HIROSHIMA AND NAGASAKI. J. V. Neel and W. J. Schull. Washington, National Academy of Sciences-National Research Council. 1956. 241p.

Irradiation and the outcome of 76,626 pregnancies terminating in Hiroshima and Nagasaki between 1948 and 1953 is presented. Aspects considered include sex, malformation, viability at birth, birthweight, and death during the first six postpartum days. On a sample of 19,818 pregnancy terminations followed up at age nine months, data were obtained on infant survival, malformations, and growth of the child. Variation in indicators of genetic changes were analyzed in relation to parents. NSA 11-3294

8080

RADIATION THERAPY WITH 20 MEV. R. Glocker. *Strahlentherapie* 78, 541(1949).

A review is given of work on the betatron and other high energy machines, particularly insofar as it applies to radiation therapy with energies up to 20 Mev. It is pointed out that depth-dosage curves for very hard x-rays show a maximum at a certain depth which is more pronounced and shifted toward greater depth with increasing hardness. This is due to the production of Compton electrons by the x-rays. Moreover, there is a decrease in the half-value thickness for energies through pair production. Finally, it is mentioned that irradiation with electrons rather than x-rays from high energy machines has the practical advantage of a more limited range of penetration for the same energy. NSA 4-1886

8081

CHANGES IN THE BIOLOGICAL EFFICIENCY OF MEMBRANES DUE TO ROENTGEN RAYS. J. Grauer. *Strahlentherapie* 49, 118-131(1934). (In German).

8082

MUTAGENIC ACTIONS OF COLD AND X-RAYS IN STREPTOMYCES. Howard B. Newcombe. Atomic Energy of Canada, Ltd., Chalk River, Ont. *Radiation Research* 5, 382-9(1956). NSA 11-862

8083

MUTATIONS IN TOBACCO INDUCED BY X RAYS. S. Matsumura and T. Fujii. *Ann. Rept. Natl. Inst. Genet., Mishima, Japan* 2, 29(1952).

8084

THE EFFECT OF CELL SUSPENSIONS UPON THE DEVELOPMENT OF CATARACTS IN IRRADIATED MICE. Frank W. Newell, Thomas C. Beaman, Leon O. Jacobson, Edna K. Marks, and Evelyn O. Caston (Univ. of Chicago, Ill.). *Arch. Ophthalmol. (Chicago)* 57, 846-8(1957).

Mice exposed to 750 or 950 r of x rays delivered to the whole body or to the head only were injected with syngenic embryo spleen, liver and marrow cell suspensions after exposures. The cell suspensions failed to prevent cataract formation in the irradiated recipients. NSA 11-8798

8085

RELATION OF TUMOR SIZE TO RADIORESISTANCE. Charles M. Nice, Jr. and John Kuntz (Tech. assistance) (Univ. of Minnesota Medical School, Minneapolis). *Radiology* 68, 555-7(1957). NSA 11-6220

8086

A COMPARISON OF THE EFFECTS OF 31-MEV AND 180-KEV X RADIATION ON THE MITOSIS OF VICIA FABA L. Hedi Fritz-Niggli. *Oncologia* 9, No. 2, 269-79 (1956). (In German). NSA 10-8143

8087

STUDIES ON AGED SEEDS. III. SENSITIVITY OF AGED WHEAT SEEDS TO X-RADIATION. R. A. Nilan and Helga M. Gunthardt (State Coll. of Washington, Pullman). *Caryologia* 8, No. 2, 316-22(1956). NSA 10-9929

8088

RESPONSE TO WHOLE-BODY X-IRRADIATION IN THE STARVED RAT. L. F. Nims and J. L. Geisselsoder (Brookhaven National Lab., Upton, N. Y.). *Radiation Research* 5, 58-64(1956). NSA 10-9969

8089

AMERICAN MEAT INST. FOUNDATION, CHICAGO. RADIATION SENSITIVITY OF MEAT SPOILAGE MICRO-ORGANISMS. REPORT NO. 9 (TERMINATION) (FOR JUNE 15, 1954-JANUARY 14, 1956. C. F. Niven, Jr. 19p. Project No. 7-84-01-002. (AD-88913).

Data are tabulated on the identity and radiation resistance of organisms responsible for the spoilage of frankfurters during refrigerated storage. Attention was

devoted to studies of radiation resistance of organisms causing food poisoning. Moderate doses of radiations delayed spoilage of cured meat under refrigeration. NSA 11-828

8090

California, Univ., Los Angeles, Atomic Energy Project. EFFECTS OF IRRADIATION IN VIVO ON BACTERIAL DEOXYRIBONUCLEIC ACID. Amos Norman, John W. Rowen and Barbara Evans. Apr. 16, 1956. 15p. Contract AT-04-1-Gen-12. (UCLA-363).

Desoxyribonucleic acid exposed to 10,000 r in vivo gave the identical ultraviolet absorption spectrum and exhibited the same flow birefringence as DNA from unirradiated cells. This was true whether measurements were made immediately after irradiation or after a two hr incubation period at 37 C. DNA exposed to 10,000 r in vitro had its birefringence decreased to about half its original value. NSA 10-3770

8091

THE DISTRIBUTION AND IN SITU GROWTH PATTERN OF INJECTED RAT MARROW IN X-IRRADIATED MICE. Peter C. Nowell, Leonard J. Cole, Patricia L. Roan, and John G. Habermeyer (U. S. Naval Radiological Defense Lab., San Francisco, Calif.). J. Natl. Cancer Inst. 18, 127-43(1957). NSA 11-4793

8092

Naval Radiological Defense Lab., San Francisco. HISTOCHEMICAL DEMONSTRATION OF THE DISTRIBUTION OF INJECTED RAT BONE MARROW GROWING IN X-IRRADIATED MICE. P. C. Nowell, L. J. Cole, P. L. Roan, and J. G. Habermeyer. June 13, 1956. 27p. Project NM 006-015. 04. (USNRDL-TR-97). NSA 10-8153

8093

RADIOSENSITIVITY OF LARVAL AND ADULT AMPHIBIA IN RELATION TO TEMPERATURE DURING AND SUBSEQUENT TO IRRADIATION. John P. O'Brien and Walter L. Gajmerac (Marquette Univ., Milwaukee, Wis.). Proc. Soc. Exptl. Biol. Med. 92, 13-16(1956). NSA 10-9939

8094

EFFECTS OF ACUTE RADIATION SICKNESS ON THE ABSORPTION OF METHIONINE FROM THE GASTRO-INTESTINAL TRACT. N. M. Okulov (Central Research Inst. of Roentgen-Radiology). Med. Radiol. 1, No. 5, 41-4(1956). (In Russian). NSA 11-2800

8095

THE EFFECTS OF X- AND γ -RADIATION ON NUCLEIC ACID METABOLISM IN THE RAT IN VIVO AND IN VITRO. Margery G. Ord and L. A. Stocken (Univ. of Oxford, England). Biochem. J. (London) 63, 3-8(1956). NSA 10-9044

8096

HEART DAMAGE DUE TO ROENTGEN IRRADIATION. G. W. Parade. Med. Klin. (Munich). 31, 1396-97(1935). (In German).

8097

ATOMIC ENERGY IN ITS REPERCUSSIONS ON LIFE AND HEALTH. (Papers from A Scientific Conference Held at National Museum of Natural History, France July 1-2, 1955). Paris, L'Expansion Editeur, 1956. 254p. 1,000 frames. (In French).

Topics: equipment, explosions, radioactive ash, active particles, evolution, radioactivity in air, rain, and clouds, meteorological and biological effects, medical problems, cataracts, aquatic life, β rays, human heredity, protection, aerosols and radioactive gases, and therapy for radiolesions. NSA 11-3310

8098

Hanford Atomic Products Operation, Richland, Wash. RADIOLOGICAL SCIENCES DEPARTMENT RESEARCH

AND DEVELOPMENT ACTIVITY QUARTERLY PROGRESS REPORT FOR JANUARY-MARCH 1955. H. M. Parker. Apr. 10, 1955. Decl. with deletions Dec. 7, 1955. 28p. Contract W-31-109-Eng-52. (HW-36301(Del.)).

Includes reports on: toxicity of I^{131} ; Ru^{103} ; curare and hyaluronidase for immobilization, data on Pu absorption; fission products metabolism; P^{32} ; $Ru^{103}O_x$ to mice; plant uptake of Str^{90} and Ba^{140} , β particles on yeast, monitoring of rodents and waterfowl; ion exchange; determination of P^{32} in reactor and thorium from urine; and shields and pollution. NSA 11-2242

8099

General Electric Co. Hanford Atomic Products Operation, Richland, Wash. RADIOLOGICAL SCIENCES DEPARTMENT RESEARCH AND DEVELOPMENT ACTIVITIES. QUARTERLY PROGRESS REPORT APRIL-JUNE, 1955. H. M. Parker. 1955. Decl. Dec. 6, 1955. 31p. Contract W-31-109-Eng-52. (HW-38198).

Includes reports on: radiobiological-ecological survey of the Columbia River; effect of β rays from Ru^{106} plaques placed on skin of swine and rabbits; distribution of Pu after intragastric administration and cutaneous absorption of Pu in swine; permissible concentrations of Ru in rats; tritium absorption and metabolism; radioisotope build-up in rats; uptake of fission products in plants. NSA 10-3409

8100

General Electric Co. Hanford Atomic Products Operation, Richland, Wash. RADIOLOGICAL SCIENCES DEPARTMENT RESEARCH AND DEVELOPMENT ACTIVITIES QUARTERLY PROGRESS REPORT FOR OCTOBER-DECEMBER 1955. H. M. Parker. Jan. 11, 1956. Decl. with deletions Feb. 26, 1957. 33p. Contract W-31-109-Eng-52. (HW-41026(Del.)). NSA 11-8257

8101

PRODUCTION OF TUMOROUS ABNORMALITIES IN FERN PROTHALLI BY IONIZING RADIATIONS. Carl R. Partanen and Taylor A. Steeves (Harvard Univ., Cambridge, Mass.). Proc. Natl. Acad. Sci. (U. S.). 42, 906-9(1956).

Spontaneous tumorous abnormalities occur rarely in aseptic in vitro cultures of the prothalli of *P. aquilinum*. By treating either ungerminated spores or young prothalli with either x ray or γ radiation, tumors can be produced in quantity. With further refinement of the quantification of this technique, it promises to become valuable for investigating problems of tumor induction. NSA 11-3288

8102

CELLULAR ASPECTS OF BASIC MECHANISMS IN RADIOBIOLOGY. Harvey M. Patt and E. L. Powers, eds. Washington, National Academy of Sciences-National Research Council, 1956, 196p. NSA 11-5170

8103

EFFECTS OF PAIRED DOSES OF WHOLE BODY IRRADIATION IN THE RHESUS MONKEY. Edith Patterson, C. W. Gilbert, and Mary V. Haigh. Brit. J. Radiol. 29, 218-26(1956).

Authors studied effect of paired doses, separated by seven or 20 days, on LD_{50} in irradiated rhesus monkeys. Radiation dose given to paired dose was greater than single doses. Observations on time required for half recovery; clinical symptoms, and hematological effects are described. Relative importance of various clinical symptoms as prognostic signs are evaluated. NSA 10-7409

8104

THE INFLUENCE ON TISSUE RESPIRATION OF X RADIATION. Helmut Pauly and Boris Rajewsky. Strahlentherapie 99, 383-6(1956). (In German).

The authors report on their researches on organs of mice (liver, renal cortex, spleen) to determine the dependence of tissue respiration on the applied x-ray dose. The results of the experiments have shown that only after doses ranging about 100,000 r the tissue respiration decreases perceptibly. The dose effect curves are clearly described by means of a formula gained through considerations of hit-theoretical and reaction-kinetic character. NSA 10-9067

8105
β-GLUCURONIDASE ACTIVITY IN LYMPHATIC TISSUES OF THE RAT AFTER X-RAY IRRADIATION OF THE WHOLE BODY. C. Pellegrino and G. Villani (Univ of Pisa, Italy). *Biochem J.* (London) 65, 599-603 (1957). NSA 11-5717

8106
FACTORS INFLUENCING DIURESIS IN RATS FOLLOWING TOTAL-BODY X-IRRADIATION. E. Irene Pentz and Robert J. Hasterlik (Univ. of Chicago, Ill.). *Am. J. Physiol.* 189, 11-14 (1957).

Immediate diuresis was observed in rats exposed to total body x ray doses ranging between 100 and 400 r. Highest dosage produced more consistent results. X-ray was used in conjunction with extirpation of various glands and other organs to determine mechanism that responds so promptly to x irradiation. Anterior pituitary and adrenal cortex are particularly important. Removal of anterior lobe of pituitary or removal of adrenal glands was sufficient to inhibit diuresis following 400 r x irradiation. This diuretic response was not dependent on presence of posterior pituitary since animals having only this gland removed showed diuresis following exposure to 400 r. This suggests that release of antidiuretic substances from tissues other than posterior pituitary, under control of anterior pituitary-adrenal cortex. NSA 11-8767

8107
Utah. Univ., Salt Lake City Coll. of Medicine.
SUSCEPTIBILITY TO ORAL INFECTION IN MICE AS A FUNCTION OF POSTIRRADIATION TIME. Eugene H. Perkins, David M. Donaldson, and Stanley Marcus. 1955. 9p. (AF-SAM-56-51).

Total-body irradiation resulted in increased susceptibility to infections on first, third, fourth, and fifth postirradiation days. No difference in mortality was observed if mice were challenged at later dates or 1, 2, or 3 days prior to irradiations. Increased susceptibility to infection via the oral route depends on damage to the gastrointestinal tract in conjunction with depression of cellular and humoral defenses which develop later. NSA 11-47

8108
Utah. Univ., Salt Lake City. Coll. of Medicine.
EFFECT OF X-RADIATION ON SUSCEPTIBILITY TO INFECTION FOLLOWING ORAL CHALLENGE IN IMMUNIZED AND NONIMMUNIZED MICE. Eugene H. Perkins and Stanley Marcus. Sept. 20, 1956. 7p. (AF-SAM-57-47). NSA 11-7909

8109
Chicago. Univ. Air Force Radiation Lab.
BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION. MODIFICATION OF THE RADIATION-INDUCED INCREASES IN PHOSPHATASE ACTIVITY OF HEMATOPOIETIC TISSUES BY CHEMICAL AGENTS. Donald F. Petersen and Kenneth P. DuBois. (1955). 8p. (AF-SAM-55-61).

Experiments with p-aminopropiophenone, cysteine, and mercaptoethylamine showed that pretreatment with these agents reduced the increase in phosphatase activity observed in the spleens and thymuses of irradiated rats. Protective capacity of each compound against x-ray

mortality coincided with its ability to diminish phosphatase activity of hematopoietic tissues. These agents modify damage to the hematopoietic tissues. NSA 10-6489

8110
PATHOPHYSIOLOGICAL REACTIONS IN ACUTE RADIATION SICKNESS. I. R. Petrov and V. K. Kulagin. *Med. Radiol.* 2, No. 2, 3-12 (1957). (In Russian).

A literature review with 38 references. NSA 11-7077

8111
CHANGES IN ANTIGENIC PROPERTIES OF TISSUES OF WHITE RATS IN RADIATION SICKNESS. R. B. Petrov and L. I. Ilyina. *Bull. Exptl. Biol. Med.* (U.S.S.R.) 41, 345-8 (1956).

The authors assume that change in antigenicity of nuclear and cytoplasmic fractions of cells from the liver and jejunal mucosa of rats 3-5 days after whole-body exposure to an x ray dose of 800 r represent altered protein synthesis ("fewer antigenic determinants") by these tissues. The criterion of altered antigenicity: ability of the preparations to desensitize guinea pigs previously hypersensitized to similar extracts from non-irradiated rats. NSA 11-6621

8112
ENHANCEMENT OF PROTECTIVE PROPERTIES OF ANTITETANUS SERUM AFTER ITS IRRADIATION WITH X-RAYS. R. V. Petrov. *Bull. Exptl. Biol. Med.* (U.S.S.R.) 41, 425-7 (1956). NSA 11-6604

8113
SENSITIVITY OF IRRADIATED ANIMALS TO THE PATHOGENIC ANAEROBES AND EFFECTIVENESS OF SULFUR PROPHYLAXIS ON THE ANAEROBIC INFECTIONS DURING RADIATION INJURIES. R. V. Petrov. *Med. Radiol.* 2, No. 2, 60-5 (1957). (In Russian). NSA 11-7913

8114
ON THE CHANGES OF BLOOD PLATELETS DURING AN ACUTE RADIATION SICKNESS. A. S. Petrova. *Med. Radiol.* 1, No. 4, 52-6 (1956). (In Russian).

Rabbits were x-irradiated with 800 or 1500 r, and the number of thrombocytes, the thrombocyte formula, thrombocyte surface area, blood, coagulation time, clot retraction time and amount of prothrombin were determined. In both groups the number of thrombocytes decreased within 3 hours after irradiation and young forms decreased. The decrease in young forms was 92 per cent in the 1st group by the 8-1- day and 100 percent in the 2nd group by the 7th day. In 10-15 days, the average thrombocyte surface area increased 22-49 per cent. Coagulation time increased and the clot retraction time and prothrombin level were decreased beginning on the first day post exposure. NSA 11-888

8115
PHYSIOLOGY AND TOXICOLOGY OF TRITIUM IN MAN. Ernest A. Pinson and Wright H. Langham (Los Alamos Scientific Lab., N. Mex.). *J. Appl. Physiol.* 10, 108-26 (1957).

Using tritium water as a tracer in man, H₂O absorption through G. I. tract was found to begin min. after ingestion and to be complete in 40-45 min. Vol. of H₂O transferred from intestine to blood increased linearly with time and was proportional to vol. of H₂O ingested, within range of 10-1000 ml. On exposure to HTO vapor, via inhalation, man absorbed through respiratory system 98-99% of activity inspired. Activity in venous blood increased sharply and shortly after inhalation exposure; then declined exponentially to reach equilibrium with a 1/2 time of about 12 mins. Average dilution vol. was 62.6% and biological half-time of tritium in body H₂O averaged 11.5 days. In man exposed to atmosphere containing HTO, the HTO entering body through lungs. Both man and rat slowly oxidized inspired HT to HTO. Radiation hazard from exchange of

tritium with H₂ in tissues after chronic or acute exposure to HTO was small. Based on human data, maximum permissible body burden of tritium is 3.7 mc; maximum permissible concentrations of tritium oxide in air and H₂O for continuous 24 hr. exposure estimated to be 5×10^{-6} $\mu\text{c}/\text{ml}$ and 0.1 $\mu\text{c}/\text{ml}$. NSA 11-6226

8116

PATHOMORPHOLOGICAL CHANGES IN ANIMALS POISONED BY RADON INHALATION. A. A. Pinus. Med. Radiol. 2, 55-63(1957). (In Russian)

Radon and radon daughters were administered by various routes to dogs, rabbits and rats. The daughter products had a half life of 1-1.5 yr. Animals survived for periods of 110 days - 20 months. All showed marked weight loss (emaciation), hemolysis, with associated hemosiderosis and erythrophagocytosis, chronic nephrosis, hyaline degeneration of vascular walls, swelling of argyrophillic fibres in walls of viscera and testicular atrophy. Rats developed osteogenic sarcoma and also showed relatively high concentrations of radioactivity in liver and kidneys. NSA 11-5725

8117

EFFECT OF X-RAYS ON PARTIALLY SHIELDED LENS OF THE RABBIT. Antoinette Pirie and P. Howard Flanders. Arch. Ophthalmol. (Chicago) 57, 849-54(1957). NSA 11-8769

8118

THE RELATION OF POPULATION HETEROGENEITY TO THE PLATEAU PHENOMENON IN RADIATION DOSE-RESPONSE CURVES. David D. Pittman (Southern Illinois, Carbondale). J. Bacteriol. 71, 500-1(1956). NSA 10-9960

8119

CARCINOGENIC EFFECTS OF IONIZING RADIATION. M. N. Pobedinski. Med. Radiol. 1, No. 5, 30-40(1956). (In Russian). NSA 11-2786

8120

EFFECT OF RADIATION FROM A COBALT ISOTOPE ON THE QUALITY OF THE ROOTS OF THE SUGAR BEET. F. M. Polishchuk. Translated from Sakhamaya Prom. 30, 54-5(1956) 5p. (AEC-tr-2844). NSA 11-6193

8121

CHOLINESTERASE ACTIVITY OF BLOOD AND TISSUE IN ANIMALS EXPOSED TO THE LETHAL AND SUBLETHAL DOSES OF IONIZING IRRADIATION. N. E. Ponomarenko (Leningrad Inst. of Roentgen-Radiology). Med. Radiol. 1, No. 5, 13-16(1956). (In Russian).

Doses of 500 r and 1000 r of x rays altered the cholinesterase activity in liver, spleen, kidneys, lungs, muscles and suprarenals of dogs. The changes had a wave-like character during the first two weeks post-exposure. NSA 11-3281

8122

EXPERIMENTS ON THE X-RAY BACTERICIDES. M. Ponzio (Institut de Radiologie de l'Universite de Turin, Italy). J. belge radiol. 39, No. 4, 583-97(1956). (In French). NSA 11-33

8123

CHANGES IN NERVOUS REFLEXES IN TOTAL BODY X RADIATION. N. K. Popavsku (Central Research Inst. of Roentgen-Radiology). Med. Radiol. 1 No. 5, 10-13 (1956). (In Russian). NSA 11-2783

8124

EXPERIMENTAL INVESTIGATIONS ON CATARACT FORMATION FOLLOWING WHOLE-BODY ROENTGEN IRRADIATION. Erik Poppe. Acta Radiol. 47, 138-48 (1957).

The effect of total body roentgen irradiation was studied in 16 rabbits over periods of 3 1/2 to 24 mos. following x ray doses from 200 to 800 r. The epithelium

of the crystalline lens is highly radiosensitive. Lens opacities that occurred post-irradiation were identical with those observed after local irradiation of eye. After small cataract-producing doses, lens opacities may be the only remaining sign of injury. NSA 11-5139

8125

THE EFFECTS OF PHYSICAL AGENTS ON BACTERIAS. J. R. Porter. Bacterial Chemistry and Physiology New York John Wiley and Sons, Inc. Chap. 3, 144-223(1946) (x-rays 160-4).

8126

Michigan Univ., Ann Arbor.

STUDY OF THE BIOLOGICAL EFFECTS OF IRRADIATION. PROGRESS REPORT FOR THE PERIOD OF JANUARY 16, 1955 TO JANUARY 15, 1956. Richard L. Potter, Frank H. Bethell, David F. Behr, H. Owen France, Henry J. Gomberg, Sylvester E. Gould, James W. Lineman, and John B. Villella. 173p. Contract AT(11-1)-75. (AECU-3152).

Includes reports on: rats protected by lead shields, erythropoietic stimulating factor isolated from anemic rabbit plasma; effects of radiation on eggs of *Ascaris lumbricoides* and *Hymenolepis*, studies on unstable serum factors which may have a role in radiation growth and metabolism changes in rats. NSA 11-830

8127

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUGUST 8-20, 1955. VOLUME II. BIOLOGICAL EFFECTS OF RADIATION. New York, United Nations, 1956. 402p.

The individual papers are abstracted separately. NSA 11-44

8128

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUGUST 8-20, 1955. VOLUME 13. LEGAL, ADMINISTRATIVE, HEALTH AND SAFETY ASPECTS OF LARGE-SCALE USE OF NUCLEAR ENERGY. New York, United Nations, 1956. 393p.

The individual papers are abstracted separately. NSA 11-56

8129

Massachusetts Inst. of Tech., Cambridge
DEVELOPMENT OF A METHOD OF RADIATION STERILIZATION OF FOODS WITHOUT ADVERSE FLAVOR AND CHEMICAL CHANGES. PROGRESS REPORT NO. 5 (FOR) DECEMBER 1, 1954-MARCH 31, 1955. B. E. Proctor. 44p. Project No. 7-84-01-002. Contract DA-44-109-qm-1746. (AD-93752). NSA 11-829

8130

Massachusetts Inst. of Tech., Cambridge.
DEVELOPMENT OF A METHOD OF RADIATION STERILIZATION OF FOODS WITHOUT ADVERSE FLAVOR AND CHEMICAL CHANGES. TERMINATION REPORT NO. 8 (FOR) APRIL 1, 1954-AUGUST 31, 1955. B. E. Proctor. 109p. Project No. 7-84-01-002. Contract DA-44-109-qm-1746. (PB-121305).

Various methods of food processing prior to irradiation were tested as a means of preventing flavor changes. With some foods some treatment were effective at a particular dose level and with other foods none, were effective at the sterilizing dose level. No processing treatment was universally outstanding. Pre-cooking prior to irradiation was not beneficial. Data are tabulated. NSA 10-9916

8131

"EFFECT OF X-RAY IRRADIATION ON THE BACTERIAL COUNT OF GROUND MEAT." RESEARCH REPORTS ON QUARTERMASTER CONTRACT PROJECTS FROM

JULY 1, 1942 TO JUNE 30, 1943. B. E. Proctor and H. Tram. *Food Tech. Laboratories, M.I.T.*, 217.

8132
ALTERATIONS IN ADENOSINE TRIPHOSPHATASE ACTIVITY DURING ACUTE AND SUBACUTE RADIATION SICKNESS. E. A. Prokudina. (Central Research Inst. of Roentgen-Radiology). *Med. Radiol.* 1, No. 6, 46-51 (1956). (In Russian)

Adenosinetriphosphatase (ATP-ase) activity was estimated in liver, kidney, brain, spleen, thymus, lymph nodes and testes of mice and rats after whole body exposure to an x ray dose of 1000 r or 3000 r. Only the lymphatic tissues and testes showed a change in the enzyme activity (marked increase) after irradiation. By means of spleen shielding and irradiating only the spleen, the ATPase activity and morphological changes were shown to be due to a direct radiation effect on that organ due either to increased release of the enzyme from the cells or to an alteration of the enzyme per sec. NSA 11-3671

8133
PHYSICAL METHODS OF STERILIZATION OF MICRO-ORGANISMS. O. Rahn. *Bacteriol. Rev.* 9, 1-48(1945).

8134
EFFECT OF BONE MARROW TREATMENT ON MORTALITY OF MICE IRRADIATED WITH FAST NEUTRONS. M. L. Randolph, C. C. Congdon, Irene S. Urso, and D. L. Parrish (Oak Ridge National Lab., Tenn.). *Science* 125, 1083-4(1957). NSA 11-7074

8135
C¹⁴-FORMATE METABOLISM BY ISOLATED TISSUES FROM X-IRRADIATED RATS. D. A. Rappoport, R. A. Seibert, and V. P. Collins (Baylor Univ. Coll. of Medicine, Houston, Texas. *Radiation Research* 6, 148-52 (1957).

Minced testis, kidney, liver and spleen and sections of intestine from rats treated (total body) with 5000 r x rays were incubated with C¹⁴ formate 17 hrs. post-radiation. Results were as follows: in spleen, formate incorporation was decreased in all cell components tested; in liver, formate metabolism was enhanced, in testes and intestine, there was no significant change, in kidney, formate utilization was changed only in lipid fraction. NSA 11-5183

8136
BONE METABOLISM. II. TOXICITY AND METABOLISM OF RADIOACTIVE STRONTIUM (Sr⁹⁰) IN RATS. Robert D. Ray, Duncan M. Thomson, Norville K. Wolff, and Duana LaViolette (Univ. of Washington School of Medicine, Seattle). *J. Bone and Joint Surg.* 38A, 160-74(1956). NSA 10-7413

8137
ENDOCRINE INFLUENCES UPON THE UPTAKE OF COLLOIDAL THORIUM BY RETICULO-ENDOTHELIAL ORGANS. Sherwood M. Reichard, Abraham Edelmann, and Albert S. Gordon (New York Univ., N. Y. and Brookhaven National Lab., Upton, N. Y.). *Res. Bull.* 34-9(1956). NSA 11-5713

8138
EFFECT OF POSTIRRADIATION SURGICAL STRESS, ANESTHESIA, AND SPLEEN TRANSPLANTATION ON SURVIVAL OF MICE. Salvatore R. Restivo and Roy B. Mefferd, Jr. (Univ. of Texas, Austin). *Radiation Research* 6, 153-66(1957). NSA 11-5161

8139
INFLUENCE OF GAMMA IRRADIATION ON THE BREEDING AFFINITIES OF *LOLIUM PERENNE* AND *FEATUCA PRATENSIS*. J. D. H. Reusch (Univ. Coll. of Wales, Aberystwyth). *Nature* 178, 929-30(1956).

Results are reported from an investigation into the nature of the differentiation and the barriers to success-

ful hybridization between *L. perenne* and *F. pratensis*. Results are tabulated on the effect of pollen irradiation at various dose levels of γ radiation on seedset and germination in crosses between the two plants. NSA 11-855

8140
LENS CHANGES FOLLOWING X-IRRADIATION: OF SINGLE AND MULTIPLE QUADRANTS. R. D. Richards, E. F. Riley, and P. J. Leinfelder. *Am. J. Ophthalmol.* 42, No. 4, 44-51(1956). NSA 11-4229

8141
THE EFFECT OF X-RADIATION *IN VIVO* ON PROTEIN AND NUCLEOPROTEIN METABOLISM IN THE RAT. J. E. Richmond, Margery G. Ord, and L. A. Stocken (Univ. of Oxford). *Biochem. J.* (London) 66, 123-7(1957).

Authors studied incorporation of labeled glycine, lysine and phosphate into rat tissues 2 hours after 1000 r of x radiation. Uptake of P³² and 2-C¹⁴ glycine by rat thymus DNA was reduced by x radiation. Incorporation of glycine and lysine into thymus nucleoproteins was decreased, but uptake into liver nucleoproteins was not affected. Incorporation into cytoplasmic proteins of thymus, liver and pancreas was unaffected or slightly increased. The difference in the radiosensitivity of liver and thymus is discussed. Observations on blood and bone marrow proteins are also reported. NSA 11-7052

8142
EFFECT OF ROENTGEN RAYS ON BACTERIA. H. Rieder. *Med. Wochschr.* 45, 101-4(1898).

8143
EFFECT OF ROENTGEN RAYS ON BACTERIA AND ON THE HUMAN SKIN. H. Rieder. *Med. Wochschr.* 45, 773-4(1898). (In German).

The bacteriostatic effects of x rays is compared with that of visible light and U. V.

8144
BACTERICIDAL EFFECT OF ROENTGEN RAYS. H. Rieder. *Med. Wochschr.* 49, 402-10(1902). (In German).

8145
RADIATION-INDUCED ALTERATION OF FIBRINOGEN CLOTTING RATE AND CLOT LABILITY. Peter Rieser. (Univ. of Pennsylvania, Philadelphia and Marine Biological Lab., Woods Hole, Mass.). *Proc. Soc. Exptl. Biol. Med.* 91, 654-7(1956).

Purified bovine fibrinogen was exposed to single x ray doses in ranges of 25-100 r and 100-500 r. In each case the log of the thrombin clotting time increased linearly with increasing dose. Clotting delay due to irradiation was dependent on thrombin concentration but independent of fibrinogen concentration. Addition of sulfhydryl reagents prior to exposure failed to abolish radiation induced clotting defect. Irradiation of fibrinogen increased the rate of solution of fibrin clots in concentrated urea. NSA 10-9063

8146
ON THE NATURE OF THE CLOTTING DEFECT IN IRRADIATED FIBRINOGEN. P. Rieser and R. J. Rutman (Univ. of Pennsylvania, Philadelphia). *Arch. Biochem. Biophys.* 66, 247-9(1957).

Irradiation altered fibrinogen so that its reactivity with thrombin, but not its clot forming ability, was reduced. There was a pronounced effect on release of fibrinopeptide from irradiated fibrinogen. NSA 11-4839

8147
MALFORMATION OF THE ADULT BRAIN (ALBINO RAT) RESULTING FROM PRENATAL IRRADIATION. Helena E. Riggs, John J. McGrath, and Henry P. Schwars (Philadelphia General Hospital, Penna.). *J. Neuropathol. Exptl. Neurol.* 15, 432-47(1956). NSA 11-1742

8148

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF FAST-NEUTRON AND X-RADIATION. SURVIVAL AND CATARACT STUDIES OF SWINE MICE. E. P. Riley, T. C. Evans, R. B. Rhody, P. J. Leinfelder, and R. D. Richards (State Univ. of Iowa, Iowa City). *Radiology* 67, 673-85(1956). NSA 11-870

8149

THE EFFECT OF ROENTGEN-RAY QUALITY ON BONE GROWTH AND CORTICAL BONE DAMAGE. Leonard Rosenthal and James F. Marvin (Univ. of Minnesota Hospitals, Minneapolis). *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 77, 893-8(1957). NSA 11-6601

8150

Argonne National Lab., Lemont, Ill.
THERAPY OF RADIOELEMENT POISONING. TRANSCRIPTION OF A MEETING ON EXPERIMENTAL AND CLINICAL APPROACHES TO THE TREATMENT OF POISONING BY RADIOACTIVE SUBSTANCES, HELD OCTOBER 20 AND 21, 1955. Marcia White Rosenthal, ed. 1956. 181p. Contract W-31-109-eng-38. (ANL-5584).

Includes data on: absorption, tissue distribution and excretion of Am^{241} , Am^{242} , Ca^{45} , Cu^{64} , La^{140} , P^{32} , Pu , Sr^{85} , Sr^{90} , Th^{227} , Y^{90} and other radioactive materials. NSA 11-893

8151

KINETICS OF BODY DISTRIBUTION OF PLUTONIUM AS INFLUENCED BY ZIRCONIUM. Marcia White Rosenthal, and Jack Schubert (Argonne National Lab., Lemont, Ill.). *Radiation Research* 6, 349-54(1957). NSA 11-5754

8152

THE INFLUENCE OF X-RAYS ON VITAMIN FREE FOODS. F. Rost and W. Dieterich. *Strahlentherapie* 29(1), 152-60(1928).

Rats fed previously-heated and ultraviolet-irradiated fat gained weight. Those weakened through vitamin-free diet showed some recovery when fed with soft x-irradiated bacon, less when fed with hard x irradiated bacon.

BA 6-15813

8153

THE EFFECT OF MASSIVE DOSES OF NEUTRONS ON THE MEDIAN SURVIVAL TIME OF MICE. Samuel M. Rothermel, Kent T. Woodward, and John B. Storer (Los Alamos Scientific Lab., N. Mex.). *Radiation Research* 5, 433-40(1956). NSA 11-864

8154

PROTECTIVE EFFECT OF PRE-IRRADIATION ON LYMPHOCYTIC CHORIOMENINGITIS INFECTION IN MICE. Wallace P. Rowe (Naval Medical Research Inst., Bethesda, Md.). *Proc. Soc. Exptl. Biol. Med.* 92, 194-8(1956).

300 r total body x irradiation given to adult mice 1-4 days prior to intracerebral or intraperitoneal infection with virus LCM, produced marked increase in survival and diminution in objective evidence of the infection. Growth curve of virus after intracerebral inoculation was identical in irradiated and non-irradiated groups. After intraperitoneal infection with a viscerotropic strain there appeared to be a slightly lower virus titer in pooled organs of irradiated as compared with non-irradiated mice. NSA 10-9940

8155

RADIOACTIVE GOLD IN THE SUBARACHNOID SPACE OF THE DOG. Sidney Rubinfeld and Bertram E. Zeitel. *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 76, 367-71(1956).

Inconclusive results were obtained in this experimental trial of injecting 6.6 mc of Au^{198} into the subarachnoid space of a dog in order to learn whether the isotope could be used in place of x ray therapy in the treatment of medulloblastoma. NSA 10-9933

8156

EFFECT OF RADIATION ON DNA SYNTHESIS IN MAMMALIAN CELLS. L. S. Kelly. *Prog. Biophys. Chem.* 8, 143-163(1957).

Irradiation with doses of the order of 100-5000 r depresses the rate of incorporation of precursors into DNA of most mammalian tissues. Inhibition of DNA synthesis appeared to reflect changes in cell populations rather than specific aberrations in synthesis. Ascites tumor maintained normal DNA synthesis for a considerable time after radiation. Radiation may abolish mitosis without producing a discernable effect on DNA synthesis and it is suggested that radiation-induced mitotic delay may be due to some radiosensitive process that is independent of DNA synthesis. On the other hand, mitotic inhibition could influence DNA synthesis by preventing cells from entering the synthetic phase of the cell cycle. Biochemical changes are difficult to interpret in tissues composed of mixed cell populations. Tissues studied: spleen and thymus (rat), liver, regenerating liver, solid tumors (mice.)

8157

STUDIES ON THE INFLUENCE OF ROENTGEN RAYS ON MICROORGANISMS. Dr. Viktor K. Rufs. *Arch Hyg.*, 341-360(1956).

8158

EFFECT OF SUCKLING YOUNG OF X-IRRADIATION OF LACTATING MOTHER. Robert Rugh (Radiological Research Lab., Columbia, Univ.). *Proc. Soc. Exp. Biol. Med.* 93, 523-4(1956).

Increasing x irradiation of nursing female mouse caused increasing retardation of growth of suckling young. Some effect was detected after 50 r exposure of mother on 3rd day post-parturition; a pronounced effect following 200 r or more. There was no evidence of toxic substance passing through milk to the young. Effect is attributed to simple starvation caused by general debilitation of the irradiated mother. Newborn mice starved by x-irradiated mother recover rapidly if given to normal lactating mother 15 days post parturition and by 30 days will be equal controls in body weight. NSA 11-2787

8159

RELATIVE VALUE OF CYSTEAMINE AND CYSTAMINE AS RADIOPROTECTIVE AGENTS FOR FETAL AND ADULT MICE. Robert Rugh (Columbia Univ., New York. *Am. J. Physiol.* 189, 31-5(1957). NSA 11-8796

8160

RELATION OF GONAD HORMONES TO X-IRRADIATIONS SENSITIVITY IN MICE. Robert Rugh and Joan Wolff (Columbia Univ., New York). *Proc. Soc. Exptl. Biol. Med.* 92, 408-10(1956).

Differential in survival of male and female mice, were exposed to whole body x irradiation (625 r) seems to be due in part to gonadal hormones. Intact males with normal testosterone levels have lower survival value than castrate males. Castrate males injected with the female hormone, estradiol benzoate, showed maximum survival approaching that of the intact female. NSA 10-9944

8161

IMPLANTATION OF NORMAL BLOOD-FORMING TISSUE IN RADIATED GENETICALLY ANEMIC HOSTS. Elizabeth S. Russell, Lois Jean Smith, and Fay A. Lawson (Roscoe B. Jackson Memorial Lab., Bar Harbor, Maine). *Science* 124, 1076-7(1956). NSA 11-885

8162

EFFECTS OF LOW DOSES OF X-RAYS ON EMBRYONIC DEVELOPMENT IN THE MOUSE. Liane Brauch Russell, (Oak Ridge National Lab., Tenn.). *Proc. Soc. Exptl. Biol. Med.* 95, 174-8(1957). NSA 11-7917

8163

X-RAY INDUCED DEVELOPMENTAL ABNORMALITIES

IN THE MOUSE AND THEIR USE IN THE ANALYSIS OF EMBRYOLOGICAL PATTERNS. II. ABNORMALITIES OF THE VERTEBRAL COLUMN AND THORAX. Liane Brauch Russell (Oak Ridge National Lab., Tenn.). J. Exptl. Zool. 131, Part 3, 329-95(1956).

Abnormalities in the vertebral column and thorax of newborn mice are described, they were produced by x irradiation during embryonic development. NSA 10-9928

8164
RADIATION-INDUCED PRESUMED SOMATIC MUTATIONS IN THE HOUSE MOUSE. Liane Brauch Russell and Mary H. Major (Oak Ridge National Lab., Tenn.). Genetics 42, 161-75(1957). NSA 11-8774

8165
THE SENSITIVITY OF DIFFERENT STAGES IN OOGENESIS TO THE RADIATION INDUCTION OF DOMINANT LETHALS AND OTHER CHANGES IN THE MOUSE. p. 187-95 of INTERNATIONAL CONFERENCE ON RADIOBIOLOGY. FOURTH, CAMBRIDGE, ENGLAND, AUGUST 1955. PROGRESS IN RADIOBIOLOGY. F. J. Mitchell, B. E. Holmes, and C. L. Smith, eds. Charles C. Thomas, Publishers, Springfield, Ill. 1956. 557p. NSA 11-5157

8166
COMPARISON OF X-RAY INDUCED MUTATION RATES IN DROSOPHILA AND MICE. W. L. Russell (Oak Ridge National Lab., Tenn.). Am. Naturalist 90, 69-80(1955). NSA 10-7403

8167
SHORTENING OF LIFE IN THE OFFSPRING OF MALE MICE EXPOSED TO NEUTRON RADIATION FROM AN ATOMIC BOMB. W. L. Russell (Oak Ridge National Lab., Tenn.). Proc. Natl. Acad. Sci. U. S. 43, 324-9 (1957). NSA 11-6205

8168
EFFECTS OF TOTAL BODY X-IRRADIATION AND PLUTONIUM INJECTION ON THE CHOLINESTERASE OF ERYTHROCYTES AND BRAIN. Jean C. Sabine (Los Alamos Scientific Lab., N. Mex.). Am. J. Physiol. 187, 275-9(1956).

Both total body x-irradiation (25 to 300 r) and injected plutonium ($0.63 \mu\text{C Pu}^{+6}$) produce an increase in the cholinesterase activity of erythrocytes of mice on the 4th day. In mice receiving 300 r, high values were found on the 3rd-5th days. Subsequently there was a sharp fall in this titer to values far below normal at the end of the 1st week. During the 2nd week recovery began and was apparently complete by the end of the 3rd week. The reticulocyte count was significantly depressed during the 1st week, and there was a small but significant reticulocytosis during the 3rd. In the plutonium-injected mice, the same early peak was observed and the same fall to values well below normal. There was no recovery during 63 days of observation. Data are presented for the 4th day following doses of x-rays from 15-300 r. From 25 r upwards there is a significant increase in the mean cholinesterase titer. There appears to be a relationship between the proportion of high individual titers and the dose, and the highest individual values were observed at 300 r. Data are presented on a large series of control mice, and these are shown to conform well to the normal distribution as evaluated by k-statistics. NSA 11-1727

8169
INACTIVATION OF CHOLINESTERASE BY GAMMA RADIATION. Jean C. Sabine. Am. J. Physiol. 187, 280-2(1956).

In vivo exposure to 60,000 r of γ radiation caused no change in cholinesterase activity or activity-pS kinetics of brains of rats sacrificed while having violent convulsions and diarrhea postexposure. In vitro studies revealed (1) no change in cholinesterase titer in whole

human plasma after 100,000 r of 1 mev x rays, (2) inactivation of dilute solution of the enzyme in M/15 phosphate buffer by 10,000-100,000 r doses in "single hit" phenomenon. Results of in vitro studies considered not to be directly related to cholinergic response seen in irradiated intact animals. NSA 11-1728

8170
A SIGN OF SEVERE RADIATION INJURY OBSERVED IN THE ERYTHROCYTE SEDIMENTATION OF DOGS. George A. Sacher (Argonne National Lab., Lemont, Ill.). Blood 11, 174-83(1956).

The erythrocyte sedimentation curves obtained from dogs exposed to x radiation or injected with radiostrontium or Pu were found to differ following exposure to lethal and sub-lethal dosages. NSA 10-7408

8171
HISTOLOGICAL AND HISTOCHEMICAL CHANGES IN GAMMA-IRRADIATED LIMA BEANS, PHASEOLUS LUNATUS. D. K. Salunkhe (Utah State Agricultural Coll., Logan). Nature 179, 585-6(1957). NSA 11-5727

8172
STIMULATION BY CHRONIC GAMMA IRRADIATION OF THE SPONTANEOUS RATES OF HERITABLE SOMATIC INSTABILITIES IN A CLONE OF NICOTIANA. S. A. Sand, H. H. Smith and A. H. Sparrow. Genetics 39, 991-92(1954).

8173
ON THE TOXICOLOGY OF RADIOACTIVE MATERIALS. V. A. Sanotskii. Med. Radiol. 2, 28-36(1957). (In Russian). NSA 11-5723

8174
THE RADIOSENSITIVITY OF SEEDS OF DIFFERENT ONTOGENETIC DEVELOPEMENT. I. THE EFFECTS OF X-IRRADIATION ON OAT SEEDS OF DIFFERENT PHASES OF ONTOGENETIC DEVELOPEMENT. Mlode R. Saric (Institute for Plant Breeding and Plant Production. Zemun-Polje, Yugoslavia). Radiation Research 6, 167-72(1957).

One month after planting, plants grown from seeds irradiated, in various stages of ontogenetic development, with 2500 r, 5000 r, 10,000 r or 20,000 r were studied. Development at time of irradiation definitely influenced response to irradiation. Stimulation was observed following 2500 r dose, larger doses retarded growth and had greater effect on younger ontogenetic stages. The most prominent effect was reduction of primary root development. Other changes noted in plant height, number leaves and weight of plants. NSA 11-5162

8175
THE INFLUENCE OF HISTOLOGICAL STRUCTURE ON THE RADIOSENSITIVITY OF TUMORS, A SYMPOSIUM. I. THE HISTOLOGICAL ASPECTS OF TUMOUR RADIOSENSITIVITY. R. W. Scharff and P. S. Andrews (Middlesex Hospital, London). Brit. J. Radiol. 29, 478-82(1956).

Radiosensitivity of tumors is reviewed with respect to histological type and structure, initial response and ultimate result, the tumor bed and factors affecting it, and the nature of radioresistance. Authors stress the need for further research into behavior of different types of tumors before exact correlation of histological appearances with radiosensitivity is possible. NSA 11-25

8176
EFFECT OF TOTAL BODY X-IRRADIATION ON THE PARAKEET. Hans G. Schlumberger and Ulrich K. Henschke (Ohio State Univ. Coll. of Medicine, Columbus). Proc. Soc. Exptl. Biol. Med. 92, 261-6(1956).

Total of 326 adult parakeets received total body doses of 250 kv x rays (22 r/min) ranging from 500-3000 r. Effects on survival, clinical pattern and peripheral

blood as well as histological changes seen in autopsy material are described. LD_{50-30} found to be 1800 ± 75 r. Hematopoietic tissue changes are similar to those in irradiated mammals; kidney may be more, and intestinal tract less susceptible than in mammals. NSA 10-9942

8177

THE EFFECTS OF FRACTIONATED DOSES OF X-RAYS ON DORMANT BARLEY SEEDS. A. R. Schooler (North Dakota State Coll., Fargo). R. A. Nilan (State Coll. of Washington, Pullman), and L. L. Phillips (North Carolina State Coll., Raleigh). Northwest Sci. 31, No. 2, 80-91(1957). NSA 11-7914

8178

IN VITRO SENSITIVITY OF HUMAN LEUKEMIC CELLS TO X-RAYS. Robert Schrek, Stanley L. Leithold, and Irving A. Friedman (Veterans Administration Hospital, Hines, Ill.). Proc. Soc. Exptl. Biol. Med. 94, 250-3 (1957).

Survival in vitro of lymphocytes from 11 to 12 patients with chronic lymphocytic leukemia were shortened (relative to unirradiated cells) by in vitro irradiation with 5-1000 r doses of x rays. Leukocytes from 3 patients with chronic myelogenous leukemia and 3 with acute leukemia had no change in vitro survival times after 1000 r. NSA 11-4794

8179

INVESTIGATION OF EXPERIMENTAL CANCER INDUCED BY LOCAL β -RADIATION. G. Schubert, H. A. Kunkel, L. Overbeck and G. Uhlmann. Strahlentherapie 100, 335-51(1956). (In German).

By means of the continuous effect of β -radiation glass heads which had been implanted under the skin and into the peritoneum, 87 malignant tumors were induced in 214 rats. For the skin tumors (sarcomas and carcinomas) of the subcutaneous series the frequency of the tumors, the medium latent period and the period of epilation were dependent on the intensity of the Sr^{90} -beads. Hepato-cellular carcinomas could be provoked in border zones of liver hematomas by local intra-abdominal ray effects. NSA 11-37

8180

CARCINOGENIC ACTION OF DIFFERENT DOSES OF LOCAL β -RAY IRRADIATION. G. Schubert, H. A. Kunkel, and J. G. Uhlmann. p. 480-4 of INTERNATIONAL CONFERENCE ON RADIOBIOLOGY. FOURTH, CAMBRIDGE, ENGLAND, AUGUST 1955. PROGRESS IN RADIOBIOLOGY. F. J. Mitchell, B. E. Holmes, and C. L. Smith, eds. London, Oliver and Boyd, Publishers. and Springfield, Ill., Charles C. Thomas, Publishers. 1956. 557p.

8181

REMOVAL OF RADIOELEMENTS FOR THE MAMMALIAN BODY. Jack Schubert (Argonne National Lab., Lemont, Ill.). Ann. Rev. Nuclear Sci. 5, 369-412(1955).

The development of methods for treating radioactive poisoning in animals is discussed. Complexing agents and colloidal ion-exchange carriers are examined as agents for removing radioisotopes from the body. 93 references. NSA 10-7444

8182

SEVERAL FACTORS WHICH INFLUENCE THE RATE OF AVENA COLEOPTILE RESPIRATION. A. R. Schrank (Univ. of Texas, Austin). J. Cell. Comp. Physiol. 48, 77-85(1956).

The endogenous respiration of individual Avena coleoptiles taken from seedlings 96 hours old was measured in aluminum microrespirometers. Uniform rates were maintained for at least two hours. Geotropic stimulation and decapitation cause slight increases in the rate of oxygen consumption. The rates of oxygen utilization of coleoptiles grown from seeds exposed to

gamma rays from Co^{60} are dependent on the radiation dosage. Doses from 5,000 to 10,000 r inhibit the rate of oxygen consumption. From 0 to 5,000 r there is a slight increase in the respiration rate, and from 10,000 to 100,000 r there are several cycles of increased and decreased rates which result in a net increase of 39%. Since coleoptiles grown from seeds exposed to 100,000 r manifest an increased rate of respiration but grown only one-fourth as long as controls, the inhibition of growth by gamma rays apparently is not dependent on the effects of irradiation on O_2 consumption. NSA 11-1740

8183

RADIATION DAMAGE ON HUMAN BONES AFTER DEEP ROENTGEN THERAPY TO FEMALE CARCINOMA. Gerd Schroder. Strahlentherapie 96, 469-73(1955). (In German).

Four cases of pathological fractures after intensive deep roentgen ray therapy for cancer of mamma with typical localization in the upper, anterior ribs are described. The tumor dose was approximately 4000 r. The latent period up to the time when changes could be detected by roentgenological means, and when pains were felt by the patient, varied from 3 months to 2 years. Most of the radiolesions will neither become manifest nor reveal symptoms. (from the authors' summary). NSA 10-6486

8184

Oregon. Agricultural Experiment Station, Corvallis. FLAVOR OF FOODS STERILIZED BY COMBINING CONVENTIONAL PROCESSING WITH IONIZING RADIATIONS. TERMINATION REPORT NO. 10 (FOR) APRIL 23, 1954 TO OCTOBER 22, 1955. H. W. Schultz. 51p. Project No. 7-84-01-002. Contract DA-44-109-qm-1782. (PB-121302).

Results are reported from a study on the effect of various methods of processing when combined with sterilization by ionizing radiations on the flavor of meat and meat products. Data are presented on whole cuts and ground beef and pork NSA 11-3651

8185

FURTHER STUDIES ON THE REVERSAL IN THE SEEDLING HEIGHT DOSE CURVE AT VERY HIGH LEVELS OF IONIZING RADIATIONS. Drew Schwartz and Cella E. Bay (Oak Ridge National Lab., Tenn.). Am. Naturalist 40, 232-7(1956). NSA 11-5716

8186

Naval Radiological Defense Lab., San Francisco THE EFFECT OF WHOLE-BODY X IRRADIATION ON THE ELECTRO-CONVULSIVE THRESHOLD IN THE RAT. J. S. Schwartzbaum, E. L. Hunt, B. P. Davies, and D. J. Kimeldorf. May 24, 1956. 16p. Project 006-015. 04.

Relatively little information is available concerning the effects of ionizing radiation upon the electrophysiological activity of the brain. The present study was designed to investigate the possible effects of x rays upon the threshold for electroshock induced seizure in the rat. Seizure thresholds were determined before and after x irradiation or sham-irradiation (control) treatment. Several groups of irradiated and control animals were tested during the first week post-irradiation in order to describe the time course for the effect. Following whole-body exposure to 5000 r the electroconvulsive threshold was reduced. This decrement persisted throughout the six-day period of testing postirradiation. Significant changes were not detected in the magnitude of effect within this time period. The degree of threshold change produced by radiation exposure extended beyond the effect attributable to the post-irradiation decrease in body weight. NSA 10-8141

8187

American Meat Inst. Foundation, Chicago
CHEMISTRY OF COLOR, FLAVOR, AND ODOR CHANGES
IN IRRADIATING MEAT. TERMINATION REPORT NO.
6 (FOR) APRIL 1, 1954 TO SEPTEMBER 30, 1955.
B. S. Schweigert. 16p. Project No. 7-84-01-002.
Contract DA-44-109-gm-1757. (PB-121309).

Data are presented from studies on the nature of chemical changes in meat during irradiation that may be associated with the production of undesirable color, flavor, and odor. Fresh ground beef and fresh pork tenderloin were exposed to approximately 2 to 10 million rep with the use of Co^{60} of the Idaho Falls γ ray sources. Data are tabulated. NSA 10-9920

8188

ON SPECIFICITY OF ROENTGEN DAMAGE OF HEART MUSCLE. E. Schweitzer. *Strahlentherapie* 18, 812-28 (1924). (In German).

8189

EFFECT OF IONIZING RADIATION ON RUST REACTION IN PLANTS. E. A. Schwinghamer (Brookhaven National Lab., Upton, N. Y.). *Science* 125, 23-4(1957). NSA 11-2795

8190

THE EFFECT OF RADIATION ON THE ESOPHAGUS. A CLINICAL AND HISTOLOGIC STUDY OF THE EFFECTS PRODUCED BY THE BETATRON. William B. Seaman and Lauren V. Ackerman (Washington Univ. School of Medicine, St. Louis). *Radiology* 68, 534-41(1957). NSA 11-6206

8191

ACUTE MYELOID LEUKEMIA FOLLOWING PROLONGED IODINE-131 THERAPY FOR METASTATIC THYROID CARCINOMA. S. M. Seidlin, Edward Siegel, A. Aaron Yalow, and S. McIlamed (Montefiore Hosp., New York). *Science* 123, 800-1(1956).

Two instances of acute myeloid leukemia are reported in a group of sixteen patients with metastatic thyroid carcinoma treated intensively with radioiodine. The radioiodine administered to this group of patients, commencing in 1943, ranged from 195 to 2290 mc over a 6-mo to 9-year interval. Brief summaries of the case histories are included. NSA 10-8144

8192

ON PROPHYLATIC USES OF SULFUR CONTAINING COMPOUNDS IN RADIATION SICKNESS. L. E. Semenov and E. A. Prokudina. *Med. Radiol.* 1, No. 4, 70-5(1956). (Central Research Inst. of Roentgen-Radiology). (In Russian). NSA 11-882

8193

STATE OF TISSUE ACETYLCHOLINESTERASE AS DETERMINED BY COBALT-60 GAMMA RADIATION INACTIVATION. Irving Serlin and George C. Cotzias (Brookhaven National Lab., Upton, N. Y.). *Radiation Research* 6, 55-66(1957).

Authors studied inactivation of acetyl cholinesterase after (1) irradiation of the electric organ of the eel, (2) irradiation of dilute enzyme solutions *in vitro* and (3) irradiation of human erythrocytes and plasma and (4) of rat brains in fresh, wet state or in dry state *in vitro*. NSA 11-4244

8194

THE SIZE AND SHAPE OF THE RADIOSENSITIVE ACETYLCHOLINESTERASE UNIT. Irving Serlin and Donald J. Fluke (Brookhaven National Lab., Upton, N. Y.). *J. Biol. Chem.* 223, 727-36(1956).

Thin, dried films of electric eel organ acetyl cholinesterase were exposed to electron, proton and α particle bombardment. Rates of inactivation were found to be related exponentially to the doses delivered. The radiosensitive units of the enzyme were found to

have a molecular weight of 105,000 and molecules were non-spherical. NSA 11-2781

8195

X-RAY BIOLOGICAL INVESTIGATIONS ON CARCINOMAS. I. CYTOLOGICAL STUDIES ON THE SUPERFICIAL AND DEEP HUMAN CARCINOMAS. P. Sculberger, W. Schmidt and F. Kroning. *Strahlentherapie* 31(3), 467-94(1929). (In German).

Number and quality of mitoses in carcinomata were observed to vary widely before exposure. Qualitative and quantitative change occurs post-irradiation in mitoses of each tumor at varying time. BA 6-16348

8196

EFFECTS OF VARIOUS DIETARY FACTORS ON THE ABSORPTION PROCESSES OF SMALL INTESTINES IN ANIMALS EXPOSED TO DAMAGING IRRADIATION. V. A. Shaternukov. *Med. Radiol.* 1, No. 4, 61-7(1956). (In Russian).

Dogs with isolated intestinal loops were fed different rations and were whole body irradiated with 350 to 500 r of x rays. During acute radiation sickness, dogs fed a physiological (62 percent meat, 8 percent milk) or liver (50 percent liver, 20 percent meat) diet showed a generally increased rate of intestinal absorption, with sharp increases and decreases. Those on a milk egg (37 percent milk, 14 percent egg, 20 percent meat) diet showed normal absorption. Physiological or milk egg diets enriched with vitamins P, PP, and C had a positive effect on normalization of the absorption from isolated intestinal loops. NSA 11-1397

8197

PROTECTION BY SODIUM HYDROSULFITE AGAINST X-RAY-INDUCED MITOTIC INHIBITION IN GRASS-HOPPER NEUROBLAST. E. I. Shaw (Oak Ridge National Lab., Tenn.). *Proc. Soc. Exptl. Biol. Med.* 92, 232-6 (1956). NSA 10-9970

8198

THE ENERGY OF RADIATIONS AND SOME LAWS OF THEIR ACTION ON BIOLOGICAL OBJECTS. E. S. Shchepotyeva. *Soviet J. Atomic Energy* 4, 597-604(1956).

Modern views are presented on the primary physico-chemical stage of the mechanism of the biological action of ionizing radiations and on certain laws of their action on biological objects, determined by the space and time distribution of the radiation energy in the organism. NSA 11-5166

8199

THE OCCURRENCE OF MAMMARY TUMORS IN THE RAT AFTER SUBLETHAL WHOLE-BODY IRRADIATION. C. J. Shellabarger, E. P. Cronkite, V. P. Bond, and S. W. Lippincott (Brookhaven National Lab., Upton, N. Y.). *Radiation Research* 6, 501-12(1957). NSA 11-6610

8200

Brookhaven National Lab., Upton, N. Y.
THE PRESENCE OF ENLARGED PITUITARY GLANDS IN RATS FOLLOWING ADMINISTRATION OF I^{131} . C. J. Shellabarger and J. T. Godwin. (1955). 5p. (BNL-2450). NSA 10-3251

8201

BIOLOGICAL EFFECTS OF FAST NEUTRONS FROM AN INTERNAL TARGET CYCLOTRON; PHYSICAL METHODS AND DOMINANT LETHALS IN DROSOPHILA. C. W. Sheppard, M. Slater, E. B. Darden, Jr., A. W. Kimball, G. J. Atta, C. W. Edington, and W. K. Baker (Oak Ridge National Lab., Tenn.). *Radiation Research* 6, 173-87(1957). NSA 11-5163

8202

EXPERIMENTAL STUDIES ON THE EFFECT OF ROENTGEN RAYS ON FOOD. F. Ludwig and H. Hopf. *Strahlentherapie* 20, 343(1925). (In German).

A diet of irradiated food had a toxic effect on rats as shown by effects on growth and development and in body weight.

8203

Rochester, N. Y. Univ., Atomic Energy Project. THE RESPONSE OF DOGS TO BILATERAL WHOLE BODY Co^{60} IRRADIATION. PART I. LETHAL DOSE DETERMINATION. James N. Shively, Sol M. Michaelson, and Joe W. Howland. Oct. 17, 1956. 13p. Contract W-7401-eng-49. (UR-465).

The mid-line tissue $\text{LD}_{50/30}$ for dogs exposed to bilateral irradiation from a Co^{60} source has been estimated to be 335 r with 95% confidence limits of 310 to 358 r. The mean day of death was 17.3 days. The Co^{60} mid-line tissue $\text{LD}_{50/30}$ dose is higher than that reported for x-ray. This dose, however, is essentially the same as that for unilateral x-irradiation applied to the dorsal aspect. NSA 11-836

8204

A STUDY OF THE EFFECTIVENESS OF PYRIDOXINE AND DRAMAMINE ON CLINICAL RADIATION SICKNESS. Anna Silverman, Morton M. Kligerman, John W. Fertig, and Kent Ellis. (Columbia Univ. Coll. of Physicians and Surgeons, New York and Presbyterian Hosp., New York). Radiology 66, 403-7(1956).

Authors describe their controlled clinical study of effectiveness of dramamine and pyridoxine on the course of radiation sickness. The group, studied over a period of one year, included 185 patients receiving deep x ray therapy. No significant differences were found in the frequency or duration of symptoms attributable to radiation sickness in groups of patients receiving pyridoxine, dramamine, or placebo. NSA 10-6498

8205

Naval Radiological Defense Lab., San Francisco. BACTERIOLOGICAL STUDIES ON MICE EXPOSED TO SUPRALETHAL DOSES OF IONIZING RADIATION. I. RADIATION FROM A NUCLEAR SOURCE. II. FAST NEUTRON AND X-RADIATION FROM LABORATORY SOURCES. M. S. Silverman, V. P. Bond, V. Greenman, and P. H. Chin. Nov. 20, 1956. 26p. Project NM-006-015. (USNRDL-TR-122).

Of a group of mice exposed to supralethal doses of neutron or combined neutron- γ radiation, 78% of the neutron group and 96% of the n- γ group were found (killed when moribund due to gastrointestinal injury) to be infected with organisms normally confined to the intestinal tract. The characteristics of the infectious process are described. Antibiotic therapy decreased the incidence of infection without influencing mortality or survival time. NSA 11-4783

8206

INFLUENCE OF SPLEEN HOMOGENATE INJECTION ON POSTIRRADIATION INFECTION. Myron S. Silverman, Vivian Greenman, Marie Ellis, and Leonard J. Cole. (U. S. Naval Radiological Defense Lab., San Francisco, Calif.). Radiation Research 6, 474-82(1957).

Injection of isologous spleen homogenate after a dose of x rays resulted in decreased mortality. This was accompanied by a decreased incidence of infection with the normal bacteria during the first 10 days. Although the number of mice from which bacteria were isolated increased during the latter portion of the second week, there was no increase in deaths. Sufficient recovery of the body against infection enabled the animals to combat the invading organism. NSA 11-6617

8207

THE CONTRIBUTION OF RADIATION GENETICS TO CROP IMPROVEMENT. W. R. Singleton, C. F. Konzak, S. Shapiro, and A. H. Sparrow. Proc. Intern. Conf.

for the Peaceful Uses of Atomic Energy, Geneva, 1955 12, 25-30(1956).

8208

THE RESPONSE OF ADRENAL GLAND OF INFANTILE RATS TO STRESS EFFECTS OF X-RADIATIONS. Djurdjina S. Sladic, Miroslava R. Pavlovic, and Dusanka V. Radivojevic. Bull. Inst. Nuclear Sci. "Boris Kidrich" (Belgrade) 6, 199-202(1956).

New born rats up to 10 days of age do not react to stress effected by x rays. Fall in concentration of cholesterol, 3 hrs following x irradiation, was observed for the first time in animals 10 days old. Under our experimental conditions, adrenal ascorbic acid content begins to fall only in older infant rats, i.e., after 13 days of age. This decline was gradual and paralleled the age. An exposure of animals to the same conditions causes a different adrenal response with respect to adrenal ascorbic acid and cholesterol. (from authors' summary). NSA 11-1731

8209

THE EFFECT OF X-IRRADIATION OF THE OVIDUCT ON EGG PRODUCTION AND EGG QUALITY IN THE FOWL. Arthur H. Smith, T. J. Hage, L. M. Julian, and D. M. Redmond (Univ. of California, Davis). Poultry Sci. 35, 539-45(1956). NSA 11-856

8210

STUDIES ON THYMUS OF THE MAMMAL. IX. HISTOCHEMICAL STUDY OF IRRADIATED MOUSE THYMUS. Christianna Smith (Mount Holyoke Coll., South Hadley, Mass.). Proc. Soc. Exptl. Biol. Med. 93, 310-14 (1956).

Mesenchymal reticular cells of mouse thymus become active macrophages, rich in acid phosphates, following whole body exposure to 410 r of 250 kv x rays. Effect is seen as early as 2 hours post-exposure, is maximal at 24-36 hours after which size and number of the macrophages diminish. Thymus is histologically normal again 9 days after exposure. NSA 11-1745

8211

STUDIES ON THYMUS OF MAMMAL. X. REGENERATION OF IRRADIATED MOUSE THYMUS. Christianna Smith and Dorothy Anne Kieffer (Mount Holyoke Coll., South Hadley, Mass.). Proc. Soc. Exptl. Biol. Med. 94, 601-5(1957).

Numbers of resting and dividing cells in mouse thymus cortex are decreased 24 hours after total body exposure to 400 r γ rays followed by colchicine injection. Increase in number of mitoses after the period of depression precedes the increase in number of cells (repopulation of glands). Greatest number of mitotic figures was observed on 5th post-exposure day. NSA 11-5156

8212

ATTEMPTS TO PROVIDE THE RAT WITH NUTRITION DURING POST-IRRADIATION ANOREXIA. Douglas E. Smith and Ella B. Tyree (Argonne National Lab., Lemont, Ill.). Radiation Research 4, 435-48(1956). NSA 10-9086

8213

Texas. Univ., Austin. Radiobiological Lab. PROLONGATION OF SULFHYDRYL PROTECTION IN IRRADIATED MICE. Joe E. Smith. Apr. 27, 1956. 5p. (AF-SAM-56-111). NSA 11-6208

8214

THE EFFECT OF WHOLE-BODY X-IRRADIATION ON THE ENZYMIC ACTIVITY OF SEVERAL RAT TISSUES TOWARD URIDINE, URIDYLIC ACID, CYTIDINE, AND CYTIDYLIC ACID. Kendrick C. Smith and Bertram V. A. Low-Beer. Radiation Research 6, 521-31(1957).

8215

EFFECTS OF X-IRRADIATION ON RENAL FUNCTION OF RATS. L. H. Smith and W. R. Boss (Syracuse Univ.,

N. Y.). *Am. J. Physiol.* 188, 367-70(1957).
NSA 11-6194

8216

Personnel and Training Research Center. Personnel Lab., Lackland AFB, Tex.
METHODS OF REDUCTION OF PSYCHOLOGICAL STRESS DUE TO RADIATION. Robert G. Smith, Jr. and John A. Cox, Jr. Feb. 4, 1957. 14p Project 7734. (AFPTRC-TN-57-19, AD-098922). NSA 11-7048

8217

EFFECT OF PRETREATMENT WITH DIHYDROXY-DIMETHYL PEROXIDE ON THE RATE OF MUTATIONS INDUCED BY X-RAYS. F. H. Sobels. *Nature* 177, 980-2 (1956).

Author treated male *Drosophila*, 1-2 days old, with dihydroxydimethyl peroxide immediately before exposure to x rays to determine the effect of the chemical on mutation induction by x rays. NSA 10-9059

8218

ON THE EFFECTS OF IONIZING RADIATION ON THE NIDUS OF INFECTION AND ITS PROPHYLAXIS AND CURE (STUDY OF WHOOPING COUGH INFECTION). B. N. Sofrouov (Inst. of Exp. Medicine). *Med. Radiol.* 2, 33-40(1956). (In Russian). NSA 10-9056

8219

ON CERTAIN REGULARITIES IN IONIZING RADIATION EFFECTS ON MICROORGANISMS. E. N. Sokurova (Inst. of Microbiology). *Izvest. Akad. Nauk S.S.S.R. Ser. Biol.* No. 6, 35-53(1956). (In Russian). AERE-lib-Trans-772. NSA 11-3279

8220

THE EFFECTS OF GAMMA RAYS FROM 20 MEV BETATRON AND FROM Co⁶⁰ ON THE CELLULAR ELEMENTS AND SUGAR IN THE BLOOD OF RABBITS. P. F. Soldatenkov, V. A. Kostromskaya, and K. K. Yakovleva (Urals Acad. of Science) *Doklady Akad. Nauk S.S.S.R.* 108, 1065-8(1956). (In Russian). NSA 11-30

8221

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF TRITIUM β -RADIATION WITH THE BROAD BEAN ROOT (VICIA FABA) AS A TEST SYSTEM. J. F. Spalding, Wright Langham, and Ernest C. Anderson (Los Alamos Scientific Lab., N. Mex.). *Radiation Research* 4, 221-7(1956).

Tritium β particles and 175 KVP x rays were compared with respect to their effectiveness in depressing growth of the apical cell mass of the broad bean root. The relative biological effectiveness of the β particles was 1.0 ± 0.06 . NSA 10-6482

8222

THE EFFECTS OF HIGH-DOSAGE X-RAY ON THE MATURATION OF THE RAT OVUM AND THEIR MODIFICATION BY GONADOTROPINS. J. F. Spalding, J. M. Wellnitz, and W. H. Schweitzer (Los Alamos Scientific Lab., N. Mex.). *Fertility and Sterility* 8, No. 1, 80-8(1957). NSA 11-4234

8223

A NEW METHOD OF POTATO SPROUT INHIBITION BY EXPOSURE TO IRRADIATION. A. H. Sparrow. *American Potato Yearbook* 17-18(1956).

8224

A SURVEY OF THE RADIOSENSITIVITY OF SOME HIGHER PLANTS. A. H. Sparrow. *Radiation Research* 3, 349(1955).

8225

BIOLOGICAL EFFECTS OF EXTERNAL X AND GAMMA RADIATION. PART I. EFFECTS OF TOTAL BODY X IRRADIATION ON RABBITS. II. HEMATOLOGICAL EFFECTS. R. E. Zirkle, Editor. (McGraw Hill Book Co. Inc., N. Y., 530 pp. 1954).

While no rabbits died from hematopoietic injury even after 12,000 r accumulated at the rate of 8.8 r/week, most guinea pigs died from aplastic anemia after accumulating a dose of 700 r to 6000 r.

8226

CYTOLOGICAL CHANGES INDUCED BY IONIZING RADIATIONS AND THEIR POSSIBLE RELATION TO THE PRODUCTION OF USEFUL MUTATIONS IN PLANTS. A. H. Sparrow. p. 76-113 of WORK CONFERENCE ON RADIATION INDUCED MUTATIONS. Brookhaven Symposium in Biology on Genetics and Plant Breeding, 1956.

8227

DISCUSSION OF A. D. CONGER'S PAPER, RADIATION EFFECTS ON ASCITES TUMOR CHROMOSOMES. A. H. Sparrow. *Ann. N. Y. Acad. Sci.* 63, 936-937(1956).

The ascites tumor cell lends itself well to the study of changes in chromosome number, chromosome morphology and mitotic rate and to quantitative studies of chromosome aberration frequency, all of which may be affected by ionization radiation. Phenomenon of mitotic inhibition may be due to (1) inhibition of synthesis of DNA or another essential component of the nucleus (2) production of a cell poison or anti-mitotic substance (3) chromosome breakage and aberration.

8228

SOMATIC MUTATIONS INDUCED IN PLANTS BY TREATMENT WITH X AND γ -RADIATION. A. H. Sparrow. *Caryologia*, Suppl. Pt. 2, 6, 1105-6(1954) (BNL-1427).

8229

STIMULATION AND INHIBITION OF PLANT GROWTH BY IONIZING RADIATION. A. H. Sparrow. *Radiation Research* 1, 562(1954).

8230

INDUCTION OF TUMORS BY IONIZING RADIATION ON STEMS, LEAVES, ROOTS OF AN INTERSPECIFIC NICOTIANA HYBRID. Arnold H. Sparrow and James E. Gunckel (Brookhaven National Lab., Upton, N. Y. and Rutgers Univ., New Brunswick, N. J.), p. 485-8 of INTERNATIONAL CONFERENCE ON RADIOBIOLOGY. FOURTH, CAMBRIDGE, ENGLAND, AUGUST 1955. PROGRESS IN RADIOBIOLOGY. F. J. Mitchell, B. E. Holmes and C. L. Smith, eds. London, Oliver and Boyd, Publishers, England; Charles C. Thomas Publisher, Springfield, Ill. 557p. NSA 10-9931

8231

THE EFFECT ON PLANTS OF CHRONIC EXPOSURE TO GAMMA RADIATION FROM RADIOCOBALT. A. H. Sparrow and J. E. Gunckel. *Proc. Intern. Conf. on the Peaceful Uses of Atomic Energy* 12, 52-9(1956).

Report refers to observations on 79 species of plants (39 families). Subjects considered include: tolerance of certain species to chronic gamma radiation, growth inhibition and stimulation, morphological effects and tumor induction. NSA 11-5155

8232

TUMOR FORMATION IN HYBRID NICOTIANA GLAUCA X LANGSDORFII EXPOSED TO CHRONIC GAMMA IRRADIATION FROM COBALT-60. A. H. Sparrow and J. E. Gunckel. p. 198-99 of Intern. Congr. Botany, 8th Congr., Paris 1954. Rapports et Commun. deposees lors du Congres dans les Sections 7 et 8. 1954.

8233

RADIATION-INDUCED TUMORS IN AN AMPHIDIPOID TOBACCO HYBRID (DEMONSTRATION). A. H. Sparrow, J. E. Gunckel, L. A. Schairer and G. Hagen. *Radiation Research* 3(3), 349-350(1955).

8234

TUMOR FORMATION AND OTHER MORPHOGENETIC

RESPONSES IN AN AMPHIDIPLOID TOBACCO HYBRID EXPOSED TO CHRONIC GAMMA IRRADIATION.

Arnold R. Sparrow, James E. Gunkel, Lloyd A. Schairer, and George L. Hagen (Brookhaven National Lab., Upton, N. Y.). *Am. J. Botany* **43**, 377-88(1956).

Abnormalities induced ranged from slight fasciations and multiple axillary buds to a loose mass of green, leaf like outgrowths (organoid neoplasia) to nearly glabrous undifferentiated tumor masses. Genetic factors in tumor induction and other morphogenetic responses are discussed. NSA 10-9932

8235

DEOXYRIBONUCLEOPROTEINS OF CELL NUCLEI: SENSITIVITY TO X-RAYS. M. H. Bernstein. *Nature*, **174**, 463(1954).

Author studied effects of X rays on aqueous nucleoprotein gels prepared from calf thymus nuclei. This system was chosen because of the marked instability of DNA in aqueous systems, even with simple storage 2-5°C for 24-36 hr in contrast to the marked stability of 1.0M NaCl preparations. It was felt that the instability might be important in determining radio-sensitivity of the DNA.

8236

Argonne National Lab. Council of Participating Institutions, Lemont, Ill.

SOME CYTOGENETIC MORPHOGENETIC EFFECTS OF IONIZING RADIATION ON PLANTS. A. H. Sparrow and Virginia Pond. p. 125-39 of A CONFERENCE ON RADIOACTIVE ISOTOPES IN AGRICULTURE HELD ON JANUARY 12, 13, AND 14, 1956 AT MICHIGAN STATE UNIVERSITY, EAST LANSING, MICHIGAN. Jan. 1956. 420p. (TID-7512).

8237

THE RELATIONSHIP BETWEEN DOSE RATE AND SOMATIC MUTATION IN ANTHRRHINUM MAJUS EXPOSED TO CHRONIC GAMMA IRRADIATION. A. H. Sparrow and Virginia Pond. *Radiation Research* **5**, 596(1956).

Mutations are induced in snapdragons by irradiation even at very low dose rates and, in fact, rate of induction appears to be higher at lower dose rates. (Radiation was delivered at rates varying between 0.1 and 285 r per day for periods up to 4 mo.) Unknown environmental factors also appeared to be important in altering the frequency of both spontaneous and radiation-induced mutations.

8238

PERNICIOUS ANEMIA AND MYELOGENOUS LEUKEMIA PROVOKED BY HANDLING RADIOACTIVE SUBSTANCES. E. Weil and A. Lacassagne. *Bull. Akad. Medicine* **9**, 257(1925). (In French).

8239

RESULTS OF DESTRUCTION, BY LOCALIZED IRRADIATION, OF TWO OR FOUR MACROMERES OF THE EGG OF RANA FUSCA IN THE EIGHT CELL STAGE. P. Vintemberger. *Compt. Rend. Soc. Biol. (Paris)* **112**, 1083-1086(1933). (In French).

8240

EFFECT OF X RAYS, GAMMA RAYS, FAST ELECTRONS AND FAST NEUTRONS ON INHIBITION OF GROWTH AND SPROUTING IN POTATOES. A. H. Sparrow and L. Schairer. p. 7-12 of CONFERENCE ON BIOLOGICAL, PHYSICAL AND INDUSTRIAL ASPECTS OF POTATO IRRADIATION. Brookhaven National Lab., Upton, L. I., N. Y. 1955.

8241

TUMOR FORMATION IN NICOTIANA HYBRIDS EXPOSED TO CHRONIC GAMMA IRRADIATION. A. H. Sparrow and L. Schairer. p.10 of AMERICAN SOCIETY OF PLANT PHYSIOLOGY, 29th ANNUAL MEETING, GAINESVILLE, FLA. Sept. 1954. (Abstracts).

8242

THE FORMATION OF POLYPLOID MICROSPORES IN TRILLIUM ERECTUM FOLLOWING X-RAY TREATMENT AT FIRST MEIOTIC METAPHASE. A. H. Sparrow and R. C. Sparrow. *Radiation Research* **1**, 229(1954).

Polyploid microspores are seen in Trillium erectum after exposure to x rays. Relationship between percentage of polyploid nuclei and x ray dosage delivered during first mitotic phases were studied. Chromosome counts at microspore metaphase following exposures to 0, 50, 100, 200 and 400 r showed polyploidy, which is attributed to destruction of the spindle. There was evidence that irradiation of meiotic stages interfered with formation of the spindle. (from authors' abstract).

8243

INVESTIGATIONS OF RADIOACTIVE METHIONINE EFFECTS ON RETARDING THE GROWTH OF SARCOMA IN ANIMALS. I. G. Spasskaya. (Inst. of Experimental Pathology and Therapy of Cancer). *Med. Radiol.* **1**, No. 6, 74-7(1956). NSA 11-3673

8244

EFFECT OF 500 R WHOLE BODY IRRADIATION ON THE CELLULAR COMPOSITION OF THE PERITONEAL FLUID FOLLOWING AN INTRAPERITONEAL INJECTION OF ANTIGEN IN MICE. R. S. Speirs. (Brookhaven National Lab., Upton, N. Y.). *J. Immunol.* **77**, 437-43(1956). NSA 11-6201

8245

Rochester, N. Y. Univ., Atomic Energy Project. POSSIBLE SEX INFLUENCES ON THE METABOLISM OF POLONIUM²¹⁰ IN THE RAT. J. N. Stannard and M. A. K. Angell. *Jan. 30, 1956*, 19p. Contract W-7401-eng-49. (UR-427). NSA 10-3258

8246

Rochester, N. Y. Univ. Atomic Energy Project. THE EFFECT OF BAL (BRITISH ANTI-LEWISITE) ON DISTRIBUTION AND EXCRETION OF ORALLY ADMINISTERED POLONIUM²¹⁰. J. N. Stannard and Helen Haydon. Feb. 20, 1956. 16p. Contract W-7401-eng-49. (UR-429).

The effectiveness of intramuscular British Anti-Lewisite in influencing the metabolism of orally administered Po has been determined in the rat. In contrast to its effects on Po administered intravenously, BAL did not promote excretion of the metal in either urine or feces, did not reduce retention, and did not reduce the relative amounts of Po deposited in radiosensitive tissues. Instead, BAL facilitated absorption from the gastrointestinal tract, reduced fecal excretion, and increased retention. While relative toxicity was not determined in these experiments, it would not be predicted that BAL would materially reduce the effects of a given body burden received by the oral route. This again contrasts with the clearly reduced toxicity of intravenously administered Po when BAL treatment is given. It is thought that these contrasts reside in differences in the chemical form of Po in the body. In view of current trends toward adding chelating agents to food products, it is suggested that the effect of such agents on gastrointestinal absorption of trace metals be investigated. NSA 10-3259

8247

TEMPERATURE DEPENDENCE OF BACTERIAL INACTIVATION BY X-RAYS. G. E. Stapleton and C. W. Edington (Oak Ridge National Lab., Tenn.). *Radiation Research* **5**, 39-45(1956).

Inactivation of *E. coli* β/r has been investigated as a function of temperature during irradiation for O₂ saturated and O₂ depleted suspensions. O₂ saturated suspensions show a significant change in sensitivity at

subfreezing temp. and a discontinuous change at freezing point. In absence of O_2 no significant change in sensitivity occurs with decreasing temp. below freezing point. (from authors' summary.) NSA 10-9950

8248

THE EFFECT OF O_2 PRESSURE ON THE SENSITIVITY TO RADIATION BY TOTAL BODY EXPOSURE. H. St. Stender and Th. Hornykiewytsch. *Strahlentherapie* 96, 445-52(1955). (In German).

In normal and adrenalectomized rats as well as in rats pretreated with cortisone and thyroxine, the radiosensitivity decreases if the oxygen tension in the breathing air is reduced below 10%. If the animals are pretreated with megaphen, then the protective effect produced by the reduced oxygen tension, is even considerably stronger. NSA 10-6500

8249

THE INFLUENCE OF MEGAPHEN ON THE SENSITIVITY TO RADIATION BY TOTAL BODY EXPOSURE. H. St. Stender and Th. Hornykiewytsch. *Strahlentherapie* 96, 453-7(1955). (In German).

A preliminary treatment of rats with Megaphen brings about an increase of the medium survival time after total-body irradiations with 800 and 1000 r, and of the survival rate after 600 r. A similar effect takes place in adrenalectomized rats after 600 r. Oxygen deficiency considerably increases the effect of Megaphen. An aftertreatment with Megaphen merely exerts a minor influence on the survival time. The author discusses the mechanism of action of the protective effect. NSA 10-6501

8250

THE HISTOLOGICAL BASIS FOR THE EVALUATION OF RADIATION PROTECTION. Rudolf Stodtmeister, Theodor M. Flhedner, and Stefan Sandkuhler. *Strahlentherapie* 101, 296-307(1956). (In German). NSA 11-3291

8251

NEW DRUGS FOR IRRADIATION SICKNESS. Basil A. Stoll (Peter MacCallum Clinic, Melbourne, Australia). *Radiology* 68, 380-5(1957). NSA 11-5177

8252

REGENERATION OF X-RAY EXPOSED NERVES IN AMPHIBIAN LARVAE. Rita Stolz and Wolfgang Luther. *Strahlentherapie* 102, 73-7(1957). (In German). NSA 11-5169

8253

THE PRODUCTION OF MUTATIONS IN *STAPHYLOCOCCUS AUREUS* BY IRRADIATION OF THE SUBSTRATE. W. S. Stone, O. Wyss and F. Haas. *Proc. Natl. Acad. Sci. U. S.* 33, 59-66(1947).

8254

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF VARIOUS IONIZING RADIATIONS IN MAMMALIAN SYSTEMS. John B. Storer, Payne S. Harris, John E. Furchner, and Wright H. Langham (Los Alamos Scientific Lab., N. Mex.). *Radiation Research* 6, 188-288(1957).

The relative biological effectiveness of 9 different ionizing radiations are reported. For each type of radiation, 1-10 biological responses of rats and/or mice were measured quantitatively and values for RBE are expressed with reference to effects produced by radium γ rays. All responses were of the acute type. NSA 11-5164

8255

Los Alamos Scientific Lab., N. Mex.
RELATIVE ACUTE TOXICOLOGICAL EFFECTS OF URANIUM 233 AND URANIUM 238 . John B. Storer, Phyllis Sanders, John Furchner, and Julian Wellnitz. June 3, 1952. *Decl. Dec.* 8, 1955. 37p. Contract W-7405-Eng-36. (LA-1423). NSA 10-3775

8256

STUDIES ON THE LETHAL EFFECT OF INCORPORATED

P^{32} AND S^{35} IN *NEUROSPORA CRASSA*. B. S. Strauss, Tiuu Vaharu, P. Frickey, and J. Matheson (Syracuse Univ., N. Y. and Brookhaven National Lab., Upton, N. Y.). *Radiation Research* 5, 25-38(1956).

Incorporated S^{35} and P^{32} have a lethal effect on conidia of *Neurospora crassa*. This effect is due to transmutation of P^{32} and S^{35} rather than to β radiation accompanying the disintegration of these isotopes. Conidia grown on media with minimal phosphorus concentrations are more readily inactivated by X radiation than are conidia grown on media containing adequate P for optimal growth.

8257

X-RAY STUDIES ON HYDRAS. II. THE HISTOLOGICAL CHANGES IN THE BODY DEVELOPMENT OF *HYDRA-OLIGACTIS* UNDER THE EFFECTS OF X-RAYS AND ITS MEANING IN REGENERATION AND MULTIPLICATION.

G. S. Streln. *Z. wiss. Biol. Abt. D. Wilhelm Roux' Arch. Entwicklungsmech. Organ.* 115, 27-51(1929). (In German).

Action of x-rays on undifferentiated interstitial elements of hydra was shielded. Radiosensitivity was greatest at prophase. BA 6-15765

8258

ON CERTAIN REGULARITIES IN BIOLOGICAL EFFECTS OF IONIZING RADIATION. G. S. Sterlin (Central Research Inst. of Roentgen Radiology). *Med. Radiol.* 1, 27-35(1956). (AEC-tr-3333).

Selective suppression of the processes of physiological and reparative regeneration is a characteristic feature of the biological action of ionizing radiation. This feature may be demonstrated in very diverse biological material. Lesions caused by irradiation may be clearly seen morphologically during regeneration. Radiation lesions not only appear during the process of regeneration but also disappear, and normal tissue is restored. The varying ability of tissues to repair radiation lesions is due to their inherent activity of physiological regeneration, and is determined by correlation between the sensitivity of the tissues and changes in the strength of the dose of irradiation. This conclusion is confirmed by a number of facts but cannot yet be considered completely proved. NSA 12-15220

8259

CANCER FORMATION ON A RAT'S TAIL BY FRACTIONAL IRRADIATION. Ernst Stuts and Ursula Stuthgen. *Strahlentherapie* 102, 559-62(1950). (In German). NSA 11-8787

8260

EFFECTS OF ANOREXIA AND X-IRRADIATION ON VITAMIN B_6 EXCRETION IN RATS. Chung Suk Song, William N. Pearson, and William J. Darby (Vanderbilt Univ. School of Medicine, Nashville, Tenn.). *Am. J. Physiol.* 184, 309-11(1956). NSA 10-6471

8261

School of Aviation Medicine, Randolph, AFB, Texas and Chicago, Univ., Air Force Radiation Lab.
INFLUENCE OF X-RAY ON OXYGEN CONSUMPTION BY HEMATOPOIETIC TISSUES OF RATS. Maurice F. Sullivan and Kenneth P. DuBois. 1956. 9p. (AF-SAM-55-114).

Rats were sacrificed at various intervals after 400 r and oxygen consumption of slices of spleen and thymus glands was estimated. Respiration had decreased 50% within 48 hr, subsequently returned to normal. Effects of adding intermediates of tricarboxylic acid cycle to *in vitro* tissues, and of treating rats with cysteine or p-aminopropiophenone before irradiation are described. NSA 10-7388

8262

THE PRIMARY HEMOLYSIN RESPONSE IN RABBITS FOLLOWING SHELDING FROM X RAYS OF X IRRADIA-

TION OF THE SPLEEN, APPENDIX, LIVER OR HIND LEGS. Dieter H. Suasdorf and Laurence R. Draper (The Univ. of Chicago, Ill.). *J. Infectious Diseases* 99, 129-42(1956). NSA 11-4238

8263

LIVER CELL NUCLEI OF MICE AFTER IRRADIATION. Hella Sussman. *Onocologia* 9, No. 4, 373-86(1956). (In German).

(1) Mice were irradiated totally with 10 fractions of 100 r, with a single dose of 1000 r or with a single dose of 5000 r to the liver only. After 1000 and 5000 r, the average nucleus of liver cells increases by 15-18%. Following 1000 r the larger nuclei are prevalent; after 5000 r the medium sized one. Fractional irradiation (10 x 100 r) appears to have no or only little influence on the average nuclear size. The largest nuclei observed were found following such exposure, however. NSA 11-1398

8264

Atomic Bomb Casualty Commission, Hiroshima. SUMMARY OF MEDICAL STUDIES ON HIROSHIMA CHILDREN EXPOSED TO THE ATOMIC BOMB, 1951-1953. Wataru W. Sutow. 99p. (NYO-4478).

Author presents data accumulated over a three year period, 1950 to 1953, on the physical condition of a group of children exposed to the atomic bomb at Hiroshima and a group of children selected as controls. Statistical comparisons are made of findings on the two groups. NSA 11-8763

8265

POLYPLOIDY AND RADIOSENSITIVITY. M. S. Swaminathan and A. T. Natarajan (Indian Agricultural Research Inst., New Delhi). *Nature* 179, 479-80(1957). NSA 11-5154

8266

GLUTATHIONE PROTECTION IN X-IRRADIATED EYES. Arnold A. Swanson, Heinrich W. Rose, Jack I. Taube (Randolph Air Force Base, Texas). *Arch. Ophthalmol.* (Chicago) 57, 832-9(1957).

Preliminary results are presented from an investigation on clinical and enzymatic changes in rabbit eyes after x irradiation alone and after x irradiation preceded by treatment with glutathione. Protection afforded by glutathione against radiation damage was significant in the retina, lens capsule, and iris. NSA 11-8797

8267

CERTAIN ASPECTS OF PROTEINIC METABOLISM OF LIVER OBSERVED DURING RADIATION SICKNESS. N. V. Syromyatnikova. *Doklady Akad. Nauk S.S.S.R.* 111, 730-2(1956). (In Russian). NSA 11-3659

8268

EFFECT OF TOTAL BODY X-IRRADIATION ON THE RESPIRATION OF THE HOMOGENIZED DUODENAL MUCOSA OF THE RAT. S. Szonyi and W. Varteresz (Radiobiological Research Inst., Budapest). *Nature* 179, 51(1957). NSA 11-4239

8269

X-RAY EFFECTS ON HEMOLYSIN FORMATION IN RABBITS WITH THE SPLEEN SHIELDED OR IRRADIATED. William H. Taliaferro and Lucy Graves Taliaferro (Univ. of Chicago, Ill.). *J. Infectious Diseases* 99, 109-28(1956). NSA 11-4792

8270

California. Agricultural Experiment Station, Davis. Dept. of Food Technology. RELATIONSHIP OF RADIATION INDUCED FAT OXIDATION AND FLAVOR, COLOR, AND VITAMIN CHANGES IN MEAT. REPORT NO. 8 (FINAL) FOR DECEMBER 31, 1954 TO JANUARY 15, 1956. A. L. Tappel. 7p. Project No. 7-84-01-002. Contract DA-19-129-gm-256. (PB-121307).

Changes were produced in beef, pork, poultry, and fish by sterilizing radiation doses. Radiation that pasteurized meat did not effect flavor, but radiation for sterilization made meat unacceptable. Irradiation in nitrogen eliminated peroxides. Carbonyl compounds formed in oxygen or nitrogen. Irradiation effects on hematin, carotenoids, vitamins, enzymes, and texture are discussed. NSA 10-9918

8271

Wisconsin Alumni Research Foundation, Madison. ANIMAL FEEDING STUDIES ON WHOLESOMENESS OF IRRADIATED FOODS. PROGRESS REPORT NO. 1 (FOR) JANUARY 15, 1955 TO MAY 15, 1955. L. J. Teply and B. E. Kline. 13p. Contract DA-49-007-MD-608. (AD-93911).

Twelve irradiated food items were used in eight-week feeding tests employing young rats. Food items tested include dried apricots, frozen brussel sprouts, frozen cherries, frozen cranberries, crackers, Jello powder, macaroni, dried pears, frozen peas, pound-cake, pork sausage, and frozen shrimp. In general there was no marked difference in the growth rates of control rats and those fed irradiated foods except for those fed diets with Jello powder. NSA 11-1723

8272

Rochester, N. Y. Univ. Atomic Energy Project. THE METABOLISM OF THORIUM²³⁰ (IONIUM) ADMINISTERED BY INTRATRACHEAL INJECTION TO THE RAT. Robert G. Thomas. Dec. 10, 1956. 30p. Contract W-7401-eng-49. (UR-480).

Thorium is excreted in urine after intratracheal injection. Thorium²³⁰ has very low solubility in body fluids and excretion via urine is negligible after intratracheal administration. Lung appears to be the critical organ for calculating MPC for a single intratracheal dose. Almost all Th²³⁰ which does enter the circulation from respiratory tract localizes in bone. Fecal analysis during the week following a single exposure may permit estimation of lung or body burden. NSA 11-3674

8273

Rochester, N. Y. Univ. Atomic Energy Project. THE METABOLISM OF POLONIUM²¹⁰ ADMINISTERED BY INTRATRACHEAL INJECTION TO THE RAT. Robert G. Thomas and J. N. Stannard. Feb. 21, 1956. 38p. Contract W-7401-eng-49. (UR-430).

The distribution and excretion of Po²¹⁰ has been studied in rats receiving a soluble salt of this element by intratracheal injection (intubation). The metabolism was found to differ markedly in some respects from that seen after either oral or intravenous administration. NSA 10-3168

8274

EFFECT OF X IRRADIATION ON INCREASE IN RAT LIVER TRYPTOPHAN PEROXIDASE PRODUCED BY ADRENAL STEROIDS. John F. Thomson and Florence J. Klipfel (Argonne National Lab., Lemont, Ill.). *Proc. Soc. Exptl. Biol. Med.* 95, 107-8(1957). NSA 11-7916

8275

INTERNATIONAL CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY, GENEVA. REPORT OF THE UNITED STATES DELEGATION TO THE INTERNATIONAL CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY HELD BY THE UNITED NATIONS, AUGUST 8-20, 1955, GENEVA, SWITZERLAND, WITH APPENDICES AND SELECTED DOCUMENTS. VOLUMES I. (Norvell Page, comp. and ed.). (Vol. I, 377p. and Vol. II, 573p). TID-5315(Vols. I and II).

Pertinent papers are abstracted individually. NSA 10-3961

8276

CROSS REACTIVATION OF DEUTERON BOMBARDED T1 BACTERIOPHAGE. J. E. Till and Ernest Pollard (Yale Univ., New Haven, Conn.). *Arch. Biochem. Biophys.* **63**, 260-2(1956).

Cross reactivation of T1 bacteriophage by deuterons was studied. About 60% of the genetic part of the phage is essential for cross reactions. The sensitive region is long and thin. Similar results were obtained with x rays. NSA 10-9935

8277

LYMPHOID TUMOR INCIDENCE IN MICE TREATED WITH ESTROGEN AND X-RADIATION. Paul Toch, Barbara B. Hirsch, Mary B. Brown, C. Susan Nagareda, and Henry S. Kaplan (Stanford Univ., School of Medicine, San Francisco, Calif.). *Cancer Research* **16**, 890-3(1956).

Studies on combined action of x radiation and estrogen on lymphoid tumor induction in C⁵⁷BL and BALB mice are reported. Estrogen markedly augmented the lymphomogenic action of x radiation in both male and female C⁵⁷BL mice. Irradiation of BALB mice resulted in a relatively low lymphoma incidence and a prolonged latent period. Only 2 lymphomas developed during 1 yr. among 36 BALB mice treated with estrogen. (from authors' summary). NSA 11-840

8278

MORPHOLOGICAL CHARACTERISTICS OF RADIATION SICKNESS INDUCED BY BEAMS FROM 10 MEV BETATRON. I. V. Toroptsev and N. V. Sokolova (Tomsk Medical Inst.). *Med. Radiol.* **1**, No. 4, 41-7(1956). (In Russian). NSA 11-887

8279

GENERALIZED ESSENTIAL RETICULOSIS RESULTING FROM EXPOSURE TO RADIATION. Abe Towbin, Michael Kenney, and Harry Weinranch (Veterans Administration Hospital, New York). *Cancer* **10**, 385-7(1957).

Authors describe development of generalized essential reticulosis in a man after chronic exposure to radiation. Patient was subjected over a period of many years to extensive amount of radiation while assisting in fluoroscopy and taking roentgenograms. At autopsy, enlargement of spleen and liver associated with rich reticulum cell proliferation in tissues confirmed the diagnosis of essential reticulosis. In this case the development of essential reticulosis is analogous to the development of cutaneous cancer and leukemia in man after chronic exposure to radiation (from authors' summary.) NSA 11-8770

8280

ANIMAL EXPERIMENTAL RESEARCH ON THE EFFECT OF SUBLETHAL AND SMALL RADIATION DOSES. Johannes Trautmann. *Strahlentherapie* **102**, 543-5 (1957). (In German).

Reports are given on the effects of small x ray doses on the progress of an experimentally produced general infection, on the effects of sublethal doses of total radiation on the female sex hormones of mice, and on the effect of total radiation doses of 200 r, applied during the main organization phase, on the fetuses. NSA 11-8785

8281

EFFECT OF X-RAY DOSE ON MORTALITY AND SKIN TRANSPLANTABILITY IN MICE RECEIVING F₁ HYBRID MARROW. J. J. Trentin (Baylor Univ. of Medicine and Univ. of Texas Dental Branch, Houston). *Proc. Soc. Exptl. Biol. Med.* **93**, 98-100(1956).

The 21-day LD₅₀ of x rays is approximately 600 r. Irradiation of CBA mice followed by intravenous administration of bone marrow suspension from Cb x CBA F₁ hybrids resulted in little or no 21-day mortality at 110, 330, 660, and 770 r, but in almost 100% mortality at 550 r. Homografts of Cb skin were accepted by mice

at 660 and 770 r dose levels but not by mice at 0, 110, and 330 r dose levels. None of the marrow-treated mice at 550 r survived to be skin grafted. NSA 11-35

8282

STUDIES ON THE BACTERICIDAL ACTION OF X RAYS. J. J. Trillat. *J. chim. phys.*, **25**, 484(1929). (In French).

8283

Los Alamos Scientific Lab., N. Mex. BIOLOGICAL EFFECTS OF INHALATION OF HIGH CONCENTRATIONS OF TRITIUM GAS. T. T. Trujillo, F. C. Anderson, and W. H. Langham. Dec. 1955. 37p. Contract W-7405-eng-36. (LA-1986).

Mice fixed an LD₅₀₋₃₀ of tritium water (1.5 mc/cc body fluid or 800 rep-total body exposure) in about 45 min. when inhaling 1% tritium gas. Dose to lung surfaces: ~135,000 rep. which produced no histological acute change in lungs. The LD₁₀₀₋₈₀ is the same as that for mice given equivalent dose of HTO by injection. Lethality of inhaled tritium gas is attributed to fixation of HTO in body fluid, not to pulmonary effects. NSA 11-19

8284

RADIOACTIVE DAMAGE OF JAPANESE FISHERMAN CAUSED BY BIKINI ASHES. M. Tsuzuki. *Munch. med. Wochschr* **97**, 988-994(1956).

8285

EFFECT OF IONIZING RADIATION ON THE OPTIC ANALYSOR OF RABBITS. A. B. Tsypin. *Med. Radiol.* **1**, No. 5, 22-30(1956). (In Russian).

Rabbits were x irradiated with single 1000 r doses either to the whole body or locally to the eyes. The whole analyzer system (retina, cortical optical centers, and cortical ending of the optical analyzer) was damaged, as shown by electroroentgenograms and morphological changes in the retina, interference with afferent impulses to the cortex and changes in the bioelectric activity. Numerous electroroentgenograms and several histological section preparations are shown. Electroroentgenograms were made 3 to 4 days before the irradiation and daily afterwards until death. NSA 11-2785

8286

EFFECTS OF IONIZING RADIATION ON IMMUNITY TO INTESTINAL INFECTIONS. M. A. Tumanyan and A. V. Izekova. (Gamalei Inst. of Epidemiology and Microbiology). *Med. Radiol.* **1**, 59-65(1956). (In Russian). NSA 10-9050

8287

EXPERIMENTS WITH CHEMOTHERAPY IN RADIATION SICKNESS OF MONKEYS. M. A. Tumanyan, Z. V. Shevtsova (Gamalei Inst. of Epidemiology and Microbiology). *Med. Radiol.* **2**, 41-5(1956). (In Russian).

Chemotherapy using several antibiotics combined with vitamin therapy was applied to monkeys exposed to lethal doses of x radiation. The best results were obtained with parenteral application of penicillin and streptomycin in combination with peroral doses of levomycin and streptomycin. The results confirm the important part played by the auto-infection and bacteremia and show the organism's capacity for restoration of tissues and functions when complications caused by infections are eliminated. NSA 10-9084

8288

Rochester, N. Y. Univ. Atomic Energy Project. RADIATION CATARACTS. L. W. Tuttle. June 20, 1956. 8p. Contract W-7401-eng-49. (UR-443).

Among the approximately 8000 exposed survivors of the Hiroshima and Nagasaki bombings who have been examined during the decade following their exposure to nuclear radiations, there have been found 10 cases of severe cataract, approximately 25 cases with slightly unpaired vision, and perhaps two hundred cases with

minimal lenticular changes detectable only by careful aM1-lamp examination by specially trained personnel. It may be concluded that the Japanese atomic bomb explosions have resulted in negligible loss of vision to date. NSA 10-8138

8289

EFFECTS OF X RAYS ON THE REGENERATION OF MUSCULAR TISSUE. T. N. Tuzhilkova (Pavlov, Leningrad Med. Inst.). Med. Radiol. 1, No. 4, 14-21(1958). (In Russian).

Intact leg of adult white mice was locally irradiated before or after mechanical damage. Irradiation with doses as high as 3000 r had little effect on the muscle, but irradiation with 1500 or 3000 r prior to trauma decreased the rate of regeneration and increased the size of the wound. Even 6 months after 3000 r, regeneration ability of irradiated muscle was not back to normal. When the trauma occurred the 2nd day after 6000, 3000, or 1500 r irradiation, the muscle regeneration pattern was similar to that with trauma before irradiation, but only 6000 r had a marked effect when the trauma was on the 6th day after irradiation. On the other hand, 3000 r caused rapid development of radiation damage, with destructive changes in the skin. Both damage and repair were faster when accompanied by further mechanical damage, which tended to increase the proliferation. Healing process was observed microscopically in histological sections of muscle and epithelium.

NSA 11-849

8290

California. Univ., Los Angeles. Atomic Energy Project. QUARTERLY PROGRESS REPORT FOR THE PERIOD ENDING SEPTEMBER 30, 1954. Oct. 1, 1954. Decl. Mar. 20, 1956. 121p. Contract AT-04-1-gen-12. (UCLA-307).

Includes reports on: Kinetics of Radiation Inactivation of microorganisms (A. Norman, p. 60), Studies of Late Effects of Roentgen Irradiation (L. R. Bennett, p. 64), Effect of Heavy X Irradiation on the Functional Activity of the Anterior Lobe of the Pituitary Gland Transplanted into Young Tadpoles (B. M. Allen, p. 67), and Effect of Irradiation on the Constituents of Embryonic Serum (O. A. Schjeide, p. 68). NSA 11-2233

8291

RADIATION-INDUCED CHANGES IN REACTIVITY IN BOVINE FIBRINOGEN. P. Rieser and R. J. Rutman. Nature 178, 257-58(1957).

Authors studied the direct effect of low doses of radiation on fibrinogen. The radiation induced a defect in clotting and leads to a specific alteration of the fibrinogen molecule.

8292

California. Univ., Los Angeles. Atomic Energy Project. QUARTERLY PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1954. Dec. 1, 1954. Decl. Mar. 20, 1956. 124p. Contract AT-04-1-GEN-12. (UCLA-320).

Progress in: irradiation and fat absorption, nucleic acids; tribromostearic acid and hexabromostearate; edema formation and histamine excretion; Mg content in blood plasma, reticulo-endothelial system stimulation; phagocytic function of the reticulo-endothelial system, nonradioactive Sr in intake by humans; oxidation of ammonia by hypobromic acid and peroxide production, and exhaustion to activity of lactobacilli; plasma lipoproteins; radiation and solubility of Cu, Ag, H₃PO₄; metabolism of fission products. (See UCLA-307). NSA 11-2237

8293

California. Univ., Los Angeles. Atomic Energy Project. QUARTERLY PROGRESS REPORT FOR PERIOD

ENDING MARCH 31, 1955. Apr. 10, 1955. Decl. Mar. 6, 1957. 111p. (UCLA-329).

Includes reports on: effects of total body irradiation on excretion of histamine by rats, blood Cu level in irradiated burros, protective effects of R-E stimulants in irradiated mice, rats and rabbits, phagocytosis in irradiated animals.

8294

California. Univ., Los Angeles. Atomic Energy Project. QUARTERLY PROGRESS REPORT FOR PERIOD ENDING JUNE 30, 1955. July 1, 1955. Decl. Mar. 20, 1956. 96p. Contract AT-94-1-GEN-12. (UCLA-338).

Includes reports on: mouse leukemia, histamine excretion in irradiated rats, effects of liver and spleen shielding on the serum Fe in irradiated rabbits; x ray protective effects of intestinal extracts and bulbocapnine HC1 in mice, work capacity of irradiated rats, protective effect of R-E stimulation in irradiated rabbits.

NSA 11-1725

8295

California. Univ. Los Angeles. Atomic Energy Project. QUARTERLY PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 30, 1955. Oct. 10, 1955 Decl. Jan. 13, 1956. 113p. Contract AT-04-1-Gen-12. (UCLA-345).

Progress is reported on the following studies: the effects of radiation on proteins of blood sera from rats and humans, the extraction of ribonucleic acid from yeast; the effects of x irradiation on the metabolism of fatty acids on rats, the synthesis of fatty acids, the effect of zymosan on survival time in irradiated mice; the development of test procedures for the evaluation of the phagocytic function of the reticulo-endothelial system. NSA 10-6103

8296

California. Univ., Los Angeles. Atomic Energy Project. QUARTERLY PROGRESS REPORT FOR PERIOD ENDING JUNE 30, 1956. July 1, 1956 Decl. March 6, 1957. 112p. Contract AT-04-1-GEN-12. (UCLA-371).

Includes reports on: effect of pre-exposure intravenous iron on postirradiation hyper-ferremia, effects of pharmacological agents on radiation injuries; particle and ciliary size on pulmonary adsorption and distribution of particles; irradiation effects on; rat blood pressure, chemical composition of embryonic blood serum; uptake and metabolism of fission products by plants. (See UCLA-362).

8297

California. Univ., San Francisco. School of Medicine Radiological Lab. SEMI-ANNUAL REPORT FOR PERIOD ENDING DECEMBER 31, 1955. 59p. Contract AT-11-1-GEN-10, Project No. 2. (UCSF-12).

Reports data on: Comparative RBE of 1000 and 250 KV x rays in terms of (1) dose-survival curves of haploid and diploid yeast irradiated in resting stage, (2) mortality studies on adult CAF, mice and (3) dose response curves for mouse testicular weight. Also reports on cortisone effect on radiation reaction in rat lung. NSA 10-3166

8298

California. Univ., San Francisco. School of Medicine. Radiological Lab. SEMI-ANNUAL REPORT FOR PERIOD ENDING JUNE 30, 1956. July 1956. 22p. Contract AT-11-1-GEN-10, Project No. 2. (USC-13).

Biology. Progress in: determinations of the biological effectiveness of 1000-kvp x radiation for a number of biological test objects, influence of strain on the acute x radiation lethality in the mouse; radiosensitivity of

hamsters; late effects of whole-body x irradiation on the mouse; and the effects of partial-body irradiation in the dog. NSA 11-21

8299

California. Univ., San Francisco. School of Medicine. Radiological Lab.
SEMIANNUAL REPORT FOR PERIOD ENDING DECEMBER 31, 1956. Feb. 1957. 21p. Contract AT-11-1-GEN-10, Project No. 2, (UCSF-14).

Data are presented on: the relative biological effectiveness of various energies of x radiation for a variety of test organisms; influence of age and strain on radiosensitivity of mice; the LD₅₀ for rats exposed to x radiation; and methods for enumerating blood platelets. The skin response of cancer patients treated with the synchrotron x-ray beam. A list of publications is included. NSA 11-6596

8300

ELEVENTH SEMIANNUAL REPORT OF THE ATOMIC ENERGY COMMISSION. United States Atomic Energy Commission U. S. Government Printing Office (1952).

8301

TWELFTH SEMIANNUAL REPORT OF THE ATOMIC ENERGY COMMISSION. United States Atomic Energy Commission U. S. Government Printing Office, Washington, D. C. (1953).

8302

EFFECTS OF ATOMIC WEAPONS. United States Department of Defense and United States Atomic Energy Commission U. S. Government Printing Office (1950).

8303

LIVER DAMAGE AND HEPATOMAS IN MICE PRODUCED BY RADIOACTIVE COLLOIDAL GOLD. A. C. Upton, J. Furth and V. T. Burnett, Jr. (Oak Ridge National Lab., Tenn.). Cancer Research 16, 211-15(1956). Mar.

Colloidal radioactive Au¹⁹⁸ was injected intravenously into mice in large doses in an attempt to produce neoplasms of the reticuloendothelial cells. The Au¹⁹⁸ became rapidly concentrated in these cells, over 80% being retained in the liver. Of eight mice receiving 475 to 1350 μ c, seven died within 2 weeks with leukopenia, necrosis of the bone marrow, and hepatic degeneration, and one mouse surviving 9 months died with cirrhosis. A dose of 44 to 160 μ c of Au¹⁹⁸, estimated to deliver 850 to 3400 rep to the liver, caused no early deaths but produced chronic liver damage in 45 to 83% and hepatomas in 10 to 26% of mice injected. In five of 31 livers examined microscopically, foci of ossification with marrow formation were noted. The incidence of leukemia was not significantly altered, and neoplasms of reticuloendothelial cells were not produced by the colloidal Au¹⁹⁸. An increase in the incidence of pulmonary adenomas occurred in mice receiving both radioactive and nonradioactive colloidal gold. NSA 10-6474

8304

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF NEUTRONS, X-RAYS, AND GAMMA RAYS FOR THE PRODUCTION OF LENS OPACITIES; OBSERVATIONS ON MICE, RATS, GUINEA-PIGS, AND RABBITS. A. C. Upton, K. W. Christenberry, G. S. Melville, J. Furth, and G. S. Hurst (Oak Ridge National Lab., Tenn.). Radiology 67, 686-96(1956).

For the production of cataracts in mice, rats, and guinea pigs, cyclotron neutrons of 1 to 2 Mev mean effective energy, administered at high intensity, were two to four times as effective as 250-kvp x rays and three to four times as effective as 1.2-Mev gamma rays, fission neutrons from an experimental nuclear detonation and thermal neutrons had a similar cataractogenic effectiveness in mice. The radiosensitivity of the lens varied appreciably with species, the mouse, rat, guinea-

pig, and rabbit exhibiting decreasing sensitivity in the order listed, all being presumably more sensitive than man. With fractionation of neutron or gamma irradiation, there appeared to be only slight, if any, reduction in dose effectiveness at low dose levels in mice. The RBE of fast neutrons of 2 to 3 Mev mean energy (Po-B) administered at relatively low intensities was approximately 9 for induction of mild opacities in mice and appeared to be greater than 9 for the production of threshold lens damage, the relative cataractogenic effectiveness of these and of the other fast neutrons varying inversely with the dose and with the severity of lens injury. NSA 11-871

8305

LEUKEMIA INDUCTION IN MICE BY FAST NEUTRON IRRADIATION. A. C. Upton, G. S. Melville, Jr., M. Slater, F. P. Conte, and J. Furth (Oak Ridge National Lab., Tenn.). Proc. Soc. Exptl. Biol. Med. 92, 436-8(1956). NSA 10-9945

8306

Department of Commerce, Washington, D. C.
U. S. ARMY PANEL DISCUSSION ON RADIATION PRESERVATION OF FOOD. U. S. Department of Commerce Second Annual Atomic Energy Exhibition. April 17, 1956. 22p. (PB-121103).

Status of radiation preservation of food is reviewed. Results indicate that radiation treatment will preserve food for prolonged storage without refrigeration. The irradiated foods are not toxic, harmful, or radioactive. Not all foods respond favorably from the color, odor, taste, and texture aspect, but even some of these will yield to further research. Effects of pasteurization and sterilization doses on various foods, and the problem of consumer acceptance are discussed. NSA 10-9039

8307

EFFECTS OF IONIZING RADIATION ON INTESTINAL ACTIVITY. Yu. N. Uspenski (Astrakhan Med. Inst.). Med. Radiol. 1, 66-8(1956). (In Russian). NSA 10-9083

8308

RADIATION STRICTURE OF SMALL INTESTINE. R. E. Anderson, L. J. Witkowski and G. V. Pontius. Surgery 38, 605-9(1955).

Ulceration of the gastrointestinal tract may be a late effect of therapeutic irradiation. The lesions are secondary to vascular sclerosis.

8309

Western Reserve Univ., Cleveland. Atomic Energy Medical Research Project.
EFFECT OF X-IRRADIATION ON RAT SPLEEN ADENYLATE KINASE. Edwin M. Uyeki. Jan. 31, 1956. 13p. Contract W-31-109-eng-78. (NYO-4926).

Marked increase in activity of adenylate activity in spleens of rats followed exposure to sublethal doses of x rays. Activity was greatest at 3 days post-irradiation, followed by gradual return to normal enzyme activity. Results indicate that increase in adenylate kinase activity may contribute to a decrease in adenosine nucleotide content of spleen tissue brought about by x irradiation. NSA 10-3897

8310

EXPERIMENTAL INVESTIGATION OF THE QUESTION OF X-RAY SENSITIVITY OF BONE GROWTH IN ANIMALS. Pieter Van Caneghem and Carl Georg Schirren. Strahlentherapie 100, 433-4(1956). (In German).

Authors report results of studies on effect of hardness, total dose (1200 r and 12,000 r) and dose for fractionation of the effect of x rays on cartilages of the tarsometatarsal articulation of the chicken. Effects are contrasted with those observed in other tissues composed of dividing cells. NSA 11-40

8311

RELATIONSHIP BETWEEN CHANCES OF SURVIVAL AND REGENERATION OF HEMATOPOIETIC TISSUE IN IRRADIATED RATS. J. Van Lancker (Univ. de Louvain, Belgium). J. Natl. Cancer Inst. 18, 407-12 (1957).

The correlation of the chance of survival and degree of regeneration of bone marrow and spleen was studied in group of 67 rats that received 700 r after hepatic zone was shielded. Animals that died spontaneously did not regenerate bone marrow and spleen, but 44% of sacrificed animals regenerated hematopoietic tissue early (before 8th day). After 30 days all animals that survived had regenerated bone marrow and spleen. (from authors' summary.) NSA 11-5153

8312

THE INFLUENCE OF SERUM ALBUMIN FRACTIONS IN CANCER DURING FRACTIONAL ROENTGEN IRRADIATION. A. Verhagen and F. Meibusr. Strahlentherapie 99, 162-5 (1956). (In German).

Roentgen irradiations of patients suffering from gynecological carcinoma results in a shift of the serum albumin fractions, which is detectable in the electrophoresis pattern. Data are tabulated from a series of studies. NSA 10-6488

8313

EFFECTS OF ROENTGEN IRRADIATION ON THE TUMOR BED. II. THE INHIBITING ACTION OF DIFFERENT DOSE LEVELS OF LOCAL PRETRANSPLANTATION ROENTGEN IRRADIATION ON THE GROWTH OF MOUSE MAMMARY CARCINOMA. H. Vermund, K. W. Stepstrom, D. G. Mosser, and E. A. Johnson (Univ. of Minnesota Medical School, Minneapolis). Radiation Research 5, 354-64 (1956). NSA 11-860

8314

BIOLOGICAL ROLE OF POTASSIUM-40. A. P. Vinogradov. (Academy of Sciences, Moscow). Nature 179, 308-9 (1957).

A study was made on *Aspergillus niger* in order to determine whether the presence of K^{40} in an organism has any significance in its life. It was shown that the growth of this organism proceeded in proportion to the concentration of K in the culture medium, regardless of isotopic composition. NSA 11-4223

8315

BIOLOGICAL ROLE OF K^{40} RADIOACTIVITY ON ANIMALS. A. P. Vinogradov and V. V. Koval'skii (Vernadskii Inst. of Geochemistry and Analytical Chemistry). Doklady Akad. Nauk S. S. S. R. 113, 315-18 (1957). (In Russian).

It has been found that the K^{40} radioactivity does not affect the biological and chemical reactions in the muscles of animals. NSA 11-8771

8316

ON THE EFFECT OF NUCLEAR RADIATION OF PLANTS. P. A. Vlasyuk and D. M. Grodzinskii. (Inst. of Plant Physiology and Agrochemistry). Doklady Akad. Nauk S. S. S. R. 106, 562-4 (1956).

Ionizing radiation produced 2-phase reactions. Small doses intensified physiological functions, large doses depressed them and undermined cell and tissue functions although eventually recovery occurred. Typical 2-phase reactions were observed in study of effects of Ca^{45} and P^{32} on *Saccharomyces cerevisiae* and in *Uromyces onobrychides*. From experiments using sugar beet leaves and oat seeds, it was concluded that effects of ionizing radiation are determined by the functional condition of the growing organism or by the condition of its separate organism and tissues. It is suggested that radiation may also provide background excitation for plants. NSA 10-8146

8317

EFFECTS OF SMALL DOSES OF IONIZING RADIATIONS ON OXIDATION-REDUCTION PROCESSES IN PLANTS. P. A. Vlasyuk, Z. M. Klimovitskaya, and E. S. Kosmatii (Ukraine Inst. of Plant Physiology and Agrochemistry). Doklady Akad. Nauk S. S. S. R. 106, 731-4 (1956). (In Russian).

Tracer studies of radioactive Ca^{45} (5 to 10 μ c per plant) effect on sugar beet yield and the effects of small doses of P^{32} , Ca^{45} , and S^{35} in the food supply of sugar beets and clover are tabulated and discussed. The studies established that in the early stages of growth of sugar beets the ionizing radiation increased the oxidation and lowered the reduction processes. Considerable increase of reduction processes over the oxidation which resulted in richer sugar beet yield were observed towards the end of the vegetative period. Larger ionizing radiation doses in clover plants increased oxidation and suppressed the reduction process. In clover plants small doses of radioactive S^{35} have intensified the oxidation, the tissue iodo-reducing properties, and the content of reducing forms of ascorbic acid. NSA 10-8147

8318

COMPARATIVE MORTALITY FOLLOWING SINGLE WHOLE BODY EXPOSURES OF MICE TO FISSION NEUTRONS AND Co^{60} GAMMA RAYS. Howard H. Vogel, John W. Clark, and Donn L. Jordan (Argonne National Lab., Lemont, Ill.). Radiology 68, 386-98 (1957).

Curves showing acute lethality following exposure to fission neutrons and Co^{60} γ rays are presented for three dosage groups representing LD_{50} , LD_{50} , and LD_{20} . Probability of death for each 24 hour period is calculated. NSA 11-5165

8319

COMPARATIVE MORTALITY AFTER 24-HOUR, WHOLE-BODY EXPOSURES OF MICE TO FISSION NEUTRONS AND COBALT-60 GAMMA RAYS. Howard H. Vogel, Jr., John W. Clark, and Donn L. Jordan (Argonne National Lab., Lemont, Ill.). Radiation Research 6, 460-8 (1957).

Effects of increasing time of irradiation from 1.5 hrs. to 24 hrs. were studied to test dose-rate dependence in experiments with fission neutrons and Co^{60} γ rays. The 30 day mortality curves are presented and are compared by means of probit regression lines (30 day mortality on dose) representing exposure to each radiation for 1.5-24 hr. irradiation periods. NSA 11-6608

8320

REACTIONS OF TEMPERATURE CONTROL CENTERS IN RABBITS VACCINATED BY PYROGENIC ORGANISMS AFTER TOTAL-BODY EXPOSURE TO X RADIATION. N. A. Volokhova (Inst. of Experimental Medicine). Med. Radiol. 1, No. 4, 25-30 (1956). (In Russian). NSA 11-851

8321

ACTION OF X-RAYS ON NUCLEIC ACID METABOLISM IN JENSEN SARCOMA. H. von Euler and G. Hevesy. Arkiv. Kem. Mineral. Geol. 17A, 60 (1944).

Nucleic acid metabolism in liver, spleen and intestinal mucosa of adult rats was depressed by 1/2 - 1/3 during a period of 2 hr. following total body exposure to 1500-3000 r, an effect similar to that found in Jensen sarcoma. In immature rats whose livers were increasing in weight at a rate of 10.2% per day, the increase in DNA was twice as fast and it was found that for the formation of every 3 DNA molecules, 1 old DNA molecule was lost. When the young rats were x irradiated, the depression of DNA metabolism was depressed to about the same extent as in adult rats. Spreading the dose over a 2 hr. period caused greater depression. Much of the inhibition appears to cease after the 2nd hour post-exposure.

8322

EXPERIMENTAL INVESTIGATIONS ON THE INFLUENCE OF ROENTGEN IRRADIATION ON THE GROWTH OF

MULTIPLE TUMORS. Antero Voutilainen (Univ. of Helsinki and General Hospital, Helsinki). *Acta Radiol.* 47, 149-56(1957).

The effects of roentgen irradiation on multiple ITB tumors transplanted subcutaneously into rats were studied. A tumor in the interscapular region was irradiated with 10 daily doses of 500 r, and growth phenomena were followed in a non-irradiated tumor in the gluteal region. The growth of this latter was inhibited, its size being significantly smaller, after 10 days of treatment, than that of a corresponding tumor in a non-irradiated control rat. Mitotic activity was found to be significantly less both 5 and 10 days after commencement of treatment. Some tumor inhibiting factor appears to be released from or activated by the irradiated tumor. NSA 11-5140

8323

DEPENDENCE OF THE LATENT PERIOD OF BIOLOGICAL RADIATION REACTION ON THE DOSAGE LEVEL. Felix Wachsmann and Apostolos Yiannakopoulos. *Strahlentherapie* 100, 428-32(1956). (In German).

In pea seeds, retardation of root growth increases with increasing doses, the latent period is not influenced. Doses up to 100,000 r produced an effect on latent period of epitheliolysis and necrosis of rat tails, less on latent period on erythema. Increasing the dose to 15,000,000 r caused further shortening of the latent period as well as thinning of the tail. (from authors' summary). NSA 11-39

8324

EFFECT OF SURFACE RIPENED CHEESE OF IRRADIATION OF SPORES AND TOXIN OF CLOSTRIDIUM BOTULINUM TYPES A AND B. R. O. Wagenaar and G. M. Dack (Univ. of Chicago). *Food Research* 21, 226-34(1956). NSA 10-9045

8325

School of Aviation Medicine, Randolph AFB, Tex. SERUM PROTHROMBIN TIME PROLONGATION FOLLOWING TOTAL-BODY X-IRRADIATION IN MAN. Niel Wald. (Dec. 1955). 5p. (AF-SAM-55-65).

Hematological studies were carried out on 41 patients with disseminated neoplastic disease, receiving therapeutic whole-body x irradiation. An increase in the average serum prothrombin time and in the incidence of prolonged serum prothrombin times was found after irradiation. Greater sensitivity resulted when pure fibrinogen was used in place of prothrombin-free plasma in the one-stage serum prothrombin test. NSA 10-7387

8326

CYTOLOGICAL ANALYSIS OF X-RAY INDUCED MUTATIONS AT EIGHT SPECIFIC LOCI IN THE THIRD CHROMOSOME OF DROSOPHILA MELANOGASTER. Calvin L. Ward and Mary L. Alexander (Oak Ridge National Lab., Tenn., Duke Univ., Durham, N. C., and Univ. of Texas, Austin). *Genetics* 42, 42-54(1957). NSA 11-8605

8327

LONGEVITY AND CAUSES OF DEATH FROM IRRADIATION IN PHYSICIANS. Shields Warren. *J. Am. Med. Assoc.* 162, 464-8(1956).

In a study of Deaths of 82,441 physicians in 1930-1954, it was found that radiologists die on the average 5.2 years earlier than do other physicians. Non-radiology specialist exposed to radiation show shortening of life but less than radiologists. Radiation exposure is the predisposing factor in the life shortening. Precautions employed by some radiologists have not been adequate to protect them. Present standards appear adequate, but more determined effort should be made to live up to them. (from authors' summary). NSA 11-846

8328

THE RESPONSE OF EXPLANTED HUMAN TUMOR TO

RADIATION. Shields Warren and Olive Gates (Harvard Univ. and New England Deaconess Hospital, Boston, Mass.). *Cancer Research* 17, 163-6(1957).

In general, human tumors growing in hamsters varied in radiosensitivity to about the same extent as their general type appeared to do in man. Some transplanted cancer cells survived heavy doses of radiation and retained their ability to proliferate as long as fresh supporting tissues were provided. The authors emphasize that various cells from the same tumor may show significant differences in their radiosensitivity. NSA 11-6196

8329

AN INTERPRETATION OF ORGAN WEIGHT CHANGE INDUCED BY TOTAL-BODY IRRADIATION S D Warshaw (The Univ. of Chicago, Ill.). *Radiation Research* 5, 634-49(1956).

A simple mathematical model is introduced which attempts, with some success to correlate the normal growth pattern of an organ with time dependence of its weight after exposure. One simple result of model is that it predicts "insensitive fraction" of organ weight. Model is applied to two conventional experiments and is found to be consistent with the observations if gross qualitative features are emphasized. It is concluded that this model may or may not be adequate to cover any but a small class of problems involving response of large organism where response of only a small part of it is observed. For the determination of clinically important quantities like the RBE, the technique of observing organ weight changes is probably a valid one. Organs studied: rat spleen, thymus, mesenteric lymph nodes and cervical nodes. NSA 11-2790

8330

RADIATION PROCESSING OF FOODS. R. H. Wasserman (Oak Ridge Inst. of Nuclear Studies, Tenn.). *J. Am. Dietet. Assoc.* 33, 33-6(1957).

Recent advances in the processing of foods by exposure to ionizing radiations are reviewed. NSA 11-4235

8331

California. Univ., Berkeley. Radiation Lab. THE DISTRIBUTION AND ACUTE EFFECTS OF LARGE DOSES OF IODINE-131 IN THE RAT. R. W. E. Watts and Patricia W. Durbin. Apr. 13, 1956. 16p. Contract W-7405-eng-48. (UCRL-3376).

Authors compared isotope distribution in tissues of 2 groups of rats injected intravenously with (1) 30 $\mu\text{C}/\text{g}$ body weight and (2) 0.33 $\mu\text{C}/\text{g}$ body weight. Observations on body weight change, blood picture and histology of many tissues from both dosage groups are reported. NSA 10-6464

8332

ON THE PATHOLOGICAL ANATOMY OF ROENTGEN ANEMIA. C. Wegelin. *Beitr. pathol Anat. u. allgem. Pathol.* 84, 299(1930).

The pathological anatomy of anemias developing in persons receiving chronic occupational exposure to x rays is discussed. Autopsy findings include: aplastic marrow and hematological changes like those seen in panmyelophthisis, with increased numbers of pigment-containing phagocytes.

8333

School of Aviation Medicine, Randolph AFB, Tex. TIME TREND OF HYPERLIPOPROTEINEMIA AFTER RADIATION INJURY. Norman Weiner, Harry G. Albaum, and Lawrence J. Milch. (1955). 8p. (AF-SAM-55-139).

Rabbits subjected to local radiation injury were found to develop, during the first week post-exposure, elevated plasma lipid levels which persisted for several weeks thereafter. The time curves of individual lipid and lipoprotein components are presented. Muscle histology

and ATP levels are presented to show progression of local tissue changes after radiation. NSA 10-7389

8334

THE EXPERIMENTAL ROENTGEN DAMAGE OF THE HEART MUSCLES. A. Werthemann. *Strahlentherapie* 38(4), 702-9(1930). (In German).

In 2 series of experiments on 11 rabbits, x-ray injuries to heart muscle, including injuries to parenchyma and changes in interstitial connective tissue, were observed. BA 6-16354

8335

California. Univ., Berkeley. Radiation Lab. CALIFORNIA CATTLE THYROID ACTIVITY ASSOCIATED WITH FALLOUT, 1955. Margaret R. White and Ernest L. Dobson. Mar. 28, 1956. 14p. Contract W-7405-eng-48. (UCRL-3355).

Thyroids from cattle were collected from February until September 1955 and followed for radioactivity. A period of elevated radioactivity was noted, which lasted from the end of March until the end of July. The total maximum beta-ray doses during this period was approximately 1 rep. This was maximum, not the average, dose delivered to the thyroid tissue studied. Evidence indicating that the radioactivity was taken into the body through food is presented. NSA 10-3899

8336

DIFFERENCES IN RESPONSE OF IRRADIATED EGGS AND SPERMATOCYTES OF *HABROBRACON* TO ANOXIA. Anna R. Whiting and W. L. Murphy (Oak Ridge National Lab., Tenn. and Univ. of Pennsylvania). *Genetics* 54, 297-303(1956).

Authors studied induction by x rays of dominant and recessive lethal and visible mutations in eggs and spermatozoa of *Habrobracon* exposed in air or in nitrogen. Eggs irradiated while in metaphase I or prophase I showed more dominant and recessive lethal mutations than did sperm. In metaphase I eggs, dominant lethal mutations associated with isochromatic breaks, lateral sister union and with conditions preventing restitution, decreased in the same ratio as did recessive lethals and visible mutations. The greater frequency of mutations in eggs suggests that mutation induction may be related to the greater amount of cytoplasm. (from authors' summary.) NSA 11-5719

8337

A NEW APPROACH TO THE MATHEMATICAL THEORY OF THE ACTION OF HIGH-ENERGY RADIATION ON SINGLE CELLS. I. FORMULATION OF THE THEORY. Robert A. Wijsman (National Institute of Health, Public Health Service). *Radiation Research* 1, 257-69(1956).

Discussion is centered around the yeast cell. Yeast cells of different ploidy respond very differently to radiation. Interaction between radiation and genetic material takes place in 2 different ways classified as direct action and indirect action. Theoretical expressions for probability of survival of an irradiated cell are complicated and uncertain. A new approach is proposed whereby the survival probability under any kind of high energy radiation is expressed in terms of survival probability under X rays. (from authors' summary). NSA 10-7419

8338

NUCLEAR RADIATION AT HIROSHIMA AND NAGASAKI. Robert R. Wilson (Cornell Univ., Ithaca, N. Y.). *Radiation Research* 4, 349-59(1956).

Data are reviewed on the radiation dosage due to neutrons and γ -rays from atomic explosions received by residents of Hiroshima and Nagasaki. NSA 10-9027

8339

A NEW APPROACH TO THE MATHEMATICAL THEORY OF THE ACTION OF HIGH-ENERGY RADIATION ON

SINGLE CELLS. II. CONSEQUENCES OF THE THEORY. Robert A. Wijsman (National Institutes of Health, Public Health Service). *Radiation Research* 4, 270-7(1956).

This paper is concerned with various theoretical implications of a previously derived formula for probability of survival of a single cell subjected to any type of high energy radiation. If the size of the nucleus depends on ploidy, some of the theoretical implications have to be modified slightly. In all instances tested, theoretical implications agree with experimental results.

NSA 10-7420

8340

THE EFFECT OF X RAYS ON THE UPTAKE OF PHOSPHORUS BY THE KNEE JOINT AND TIBIA OF SIX-WEEK-OLD MICE: RELATION OF DEPRESSION OF UPTAKE TO X-RAY DOSE. C. W. Wilson (Westminster Hospital, London). *Brit. J. Radiol.* 29, 571-3(1956). NSA 11-28

8341

THE EFFECT OF X RAYS ON THE UPTAKE OF ^{45}P BY THE KNEE JOINT AND TIBIA OF SIX-WEEK-OLD MICE. A COMPARISON OF THE EFFECTS PRODUCED BY EQUAL DOSES OF 200 KV AND 2 MEV X RAYS. C. W. Wilson (Westminster Hospital, London). *Brit. J. Radiol.* 30, 92-4(1957). NSA 11-4789

8342

COMPARISON OF THE SKIN AND DEPILATORY REACTION PRODUCED IN THE LEGS OF MICE BY 2000 R OF 200 KV AND 2 MEV X RAYS. C. W. Wilson (Westminster Hospital, London). *Brit. J. Radiol.* 30, 269-70(1957). NSA 11-7053

8343

PROTEIN CONTENT AND COMPOSITION OF RAT SERUM AS RELATED TO AMOUNT OF WHOLE-BODY X IRRADIATION. C. Winkler and G. Paschke. (Roentgenabteilung der Chirurgischen-Universitäts-Klinik, Bonn, Germany). *Radiation Research* 5, 156-61(1956).

This article gives a brief report on electrophoretic examination of rat blood serum after various light doses of x radiation. It is shown that characteristic changes in the serum protein composition occur in accordance with the amount of the dose. Therefore it can be assumed that it is possible, from the manner and degree of the changes in connection with the time necessary for their formation, to determine the degree of destruction caused by the irradiation. (From authors' summary). NSA 10-9955

8344

DO THE ROENTGEN RAYS HAVE ANY KIND OF INFLUENCE ON BACTERIA? J. Wittlin. *Centr. Bakteriolog. Parasitenk., Abt. 11*, 2, 676-677(1896).

8345

BLOOD CHANGES IN RADIUM WORKERS IN JOACHIMSTHALS. A. Woldrich. *Med. Klin. (Munich)* 27, 17-19(1931). (In German).

The author reports results of blood studies on 21 miners retired for at least 4 years, 8 active miners, 8 uranium mill workers and 2 laboratory workers. There was a tendency towards mild anemia and slight leukopenia.

8346

INACCURACY OF ANAPHASE BRIDGES AS A MEASURE OF RADIATION-INDUCED NUCLEAR DAMAGE. Sheldon Wolff and H. P. Luippold (Oak Ridge National Lab., Tenn.). *Nature* 179, 208-9(1957).

Discrepancy between experimental results and the expected one-hit or two-hit curves appears to be due to an artefact that is significant when anaphase bridges are scored. Cause of the artefact is not known. At low doses there were nearly as many aberrations detectable at anaphase as at metaphase but as dose increased, the discrepancy between curves representing anaphase

and metaphase increased. Metaphase curves are a more accurate indicator of the amount of nuclear damage. NSA 11-4241

8347

THE BIOCHEMICAL ASPECTS OF CHROMOSOME REJOINING. Sheldon Wolff and H. E. Luttpold. p.217-21 of INTERNATIONAL CONFERENCE ON RADIOBIOLOGY. Fourth, Cambridge, England, August 1955. Progress in Radiobiology. J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. London, Oliver and Boyd, Publishers and Springfield, Ill. Charles C. Thomas, Publishers. 1956. 557p.

Seeds of *V. faba* were soaked for 24 hours and then exposed to a 600 r dose of x rays *in vacuo* to produce chromosome breaks that remained open for 30 min. Immediately after irradiation, various enzyme inhibitions were added in an attempt to prevent rejoining and 75 min. later a second x ray dose of 400 r was delivered and effect on chromosome breaking and rejoining was observed. Effect of dose rate on rejoining was also tested. A generalized scheme for production of 2-hit aberrations by irradiation is presented as schematic drawings. NSA 11-5158

8348

OBSERVATIONS ON GASTROINTESTINAL FUNCTION AFTER X-RAY AND THERMAL COLUMN EXPOSURES. I. EFFECT ON THE PROGRESS OF BARIUM MEAL. BODY WEIGHT, AND SURVIVAL. Kent T. Woodward and Samuel M. Rothermel (Los Alamos Scientific Lab., N. Mex.). Radiation Research 5, 441-9(1956).

Doses as small as 50 rep induced gastric retention of Ba in rats. The effect was greater and persisted longer following higher doses. Body weight increase was directly proportional to x ray dose and thermal neutron doses in the range 1200-9000 r. Surgical removal of the pylorus had no effect on gastric retention. Gastrectomized irradiated rats lost weight comparable to that lost by unoperated irradiated animals. Diminished food intake and weight loss are not related to acute gastric retention and dilatation. NSA 11-865

8349

THE EFFECT OF CATHODE RAYS UPON CERTAIN BACTERIA. R. W. G. Wyckoff and T. M. Rivers. J. Exptl. Med. 51, 921-932(1930).

For the two motile bacilli, *B. coli* and *B. aertryke*, the absorption of a single 155 K^v electron is sufficient to cause death. All, or nearly all, electrons absorbed are lethal. The same is true of *Staphylococcus aureus*. Radiation of the energy content used in these experiments is not suitable for altering inheritable characteristics of bacteria. (from authors' summary).

8350

THE KILLING OF CERTAIN BACTERIA BY X RAYS. R. W. G. Wyckoff. J. Exptl. Med. 52, 435-46(1930).

8351

EFFECT OF CATHODE RAYS UPON CERTAIN BACTERIA. R. W. G. Wyckoff and T. M. Rivers. Proc. Soc. Exptl. Biol. Med. 27, 312-14(1929-30).

8352

THE RADIATION SENSIBILITY OF THE BONES IN THE IMPORTANCE OF THE X-RAY TREATMENT OF JOINT TUBERCULOSIS. Walter Wynen. Munch. med. Wochenschr. 76(6), 244-46(1929). (In German).

Bones are better x-ray filters and are more x-ray resistant than most body tissues. Use of x-ray therapy in tuberculosis is described. BA 6-15769

8353

CHEMICAL AND BIOLOGICAL ALTERATIONS INDUCED BY IRRADIATION OF I¹³¹-LABELED HUMAN SERUM ALBUMIN. Rosalyn S. Yalow and Salomon A. Berson (Veterans Administration Hospital, Bronx 68, N. Y.). J. Clin. Invest. 36, 44-50(1957).

Biological alteration due to irradiation rendered albumin susceptible to rapid metabolic degradation *in vivo*. The effect was detectable when protein concentrations were 5 mg/ml or less and radiation doses were comparable to those received in 1 wk. by solutions initially containing at least 0.8 mc I¹³¹/ml. Magnitude of protein change was a direct function of radiation dose and was inversely related to the protein concentrations during irradiation. Potential radiation damage to I¹³¹ labeled proteins of high specific activity is discussed and a method for preventing radiation damage is suggested. (from authors' summary). NSA 11-4237

8354

THE EFFECTS OF COMBINED RADIATIONS ON CROSSING OVER IN *DROSOPHILA MELANOGASTER*. Henry T. Yost, Jr. and Robert N. Benneyan (Amherst Coll., Mass.). Genetics 42, 147-60(1957).

Infrared radiation for 24 hour at 10°C is unable to modify ionizing radiation effect on induction of crossing over. Data are considered in light of other work on induced crossing over. Infrared radiation may be one way to determine correspondence between chiasmata formation and genetic crossing over. NSA 11-8773

8355

CERTAIN PECULIARITIES IN THE EFFECTS OF RADIOACTIVE SUBSTANCES IN ORGANISMS. D. I. Zakutinski. Med. Radiol. 1, 63-70(1956). (In Russian).

Various radioactive elements were administered to white rats in various ways and animals were observed while living and after death. The intensity of the radiation, the rate of radioactive substances from the organism were shown to be related to their aggregate state, the carrier, their physico-chemical and chemical properties, the mode of entry of the radioactive substances into the organism, and the initial functional state of the organism on which they acted. Radioactive substances remaining in the organism for a long time, being a constant source of radiation, caused serious after effects. There was long term sexual damage, and progeny of animals containing radioactive substances were also carriers of these substances. Viability of the progeny was affected, with a lag in organ development and depression of immunity. In long-surviving damaged animals, malignancies developed and there was a clear relation between distribution of the radioactive substance and tumor induction. Some of the damaged animals aged early, and showed greatly decreased immunity. Histological studies in animals that died are reported. NSA 10-9051

8356

DELAYED PATHOLOGICAL EFFECTS INDUCED BY IONIZING RADIATION. D. I. Zakutinski. Med. Radiol. 2, 22-8(1957). (In Russian).

Results of experimental studies of late effects of ionizing radiations are described, including a decreased resistance to infection after either large single doses or prolonged chronic exposure, an increased propensity to develop blood diseases, altered sexual function, decreased fertility (with a high proportion of nonviable offspring). After prolonged exposures to radioactive isotopes, a variety of tumors of many tissues developed, and life span was markedly decreased. NSA 11-5722

8357

X-RAY STUDIES ON HYDRAS. A. A. Zawarzin. Z. Wiss. Biol. Abt. D. Wilhelm Roux Arch. Entwicklungsmech. Organ. 115, 1-26(1929). (In German).

Acceleration, stimulation or retardation of asexual reproduction and regeneration in hydra following x-irradiation is described. There is a stimulating action immediately of time which is inversely proportional to dose. No latent period was observed after x irradiation. BA 6-15770

8358

BIOLOGICAL EFFECT OF IONIZING RAYS ON LATENT WHEAT GERMS. Rosina Zdansky. *Strahlentherapie* 99, 129-46(1956). (In German).

Germes of dry wheat grains x rayed with 100 r show retardation or acceleration in certain developmental phases. Retardation is not dependent on temperature; accelerations are observed only in germination temperatures over 18°C. Simultaneous or supplementary applications of sound waves to x-rayed grains causes additional damage and x ray damage is influenced by different temperatures in different seasons. X ray damage is due to ray-induced fractures of chromosome sections of embryonic cells. NSA 10-6487

8359

THE INFLUENCE OF LOCAL X-RAY IRRADIATION ON FUNCTIONAL PROCESSES IN THE CENTRAL NERVOUS SYSTEM. Vladimir Zeleuy. p.403-9 of INTERNATIONAL CONFERENCE ON RADIOBIOLOGY. FOURTH, CAMBRIDGE, ENGLAND, AUGUST 1955. PROGRESS IN RADIOBIOLOGY. J. S. Mitchell, B. E. Holmes, and C. I. Smith, eds. London, Oliver and Boyd, Publishers; Springfield, Ill.: Charles C. Thomas, Publishers. 1956. 557p.

The author studied the effects of x irradiation on rats that had been trained to recognize acoustic or optical stimuli as food signals. The response was pushing a lever. Irradiated rats performed less well than non-irradiated rats. Radiation doses were fractionated so that the irradiation period included the major part of the experimental period.

8360

FORMATION OF BONE CALLUS DURING RADIATION SICKNESS. A. G. Zemlyanoi. *Med. Radiol.* 1, No. 5, 72-4(1956). (In Russian).

Formation of bone callus was delayed in rabbits (with fractures) receiving whole body x ray doses of 800 r. NSA 11-3311

8361

CHANGE IN SUPRARENAL ASCORBIC ACID CONTENT IN GUINEA PIGS FOLLOWING X RADIATION. L. Ya. Zhorno. (Pavlov Leningrad Med. Inst.). *Med. Radiol.* 1, 79-81(1956). (In Russian). NSA 10-9052

8362

ON THE EFFECTS OF IONIZING RADIATION ON THE ANTIGENIC PROPERTIES OF ALBUMEN. L. A. Zil'ber, V. A. Artamonova, G. M. Frank, and A. D. Snezhko (Gamalei Inst. of Epidemiology and Microbiology). *Med. Radiol.* 2, 17-23(1956). NSA 10-9054

8363

AUTOMATIN DOSE AND THE FREQUENCY OF THE HEART BEAT. H. Zwaardemaker and H. Zechuisen. *Arch. ges. Physiol., Pfluger's* 218(5/6), 568-72(1928). (In German).

The frequency of the heartbeat is described as being under the influence of automatin, a hormone produced from automatinogen of the skeletal muscles by activation with x-rays. Normally the K in the tissues plays the role of a radio-active substance. BA 6-16027

8364

INFLUENCE OF RADIATION ON DNA METABOLISM. Alma Howard. p.196-206 of CIBA FOUNDATION SYMPOSIUM ON IONIZING RADIATIONS AND CELL METABOLISM. Little, Brown and Co. Publishers 1956. 318p.

8365

THE INFLUENCE OF OXYGEN ON RADIATION EFFECTS. H. Laser. p.106-115 of CIBA FOUNDATION SYMPOSIUM ON IONIZING RADIATIONS AND CELL METABOLISM. Little, Brown and Co. Publishers 1956. 318p.

8366

EFFECTS OF RADIATION AND PEROXIDES ON VIRAL AND BACTERIAL FUNCTIONS LINKED TO DNA

SPECIFICITY. Raymond Latartet. p.275-297 of CIBA FOUNDATION SYMPOSIUM ON IONIZING RADIATIONS AND CELL METABOLISM. Little, Brown and Co. Publishers 1956. 318p.

8367

THE ACTIVITY OF ENZYMES AND COENZYMES IN IRRADIATED TISSUES. Antoniette Pirie. p.38-54 of CIBA FOUNDATION SYMPOSIUM ON IONIZING RADIATIONS AND CELL METABOLISM. Little, Brown and Co. Publishers 1956. 318p.

8368

THE INDUCTION OF CHROMOSOMAL ABERRATIONS BY IONIZING RADIATIONS AND CHEMICAL MUTAGENS. C. P. Swanson and B. Kihlman. p.239-251 of CIBA FOUNDATION SYMPOSIUM ON IONIZING RADIATIONS AND CELL METABOLISM. Little, Brown and Co. Publishers 1956. 318p.

8369

NATIONAL COMMITTEE ON RADIATION PROTECTION. United States Atomic Energy Commission, Oak Ridge, Tenn. *Isotopics* 2, No. 1, 5(1952).

8370

USE OF RADIOIRON IN HUMANS. United States Atomic Energy Commission, Oak Ridge, Tenn. *Isotopics* 2, No. 2, 2-5(1952).

A review of the findings of the Subcommittee on Human Applications of the Advisory Committee on Isotope Distribution with respect to the physical and physiological factors of importance in determining the safe use of radioactive iron in man. Conclusions of the committee are summarized.

8371

THE ACTION OF RADIOACTIVE SALTS OF URANIUM AND THORIUM ON VEGETATION. C. Acqua. Reference made in *Chemical Abstracts*, Vol. 3, 1909, as follows: *Ann. botan.* 6, 387-401; *Botan. Centr.* 110, 18, 453. CA 3-2580

8372

ACTION OF URANIUM ON THE PLANT CELL. C. Acqua. Reference made in *Chemical Abstracts*, Vol. 6, 1912, as follows: *Arch. farmacol. sper.* 14, 81-4.

Uranium salts impede karyokinesis by acting on the nuclei. U does not kill the cells. CA 6-3435

8373

ACTION OF URANIUM SALTS ON CERTAIN MICRO-ORGANISMS. H. Agulhon and R. Sazerac. Reference made in *Chemical Abstracts*, Vol. 7, 1931, as follows: *Bull. soc. chim.* 11, 868-72, CA 7-1736

8374

THE ACTION OF RADIUM AND ITS EMANATIONS ON THE GERMINATION OF THE HIGHER PLANTS. Herni Agulhon and Robert Therese. *Ann. inst. Pasteur* 29, 261-273(1915). (In French).

There were three series of experiments carried out with various seeds during germination or during the period when the plant embryo lives at the expense of storage reserves. The radiation used was: (1) Ra in a sealed tube, (2) dilute solution of Ra Br and (3) Ra in an unsealed tube so that emanation could diffuse in the closed space in which seeds were growing. Germinating seeds exposed to (1) showed growth inhibition, (2) had no effect on seeds germinating in the solution (3) appeared to stimulate growth. CA 9-2772

8375

THE INFLUENCE OF ROENTGEN RAYS ON CELL DIVISION. W. Alberti and G. Politzer. *Arch. mikroskop. Anat. u. Entwicklungsmech.* 100, 83-109(1924).

Roentgen ray effects on mitosis in the larvae of *Salamandra Maculosa* and a triton species shows 3 periods: (1) decreased mitosis, (2) absence of mitosis, (3)

partial recovery of mitosis. The abnormal cell division observed was analogous to that induced by heat, cold, chemicals and electric current. CA 19-541

8376

THE BEHAVIOR OF THE NUCLEUS OF RADIUM-TREATED SPERMATOZOA OF CYCLOPS AFTER FERTILIZATION. F. Alverdes. Arch. mikroskop. Anat. u. Entwicklungsmech. 47, 375-98(1921).

Sperm cells of *Cyclops viridis* were exposed to RaBr_2 . Eggs fertilized with irradiated sperm developed abnormally when the exposure time was longer than 3 days. CA 16-3346

8377

THE EFFECT OF LARGE DOSES OF X-RAYS ON THE RESISTANCE OF MONKEYS TO EXPERIMENTAL POLIOMYELITIS. H. L. Amoss, H. D. Taylor, and W. D. Witherbee. Proc. Soc. Exptl. Biol. Med. 16, 54-5 (1918-19).

Monkeys were infected with experimental poliomyelitis after being irradiated for 6-7 days. The x-rays were sufficient to reduce greatly the number of circulating lymphocytes, but in non-rayed controls no symptoms were obtained. CA 13-2921

8378

CELLULAR RADIOSENSITIVITY. P. Ancel and P. Vintemberger. Compt. rend. soc. biol. 92, 517-20(1925).

Authors first discussed the significance of observations showing that some cells (and not others) in a given tissue are injured by radiation. They emphasize the fallacy of concluding that the two types of cells necessarily differ in radiosensitivity. Embryonated chick eggs irradiated in the cold and kept cold show no damage following irradiation. This does not mean that the embryo is not radiosensitive, for lesions become apparent if the egg is incubated long enough for embryonic development to commence. Histological studies of testes must be interpreted in the same light. Authors emphasize that manifestations of radiation injury are regulated by modifiers of cellular activity, and it is important to distinguish among (1) the radiolesion, (2) manifestations of lesions, and (3) recovery factors. CA 19-1870

8379

RADIOSENSITIVITY OF DIVIDING CELLS. P. Ancel and P. Vintemberger. Compt. rend. soc. biol. 92, 986-8 (1925). (In French).

It has been found that radiosensitivity of chick blastoderm cells in the resting phase are similar to those undergoing mitosis. CA 19-3547

8380

COMPARISON OF THE EFFECTS OF X-RAYS AND OF AGING ON CHICK EGGS. P. Ancel and P. Vintemberger. Compt. rend. soc. biol. 92, 1401-3(1925). (In French).

X rays produce a rapid change in chick cells which is comparable to the aging of chick eggs from eleven to forty days at 10°C . CA 19-3546

8381

EFFECT OF THE RATE OF DEVELOPMENT OF RADIATED EGGS OF RANA ON ITS SURVIVAL TIME. P. Ancel and P. Vintemberger. Compt. rend. soc. biol. 93, 281-3 (1925). (In French).

The chances of survival of x-irradiated frog eggs are increased by slowing down its development rate. CA 19-3547

8382

EXPERIMENTS ON RADIOACTIVE FERTILIZER. P. Andouard. J. agr. prat. 34, 470-1, 491-2(1920), Expt. Sta. Record 45, 517-18(1920). CA 16-3159

8383

CHANGE OF THE BLOOD'S CHOLESTEROL CAPACITY AFTER DEEP RADIATION. Maria Babarczy. Magyar Orvos Arch. 25, 403-11(1924).

The cholesterol level of the blood was measured by Bloor's colorimetric technique. Radiation caused an increase in blood cholesterol. The increase appears to be due to cholesterol mobilization. CA 19-1012

8384

DISTURBANCES IN MAMMALIAN DEVELOPMENT PRODUCED BY RADIUM EMANATION. Halsey J. Bagg. Am. J. Anat. 30, 133-61(1922).

The development of the nervous and reproductive systems of the rat embryo was inhibited when radiation was given near the end of pregnancy. Large amounts of subcutaneous connective tissue were destroyed, suggesting that radium may be specific for endothelium of blood vessels. CA 16-2913

8385

PATHOLOGICAL CHANGES ACCOMPANYING INJECTIONS OF AN ACTIVE DEPOSIT OF RADIUM EMANATION. I. INTRAVENOUS AND SUBCUTANEOUS INJECTIONS IN THE WHITE RAT. Halsey J. Bagg. J. Cancer Research 5, 1-23(1920). CA 14-1158

8386

EFFECTS PRODUCED BY X-RAY ENERGY ACTING ON FROG OVA AT EARLY DEVELOPMENTAL STAGES. W. M. Baldwin. Science 52, 229-30(1920). CA 14-3478

8387

IRON METABOLISM IN MYELOGENOUS LEUKEMIA AND SPLENECTOMY. INFLUENCE OF ROENTGEN RAYS. Rudolf Bayer. Mitt. Greuggebu. 22, 111-34(1911). (In German).

In myelogenous leukemia less Fe is excreted than normally. Exposure of either normal subjects or leukemics to x rays causes an increased Fe output in the feces. CA 5-131

8388

RELATION OF RADIOACTIVITY TO PLANT BIOLOGY. P. Becquerel. Rev. gen. sci. 23, 576-85(1912). (In French).

Growth of lower forms of animal and plant life is inhibited by x rays, and the structure and function of plants are also affected. β and γ rays are not as effective. Radioactivity and the origin of life are also discussed. CA 7-798

8389

EFFECT OF X-RAYS ON THE CHEMISTRY OF GASTRIC SECRETION. Solomon Bensaude and Oury. Compt. rend. soc. biol. 91, 1364-5(1925). (In French).

The acidity and pepsin contents of gastric juice are decreased by repeated radiation of the gastric area. CA 19-1298

8390

BIOLOGICAL ACTION OF ROENTGEN RAYS ON MICE. Franz Blumenthal and J. Karsis. Deut. med. Wochschr. 42, 1184(1916). (In Russian).

Small amounts of hard x rays caused death of mice within a short time. A relationship between degree of hardness and destructive effects on mice was noted. CA 14-3463

8391

SUPPRESSION OF THE BLASTOPORE IN RANA FUSCA DUE TO IRRADIATION LOCALIZED TO THE INFERIOR HEMISPHERE OF THE BLASTULA, AND THE THEORY OF THE ORIGIN OF THE BLASTOPORE AND OF THE EMBRYO. P. Vintemberger. Compt. rend. soc. biol. (Paris) 112, 809-812(1933). CA 22-19

8392

ACTION OF RADIUM UPON GROWING AND RESTING PLANT PARTS, AND THE APPLICATION OF RADIOACTIVE PREPARATION IN GARDENING. C. Brick. Jahresber. Gartenbauverein 1-6(1916). (In German).

Growth of germinating seeds is inhibited by radium. Radium induces early opening of winter buds and decreases

starch formation in starved leaves. Enzyme functions of the cell are destroyed by radium and reserve foods can not be utilized. CA 15-2468

8393
EFFECT OF X-RAYS ON GASTRIC SECRETION IN DOGS. Solomon Brocq and Oury. *Compt. rend. soc. biol.* 91, 1362-4(1925). (In French).

X-ray treatment of dogs results in a decrease of gastric acidity. The initial secretory activity influences the amount of decrease. CA 19-1298

8394
THE EFFECT OF RADIUM ON MICROORGANISMS. R. Bruynoghe and W. Mund. *Compt. rend. soc. biol.* 92, 211-3(1925). (In French)

Cell division is impaired following irradiation with Ra but no other effect was noted. CA 19-2221

8395
EFFECT OF RADIUM *IN VITRO* ON TRYPANOSOMES. R. Bruynoghe and A. Dubois. *Compt. rend. soc. biol.* 92, 213-5(1925). (In French).

This article is concerned with the effect of Ra rays on cell division in trypanosomes. CA 19-1904

8396
EFFECT OF RADIUM *IN VITRO* ON TREPONEMA DUTTONI. R. Bruynoghe and A. Dubois. *Compt. rend. soc. biol.* 92, 466(1925). (In French).

Treponemas are rendered non-infective following exposure to doses of 5 millicuries of Ra for 5-23 hours. CA 19-2511

8397
RADIUM AND ITS PHYSICAL PROPERTIES. O. Buseck *Hahnemannian Monthly* 51, 335-50(1916).

The physiological effects of radium are included in this review. CA 10-2113

8398
THE TREATMENT OF INFECTIOUS DISEASES WITH RADIUM. W. Caspari. *Landwirtsch Jahrb* 38. (In German).

Guinea pigs infected with diphtheria were treated with Ba SO₄ containing radium. Glandular Tuberculosis developed more slowly under treatment, while cutaneous tuberculosis was more successfully treated with Ra rays. CA 4-1189

8399
INFLUENCE OF VARIOUS RAYS ON THE EYE. A. Chalupecky. *Prague. Biol. listy*, 641, Zentr. Augenheilk 37, Suppl.-Heft 437(1915), Zentr. Biochem. Biophys. 18, 175-6(1915).

The influence of ultraviolet rays is explained by the fact that they are readily absorbed by the crystalline lens (also by the conjunctiva and cornea). Chem. transformations, such as production of globulins and insol. proteins with consequent opacity, result from this absorption. Roentgen rays produce changes in almost all portions of the eye (least pronounced in the crystalline lens, although they are absorbed by the lens to a considerable extent); Roentgen rays readily cause cataract formation. Ra produces conjunctivitis and smoky opacity of the cornea, contrary to Birch-Hirschfeld C. observed no changes in the soft spots of the eye. Em, in the form of radioactive H₂O, was absorbed without reaction when intraocularly injected. Meso-Th(10 mg. placed for 1-2 hrs. daily on the eyelids) caused pronounced conjunctivitis, suppurative and opacity of the cornea in rabbits, the crystalline lens and soft spots of the eye remained unaffected. CA 10-1546

8400
ACTION OF RADIUM ON THE EYE. J. Chalupecky. *Casopia Lekarn ceskysh* 49(1911). Zentr. Biochem. u. Biophys. 12, 630(1911-12). CA 7-165

8401
THE BACTERICIDAL ACTION OF RADIUM EMANATION. Helen Chambers and S. Russ. *Proc. Roy. Soc. Med.* 5, 188-212(1911-12).

Suspensions of bacteria in distilled water were exposed to radium emanation. Alpha and β rays were active, but γ were not, in causing agglutination of the

bacteria. Bacteria were destroyed more rapidly than were opsonin and leukocytes. CA 6-2248

8402
THE ACTION OF RADIUM EMANATION OF SOME OF THE MAIN CONSTITUENTS OF NORMAL BLOOD. Helen Chambers and Sidney Russ. *Proc. Roy. Soc. (London)* 84, 124-36(1912), *J. Chem. Soc.* 100, 809(1912).

Alpha rays cause hemolysis of erythrocytes, conversion of oxyhemoglobin into methemoglobin, and degenerative changes in leucocytes. Exposure of serum to alpha rays causes loss of specific properties of opsonin and hemolytic complement. CA 6-1031

8403
NOTE UPON THE EFFECT OF THE GROWTH OF RATS, RECEIVING A DIET DEFICIENT IN FAT-SOLUBLE VITAMINS, OF EXPOSING THEIR ENVIRONMENT TO THE EMANATION FROM RADIUM BROMIDE. Harriett Chick and Mary Tazellar. *Biochem. J.* 18, 1346-48(1924).

Glass containers for rats were irradiated, when empty, with radium for 10 minutes daily. No effect of radium on rats was noted. CA 19-1151

8404
VARIATION IN CONCENTRATION OF HYDROGEN IONS OF THE BLOOD IN ANIMALS UNDER THE INFLUENCE OF X-RAYS. J. Cluzet and T. Kofmann. *Compt. rend. soc. biol.* 91, 968-70(1924).

X-radiation causes a decrease in the hydrogen ion concentration of serum and plasma. CA 19-1296

8405
THE EFFECT OF RADIATION ON THE BACTERICIDAL POWER OF THE BLOOD. L. Colebrook, A. Eidenow, and Leonard Hill. *Brit. J. Exptl. Pathol.* 5, 54-64(1924).

It has been found in studies of irradiated rabbits that there is a bactericidal material produced. The author suggests that this material results from reactions of products from damaged tissue cells and is produced by leukocytes and serum. CA 18-2030

8406
A COMPARISON OF THE ALTERATIONS IN THE VELOCITY OF GROWTH OF CERTAIN SEEDLINGS THROUGH THE ACTION OF RAPID AND SLOW ELECTRONS OF THE BETA RAYS OF RADIUM, ALSO A COMPARISON OF THE ROLE OF CHEMICAL MAKE-UP AND OF PHYSICAL FACTORS IN DETERMINING THESE ALTERATIONS. E. D. Congdon. *Arch. mikroskop. Anat. u. Entwicklungsmech.* 34, 267-81(1912) CA 6-1627

8407
EFFECTS OF X-RAYS ON THE RATES OF SPECIFIC HEMOLYSIS. Karl Cori and G. W. Pucher. *J. Immunol.* 8, 201-9(1923).

The rate of hemolysis is enhanced by x-rays although this does not appear to be the case if radiation of individual components of the system are considered. CA 17-2610

8408
THE EFFECT OF ROENTGEN RAY AND MUSTARD GAS (DICHLORETHYLSULPHID) ON ACTIVE ANAPHYLAXIS IN THE GUINEA PIG. H. J. Corper, Louisa T. Black, and Mary Moore. *J. Infectious Diseases* 30, 50-7(1922).

Guinea pigs were given nonlethal doses of x rays and mustard gas before or coincident with the first and second injections in anaphylaxis. Some effect on the anaphylaxis reaction was noted at the time of the second injection. CA 16-1806

8409
ON BLOOD PLATELETS, THEIR BEHAVIOR IN VITAMIN A DEFICIENCY AND AFTER RADIATION, AND THEIR RELATION TO BACTERIAL INFECTIONS. W. Cramer, A. H. Drew, and J. C. Mottram. *Proc. Roy. Soc. (London)* 93B, 449-67(1922).

Rats develop the same type of thrombopenia when exposed to Ra radiation as did rats on a Vitamin-A-free diet. In addition, lymphopenia occurred but both conditions improved rapidly upon cessation of radiation. Another deleterious effect of the radiation on the rat was a lowering of

resistance to infection. This latter condition was reversible if platelet recovery occurred. CA 16-4216

8410

MICROWAVE SPECTROSCOPY OF BIOLOGICAL SUBSTANCES. I. PARAMAGNETIC RESONANCE IN X-IRRADIATED AMINO ACIDS AND PROTEINS. W. Gordy, W. B. Ard, and H. Shields. *Proc. Natl. Acad. Sci., U. S.*, 41, 983(1955).

8411

EFFECT OF RADIOACTIVITY ON THE BLOOD AND THE HEMATOPOIETIC ORGANS. A. da S. Mello. *Arch. Brasil. Med.* 9, 123-7(1919), *Physiol. Abstr.* 4, 344. CA 14-1856

8412

ADRENALINE CONTENT OF THE ADRENALS AFTER IRRADIATION WITH X-RAYS. O. David and Arnold Hirsch. *Klin. Wochschr.* 2, 790(1923). (In German).

X-rays have a deleterious effect on the adrenals and the epinephrine content is decreased following irradiation of 1 erythema dose. However, an increase is recorded following x-radiation with 0.25 dose. CA 17-3365

8413

VITAL EFFECTS OF RADIUM AND OTHER RAYS. REFERENCE IN CHEMICAL ABSTRACTS, VOL. 7, 1913, as follows; *Chem. News* 106, 38-40, 50-2.

A summary of the effects of roentgen and radium emanations on the biologic system is given. CA 7-650

8414

A CAUSE OF RADIODERMATITIS AND ITS PREVENTION Foveau DeCourmelles. *Compt. rend.*, 152, 1867-8 (1911). (In French). CA 5-3017

8415

THE EFFECTS OF ROENTGEN IRRADIATION UPON THE CHANGES OF THE CELL CONTENT OF THE BLOOD AND LYMPH INDUCED BY INJECTIONS OF PILOCARPINE. R. L. Dixon. *J. Exptl. Med.* 11, 453-69(1909). CA 3-2002

8416

THE METABOLIC CHANGES ASSOCIATED WITH X-RAY AND RADIUM TREATMENT. E. C. Dodds and J. H. Douglas Webster. *Lancet* 1, 533-6(1924).

Irradiation of the upper portion of the body of patients with malignancies, goiter, leukemia with either radiation apparently had no effect. This was not true when the abdomen and spleen were irradiated as a decrease in the levels of uric acid, urea, ammonia, and other components of the urine were noted. Cervical irradiation caused a fall in urinary creatinine. CA 18-1855

8417

TEMPERATURE COEFFICIENT OF THE X-RAY ACTION ON ASCARIS EGGS. A. Dognon. *Compt. rend. soc. biol.* 92, 1389-92(1925). (In French).

Temperature plays an important role in influencing x-ray effects on round worm eggs. A rise of only 20°C results in a maximum increase of 6 fold especially in a 17-40°C temperature range. Moisture content also plays a role in this action. CA 19-3326

8418

THE ARREST AND THE PROLONGED STAY OF RADIUM IN THE LIVING TISSUES FOR A PERIOD EXCEEDING A YEAR. H. Dominici and M. Faure-Beaulieu. *Compt. rend. soc. biol.*, 68, 46-8(1910).

A rabbit killed 18 months after 0.05 mg of Ra So₄ had been injected into his ear, showed no morbid manifestations. CA 4-1979

8419

EXPERIMENTAL AND PATHOLOGICAL-ANATOMICAL STUDIES OF THE KIDNEYS WHEN POISONED BY SMALL DOSES OF URANIUM. Lasar Dunner and Karl Siegfried. *Z. exptl. Pathol. Therapy.* 21, 380-92(1920). (In German). CA 15-900

8420

EFFECT OF POTASSIUM AND RADIOACTIVITY ON THE RATE OF OXIDATION OF ERYTHROCYTES. P. Ellinger. *Z. physiol. Chem. Hoppe-Seyler's* 116, 266-76(1921).

The rate of oxidation of bird erythrocytes decreased when they were placed in potassium-free Ringer's solution. The rate was increased when they were placed in Ringer's solution with added potassium. Effects of Rb, Cs, Ra, U and Th were also studied. CA 16-2546

8421

BIOLOGICAL ROENTGEN-RAY ACTION. P. Ellinger and Oscar Gans. *Arch. exptl. Pathol. Pharmacol. Naunyn-Schmiedeberg's* 95, 291-303(1922). (In German).

In studies of both patients and rats, thorium nitrate appears to sensitize the action of x-rays. CA 17-1844

8422

MECHANISM OF ACTION OF BECQUEREL RAYS ON THE FUNCTION OF CELLS. W. Engelmann. *Strahlentherapie* 11, 287-91(1920). (In German).

Acetoacetic acid production is not increased in the liver when it is perfused with blood containing radium. An increase does occur if the animal has been given radium-containing water the day before. CA 16-1981

8423

ACCELERATION OF BLOOD CLOTTING BY MEANS OF ROENTGEN RAYS. R. Feissly. *Munch. med. Wochschr.* 68, 1418(1921); *Physiol. Abstracts* 6, 567.

X-rays were found to enhance the blood coagulation rate following addition of CaCl₂. CA 16-3974

8424

INFLUENCE OF RADIUM EMANATION ON THE GENITAL ORGANS OF RABBITS. O. Fellner and Friedrich Neumann. *Z. Roentgenkunde* 14, 345(1914); *Zentr. Biochem. u. Biophys.* 14, 212(1913).

Premature development of the genital organs is caused by Ra emanations. CA 7-1554

8425

EFFECT OF RADIUM EMANATION ON THE TOXIC GROUP OF THE TETANUS TOXIN. R. Ferroux and S. Mutermilch. *Compt. rend. soc. biol.* 93, 608-10 (1925). (In French).

8426

THE URIC ACID CONCENTRATION OF THE BLOOD AS INFLUENCED BY ATOPHAN AND RADIUM EMANATION. M. S. Fine, Arthur F. Chace, and C. V. Bailey. *J. Pharmacol. Exptl. Therap.* 6, 219-34(1914).

Uric acid concentration in the blood is unaffected by RaBr₂ whether given intravenously or inhaled as radon. CA 9-105

8427

HYDROPS AND GLYCOSURIA IN URANIUM POISONING. R. Fleckseder. *Arch. exptl. Pathol. Pharmacol.*, *Naunyn-Schmiedeberg's* 56, 54-68(1906). (In German).

The clinical picture, urine chemistry, and histological changes in kidneys of rabbits with uranium poisoning and in patients after administration of uranium salts are described. Glycosuria was prominent in the rabbits. CA 1-585

8428

EXPERIMENTAL THERAPY OF MALIGNANT NEOPLASMS. VII. QUESTION OF IMMUNITY OF ANIMALS IRRADIATED WITH ROENTGEN RAYS. S. Frankel and E. Furer. *Wien. klin. Wochschr.* 483, 821(1916); *Zentr. Biochem. u. Biophys.* 19, 41(1918). (In German). CA 14-772

8429

THE CHEMICAL ACTION OF ROENTGEN AND RADIUM RAYS IN RELATION TO CARCINOMA. E. Freund and G. Kaminer. *Wien. klin. Wochschr.* 26, 201-3(1913). (In German). CA 7-2609

8430

THE INFLUENCE OF RADIUM RAYS ON THE COMPONENTS

OF THE WASSERMAN REACTION. E. Friedberger and A. Shiga. *Z. Immunitätsforsch.* 39, 445-51(1924). (In German).

Ra radiation causes Wassermann positive serums to be weakened following continuous exposure to the radiation; however, complete inactivation is not accomplished. Other extracts appear to be unaffected by the radiation. CA 18-2555

8431

PRESENT STATUS OF THE PROBLEM OF THE EFFECT OF RADIUM RAYS ON PLANT LIFE. C. S. Gager. *Mem. Botan. Garden* 6, 153-60(1916). CA 11-2920

8432

THE INFLUENCE OF RADIUM RAYS ON A FEW LIFE PROCESSES OF PLANTS. C. S. Gager. *Popular Sci. Monthly* 74, 222(1909).

The paper in non-technical and deals with the effects of radioactivity on the physiological processes of plants. CA 3-1410

8433

THE ACTION OF BURIED TUBES OF RADIUM EMANATION UPON NORMAL AND NEOPLASTIC TISSUES. H. J. Bagg. *Amer. J. Roentgenol.* 7, 536(1920).

Radium emanation has definite therapeutic value on some cancers in rats and causes various histological changes which are described.

8434

THE BIOLOGICAL ACTION OF RADIUM. L. Arzt and W. Kerl. *Wien. klin. Wochschr.* 25, 530-6(1912).

Radium causes lecithin combined with cobra venom to be less hemolytic than lecithin used by itself. Radium radiation on trypanosomes is deleterious. CA 7-2797

8435

THE THERAPEUTIC USES OF RADIUM. H. C. Gardner and O. E. Elias. *Pharm. J.* 86, 335-9(1911). CA 5-1974

8436

DISCUSSION ON RADIUM AND RADIO-THERAPEUTICS CHIEFLY IN MALIGNANT GROWTHS. A. P. Gould, Robert Abbe, and Francis Hernaman Fowler. *Brit. Med. J.* 11, 908-15(1913). CA 8-751

8437

INFLUENCE OF VARYING, LARGE DOSES OF RADIUM EMANATION ON THE BLOOD PICTURE. Gudzent and Hugel. *Radium in Biol.* 2, 202-14. *Zentr. Biochem. u. Biophys.* 16, 121(1915). (In German).

Ra emanation had a pronounced influence on the leucocyte picture, causing hyperucocytosis. CA 8-1466

8438

RADIUM IN BIOLOGY AND MEDICINE. E. Gudzent and W. Marckwald. *Monatsschrift für biologische-therapeutische Forschung.* Germany, Leipsig. Vol. I, (No. 12) 1911-12. (In German). CA 6-2264

8439

THE CONTENT OF RADIUM EMANATION IN THE BLOOD OF THE LIVING AFTER DIFFERENT THERAPEUTIC FORMS OF ADMINISTRATION. F. Gudzent. *Z. klin. Med.* 73, 298-307(1911). (In German). CA 6-513

8440

THE ACTION OF X-RAYS ON CERTAIN ORGANIC ENZYMES AND CELLS. R. Petit Guilbert and M. Lemay. *Arch. elec. med.* 32, 309-15(1924), *Science Abstracts* 28A, 129. (In French). CA 19-3114

8441

COMPARATIVE EFFECTS OF RADIUM AND X-RAYS ON VEGETABLE CELLS. H. Guilleminot. *Compt. rend.* 145, 798-801(1907).

Pumpkin seeds were exposed for different periods to 80 ft x rays. The various comparisons with control groups indicate that there was a marked retardation of

growth and decreased vitality of the plants. Long exposures from either radium or x rays greatly disturbs the germinating power, and results in plants that survive with much difficulty. However, moderate exposures have a tendency to accelerate growth in some cases. CA 1-1239

8442

QUANTITY OF X-RAYS ABSORBED AND TRANSMITTED BY SUCCESSIVE LAYERS OF TISSUES. H. Guilleminot. *Compt. rend.* 146, 597-9(1908). (In French).

Authors describes a fluorimetric method for determining accurately the energy absorbed by each tissue x-irradiated. CA 2-2703

8443

RELATION BETWEEN THE BIOCHEMICAL EFFECTS OF RADIATIONS AND THE QUANTITY ABSORBED. H. Guilleminot. *Compt. rend.* 146, 1314-6(1908).

At a given temperature, the biochemical effects of a beam of x-rays, but not of U-V or Ra rays, are proportional to the fluorescent power of the radiation. A beam of Ra rays has 4-5 times more effect (on germination of plant seeds) than has a beam of x-rays of the same fluorescent power. If the energy absorbed, rather than the incident energy, be measured and compared however, the two types of radiation are equally effective. CA 3-282

8444

ACCELERATIVE ACTION OF SLIGHT DEGREES OF IRRADIATION ON ANIMAL EGGS. V. Haccker and N. Lebedinsky. *Arch. Mikr. Anat.* 85, 555-60(1914). *Zentr. Biochem. u. Biophys.* 17, 629(1915). (In German).

Etherized copepod eggs were affected by irradiation to a greater extent than non-etherized eggs even when the amount of ether had in itself, an accelerative action on development. CA 9-3102

8445

THE EFFECT OF ROENTGEN-RAY IRRADIATION ON POSTMORTAL LIVER AUTOLYSIS. K. Hajos and S. Hofhauser. *Biochem. Z.* 146, 204-7(1924).

Guinea-pig livers were analyzed for non-coagulable nitrogen immediately after death and 24 hours later. Effects of radiation on post mortem liver autolysis were studied. CA 19-307

8446

INFLUENCE OF RADIOACTIVE SUBSTANCES ON THE PERMEABILITY OF THE KIDNEYS TO GLUCOSE. H. J. Hamburger and D. J. de Waard. *Compt. rend.* 165, 372-3(1917). (In French). CA 12-188

8447

THE EFFECT OF RADIATION ON THE PRODUCTION OF SPECIFIC ANTIBODIES. P. Hartley. *Brit. J. Exptl. Pathol.* 5, 306-13(1924).

Immunized rabbits were irradiated and no effect was observed on the content of diphtheria antitoxin or typhoid agglutinin of the serum. An increase in typhoid agglutinins may occur after repeated small bleedings. CA 19-857

8448

BLOOD AND METABOLISM STUDIES WITH RADIUM EMANATIONS. J. Hauenstein. *Munch. med. Wochschr.* 68, 809-10(1921). (In German).

Under the influence of γ rays the red corpuscles disintegrate and decrease in amount. There is an abundant increase in neutrophils and a relative decrease in lymphocytes. No effect on the large white blood cells and the mononuclear, eosinophile, and basophile cells was observed. CA 17-3368

8449

HEMOLYSIS BY RADIUM RAYS. W. Hausmann. *Wien. klin. Wochschr.* 29, 1289-90(1916), *Physiol. Abstracts* 2, 142.

Erythrocyte hemolysis occurs when exposed to beta rays from radium. CA 11-2680

8450

THE INFLUENCE OF γ -RAYS ON CELL RESPIRATION. Fumio Hazama. Z. physiol. Chem. Hoppe-Seyler's 138, 102-7(1924). (In German).

Goose blood erythrocytes suspended in Ringer solution were exposed to γ rays from Ra preparations for a short period. There was a definite increase in O_2 consumption in a majority of the cases. Radiation longer than 2 hr had no noticeable effect. CA 18-3085

8451

THE INFLUENCE OF RADIUM RADIATIONS ON THE CHLOROPHYLLIC AND RESPIRATORY FUNCTIONS OF THE PLANTS. A. Herbert and A. Kling. Compt. rend. 149, 230-2(1909). (In French).

Under the influence of Ra rays the function of assimilation was not exercised with sufficient intensity to overcome the depression of respiration. The character of the cells was somewhat modified but the ratio O_2/CO_2 was not influenced. CA 3-2707

8452

THE ACTION OF X- AND RADIUM RAYS ON INTERNAL ORGANS, PARTICULARLY ON THE SPLEEN. Heimeke. Deut. med. Wochschr. 40, 1311-2(1914). (In German).

Author discusses effects of ionizing radiations on tumors in light of animal studies and of the variation in radiosensitivity among organs and tissues. CA 8-3203

8453

FURTHER STUDIES ON THE EFFECTS OF THE ROENTGEN RAY ON ANTIBODY PRODUCTION. Ludvig Hektoen. J. Infectious Diseases 22, 28-33(1918).

Dogs and rabbits irradiated with Roentgen rays at the time antigen was introduced showed a decrease in antibody production. If antibody production were at its peak at the time of irradiation, there was little effect on the antibodies in the blood. Results support the contention that antibodies are produced in spleen, lymphatic tissues, and marrow, since Roentgen rays affect these structures. CA 12-498

8454

THE INFLUENCE OF THORIUM X ON ANTIBODY FORMATION. Ludvig Hektoen and H. J. Corper. J. Infectious Diseases 26, 330-5(1920). CA 14-1576

8455

EFFECT OF INJECTION OF ACTIVE DEPOSIT OF RADIUM EMANATION ON RABBITS WITH SPECIAL REFERENCE TO THE LEUCOCYTES AND ANTIBODY FORMATION. Ludvig Hektoen and H. J. Corper. J. Infectious Diseases 31, 305-12(1922). CA 16-4283

8456

PARTHENOGENESIS IN VERTEBRATES PRODUCED BY HETEROLOGOUS RADIUM-IRRADIATED SPERM. Gunther. Arch. mikr. Anat. 81, 88-121(1913). Zentr. Biochem. u. Biophys. 14, 621-22(1913). (In German).

Irradiated spermatozoa of *Rana fusca* were used to initiate development of the eggs of *Bufo vulgaris* and *Rana esculenta*. Parthenogenetic development resulted from the use of irradiated heterologous spermatozoa. CA 8-720

8457

EFFECTS OF MESOTHORIUM ON ANIMAL GERM-CELLS. REFERENCE MADE IN CHEMICAL ABSTRACTS, Vol. 6, 1912, as follows: Sitzber. kgl. preuss. Akad. Wiss. 39, 843-73.

Mesothorium stops cell division and causes cell degeneration. Experiments with frog ova and sperm are described. Author believes nuclei are idioplasmatic in nature and are more sensitive to β and γ rays than is the rest of protoplasm. Because of this sensitivity,

abnormalities result from exposure to radiation in later stages of development. CA 6-1312

8458

CHANGES PRODUCED BY RADIUM RADIATION IN THE KARYOKINETIC FIGURES OF THE EGGS OF *ASCARIS MEGALOCEPHALA*. Paula Hertwig. Arch. mikroskop. Anat. u. Entwicklungsmech. 77, 301-12(1911), Zentr. Biochem. u. Biophys. 12, 494(1911-12).

Although the cytoplasm is not damaged, the chromatin of the cell is injured. CA 6-3126

8459

BEHAVIOR OF FROG SPERMACHROMATIN IRRADIATED WITH RADIUM. Paula Hertwig. Arch. mikr. Anat. 81, 173-81. Zentr. Biochem. u. Biophys. 14, 776(1913). (In German).

Sperm were irradiated with mesothorium and used to fertilize the eggs of *Rana fusca*. Cytological studies showed that true parthenogenesis occurred. CA 8-763

8460

THE DIRECT AND INDIRECT EFFECTS OF X-RAYS ON THE THYMUS GLAND AND REPRODUCTIVE ORGANS OF WHITE RATS. Evelyn E. Hewer. J. Physiol. (London) 50, 438-58(1916). CA 11-1210

8461

THE INFLUENCE OF CHOLINE AND ROENTGEN RAYS UPON THE COURSE OF PREGNANCY. E. von Hippel and H. Pagenstecher. Munch. med. Wochschr. 54, 1385 (1907).

Pregnant rabbits received whole body, upper body or lower body x-irradiation. Loss of pregnancy and fetal eye damage were observed. The effects of x-rays are compared with effects of choline. CA 1-2382

8462

THE BLOOD WITH DEEP ROENTGEN-RAY THERAPY. HYDROGEN-ION CONCENTRATION, ALKALI RESERVE, SUGAR, AND NONPROTEIN NITROGEN. Edwin F. Hirsch and A. J. Petersen. J. Am. Med. Assoc. 80, 1505-7(1923).

Immediately after treatment there was a disturbance of the acid-base equilibrium shown by an increased pH and sometimes by a slight lowering of the alkali reserve. In the blood 24 hr after treatment these relationships were reserved. CA 17-2751

8463

BIOLOGICAL ACTION OF THORIUM X TOGETHER WITH OBSERVATIONS UPON THE INFLUENCE ON ANIMAL AND HUMAN TUMORS. Hirschfeld and S. Meidner. Z. klin. Med. 77, 407-37(1913). (In German).

Rabbits, mice, rats, dogs, and chickens were exposed to Ra-224. A gross examination showed a loss of weight while an examination of the blood revealed a reduction in RBC and WBC's as well as hemoglobin level. A tissue study showed many hyperemic areas. However, radiation from Ra-224 did not produce any effect on any of the tumors studied, on bacterial growth, or on trypanosomes. CA 8-3693

8464

EXCRETION OF INJECTED URIC ACID IN DOGS UNDER THE INFLUENCE OF RADIUM. Paul Hockendorf. Radium in Biol. 2, 50(1913), Zentr. Biochem. u. Biophys. 14, 385(1913). CA 7-1764

8465

THE INFLUENCE OF X-RAYS ON THE PROPERTIES OF BLOOD. R. G. Hussey. J. Gen. Physiol. 4, 511-6 (1922).

The BA/HA ratio of rabbit plasma was disturbed as a result of massive x-radiation. The maximum change in chemical reaction in the blood required about 3 hours; the maximum reduction in white blood cells required the

same length of time. The same effects were produced by injecting NaHCO_3 into the peritoneal cavity. CA 16-2542

8466

A MODIFIED ANAPHYLACTIC REACTION INDUCED BY X RAYS. R. G. Hussey. Proc. Soc. Exptl. Biol. Med. 19, 22-4(1921-22).

X rays given daily to guinea pigs following inoculation of horse serum prevented anaphylactic reactions 14 days later when an intoxicating dose was given. However, this effect did not occur if a longer period of time was present between inoculations or if irradiations were not applied during the interval between inoculations. CA 17-1994

8467

THE EFFECT OF X-RAYS UPON GLANDULAR ACTIVITY.

I. THE SUBMAXILLARY GLAND. C. Ivy, B. H. Orndoff, and A. Jacoby. Am. J. Physiol. 59, 469-70(1922). CA 16-2897

8468

THE INFLUENCE OF RADIOACTIVE EMANATIONS ON YEASTS AND ALCOHOLIC FERMENTATION. G. Jacquemin and G. Guirel. Bull. Agri. Intelligence 5, 1505(1914).

Sugar breakdown and alcoholic fermentation by yeasts are enhanced greatly by radioactivity. This fact is of important economic importance especially for the wine industry. CA 9-1221

8469

RADIUM EMANATION AND ITS FINAL BEARING ON MEDICAL SCIENCE. H. Jansen, Nord. Tidsak. Terap. (1906). Biochem. Centr. 8, 281-2(1909).

Author presents a review and a report of experiments showing that Ra emanation had no effect on the enzymes or the proenzymes of trypsin or pepsin. CA 3-2318

8470

A THEORY OF THE ACTION OF RAYS ON GROWING CELLS. J. Joly. Proc. Roy. Soc. (London) 88, 262-6(1915).

The theory is based on the assumption that growth in cells, generally, is attended and conditioned by ionic activity. There is sufficient resemblance between the effects of stimuli on a photographic plate and on cells to lead to the belief that there must be physically much in common between the actions in each case. CA 10-2375

8471

MODIFICATION OF THE IMMUNE RESPONSE BY RADIATION AND CORTISONE. W. H. Taliaferro. Ann. N. Y. Acad. Sci. 69, 745-64(1957).

8472

RADIOACTIVITY, NITROGEN FIXATION AND FERMENTATION YEASTS. E. Kayser and H. Delaval. Compt. rend. 181, 151-3(1925). (In French).

Radioactive Mineral from the Congo (3 mg% and 4 mg%) were added to *Azotobacter agile* and *A. comore* culture. During 8 months, N. fixation increased 133% and 215% respectively for *A. agile*; 80.6 and 36.3% respectively for *A. comore*. Largest quantities of N fixed per gm of sugar was observed after the addition of 4.5 mg. per 100 ml. CA 19-3284

8473

THE INFLUENCE OF ROENTGEN RAYS AND RADIUM EMANATIONS ON THE SOCALLED "PROTECTIVE ENZYMES OF ABDERHALDEN." H. Keitler and K. Lindner. Wien. klin. Wochschr. 27, 1243-4(1914). (In German).

Immunological studies on Ra or x-ray treated rabbits showed no enzyme production following placental extract injections. This is completely opposite in the case of

normal rabbits where placental splitting enzymes developed following placental extract injection. CA 9-1348

8474

THE EFFECTS OF X-RAY IRRADIATION ON LIVING CARCINOMA AND SARCOMA CELLS IN TISSUE CULTURES IN VITRO. Noriyoshi Kimura. J. Cancer Research 4, 95-135(1919). CA 13-3236

8475

EFFECT OF RADIUM EMANATIONS ON THE PHAGOCYTOSIS OF BACTERIA. C. Klercki. Bull. intern. acad. sci. Cracovie, 74-86(1912).

Rabbits were injected with aleurone and then phagocytes were obtained and placed in a weak citrate solution. Mixing of *E. coli*, *S. aureus*, and *M. tuberculosis* with the phagocytes and exposing them to radium radiation caused increased phagocytosis for the first two bacteria but decreased phagocytosis in Koch's bacillus. CA 6-2631

8476

ACTIVATION OF PROENZYMES WITH X-RAYS.

F. Kmictowicz and J. Tumidajski. Compt. rend. soc. biol. 92, 380-1(1925). (In French).

The authors conclude that the proenzymes contained in the pancreatic juice, subjected to the action of x rays, show a significant activation not only *in vivo*, but also *in vitro*, and that the digestive capacity is augmented during 48 hours. This demonstrates that there is probably an incubation process in the medium in which the x rays are absorbed. CA 19-1870

8477

ON THE INTAKE AND EXCRETION OF RADIUM

EMANATIONS BY THE HUMAN BODY. F. L. Kohbrausch and E. Plate. Biochem. Z. 20, 22-38(1909). (In German).

All urine specimens examined 1/2 hr after patient had drunk 100,000 units, showed no emanations. It was concluded that all therapeutic significance based upon the results of the examinations was not reliable. CA 4-53

8478

THE BIOLOGICAL ACTION OF MESOTHORIUM. Kenji Kojo. Berlin klin. Wochschr. 49, 779-80(1912).

The X solution was ingested. Emanations were found in expired air and in the urine. When solution was inhaled, no emanations were found in expired air or in the urine. CA 7-159

8479

PHYSIOLOGICAL ACTION OF WATER OF SPRINGS CONTAINING RADIUM. F. Krieg. Med. Klin. (Munich) 6, 1135-9(1910). (In German).

It was found that the drinking of hot-springs water containing radium increased the excretion of urinary inorganic constituents 2-3 times over the amount excreted after drinking ordinary hot water. CA 5-305

8480

THE SIGNIFICANCE OF THE PHYSICAL-CHEMICAL CONDITION OF THE CELL COLLOIDS ON THEIR SENSITIVITY TO IRRADIATION. Christian Kroetz. Biochem. Z. 137, 372-96(1923). CA 17-3682

8481

BIOCHEMISTRY OF IRRADIATION. I. INFLUENCE OF ULTRAVIOLET LIGHT AND X RAYS UPON THE ACTUAL BLOOD REACTION AND UPON THE STIMULATION OF THE RESPIRATORY CENTER. C. Kroetz. Biochem. Z. 151, 146-66(1924). CA 19-1432

8482

THE BIOCHEMISTRY OF IRRADIATION. II. INFLUENCE OF ULTRAVIOLET LIGHT AND ROENTGEN RAYS UPON THE WATER, SALT, AND PROTEIN CONTENT OF SERUM. C. Kroetz. Biochem. Z. 151, 449-66(1924). CA 19-3117

8483

IRRADIATION OF THE LIVER OF DOGS AND ITS EFFECTS ON DIGESTIVE LEUCOCYTOSIS. G. A. Krolunsky. *Compt. rend. soc. biol.* 75, 625-6(1913). (In French).

An increase of leucocytes of the blood resulted from x-irradiation of the livers of dogs; this result was explained by increased production of antileucocytolysins in the liver. Other effects of irradiation of the liver were loss of weight, cutaneous lesions and decreased coagulability of the blood. CA 8-1619

8484

BIOLOGICAL ACTION OF RADIATION ESPECIALLY OF ALPHA RAYS; THE BACTERICIDAL INFLUENCE OF THORIUM X, EITHER ALONE OR IN CONNECTION WITH VARIOUS CHEMICAL DISINFECTANTS. Erich Kuznitzky. *Z. Hyg. Infektionskrankh.* 88, 261(1919); *Zentr. Biochem. u. Biophys.* 21, 180(1920). CA 14-1353

8485

INFLUENCE OF RADIOACTIVE SUBSTANCES ON ACETIC FERMENTATION. Jaloustre Laborde and M. Leulier. *Bull. soc. chim. biol.* 4, 415-18(1922).

Acetic acid fermentation is enhanced by small doses of Radium-228 but is inhibited by Radium-224. CA 16-3905

8486

EFFECT OF RADIUM AND MESOTHORIUM TREATMENT OF CARCINOMA OF THE CERVIX. W. Lahm. *J. Am. Med. Assoc.* 62, 1442(1914).

Cancer cells are destroyed by phagocytes which have increased in numbers. Proteolytic enzymes of the leucocytes cause digestion of cancer cells. These cause immunization by auto-vaccination. CA 8-2188

8487

EXPERIMENTAL PRODUCTION OF CARCINOMA BY MEANS OF RADIUM. W. S. Lazarus-Barlow. *Proc. Roy. Soc. Med.* 15, 7-12(1922).

An attempt was made to induce cancer in rats by treatment with $RaBr_2$, but the results were not conclusive. CA 16-2905

8488

THE RELATION OF URIC ACID AND PURINE BASES IN THE BLOOD AND URINE TO THE ACTION OF ROENTGEN RAYS. Paul Lenser and Konrad Stick. REFERENCE MADE IN CHEMICAL ABSTRACTS, VOL. 1, 1907, as follows; *Deut. Arch. klin. Med.* 89, 413-31.

Irradiation with Roentgen rays increases uric acid and purine bases, decreases leucocytes in the blood. CA 1-1579

8489

BACTERICIDAL ACTION OF RADIUM. P. Lequeux and E. Chome. *Arch. Mens. d'Obstet. Gynecol.* 8, 698 (1919); *J. Am. Med. Assoc.* 74, 1054(1920). CA 14-3472

8490

THE ACTION OF BURIED GLASS CAPILLARIES OF RADIUM EMANATION ON PLANT AND ANIMAL TISSUES. Isaac Levin and Michael Levine. *J. Am. Med. Assoc.* 83, 1645-50(1924).

Glass capillaries, 1-5 mm long, containing 0.2-0.7 mc of radium emanation were implanted into normal mature plant tissues (young and adult roots of purple-top turnips and growing tips of tobacco plants), crown gall on geranium plants and club roots of cabbage and kohlrabi. Capillaries were left in tissues for 1-15 days. Histological changes that resulted are described and illustrated. Similar exposure of liver, spleen and bone marrow of rabbits; muscle and testes of rats and mice; sarcoma of rat and carcinoma of mouse were also studied and histological changes in various tissues are described and illustrated. CA 19-353

8491

THE INFLUENCE OF X-RAYS ON THE DEVELOPMENT OF THE CROWN GALL. I. Levin and M. Levine. *Proc. Soc. Exptl. Biol. Med.* 15, 24-5(1917-18). CA 12-1066

8492

CHANGES IN THE LEUCOCYTES AFTER INJECTIONS OF THERAPEUTIC DOSES OF SOLUBLE RADIUM. Margarete Levy. *Radium in Biol.* 1, 256(1912); *Zentr. Biochem. u. Biophys.* 14, 385(1913). CA 7-1764

8493

CHANGES IN LEUCOCYTES AFTER INTRODUCTION OF THERAPEUTIC DOSES OF RADIUM EMANATION. Margarete Levy. *Radium in Biol.* 2, 9(1913), *Zentr. Biochem. u. Biophys.* 14, 414(1913).

Injections of 2000-8000 Ra emanation units at 24-hr intervals resulted in leucocytosis and an increase in lymphocytes. Identical results were obtained when air containing 3.8-5.1 units per 1.0 was inhaled. Drinking emanations caused an increase in leucocytes in only a few cases. CA 7-1765

8494

THE EFFECTS OF ROENTGEN RAYS AND RADIOACTIVE SUBSTANCES ON LIVING CELLS AND TISSUES. Leo Loeb. *J. Cancer Research* 7, 229-82(1922). CA 17-2617

8495

THE ACTION OF RADIUM EMANATION ON MEN. Lowenthal. *Berlin klin. Wochschr.* 44, 1117-18(1907).

Clinical reports of the results of administering water charged with radium emanation in patients with rheumatism and chronic neuritis are reported. CA 1-2898

8496

EXPERIMENTS ON THE ACTION OF RADIUM EMANATIONS ON THE BLOOD VESSELS. A. Loewy. *Berlin klin. Wochschr.* 49, 109-13(1912).

Dogs, that were subjected to radium emanations, developed a fall in blood pressure and contraction of the lungs. The brain was only slightly altered in volume. CA 6-890

8497

OBSERVATION ON THE TOXICITY OF THORIUM X FOR MAN AND ANIMALS. H. Lohe. *Arch. pathol. Anat. u. Physiol. Virchow's* 209, 156-67(1912).

Lesions occurring in dogs injected with Th X are described. Hemorrhages into the kidney and into the large intestine were most prominent. CA 6-287

8498

THE BLOOD CHOLESTEROL IN MALIGNANT DISEASE AND THE EFFECT OF RADIUM ON THE BLOOD CHOLESTEROL. Georgine Luden. *J. Lab. Clin. Med.* 4, 849-62(1918). CA 13-473

8499

THE DIFFERENCE IN THE RESPONSE OF ANIMALS OF DIFFERENT AGES TO A CONSTANT QUANTITY OF URANIUM NITRATE. W. MacNider. *Proc. Soc. Exptl. Biol. Med.* 11, 159-62(1914).

Subcutaneous injections of uranium nitrate were given to dogs of different ages on two successive days. Glucosuria appeared in older animals within 24 hours after the first injection, but did not appear in young dogs until after the second injection. CA 9-3302.

8500

THE EFFECT OF THE X-RAY UPON THE RESPONSE OF TADPOLES TO THYROID STIMULATION. Carey McCord and Carlton J. Marinus. *Endocrinology* 2, 289-300(1918).

Tadpoles of *Rana catesbeiana* were treated with small amounts of Roentgen rays. Thyroid extract was then given to some individuals, and rate of metamorphosis of these two groups was compared with that of normal tad-

poles. No radiation effect was noted on normal tadpoles, but the thyroid-treated tadpoles showed a slight increase in susceptibility to thyroid stimulation. CA 13-236.

8501

THE EFFECT OF ULTRA-VIOLET, X-RAY AND RADIUM RADIATION ON THE TOXICITY OF NORMAL BLOOD. D. L. Macht and E. C. Hill. *J. Gen. Physiol.* 6, 671-6 (1924).

Ultra-violet rays have no effect on blood toxicity for plants, or render it less toxic. X rays and Ra emanations render blood more toxic. Coolidge tube is more effective than gas tube in producing toxicity. CA 19-133

8502

INFLUENCE OF RADIOACTIVITY ON VARIOUS PLANTS. L. Malpeaux. *Vie agr. et. rurale* 3, 289-93(1914).

Foliage of grass, oats, turnips, beets, and potatoes became darker green in color when fertilized with a fertilizer containing radioactive materials. CA 9-838

8503

HANDBUCH DER RADIOLOGIE, BAND IV LEIPZIG: AKADEMISCH VERLAGSGESELLSCHAFT, 806p. Also: *Z. Physik. Chem.* 95, 254(1920). CA 14-2888

8504

THE PHYSIOLOGICAL EFFECTS OF X-RAYS I THE VARIATION IN THE LETHAL DOSE DURING METAMORPHOSES IN THE FRUIT FLY, DROSOPHILA. J. W. Mavor. *Am. J. Physiol.* 55, 283(1921).

In the pupation of the fruit fly there is a 12 to 18 hour period in which there is a tenfold increase in resistance to x rays. CA 16-2936

8505

THE FATE OF RADIUM AFTER ITS INTRODUCTION INTO THE ANIMAL ORGANISM, WITH SOME REMARKS ON THE EXCRETION OF BARIUM. Gustave M Meyer. *J. Biol. Chem.* 2, 461-79(1906-07).

Ra apparently finds its way into most of the tissues. It is eliminated in the urine and largely with the feces. Excretion may be over a long period of time. Distribution range is affected by purity of compound, channel through which it is introduced, and time lapse after its administration before the death of the animal. CA 1-1021

8506

ACTION OF ROENTGEN RAYS ON THE CHEMICAL PROCESSES OF CELLS. H. Meyer and F. Bering. *Fortschr. Gebiete Roentgenstrahlen* 17, 33(1911), *Zentr. Biochem. u. Biophys.* 13, 230(1912).

Roentgen rays cause autolysis in various tissues. Roentgen ray effect appears not to be different in cancerous and normal tissue. Observations on horseradish peroxidase irradiated *in vitro* are included. CA 7-93

8507

ACTION OF RADIUM ON THE TISSUES. Percival Mills. *Brit. Med. J.* 1194-5(1911).

A description is given of studies of the effect of Ra emanation on liver tissue. CA 7-520

8508

THE BIOLOGICAL ACTION OF MESOTHORIUM. Minami. *Berlin klin. Wochschr* 49, 781-83(1912) CA 7-760

8509

EXPERIMENTAL STUDIES ON THE INFLUENCE OF RADIOTHORIUM ON THE METABOLISM. K. Miyadera. *Deut. med. Wochschr* 48, 252-3(1922)

The effects of radiothorium on oxygen utilization, uric acid excretion and nitrogen balance in dogs were studied. CA 16-1986

8510

HELIOtropISM AND RADIUM LIGHT. H. Molisch. *Sitzber. Akad. Wiss. Wien, Math.-naturw. Kl.* 120, 305-18(1911), *Zentr. Biochem. u. Biophys.* 12, 711-12 (1911-12). (In German).

Oat and Vetch seedlings showed positive heliotropism to Ra radiations; barley and sunflower seedlings did not. In some plants the radiation also inhibited longitudinal growth, shortened duration of spontaneous mutation of but tips and suppressed anthocyanin. CA 7-362

8511

STIMULATION OF PLANTS BY RADIUM. H. Molisch. Reference made in *Chemical Abstracts* Vol. 7, 1913, as follows: *Chem. Ztg.* 36, 513.

Ra emanations cause certain plants to sprout prematurely. Prolonged exposure to Ra kills the plants. CA 7-1893

8512

FORCING OF PLANTS BY MEANS OF RADIUM. H. Molisch. *Sitzb. Akad. Wiss. Wien.* 121, 121-39 and *Zentr. Biochem. u. Biophys.* 14, 42(1913). (In German).

The rest period of winter buds of certain trees is decreased by treatment with radium. The irradiated buds develop prematurely. CA 8-1296

8513

THE IN VITRO CULTIVATION OF TISSUES WITH REFERENCE TO THE PRODUCTION OF CANCER BY MEANS OF RADIUM AND X RAYS. J. C. Mottram. *Brit. J. Exptl. Pathol.* 6, 53-62(1925).

Conclusions: (1) Extracts made at 0°C from kidneys of adult rats inhibit the *in vitro* growth of kidney cells. (2) Exposure of emulsified kidneys to 35°C for one or 2 hours before extract is made destroys the inhibitory factor. (3) Exposure of emulsified kidneys to radium *in vitro* has a like action. (4) Exposure of kidney *in vivo* to radium or x rays likewise destroys the inhibitory factor. (5) This effect of radiation is immediate and diminishes with time elapsed between the radiation and preparation of the extract. (from author's summary) CA 19-2080

8514

ASSUMED IMMUNITY OF MICE IRRADIATED WITH ROENTGEN RAYS. Erich Muhlmann. *Wien. klin. Wochschr.* 40 (1917); *Zentr. Biochem. u. Biophys.* 19, 790(1918).

No difference was found in the tumor growth of control animals and those irradiated with Roentgen rays. CA 14-978

8515

INFLUENCE OF ROENTGEN RADIATION ON NITROGEN METABOLISM OF THE RABBIT. H. Mukai. *J. Japan. Gynecol. Soc.* 16, No. 1(1921), *Japan Med. World* 1, 24(1921).

A large dose of x rays increased the nitrogen content of the urine. Irradiation resulted in a decrease of nitrogen absorption. CA 16-262

8516

ACTION OF THORIUM ON SEEDS. J. Munoz Del Castillo. *Bol. Assoc. Agr. Exptl* 52(1914). (In Spanish).

Th is superior to Ra with respect to the stimulating effect on seed growth. CA 9-502

8517

COMPARISON OF THE EFFECTS OF X-RAY AND DRY HEAT ON ANTIBODY FORMATION. J. B. Murphy and Ernst Sturm. *J. Exptl. Med.* 41, 245-55(1925). CA 19-1160

8518

EFFECT OF X-RAY ON RESISTANCE TO CANCER IN MICE. J. B. Murphy and J. J. Norton. *Science* 42, 842-3(1915). CA 10-1553

8519

STUDIES ON THE MECHANISM OF RADIATION OF MICROORGANISMS III. INACTIVATION OF GERMINATING SPORES OF BACILLUS CEREUS. J. H. Stuy. *Biochimica et Biophys. Acta* 22, 241-46(1956).

Spores of *B. cereus* are most sensitive to x-ray and u-v during the germination period, probably due to water taken up during germination.

8520

THE PRIMARY EFFECT OF RADIUM RAYS ON LIVING MATERIAL. G. A. Nadson. *Biochem. Z.* 155, 381-6 (1925).

When yeast cells were treated with radium, the visible changes were illustrated and discussed. The most prominent change was an increase in the number and size of fat droplets. CA 19-3277.

8521

BACTERICIDAL FLUORESCENCE EXCITED BY X-RAYS.

H. S. Newcomer. *J. Exptl. Med.* 26, 657-68 (1917).

CA 11-3300

8522

EXPERIMENTAL URANIUM NEPHRITIS. F. R. Nuzum

and L. L. Rothschild. *Arch. Internal. Med.* 31, 894-909 (1923).

Uranium salts were injected subcutaneously into rabbits in doses sufficient to cause an acute reaction (nephritis) after which clinical recovery occurred. When acute subsided, another injection (larger) was given and the cycle was repeated many times with intervals of 3-60 days between injections. Chemical determinations on blood and urine were repeated throughout the study. These included (for urine) quantitative determinations of: total N, urea N, NH_3 , creatinine, uric acid, qualitative tests for acetone and diacetic acid. Blood analyses included: NPN, urea, CO_2 , alkali reserve. Microscopic examination of urine and BSP excretion were also included.

CA 17-3709

8523

DEVELOPMENT OF TROUT EGGS AFTER FECUNDATION

WITH RADIUM-IRRADIATED SPERM. Karl Oppermann.

Arch. Mikr. Anat. 83, 140, and *Zentr. Biochem. u.*

Biophys. 15, 906 (1914). (In German).

This experiment confirmed Hertwig's observations. The resistance of the spermatozoa to Ra Br is decreased with long standing of the sperm. Disturbances in development of normal eggs fertilized by irradiated sperm are chiefly manifested in the spinal cord, eyes and muscular layer of the embryo. CA 8-1471

8524

DEVELOPMENT OF TROUT EGGS AFTER IMPREG-

NATION WITH RADIUM-IRRADIATED SPERM. II.

BEHAVIOR OF THE RADIUM-CHROMATIN DURING

FIRST STAGES OF SEGMENTATION. Karl Oppermann.

Arch. Mikr. Anat. 83, 307-23, and *Zentr. Biochem. u.*

Biophys. 16, 361 (1915). (In German). CA 8-2907

8525

CURATIVE ACTION OF RADIUM ON CHICKEN SARCOMA.

H. Ozata. *Gann* 12, No. 4, 49 (1918). (In Japanese).

Jap. Med. Literature 5, 19 (1920).

When an inoculated fragment of tumor was irradiated, no change in size occurred, but there was a degeneration of cell nuclei. Growth of the tumor was inhibited by repeated radiation. CA 15-3687

8526

EFFECT OF RADIUM RADIATIONS ON THE DEVELOP-

MENT OF CHAETOPTERUS. Charles Packard. *Biol.*

Bull. 35, 50-67 (1918).

Unfertilized eggs of Chaetopterus were irradiated and then inseminated with normal sperm. Abnormal chromosomes developed and are described. CA 12-2098

8527

SUSCEPTIBILITY OF CELLS TO RADIUM RADIATIONS.

Charles Packard. *Biol. Bull. Marine Biol. Lab.* 46,

165-77 (1924). CA 18-1716

8528

DIFFERENCE IN THE ACTION OF RADIUM ON GREEN PLANTS IN THE PRESENCE AND ABSENCE OF LIGHT.

Charles Packard. *J. Gen. Physiol.* 1, 37-8 (1918-19).

CA 13-234

8529

THE EFFECT OF RADIUM RADIATIONS ON THE FERTILIZATION OF NEREIS. Charles Packard. *J. Exptl. Zool.* 16, 85-129 (1914).

Nereis eggs and spermatozoa were exposed to Ra emanations for varying lengths of time. Sperm nucleus and aster failed to develop and fuse with the egg nucleus. The egg nucleus developed without an aster. The germ nuclei developed abnormally and mitosis did not occur even with protoplasmic division. CA 8-1311

8530

THE EFFECTS OF THE β AND γ -RAYS OF RADIUM ON

PROTOPLASM. Charles Packard. *J. Exptl. Zool.* 19,

323-53 (1915).

Mitosis of *arbacia* eggs is accelerated by gamma rays from RaBr_2 , but the eggs of *Nereis* and *Drosophila* are not affected. Development is abnormal when both gamma and beta rays are used. CA 10-2939

8531

IRRADIATION EXPERIMENTS WITH X RAYS IN EINKORN

WHEAT. A. Matsumura. *Ann. Rept. Natl. Inst. Genet.*,

Mishima, Japan, 3, 36-37 (1953).

Relations between frequency of chromosome aberrations, mutation rate, dose and wave length are discussed. A list of induced mutants is given. The early and giant mutants are of possible value in breeding. CA 14-3282

8532

EFFECT OF X-RAYS ON THE ACID-BASE EQUILIBRIUM

OF THE BLOOD. P. Pagniez, F. Coste, and I. Solomon.

Compt. rend. soc. biol. 92, 489-91 (1925). (In French).

Alkalosis occurs in the blood following x-irradiation. This appears to be a result of damage to some regulating mechanism in the body. CA 19-2088

8533

THE BIOLOGICAL ACTION OF CONDENSED RADIUM

EMANATIONS. E. Partos. *Berlin klin. Wochschr.* 52,

181-3 (1915). (In German).

Ra emanation can bring about death in mice if they are exposed long enough. In smaller doses the chief effect is on the spleen where the leucocytes are destroyed and the connective tissue takes on a hyaline appearance. CA 9-2778

8534

INFLUENCE OF X-RAYS ON THE PRODUCTION OF

ANTIBODIES (HEMOLYSINS, DIPHTHERIA ANTITOXIN).

A. Paulin. *Compt. rend. soc. biol.* 92, 572-3 (1925).

Antibody formation occurs in irradiated rabbits after injection of antigen as well as in unirradiated rabbits. Antibodies already formed are not destroyed by large doses of radiation but their further production is decreased. CA 19-1895

8535

A STUDY OF THE EFFECT OF RADIUM UPON THE

EGGS OF *ASCARIS MEGALOCephala UNIVALENS*.

Fernandus Payne. *Arch. mikroskop. Anat. u.*

Entwicklungsmech. 36, 287-93 (1913).

Eggs were exposed to a Ra tube for 1-16 hr and then incubated at 37° until desired development stage was reached. Abnormalities occurred which resulted in the death of the embryo. The chromosomes were broken into granules. CA 7-2440

8536

ACTION OF RADIUM RAYS, X-RAYS, AND ULTRA-

VIOLET RAYS ON TRANSPLANTABLE CHICKEN

SARCOMA. F. Pentimalli. *Sperimentale* 78, 719-39

(1924). CA 19-1902

8537

THE CONDITIONS OF THE BIOLOGICAL ACTION OF

ROENTGEN RAYS. E. Petry. *Biochem. Z.* 128, 326-63

(1922).

Various studies on the influence of the degree of hydration of lentil seeds on their sensitivity to x rays are reported. CA 16-1971

8538

THE RELATION BETWEEN THE BIOLOGICAL ACTION OF ROENTGEN RAYS AND OXYGEN. Eugene Petry. Wien. klin. Wochschr. 35, 957-8(1922). (In German).

The effects of x-rays on germinating seeds were unchanged by an increase in the atmospheric oxygen but H_2O_2 showed considerable effect on the root structure. CA 17-797

8539

THE ROENTGEN-RAY SUSCEPTIBILITY OF DIFFERENT VARIETIES OF A PLANT GENUS. Eugene Petry. Wien. klin. Wochschr. 36, 345(1923). (In German). CA 17-2904

8540

RADIUM EMANATION CONTENT OF ARTERIAL AND VENOUS BLOOD AFTER DIRECT INTRODUCTION OF THE EMANATION INTO THE DUODENUM. Josef Picper. Z. Roentgenkunde 14, 391(1924), Zentr. Biochem. u Biophys. 14, 323(1913). CA 7-1763

8541

EVIDENCE FOR THE CELLULAR HYPOTHESIS IN RADIATION PROTECTION BY BONE MARROW CELLS. O. Vos, J. A. Davids, W. W. Weyzen and D. W. van Bekkum. Acta Physiol. et Pharmacol. Nerri, 4, 482-86(1956).

8542

THE INFLUENCE OF RADIATION ON THE SPLITTING OF FATS. L. Pincussen and J. L. Anaguostu Biochem. Z. 128, 268-73(1922).

Irradiation of the serum or the animal from which it was taken with x rays and Nitrolamp radiation resulted in a decreased serum lipase activity. Diathermy and galvanism applied to the living animal resulted in an increase of lipase activity. CA 16-1963

8543

THE INFLUENCE OF RADIATION OF NUCLEIC METABOLISM. L. Pincussen and Kate M. Floros. Biochem. Z. 126, 86-92(1921).

The effects of heat from a Nitral lamp on nucleic acid in vitro were studied by measuring changes in optical rotation of the solutions of nucleic acid or nucleic acid "sensitized" with eosin or dichloroanthracene. Some splitting occurred spontaneously. Both light and x-rays increased the oxidation of purine bases in blood serum. In vivo x-irradiation increased oxalic acid excretion. CA 16-1608

8544

THE BIOLOGICAL ACTION OF THORIUM. J. Plesch. Berlin klin. Wochschr. 49, 739-41(1912).

"Dorat" Th X preparation injected subcutaneously caused an increased respiration rate and dyspnea, increased the diastole, caused a vaso-dilation and lowered the blood pressure. Elimination of Th X is through the intestine largely, with some passing out in the urine and sweat. CA 7-159

8545

PHYSIOLOGICAL BEHAVIOR OF RADIUM EMANATION. Anna Plotzk. Biochem. Z. 24, 357-62(1910). (In German).

Radium emanation was administered to rabbits as Ra water. It was found that the emanation was excreted chiefly in expired air, in which the author measured the emanation. None could be detected in the urine; very little in the blood after intravenous injection. CA 4-1765

8546

ACTION OF RADIUM ON SMALLPOX VACCINE LYMPH. Umberto Poppi. Rev. hyg. 47, 308(1925).

Radiation from $RaBr_2$ attenuated the vaccine after exposure in excess of 86 hours but the vaccine still caused antibody production. CA 19-3318

8547

THE ACTION OF RADIUM EMANATIONS. E. Poulsson Arch. exptl. Pathol. Pharmacol. Naunyn-Schmiedeberg's Supplbd. 443-8(1908).

Experiments on rabbits and diabetic patients after the use of water containing radium emanations. CA 3-209

8548

OBSERVATIONS UPON THE EFFECTS OF RADIUM ON TISSUE GROWTH IN VITRO. Frederick Prime. J. Cancer Research 2, 107-30(1917).

Ra stopped mitosis in cultures of chicken embryonic heart muscle. Radiumized cells were able to wander out from the main tissue and this accounted for the increased area of the culture CA 12-187

8549

INFLUENCE OF X-RAYS ON GERMINATION. G. Promys and P. Drevon. Rev. gen. botan 24, 177-97(1912).

Lentils, wheat, beans, and lupines were irradiated with x rays. With a moderately high temperature, the development of the plants was accelerated. At ordinary temperature the effects on germination were variable. CA 7-3606

8550

MODIFICATION OF THE ARNETH NEUTROPHILE FORMULA OF THE BLOOD UNDER INFLUENCE OF INHALATION OF RADIUM EMANATION. Brissaud Rebattu and Richard. Compt. rend. soc. biol. 74, 471-3(1913).

Neutrophil production was increased by radium radiation. The uric acid of the blood disappeared at the same time. It is suggested that uricolytic enzymes secreted by polymorphonuclear leucocytes were activated. CA 8-1464

8551

A COMPARISON OF THE PHYSIOLOGICAL EFFECTS OF ALPHA AND BETA RAYS. A. C. Redfield Am. J. Physiol. 51, 189 (1920).

There was no apparent difference in the effects of either radiations on the marine worm Nereis limbota. CA 14-3282

8552

THE EFFECT OF RADIUM RADIATIONS UPON THE FERTILIZATION MEMBRANE OF NEREIS. A. C. Redfield and Elizabeth M. Bright. Am. J. Physiol. 45, 374-87(1918). CA 12-1489

8553

THE PHYSIOLOGICAL CHANGES PRODUCED BY RADIUM RAYS AND ULTRA-VIOLET LIGHT IN THE EGGS OF NEREIS. Alfred C. Redfield and Elizabeth M. Bright. J. Physiol. (London) 55, 61-85(1921).

The difference between radium and ultra-violet light is due to differences in the penetrating power of these radiations. The failure of visible light to affect the egg is attributable to the limited absorption of those wave lengths by protoplasm. CA 15-3337

8554

HEMOLYTIC ACTION OF RADIUM EMANATION. A. C. Redfield and Elizabeth M. Bright. Am. J. Physiol. 65, 312-7(1923).

Alpha rays are apparently the causative agent of Ra radiation responsible for in vitro sheep erythrocyte destruction. Both the hemolysis and stromatolysis appear to be independent of one another. The electrical resistance of the erythrocyte suspension increases during hemolysis but decreases when stromatolysis occurs. CA 17-3512

8555

THE PHYSIOLOGICAL ACTION OF IONIZING RADIATIONS. A. C. Redfield and Elizabeth M. Bright. Am. J. Physiol. 68, 354-67(1924).

When the eggs of *Nereis limbata* are exposed to x-rays and fertilized, the processes of membrane formation and jelly secretion are altered in a manner identical to that described previously for eggs exposed to β and γ radiation. The perivitelline space becomes uniformly enlarged on all sides of the egg and the volume occupied by jelly diminishes proportionately. Effects of hard and soft x-rays on jelly secretion are presented graphically. Physiological effects vary as the ionizing power of the primary x-rays vary. These observations support the theory that ionization is fundamental to the physiological action of ionizing radiations. CA 18-2920

8556

THE RELATIVE PHYSIOLOGICAL EFFECT OF β AND γ -RAYS UPON THE EGG OF NEREIS. Alfred Redfield and E. M. Bright. J. Gen. Physiol. 2, 25-9(1919-20).

When *Nereis* eggs are exposed to radium, the thickness of the fertilization membrane is increased. An increase in the intensity of radiation produces a corresponding increase in membrane thickness. CA 13-2715

8557

THE EFFECTS OF RADIUM RAYS ON METABOLISM AND GROWTH OF SEEDS. A. C. Redfield and Elizabeth M. Bright. J. Gen. Physiol. 4, 297-301(1922).

Radish seeds exposed to Ra rays show an increased production of CO_2 in comparison with untreated seeds. Germination is also retarded by radiation, however, those seeds which do not germinate continue to produce CO_2 . CA 16-1449

8558

THE ACTION OF β -RAYS OF RADIUM ON EXCITABILITY AND CONDUCTION IN THE NERVE TRUNK. E. S. Redfield, A. C. Redfield, and A. Forbes. Am. J. Physiol. 59, 203-21(1922). CA 16-2911

8559

ALTERNATING RHYTHM OF CELLULAR DIVISION AND THE RADIOACTIVITY OF THE TESTES. Claude Regaud. Compt. rend. soc. biol. 86, 822-4(1922). (In French).

Spermatogonia show an increase in radiosensitivity during cell division and a decrease during the resting stage of the cell. CA 16-3332

8560

RADIOSENSITIVITY OF MALIGNANT NEOPLASMS IN RELATION TO THE FLUCTUATIONS IN CELLULAR DIVISION. Claude Regaud. Compt. rend. soc. biol. 86, 993-5(1922). CA 16-3964

8561

COMPARATIVE EFFECT OF X-RAYS AND OF RADIUM ON THE NUCLEUS AND CYTOPLASM. P. Reiss. Compt. rend. soc. biol. 92, 1403-6(1925)

Sea urchin eggs and frog eggs were exposed to various doses of x-rays or radium rays and then fertilized with normal sperm. A graph shows the radiation dose required to stop development at an early stage in most eggs. The relative sensitivity of cytoplasm (compared with nucleus) was 18:1 for Ra and 3.8:1 for x rays. CA 19-3547

8562

NOTES ON THE EFFECT OF X-RADIATIONS ON THE DEVELOPMENT OF CUMINGIA EGGS. A. Richards and D. J. Good. Biol. Bull. 37, 209-21(1919). CA 14-1388

8563

THE INFLUENCE OF ROENTGEN RAYS ON THE TISSUE CONTENT OF CHOLESTEROL. A. H. Roffo. Bull. soc. chim. biol. 7, 608-14(1925).

Cholesterol content in tissues diminishes in carcinoma tissue following x-irradiation. CA 19-2848

8564

THE EFFECT OF ROENTGEN RAYS UPON THE CHOLESTEROL CONTENT OF TUMORS. A. H. Roffo and L. M. Correa. Z. Krebsforsch. 22, 79-82(1924).

The cholesterol content was lowered in connective-tissue sarcomas following x-ray therapy. CA 19-1736

8565

THERAPY OF LEUKEMIA WITH THORIUM X. George Rosenau. Munch. med. Wochschr. 60, 2214-16(1913).

In some cases of leukemia Thorium X proved to be a therapeutic aid, but was not more effective than Roentgen rays. CA 8-374

8566

THE ANTITRYPSIN CONTENT OF THE BLOOD SERUM DURING LEUKOCYTOLYSIS BY THORIUM X. Georg Rosenow and Gerland Farber. Z. ges. exptl. Med. 3, 377-84(1914). (In German). CA 9-820

8567

THE RESISTANCE OF THE DIFFERENT TYPES OF LEUCOCYTES TO THORIUM X. Georg Rosenow. Z. ges. exptl. Med. 3, 385-96(1914). (In German).

Lymphocytes appear to be more radiosensitive at first to radiation from Ra-224. However, polymorphonuclear leukocytes disappear after temporarily increasing from 1.5 to 3 per cent and are replaced by lymphocytes. CA 9-820

8568

BIOLOGY OF THE METAL THORIUM. Arnold Rossel. Reference made in Chemical Abstracts, Vol. 7, 1913, as follows: Arch. sci. phys. et Nat. 32, 347.

Sea water containing a nutrient and varying (0-50%) amounts of Th powder was placed in 2-liter bottles. Rudimentary fish were raised in this water, and it was found the greater amount of Th, the better the condition of the fish. Author concludes that Th has properties which kill germs endangering life. CA 7-650

8569

BIOLOGICAL ACTION OF ROENTGEN RAYS OF VARYING QUALITY ON THE SKIN OF MAN AND OTHER ANIMALS. G. A. Rost. Strahlentherapie 6, 269-329 (1915). and Zentr. Biochem. Biophys. 18, 362(1915).

Author describes effects of massive irradiation with x-rays. Skin shows increased connective tissue and endothelial cells, decrease in number and atrophy of elastic fibers. Repair is slow and is accompanied by formation of atypical cells. Later, pigmentation appears, due to disintegration of pigment cells. CA 11-346

8570

THE EFFECT OF THORIUM X UPON RESPIRATORY METABOLISM. Nikolaux Roth and J. V. Benezny. Arch. pathol. Anat. u. Physiol. Vitenov' 213, 515-19(1913). (Budapest). CA 8-362

Human subjects were given large amounts of Th X (300-500 electrostatic units by mouth and 1500-2000 units intravenously.) Normal metabolism was previously determined. After large amounts of Th X, the CO_2 expired and respiratory quotient were correspondingly larger than after smaller doses. CA 8-362

8571

INFLUENCE OF X RAYS ON THE VEGETATIVE SYSTEM. J. Rother. Deut. med. Wochschr. 50, 1141-3 (1924), Physiol. Abstracts 9, 487.

When the abdominal region of rabbits is irradiated, a fall in blood pressure occurs. This is due to effects of radiation on the skin. The fall in blood pressure can be prevented by atropine. In dogs and rabbits a rise in blood sugar resulted from radiation of the liver or pancreas. CA 19-2240

8572

THE INFLUENCE OF THE ROENTGEN RAYS ON THE

PROTEIN METABOLISM IN BASEDOW'S DISEASE.

C. Rudinger. Deut. med. Wochschr. 33, 51(1907). (In German).

Author reports on metabolism experiments in which the nitrogen balance was determined. Exposure to x-rays induced a reaction of nitrogen. The nitrogen elimination fell gradually after exposure. There was no relation between the phosphorus and nitrogen metabolism. CA 1-744

8573

THE INFLUENCE OF RADIOACTIVE EARTH ON PLANT GROWTH AND CROP PRODUCTION. H. H. Rusby N. Y. Botan. Garden 16, 1-23(1915); Bull. Agr. Intelligence 6, 1318-9. CA 10-1247

8574

ON THE EFFECTS OF X RAYS OF DIFFERENT WAVE LENGTHS UPON SOME ANIMAL TISSUES-PROOF OF DIFFERENTIAL ACTION. S. Russ. Proc. Roy Soc. (London) 95, 131-142(1923-4).

Effects of radiation on the skin of rats and on Jensen's Rat Sarcoma are described. Measurement of radiation dose is discussed. Action of U-V, visible light and x-rays on bacteria were compared and results are presented and discussed. Germicidal action of radiation is said to stop at λ 2960 Å, and greater effect is observed with UV. A large series of studies on irradiation of tumor slices *in vitro* and subsequent injection in rats is also reported.

8575

THE ACTION OF RADIUM RAYS UPON THE CELLS OF JENSEN'S RAT SARCOMA. S. Russ and Helen Chambers. Proc. Roy Soc. (London) 86, 482-9(1913).

Jensen's rat sarcoma, exposed to Ra β rays *in vitro*, does not grow when transplanted to normal rats. Histological examination does not indicate that these cells were killed before inoculation. CA 7-3778

8576

EXPERIMENTAL STUDIES WITH SMALL DOSES OF X RAYS. S. Russ, H. Chambers, G. M. Scott, and J. C. Mottram. Lancet I, 692-95(1919).

Tumor growth is stimulated by large doses of x rays, while growth is inhibited by small doses. A condition of immunity is produced by small doses. CA 13-2233

8577

THE ELIMINATION OF RADIUM FROM NORMAL AND NEPHRECTOMIZED ANIMALS. W. Salant and G. M. Meyer. Am. J. Physiol. 20, 366-77(1907-8).

Found that nephrectomized rabbits eliminate radium through the liver and small intestines at a rate no more rapid than than observed in normal rabbits. CA 2-418

8578

INFLUENCE OF RADIUM ON THE PRODUCTION OF ANTIBODIES IN THE ANIMAL ORGANISM. Albert Schutze. Med. Klin. (Munich) 7, 1729-30(1911). CA 6-399

8579

ACTION OF X-RAYS ON GESTATION. M. Sebileau Compt. rend. soc. biol. 61, 637-8(1960).

Exposure of pregnant rabbits to the X Rays either induces abortion or prolongs the period of gestation. When the young are born they generally die or are very small and feeble. CA 1-736

8580

EFFECT OF THORIUM B ON DEPANCREATIZED ANIMALS AND ON DIABETICS. A. Slosse. Compt. rend soc. biol. 89, 817-8(1923).

Experiments show a distinct fall in the elimination of ketone bodies. CA 18-421

8581

DISTRIBUTION AND EXCRETION OF RADIUM AND

ITS EMANATION AFTER INTERNAL ADMINISTRATION.

E. B. Smith. Quart. J. Med. 5, 249-64(1911-12). CA 6-891

8582

RADIOACTIVITY AND SMOOTH MUSCLE E. Soref. J. Physiol. 54, LXXXIII (1921).

The isolated uterus of the guinea pig may be stimulated by radioactive ions of uranium, thorium, rubidium and cesium and by free radiation. Potassium salts also have a stimulating effect. CA 16-2922

8583

MODIFICATIONS OF THE DEVELOPMENT OF AMPHIBIA EMBRYOS WHICH WERE IRRADIATED WITH RADIUM AT THE STAGE OF MEDULLARY PLATE. Werner Stachowitz. Arch. Mikr. Anat. 85, 521-51. Zentr. Biochem. u. Biophys. 17, 629(1915). (In German).

Radiation from radium affected the chromatin in the embryos of amphibia and degenerative malformations occurred. Nervous tissue was especially affected by the radiation. CA 9-1350

8584

THE PHYSIOLOGY AND PHARMACOLOGY OF PURINE ECONOMY. THE INFLUENCE OF ATOPHAN, CALCIUM SALTS AND RADIUM EMANATIONS. E. Starkenstein. Biochem. Z. 106, 139-71(1920).

The effect of atophan on uric acid excretion was studied. The production of purines in the liver was decreased by atophan. Uric acid excretion in man was increased by radium, and allantoin excretion in rabbits was increased by radium. Uric acid and allantoin excretion were decreased by calcium salts. CA 14-3279

8585

INFLUENCE OF URANIUM AND LEAD UPON VEGETATION. J. Stocklasa. Compt. rend. 156, 153-5(1913). (In French).

Radioactive waters act beneficially upon germination and growth of plants. Experiments with U and Pb nitrates show that they augment vegetable growth and production. CA 7-1740

8586

CHEMICAL AND BIOLOGICAL RESEARCHES ON SUGAR BEETS IN BOHEMIA. II. ACTION OF RADIUM ON BEET SEED. W. Stenlik. Z. Zuckerind. Bohmen-Mahren 41, 424-7(1917); Bull. Agr. Intell. 9, 566-7.

Seeds of cereals, leguminous plants and beets were irradiated by Roentgen rays. Sugar beets and mangold seeds produced plants that showed developmental differences when compared to untreated seeds. CA 12-2457

8587

INFLUENCE OF RADIOACTIVITY ON MICROORGANISMS FIXING NITROGEN OR TRANSFORMING NITROGENOUS MATTER. J. Stocklasa. Compt. rend. 157, 879-82 (1914). (In French).

The effects of radium, alpha- and beta-rays on the ability of nitrogen-fixing bacteria to assimilate nitrogen were studied. CA 8-3061

8588

INFLUENCE OF SELENIUM AND OF RADIUM ON THE GERMINATION OF SEEDS. J. Stoklasa. Compt. rend. 174, 1075-7(1922). (In French).

Seeds were treated with Ra emanations for a period of 12 hrs and their germinative qualities compared with suitable controls for a period of 72 hr. Without the emanations the germination ranged from 35%-69% in 72 hr, with the emanation, from 70-99% in 72 hr. CA 17-789

8589

THE EMANATION CONTENT OF ARTERIAL BLOOD AFTER INHALATION OR INTESTINAL INTRODUCTION OF RADIUM EMANATIONS. J. Pieper Strassburger. Berlin klin. Wochschr. 49, 387-93(1912). CA 7-159

8590

SIGNIFICANCE OF RADIOACTIVITY IN PHYSIOLOGY.

Julius Stoklasa. Z. Strahlenther. 4, 1-18. Zentr. Biochem u. Biophys. 16, 890(1915). (In German).

Nitrifying bacteria growth is increased by alpha rays but decreased by both beta and gamma rays. *Saccharomyces* fermentation is increased by radiation from Ra. CA 8-3807

8591

BLOOD GAS ANALYSIS. XIII. THE INFLUENCE OF α -RAYS ON HEMOGLOBIN AND BLOOD CORPUSCLES. H. Straub and Kl. Gollwitzer-Meier. Biochem. Z. 136, 128-39(1923).

Alpha radiation affects the CO₂-combining power of hemoglobin in solution or erythrocyte saline suspensions. Suspected causes for this action are mentioned. CA 17-3191

8592

THE INFLUENCE OF RADIATIONS FROM RADIUM EMANATION UPON TUMOR SUSCEPTIBILITY IN ALBINO RATS. K. Sugiura. J. Cancer Research 8, 376-84 (1924).

Effects of radium on the growth of carcinoma in rats were studied. It appears that a slight immunity develops as a result of mild radiation. CA 19-340

8593

THE ACTION OF RADIUM EMANATION ON THE VITAMINES OF YEAST. Kanematsu Sugiura and Stanley R. Benedict. J. Biol. Chem. 39, 421-33(1919).

Ra emanation apparently effects the mechanism promoting growth in yeasts. The author speculates that this may be the mode of action of Ra on neoplasms. CA 13-3244

8594

SOME EFFECTS OF RADIUM RADIATIONS ON WHITE MICE. K. Sugiura and G. Failla. J. Gen. Physiol. 4, 423-36(1922).

The effects of radiation from radium (1.9 - 36.5 millicurie hrs.) on new born mice were studied. Small fractionally applied doses stimulated growth, larger doses retarded growth and still larger doses caused premature death. Large sublethal doses caused severe skin lesions, retarded body growth, but failed to sterilize males. CA 16-1811

8595

INFLUENCE OF RADIUM AND X RAYS ON FROG LEUCOCYTES. M. M. Sturges and Isaac Levin. Proc. Soc. Exptl. Biol. Med. 18, 295-7(1920-21).

The action of Ra or X rays on a frog results in the decrease of the relative number of lymphocytes. There is no noticeable change in the total blood count. CA 16-1112

8596

THE INFLUENCE OF X-RAYS UPON GASTRIC SECRETION Eugen Szego and Julius Tother. Z. ges. exptl. Med. 24, 270-88(1921).

Therapeutic doses of x rays have no effect on gastric secretion of dogs, but larger doses increase both the quantity of secretion and enzyme content. Increased gastric occurs following transient depression of function. Exposure to greater doses results in cachexia, atrophy of the gastric mucosa and burns of the intestinal mucosa. CA 16-127

8597

RAYING OF GLANDS AND COAGULATION OF BLOOD. A. Szenes. Munch. med. Wochschr. 67, 786-8(1920). (In German)

Coagulation time of the blood was decreased by roentgen irradiation of the spleen. When a solution of sodium chloride was injected there was a further decrease of coagulation time. When the thyroid gland was exposed to roentgen rays, no effect was noted. CA 15-394

8598

THE EFFECT OF INTRAVENOUS INJECTIONS OF ACTIVE DEPOSIT OF RADIUM ON METABOLISM IN THE DOG. Ruth C. Theis and Halsey J. Bagg. J. Biol. Chem. 41, 525-35(1920).

Dogs were injected with NaCl solutions of active deposits of Ra emanations. Chemical constituents of blood and urine were measured after exposure to determine the effects of the injected radioactivity on various metabolic processes. Measurements included: blood and urine nitrogen content, urea, albumin, sugar and creatinine. Blood counts and temperature measurements are also reported. CA 14-1713

8599

IMMUNITY AND RADIANT ENERGY. Carl Timm. Beitr. Klin. Tuberk. 48, 195-208(1921).

Roentgen radiation increased the nonspecific immunity, radium rays increased immunity against the A partial antigen and light (U-V and various portions of the visible spectrum) increased immunity against the F and N partial antigens. Visible light and U-V also increased nonspecific immunity and immunity against A, but to a lesser extent than did Ra. None of the radiations affect immunity against the L partial antigen. CA 16-2725

8600

THE EFFECTS OF RADIUM ON RABIES VIRUS. Guido Tizzoni and Alessandro Bongiovanni. Centr. Bakteriolog. Parasitenk. 43, 713-18(1907).

Irradiation of animals *in vivo* with Ra rays increases resistance of the animals to the Rabies virus. *In vitro*, Ra emanations act directly as a chemical product on the virus. CA 1-1743

8601

INFLUENCE OF THE RADIOACTIVITY OF THE AIR ON THE MICROORGANISMS OF THE ATMOSPHERE. A. Trillat and Fouassier. Compt. rend. 159, 817-19(1914). CA 9-1928

8602

RADIATION ACTION UPON CELLS ESPECIALLY UPON CANCER CELLS AND THE QUESTION OF THE CHEMICAL IMITATION OF THE SAME. Sergel Tschachotin. Munch. med. Wochschr. 59, 2379-81(1912).

Sea urchin eggs exposed to x-rays and frog and bird erythrocytes exposed to U-V seemed to become more alkaline as judged by neutral red staining. CA 7-173

8603

MESOTHORIUM, THORIUM X, AND THORIUM EMANATIONS, AND THEIR THERAPEUTIC USE. D. Turner. Edinburgh Med. J. 9, 220-3(1912).

In vitro experiments with thorium resulted in uric acid decomposing into urea and carbon dioxide. When Radium-224 was injected into tumors, a swelling occurred and this was followed by decrease in size of the tumor. CA 6-3287

8604

REVERSIBLE GEL FORMATION IN THE CELL. CHANGE IN THE PERMEABILITY OF THE PROTOPLASM BY RADIATION WITH RADIUM. M. A. van Herwerden. Ned. Tijdschr. Geneesk. 69, I, 1217-22(1925).

Author studied reversible gelation in epithelial cells in tadpole tails. This process makes the nucleus and nucleolus of the cells visible and is presented as evidence of penetration of dilute acetic acid. Exposed cells were surrounded by 0.05-0.07% HAC after irradiation by Ra Br₂. Gelation occurred immediately, but only after 20-30 min. in non-irradiated control material. Results were not significantly different when radiation was filtered through 2 mm of Pb. CA 19-2058

8605

RADIOACTIVITY AND HEART FUNCTION. G. Viale.

Arch. sci. biol. (Italy) 6, 209-43(1924), Physiol. Abstracts 9, 450.

The presence of uranium or thorium inhibits the effect of potassium on the heart. The heart beat is temporarily increased by sodium uranate. When the heart has been stopped by perfusion with potassium-free Ringer's solution, the beat can be restored by sodium uranate. CA 19-2240

8606

THE INFLUENCE OF RADIOACTIVE WATER ON THE GERMINATION OF PLANTS. D. Vidal. Compt. rend. agr. France 11, 402-6(1925).

Radioactive water containing dissolved lead salts gave contradictory results on plant germination studies. However, some stimulatory action appeared as a result of the use of this water. CA 19-2362

8607

THE WOBURN EXPERIMENTAL STATION OF THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND. I. THE HILL'S EXPERIMENTS. THE INFLUENCE OF RADIOACTIVE ORE ON WHEAT. J. A. Voelcker. J. Roy. Agr. Soc. Engl. 77, 235-64(1916).

Ground radioactive ore containing 0.15% U_3O_8 was used in amounts of 500, 1000, and 2000 lbs/acre. The yields were: 100 for the control, 92, 94, and 93 for each of the amounts respectively. There was no effect on germination. CA 11-3089

8608

THE BIOLOGICAL ACTION OF THORIUM. Werner von Bolton. Reference made in Chemical Abstracts, Vol. 6, 1912, as follows: Z. Elektrochem. 17, 816.

Bacterial growth was visible on the surface of Th metal 6 months after it had been sealed in a vial containing 100 ml. of water. After 12 months, the surface bacteria were found to be non-viable. Author concludes that Th first promotes, but on long exposure inhibits bacterial growth. CA 6-1183

8609

ANAPHYLACTIC SHOCK AFTER TREATING SENSITIZED ANIMALS WITH ROENTGEN RAYS. Hans von Heinrich. Centr. Bakteriell. Parasitenk. I Abt., Orig. 70, 421-8 (1913). CA 7-4004

8610

THE INFLUENCE OF RADIUM EMANATION ON THE PHAGOCYTOSIS OF BACTERIA. C. v. Kleck. Z. Immunitätsforsch. 13, 589-604(1912).

Bacterial phagocytosis differs with different bacteria when in contact with Ra emanation in water solutions. Staphylococcus and E. coli had increased phagocytosis while Koch's bacillus had decreased action. CA 6-2653

8611

BIOLOGICAL ACTION OF RADIUM EMANATION. E. v. Knafli-Lenz. Z. Balncol. 5, No. 14 (1912); Zentr. Biochem. u. Biophys. 14, 244(1913).

Ra emanation has solvent action on lipoids and can decompose lecithin. This is demonstrated by its hemolytic action on red blood cells of guinea pigs and rabbits after adding lecithin. Effect of Ra emanation is considered to be analogous to effect of cobra venom in its lytic property. Emanation is also injurious to cerebral ganglionic cells. Author attributes favorable action of Ra emanation in gout to effect of nervous system. CA 7-1762

8612

ANALYSIS OF THE ACTION OF RADIOACTIVE SUBSTANCES ON CARCINOMA OF MICE. A. Wasserman. Deut. med. Wochschr. 40, 524-8(1914). (In German).

Mouse tissues were irradiated *in vitro* by γ rays, and it was found that the richer a tissue is in **genocceptors**

and the more it is inclined to regeneration and proliferation, the more sensitive it is to radioactive rays. Cancer cells derive their malignancy from the richness in **genocceptors**. CA 8-2184

8613

THE FORCING OF RESTING PLANTS BY X RAYS.

F. Weber. Biochem. Z. 128, 495-507(1922).

Irradiation of *Syringa vulgaris* with x rays during the winter rest-period resulted in a shortening of the ensuing development period. A high dose is necessary, but too high a dose will cause necrosis in the "oxalate nest" of the bud. CA 16-1971

8614

THE EFFECT OF ROENTGEN RAYS AND RADIUM RADIATIONS UPON THE VITALITY OF THE CELLS OF MOUSE CARCINOMA. B. H. Webb and S. Russ. J. Pathol. Bacteriol. 17, 1-11(1913).

Mouse tumors, when irradiated by X rays before transplantation into other mice, do not proliferate. Excised tumors, irradiated for 1 hr with β rays from $RaBr_2$, also do not proliferate, but tumors exposed for 18 hr to γ rays from $RaBr_2$ are not inhibited in their growth. CA 6-3461

8615

EFFECT OF ROENTGEN RAYS UPON TISSUE RESPIRATION. Paul Wels. Arch. ges. Physiol. Pfluger's 206, 268-73(1924).

The animal body and separate organs were irradiated. There was no effect on energy exchange of the tissues. CA 19-855

8616

EFFECT OF ROENTGEN RAYS UPON YEAST CELLS. Paul Wels and Mathilde Osann. Arch. ges. Physiol. Pfluger's 207, 156-64(1925).

Irradiation of yeast cells with Roentgen rays inhibited their reproductive rate. There was no change in O_2 consumption or the production of CO_2 . CA 19-1583

8617

THE BIOLOGICAL ACTION OF RADIUM RAYS. R. Werner. Munch. med. Wochschr. 57, (1914).

Upon exposure of hen's eggs to $RaEm$, 2/3 of the lecithin present was destroyed in 168 hr. CA 4-3083

8618

EFFECT OF RADIUM ON THE HEMOLYTIC AND ANTITRYPTIC PROPERTIES OF SERUM FROM CANCER PATIENTS. A. Wilbouchevitch and E. Bassier. Compt. rend. soc. biol. 89, 61-2(1923).

Radium therapy only rarely increases the hemolytic power of the serum but it increases the already high antitryptic index even further. CA 18-119

8619

SOME OBSERVATIONS ON THE ACTION OF RADIUM ON PLANT CELLS. Maud Williams. Ann. Botany (London), 39, 547-62(1925).

Author studied epithelial cells from the petiole of *Saxifraga umbrosa*, determining (1) permeability, by measuring stomatal apertures and (2) rate of plasmolysis by sugar solutions (hypertonic sucrose). Radium rays (0.1 gm Ra element and 0.51 mg of Ra Br with γ ray equivalent to 0.27 mg of element) caused considerable decrease in average stomatal gap and also a 2-20 fold increase in percentage of cells plasmolysed by a given solution of hypertonic sucrose. CA 19-3512

8620

EFFECT OF INTRAVENOUS INJECTIONS OF RADIUM ON A PERSISTENT POSITIVE WASSERMANN REACTION. Wilfield Ayres. Med. Record 88, 610(1915).

Negative reactions occurred in cases of syphilis after radium therapy. CA 9-3302

8621

INFLUENCE OF A SMALL QUANTITY OF RADIUM EMANATION UPON THE DEVELOPMENT AND METAMORPHOSIS OF BATRACHIANS. P. Wintrebert. *Compt. rend.* 143, 1259-62(1906).

The emanation of radium dissolved in small quantities in water has a favorable influence upon the development and metamorphosis of Batrachians. CA 1-738

8622

THE BIOLOGICAL ACTION OF X RAYS. F. Wolfers. *Rev. gen. sci.* 33, 141-4(1922).

Explanation of x-ray effect on the basis of emission of electrons in irradiated tissues and consequent ionisation is considered to be inadequate. Author believes main actions are photochemical. It is proposed that fluorescence is excited directly or indirectly in cells and x-rays merely provide a way of getting energy to the right place. Author emphasizes that presence of heavier trace elements in cells will greatly increase radiation damage and radiosensitivity can be manipulated selectively in this way. CA 16-1782

8623

ACTION OF RADIUM ON TRANSPLANTED TUMORS OF ANIMALS. F. C. Wood and F. Prime, Jr. *Ann. Surg.* 62(1915), *J. Am. Med. Assoc.* 66, 59(1916).

The relative importance of β and γ rays (large and small doses) in the effect of radium radiation on tumors was studied in experiments with various rat and mouse tumors studied either after removal from the host or *in situ*. CA 10-783

8624

THE ACTION OF RADIUM ON GROWING CELLS. F. C. Wood and F. Prime. *Proc. Soc. Exptl. Biol. Med.* 11, 140-2(1914).

Mouse carcinomas were not cured by treatment with RaBr_2 , but there was a decrease in size of the tumors. Growth of the Jensen rat sarcoma was prevented by RaBr_2 , and the Flexner rat carcinoma was inhibited. CA 9-3297

8625

COMPARISON OF THE EFFECTS OF ROENTGEN AND RADIUM RADIATION. H. Holthusen. *Strahlentherapie*, 46, 273-288(1933). (In German).

Author describes and discusses his observations on skin of human thigh and scalp skin of patients receiving therapeutic irradiation of the head. Effects of various doses and dose rates are analyzed, using erythema and epilation as criteria of effects.

8626

THE INFLUENCE OF RADIOSENSITIVITY ON DIS-SIMILATION PROCESSES. V. Zdobnický. *Vesník* 5 Sjez. Českoslov. Lékařsk. Prir. 431(1915) *Botan. Centr.* 129, 378(1915), *Exptl. Sta. Record* 35, 524.

Large amounts of radiations from radioactive materials injure plants while small amounts enhance the production of starch. CA 11-1674

8627

RADIOACTIVITY AND LIFE. H. Zwaardemaker. *Arch. neerl. physiol.* 4, 177-96(1920).

Frog hearts stopped beating after perfusion with potassium-free Ringer's solution. Pulsation was restored by perfusing the hearts with solutions of radioactive Rb, K, U and Th. CA 14-2204

8628

SUMMARY OF RECENT EXPERIMENTS ON IRRADIATION OF THE HEART. H. Zwaardemaker. *Arch. neerl. physiol.* 9, 115-7(1924).

Frog hearts were perfused with Ringer's solution containing radioisotopes instead of potassium. The action of isotopes was direct rather than on the potassium in the heart tissue. CA 19-1911

8629

THE RESTORING ACTION OF RADIUM RAYS UPON THE ISOLATED HEART WHICH HAS BEEN AFFECTED BY LACK OF POTASSIUM. H. Zwaardemaker. *Arch. ges. Physiol. Pfluger's* 169, 122-8(1917), *Physiol. Abstracts* 2, 622.

β rays from mesothorium restore the beat of a frog's heart *in vitro* after it has stopped because of lack of K in Ringer solution. CA 12-832

8630

IMPORTANCE OF RADIOACTIVITY IN ANIMAL LIFE. H. Zwaardemaker. *Geneesk. Blader* 20, 253-302(1918).

Author concludes that radioactive elements affect protoplasm by transmitting a negative or a positive charge to it. CA 14-1345

8631

PHYSIOLOGICAL RADIOACTIVITY. H. Zwaardemaker. *J. Physiol. (London)* 53, 273-89(1920).

Author summarizes his work showing that the activity of potassium in organs, especially the heart, is due to its radioactivity. It can be replaced, in a fluid perfusing an isolated heart, by another similarly radioactive element or by exposure to external radiation. Either α or β radiation may be effective but if applied together they neutralize each other. Fluorescein sensitizes tissues to radiation, calcium decreases their sensitivity. CA 14-2497

8632

RADIOBIOLOGY. H. Zwaardemaker. *Ned. Tijdschr. Geneesk.* 1, 239-52(1919), *Physiol. Abstracts* 4, 80(1919).

After lack of K has stopped the beating of a frog heart, radiation will restore it. K can be replaced by radioactive elements of equivalent amounts. Growth of bacteria was stopped by γ rays of Po and β rays of Ra or mesothorium. Combination of two types of radiation had no effect on the bacteria, since the two radiations antagonize each other. CA 14-1856

8633

RADIOACTIVE EQUILIBRIUM. H. Zwaardemaker. *Onderzoek. Physiol. Lab. (Utrecht)* 19, 262-85(1918), *Physiol. Abstracts* 4, 19. CA 14-1855

8634

POLONIUM RADIATION AND RECOVERY OF FUNCTION. H. Zwaardemaker. *Proc. Acad. Sci. Amsterdam* 22, 383-5(1920).

Frog's heart beat, after removal of K from circulating fluid, can be restored by replacing K with other radioactive elements, i.e., Rb, Th, U, Ra, I. Restorative action may be either direct or indirect with mesothorium, mica-screened Ra and polonium on Cu, but since the γ rays of Po and the β rays of K are antagonistic, it is concluded in this case that there is a direct action of radiation. CA 14-1714

8635

SENSIBILIZATION TO RADIOACTIVITY BY THE ACTION OF HORMONES. H. Zwaardemaker. *Proc. Acad. Sci. Amsterdam* 23, 838-41(1921), also *Onderzoek. Physiol. Lab. Univ. Utrecht.* 11 233(1921). (In German).

Studies with the cold blooded heart have shown that uranium α rays and potassium β rays both keep the heart going but the two may be balanced to produce heart stoppage. An excess of one or the other may start it again. Amounts necessary for equilibrium vary from winter to summer. When there is heart stoppage, a number of substances may start it again, e.g. choline, adrenaline. The charged particles send the radiation with great velocity through the lipid films on the cell surface and thus evoke a catalytic effect on stimulus. CA 15-2448

- 8636**
RECENT RADIATION EXPERIMENTS WITH THE HEART. H. Zwaardemaker. *Werk. Gen. Ber. Nat. Gen. Heilkunde* 10, 50(1921); *Physiol. Abstracts* 6, 428. CA 16-3909
- 8637**
EFFECT OF RADIOACTIVITY ON THE HEART. J. P. Zwaardemaker. Thesis Utrecht, 1922, *Physiol. Abstract* 7, 426. CA 17-2147
- 8638**
RADIOACTIVE SALTS AND RADIATIONS MODIFY THE SENSITIVENESS OF THE HEART TO THE INFLUENCE OF THE VAGUS NERVE. H. Zwaardemaker and J. W. Lely. *Arch. neerl. physiol.* 1, 745-65(1917), *Physiol. Abstracts* 2, 485(1917). CA 12-948
- 8639**
INJURY TO THE HEMATOPOIETIC SYSTEM OF MAN BY SMALL DOSES OF RADIATION. O. Henn and F. Leibetseder. *Strahlentherapie* 97, 435-443(1955). (In German).
If air containing emanation in a concentration of 3×10^{-12} curie per cm^3 (3×10^{-9} curie per liter), is inhaled by human being during 48 hr per week over a period of several months and more, inhibition of the proliferations of all cellular cords of the bone marrow takes place. In the peripheral blood there is merely a hypersegmentation and a small percentage of "Amesienkernigen" as expression of a radio-lesion. NSA 9-6573
- 8640**
ACTION OF RADIATION ON THE RESPIRATORY SYSTEM OF YEAST. L. Martin. *Compt. rend. soc. biol.* 140, 1201-2(1946). (In French).
- 8641**
CYTOGENETICAL STUDIES ON THE STERILE WILD SENNA (CASSIA TORA L.) PRODUCED BY ATOMIC BOMB EXPLOSION. I. MORPHOLOGICAL OBSERVATIONS ON THE ASYNAPTIC STERILE PLANT. T. Sugimoto. *Sci. Bull. Faculty Agr. Kyushu Univ.* 13, 14-19(1951). (In Japanese). NSA 6-6268
- 8642**
ANNUAL REPORT ON THE WORK OF THE SWEDISH SEED ASSOCIATION OF THE YEAR 1950. A. Akerman. *Sveriges Utsadesforen Tidskr.* 61, 124-191(1951).
- 8643**
MUTATIONS IN X-RAYED MATERIAL OF THE SIX-ROWED BARLEY VARIETY EDDE. E. Akerberg. *Acte Agr. Scand.* 4, 544-548(1954).
The X_2 of two lines, J38/432(Edde II) and J32/444, both selected from Edde I, contained morphological variants, chlorophyll mutants and plants with various degrees of sterility. Lines selected from irradiated material of J38/432 differ from the standard Edde I in yield of grain and straw, stiffness and length of straw, earliness and 1000-kernel weight.
- 8644**
STUDIES ON EXPERIMENTAL CYTOLOGY, THE INFLUENCE OF VARIOUS CHEMICAL AND PHYSICAL AGENTS ON THE STRUCTURE OF THE PLANT CELL. G. Amerio and N. G. Dalls. *Rend. ist. lombardo sci.*, Pt. I 75, 109-118(1941-1942).
The root tips of the onion, *Allium cepa*, and the coleoptiles of oat, *Avena*, were tested with several chemical substances and x-rays. Irreversible damage was noted as a result of the x-radiation. CA 38-6332⁸
- 8645**
A CHROMOSOMAL INTERCHANGE IN MAIZE INVOLVING THE ATTACHMENT TO THE NUCLEOLUS. E. G. Anderson. *Am. Naturalist* 68, 345-350(1934).
An interchange was found involving chromosomes 6 and 9 in an x-rayed culture of maize. The points of interchange were within the reticulate region of chromosome 6 and about one third the distance out on the long arm of chromosome 9. Linkage data are presented
- 8646**
EFFECTS OF CENTRIFUGATION ON X-RAY INDUCED CHROMATID ABERRATIONS IN *TRADESCANTIA* IRRADIATED IN AIR AND N_2 . L. F. Anderson. *Genetics* 40, 563. *Records Genet. Soc. Am.* 24, 563(1955).
Centrifugation immediately after irradiating influorescences with 100 r for 1 min resulted in considerable increase in total breakage and ratio of intrachromosomal: interchromosomal exchanges.
- 8647**
WHERE DOES FOOD AND DRUG PROCESSING STAND? (RADIATION STERILIZATION XI.) Anonymous. *Nucleonics* 13, (1) 36-39(1955).
This is a survey made through the cooperation of organizations active in this field, presenting primary problems to be studied.
- 8648**
ATOMIC THEORY AND BIOLOGY. N. Arley. *Nat. Verd.*, Kbh. 36, 207-21(1952).
Author discusses applications of atomic theory to research on genetics, cancer and viruses. (from abstract).
- 8649**
EFFECTS OF SMALL RADIATION DOSES ON OVARIES AND TESTES OF RODENTS. C. A. Joel and H. V. Wattenwyl. *Z. Mikr. Anat.* 1, 121(1941).
- 8650**
THE RELATION BETWEEN THE X-RAY SURVIVAL CURVES OF *NEUROSPORA* MICROCONIDIA AND ASCOSPORES. K. C. Atwood and T. H. Pittenger. *Genetics* 40, 563-564. *Records Genet. Soc. Am.* 24, 563-564(1955).
Survival curve of uninucleate microconidia of *Neurospora crassa* with X-rays has both single and multiple target components. Survival curve of ascospores, which are binucleate, was found to be related to that of uninucleate microconidia.
- 8651**
INDUCTION OF CHANGES IN GENES AND CHROMOSOMES. PROBLEMS IN CHEMICAL MUTAGENESIS. C. Auerbach. *Cold Spring Harbor Symposia Quant. Biol.* 16, 199-213(1951).
- 8652**
A MUTANT IN ASIATIC COTTON. R. Balasubushmanyam. *Current Sci. (India)* 20, 73(1950).
A true breeding narrow-leaved mutant, strain SX507, has been induced by x-ray treatment of seeds of *Gossypium arboreum* race *indicum*. SX507 has been crossed and back-crossed with the parent strain. The F_1 was intermediate but the F_2 showed a segregation ratio.
- 8653**
MUTATION EXPERIMENTS WITH CULTIVATED PLANTS II. SPRING AND WINTER BARLEY MUTANTS OF VALUE FOR BREEDING PURPOSES. G. Bandlow. *Zuchter* 21, 357-363(1951).
- 8654**
MUTATION EXPERIMENTS WITH CULTIVATED PLANTS III. GENETIC EARLY STAGES OF HOODED BARLEY WITH VARIABLE CHARACTERISTIC MANIFESTATIONS IN X-RAY-INDUCED MUTANTS. G. Bandlow. *Zuchter* 24, 20-27(1954).
- 8655**
RADIATION GENETICS. G. W. Beadle. AECU-255(1949).
General consideration of high energy radiation and heredity, nature of gene action, observation on radiation effects on cytology and genetics of *neurospora*, *Zea mays* (Fudiar corn) and *Drosophila melanogaster*, temperature effects on radiation induced mutation are presented.
- 8656**
GENE STRUCTURE AND GENE FUNCTION. G. W. Beadle. *Missouri Univ., Agr. Expt. Sta. Research Bull.* 588, 10-38(1955).

8657

CHROMOSOME ABERRATIONS IN ONION ROOTS FROM PLANTS GROWN IN AN ATMOSPHERE CONTAINING $C^{14}O_2$. J. M. Beal. *Am. J. Botany* **37**, 660-61(1950).

Chromosome aberrations were observed in bulk root tips of the onion *Ebenezer* which had been grown in an atmosphere containing $C^{14}O_2$. Fragments, apparently resulting from chromosome breakage, were of frequent occurrence.

8658

RADIATION MUTANTS OF *ASPERGILLUS NIGER*.

S. Berk. *Mycologia* **44**, 723-735.

Mutants characterized by dwarf or giant conical heads have been obtained from a monosporous line, FA 300, subjected to a radiation from polonium and radium.

8659

RADIOBIOLOGICAL INVESTIGATIONS I. COMMUNICATION ON THE EFFECT OF X-RAY STIMULUS ON SEEDLINGS.

E. Bersa. *Anz. Akad. Wiss. Wien Math-naturw. Kl.* **63**, 200-201(1926). BA 2-582

8660

THE INFLUENCE OF POLYPLOIDY ON THE X-RAY SENSITIVITY OF CELLS. C. J. Bishop. *Can. J. Botany* **30**, 139-146(1952).

Sensitivity of diploid and tetraploid cells were compared by studying chromosomal aberrations induced in diploid *Tradescantia paludosa* and tetraploid *T. virginiana* by X irradiation at the resting stage between meiosis and pollen grain division and at the resting stage after mitotic pollen grain division.

8661

APPLE VARIETIES, OLD AND NEW. C. J. Bishop. Nova Scotia Fruit Growers' Assoc. 88th Ann. Rept. p. 99-102(1951).

In hybridization to develop scab-resistant apples, use has been made of a highly resistant large-fruited crab, Geneva Crab. The value of X-irradiation as a means of inducing sectorial spots with improved fruit color is being explored.

8662

A COMPARISON OF THE MORPHOLOGICAL EFFECTS OF THERMAL NEUTRONS AND X-IRRADIATION OF APPLE SCIONS. C. J. Bishop and L. E. Aaldars. *Am. J. Botany* **42**, 618-623(1955).

At dosages resulting in equal inhibition of shoot growth in scions of the apple, Cortland, thermal neutrons produced about twice as many shoot bifurcations as x-rays. Shoot bifurcations are considered to result from induced chromosomal changes.

8663

A BIOLOGICAL UNIT BASED ON THE DOSES OF ROENTGEN RAYS. E. Bjorling. *Strahlentherapie* **36**, 751-77(1930). (In German).

Author presents results of studies on the effects of various doses of filtered and unfiltered Roentgen rays on the root growth of beans.

8664

ROENTGEN RAYS IN VINICULTURE. H. Breider. *Umschau Forsch. Wiss. U. Tech.* **52**, 715-7(1952).

8665

NEW ALPENVIOLETTES THROUGH ROENTGEN RAYS. H. Breider. *Umschau Forsch. Wiss. U. Tech.* **55**, 148-9(1955).

8666

CANADA, MINISTER OF AGRICULTURE. REPORT FOR THE YEAR ENDED MARCH 31, 1951. 102p

This report discusses breeding of: wheat, oats, barley, forage grasses, lucerne, clovers, field bean, potato, fibre flax, tobacco, annual oilseed rape, linseed, fruits, cabbage, and tomato.

8667

THE INFLUENCE OF RADIOACTIVE ELEMENTS ON THE YIELDS OF PLANTS. A. A. Drobkov. *Izvest. Akad. Nauk SSSR. Ser. Biol.*, p. 783-801(1940).

Addition of small quantities of radium, uranium, thorium and actinium to nutrient solutions increases the yield of peas, flax and lucerne. Ra and U usually are relatively better consumed from those solns. in which they are present in the lowest concs. Ra enters the plant during the entire vegetative period, but is utilized more intensively during flowering and ripening. The positive action of radioactive elements manifests itself chiefly in an increase of the number of seeds and an acceleration of ripening. Addition of 10^{-10} - 10^{-8} g. of Ra, 10^{-2} g. of U, and 10^{-3} g. of Th per kg. of soil per flower pot (argillaceous soil of a moderately podzole condition) considerably increases the yield of cucumbers, accelerates their ripening and increases their sugar content. Positive results have also been obtained in sand cultures of carrots. BA 16-2748

8668

RESEARCH ON THE INDUCTION OF HAPLOIDY IN FLOWERING PLANTS. R. Ehrensberger. *Biol. Zentr.* **67**, 537-546(1948).

Experiments on induction of haploidy by x-irradiation of the sporophytes of *Gastria* spp. and *Antirrhinum majus* are reported. Maternal haploids and diploids were obtained after the application of irradiated pollen. Paternal haploids were obtained by pollinating x-irradiated egg cells.

8669

NOTE ON THE TIME-INTENSITY FACTOR IN RADIO-BIOLOGY. U. Fano and L. D. Marinelli. *Proc. Natl. Acad. Sci. U. S.* **29**, 59-66(1943).

Two x-ray doses, delivered within a sufficiently short time and separated by variable time intervals, appear most suitable for investigating recovery processes that express themselves through the time-intensity factor. From experimental data an index of recovery, R, can be calculated for *Tradescantia* microspores.

8670

THE OXIDATIVE PHOSPHORYLATION BY MITOCHONDRIA ISOLATED FROM THE SPLEEN OF RATS AFTER TOTAL BODY EXPOSURE TO X-RAYS. D. W. van Bekkum, H. J. Jongefrier, H. T. M. Nieuwerkerk, and J. A. Cohen. *Brit. J. Radiol.* **27**, 127(1954).

Phosphorylation, oxygen uptake and p/o ratio were significantly reduced in mitochondria from spleens of rats receiving total body exposure to 1100 r. The effect was observed whether the substrate was succinate or α ketoglutarate.

8671

AGRONOMIC MUTATIONS IN OATS INDUCED BY X-RAY TREATMENT. K. J. Frey. *Agron J.* **47**, 207-210(1955).

This paper includes data on the yield, test weight, heading date, plant height, lodging and stem-rust reaction of a few of the 61 mutants tested.

8672

MUTATIONS FOR STEM RUST RESISTANCE INDUCED IN OATS BY X-RAY TREATMENT. K. J. Frey and J. A. Browning. *Phytopathology* **45**, 490-492(1955).

Of 61 mutants obtained after x-irradiating seed of the oat variety Huron, 44 were resistant and three segregated for reaction to stem rust races 7 and 7A, six were resistant and eight segregated for reaction to race 8, and all were susceptible to race 6.

8673

ASPECTS OF THE AGRICULTURAL VALUE OF CERTAIN BARLEY X-RAY MUTATIONS PRODUCED AND TESTED AT THE SWEDISH SEED ASSOCIATION, SVALOF, AND

ITS BRANCH STATIONS. K. Froier. Acta Agr. Scand. 4, 515-543(1954).

The majority of the promising mutants will give their best performance in seasons with optimum precipitation, in districts with relatively good and favorably distributed rainfall, and on soils with satisfactory waterholding capacity.

8674
BARLEY BREEDING BY THE SWEDISH SEED ASSOCIATION. RESULTS OBTAINED AND FUTURE PROSPECTS. K. Froier. Sveriges Utsadesforen. Tidskr. 62, 401-414 (1952).

8675
X-RAY MUTANTS IN PEAS AND VETCHES. O. E. V. Gelin. Acta Agr. Scand. 4, 558-568(1954).

Following exposure to x-rays in both pea and vetch, robust multibranched types, and minus characters, such as dwarfness, chlorophyll defects or inhibited flowering, have occurred in the X_2 . A mutant of particular interest is a gigas form obtained from the fodder pea Parvus.

8676
FREQUENCY OF MITOTIC DISTURBANCES IN X-RAYED BARLEY. O. E. V. Gelin. Agr. Hort. Genetica 11, 66-81(1953).

The possible effects of variety, species and chromosome number or of temperature during germination upon the sensitivity of dormant grains of barley to increasing doses of x rays were investigated by estimating frequency of mitotic aberrations.

8677
WEIBULL'S STRAL PEA. AN X-RAY MUTATION FROM THE KOLSTER PEA. O. Gelin. Weibulls Illustrerade Arsbok 48, 28-30(1953).

The technique of inducing mutation by x-irradiation is explained and a preliminary description is given of the new x-ray mutant Stralart (Ray pea), derived in the X_2 of Kloster, a selection from Monopol X Ambrosia.

8678
THE OXYGEN EFFECT OR RADIATION-INDUCED CHROMOSOME ABERRATIONS; BREAKAGE-VERSUS-RECOMBINATION HYPOTHESES. N. G. Giles. J. Cellular Comp. Physiol. 45, (Suppl. 2), 271-284(1955).

Oxygen increases the frequency of chromosomal aberration in Tradescantia under x-irradiation by virtue of its effect on initial chromosome breakage rather than by its influence on recombination of broken ends.

8679
SPONTANEOUS AND INDUCED BUD MUTATIONS IN FRUIT TREES. I. Granhall. Acta Agr. Scand. 4, 594-600(1954).

A general review of the occurrence and value of bud sports is followed by an outline of work on the induction of somatic mutations in tree fruits by x-rays, fast neutrons and other radiations.

8680
REPORT ON THE WORK AT BALSARD IN 1951. I. Granhall. Foren. Vaxtforadling Fruktträd. 16p. (1952).

Author reviews studies on induction of mutation in apples, pears, plums, and cherries inducing treatment with x-rays, neutrons and radioactive phosphorus and sulfur.

8681
X-RAY MUTATIONS IN APPLES AND PEARS. I. Granhall. Hereditas 39, 149-155(1953).

The following x-ray-induced mutants are described: green and yellow striations of the fruits of the pear

Esperens Herre; brown-russeted fruits of this pear variety; chlorophyll deficiency in the foliage of a form of the Williams pear; and three types of red fruit in the apple Gravenstein.

8682
MUTATION BREEDING OF FRUIT TREES. I. Granhall. Nord. Jordbrugsforskn. 31-32, 401-411(1951).

Spontaneous mutations, cytological and chemical basis of mutation, and genome, chromosome and gene mutations in fruit trees are discussed.

8683
CHROMOSOME STUDIES BY MEANS OF X-IRRADIATION. T. Gage. Idengsku Zasshi 16, 23-35(1940).
A review.

8684
METHODS AND RESULTS OF IRRADIATION MUTATION BREEDING OF CULTIVATED PLANTS. H. Hansel. Bodenkultur 7, 354-362(1953).

This article includes information on the maximum doses of irradiation tolerated by various plant species and descriptions of valuable mutations induced in cereals by irradiation.

8685
COMPARATIVE OBSERVATIONS ON THE DEVELOPMENT OF INFLUORESCENCES IN LYCOPORSICUM ESCULENTUM MILL. AND IN AN X-RAY MUTANT. J. Helm. Zuchter 21, 89-95(1951). BA 21-3097

8686
BIOCHEMICAL ASPECTS OF THE RADIATION SYNDROME. M. G. Ord and L. A. Stocken. Physiol. Revs. 33, 356-386(1953).

Authors review studies on nucleic acid metabolism, carbohydrate metabolism, fat metabolism, nitrogen metabolism, serum proteins, immunity, individual enzymes, metals, Na and K, alterations in metabolic level and radiation protection. They present a four-page tabulated summary of methods and reagents used to combat radiation damage. (from abstract). BA 28-10407

8687
RESULTS OF MUTATION BREEDING. W. Hoffmann. Vorträge Über Pflamensuchung. Land-Und Forst-wirtch Forschunqarte e. V. Bonn p. 36-53(1951).

Tabulated details, illustrations, and descriptions are presented concerning the 586 mutations produced in Hairs barley by x-ray treatment and of a number of other artificial mutations produced in spring barley, winter wheat, flax and other plants.

8688
EFFECTS OF NEUTRON IRRADIATION ON SOYBEANS II. L. M. Humphrey. Soybean Dig. 14(7), 18-19(1954).

Lines derived from neutron-irradiated seed of Dortchsoy 2, showing some improvement in resistance to shattering and other characters are being tested.

8689
CYTOGENETICS OF NON-TUMOROUS TYPES OBTAINED BY TREATMENT WITH X RAYS OF THE TUMOROUS AMPHIDIPOID NICOTIANA GLAUCA GRAH. X NICOTIANA LANGSDORFFII WEINN. C. Izard, Intern. Congr. Botany, 8th Congr., Paris Rappts. et Communs. Ser. 10, 200-201(1954). BA 25-2610

8690
CYTOGENETICS OF THE OFFSPRING OF MUTANTS OF THE TUMOROUS HYBRID N. GLAUCA X N. LANGSDORFFII; AMPHIDIPOID, OBTAINED BY TREATMENT WITH X RAYS. COMPARATIVE STUDIES OF REDUCTONAL PROPHASES. C. Izard and H. Hites. Ann. inst. exptl. Tobac, Bergerac 2(1), 45-76(1954). BA 25-2261

8691
OBSERVATIONS ON X-RAYED POA PRATENSIS. C. Julien. Acta Agr. Scand. 4, 585-593(1954).

The percentage of aberrants increased from 2.0% in the control material to just over 14% in plants obtained from seed lots exposed to 20,000 and 25,000 r. The majority of the characters affected were morphological; most of the variants were smaller than normal.

8692

A CRITICISM OF THE EXPLANATION OF LINEAR DOSE EFFECT CURVES IN RADIOBIOLOGY ON THE BASIS OF SINGLE HIT FUNCTIONS. R. W. Kaplan. *Naturwissenschaften* **38**, 120-121(1951).

The curve for mutation rate against dosage conforms to the formula for a single-hit effect rather than to that for the cumulative effect of ionization.

8693

POSSIBILITIES OF INDUCING MUTATIONS IN PLANT BREEDING. R. W. Kaplan. *Z. Pflanzenzucht* **32**, 121-131(1953).

Data are presented from experiments in which various chemical or other agents were applied during or after irradiation in order to diminish adverse effects of radiation on chromosome structure during the induction of genetic change by irradiation.

8694

ONTOGENY OF THE SORGHUM INFLORESCENCE AS REVEALED BY SEEDLING MUTANTS. K. Kaukis and L. P. Reitz. *Am. J. Botany* **42**, 660-663(1955).

Air-dried dormant caryopses of *Sorghum vulgare* were x-irradiated or exposed to thermal neutrons. From the distribution of mutant X_2 seeds with the X_1 inflorescences, it was concluded that the tissues comprising an entire panicle usually derive from more than one cell in the dormant embryo. BA 26-431

8695

THE EFFECTS OF CARBON MONOXIDE AND OXYGEN ON THE FREQUENCY OF X-RAY INDUCED CHROMOSOME ABERRATIONS IN *TRADESCANTIA*. E. D. King, H. A. Schneiderman, and K. Sax. *Proc. Natl. Acad. Sci. U. S.* **38**, 34-43(1952).

Inflorescences of *T. paludosa* were enclosed in an air-filled lucite chamber compressed to the desired pressure with N_2 , O_2 , CO, or combinations of these gases. The sealed chamber was placed in an x-ray machine and exposed to 40 min for 10 min at room temperatures. Cytological observations of dicentric and centric rings were made. (from abstract). BA 26-20248

8696

THE EFFECTS OF CARBON DIOXIDE ON THE FREQUENCY OF X-RAY INDUCED CHROMOSOME ALTERATIONS IN *TRADESCANTIA*. Edward D. King and Howard A. Schneiderman. *Proc. Natl. Acad. Sci. U. S.* **38**, 809-812(1952).

Exposure to CO_2 without irradiation gave no chromosomal aberrations, whereas exposure to CO_2 during irradiation increased the frequency of aberrations over that produced in N_2 and/or air. It is believed that CO_2 tension is important in conditioning the response of chromosomes to irradiation. BA 27-26714

8697

THE RELATIONSHIP OF POLYPLOIDY TO THE EFFECTS OF THERMAL NEUTRON EXPOSURE ON PLANTS. C. F. Konzak and W. R. Singleton. *Genetics* **37**, 596-597(1952).

Autotetraploid rye, barley and maize showed less injury resulting from exposure of dry seeds to thermal neutrons than did the diploids, as indicated by measurements of seedling growth. Tetraploid oats were more resistant to such injury than hexaploid and diploid species.

8698

ABNORMAL MEIOSIS IN *PENNISETUM TYPHOIDES*. I. DESYNAPSIS. N. Krishnaswamy, V. S. Raman, and P. Madhavamenon. *Proc. Indian Acad. Sci.* **30B**, 195-206(1949).

When the seed of *Pennisetum typhoides* were subjected to x-rays, one offspring (X-161) produced proliferating panicles with 98.5% sterility. This sterility was traced to desynapsis. (from abstract).

8699

DIFFERENCES IN THE BIOLOGICAL ACTION OF DIFFERENT RADIATIONS IN YEAST. A. Lacassagne. *Compt. rend.* **190**, 524-526(1930). CA 24-2482

8700

X-RAY BREAKAGE EXPERIMENTS WITH ENDOSPERM. I. SUBCHROMATID BREAKAGE. L. F. LaCour and A. Rutishauser. *Chromosoma* **6**, 696-709(1954).

Subchromatid breakage was induced by irradiation only during the period between early and late prophase when chromosome in a diffuse condition with separated half-chromatids and monids. This condition coincides with the time of chromosome reproduction.

8701

IRRADIATION EXPERIMENTS WITH X RAYS IN *NICO-TIANA*. S. Matsumura and T. Fujii. *Ann. Rept. Natl. Inst. Genet.*, Mishima, Japan **3**, 39-40(1953).

8702

CHROMOSOME ABERRATIONS IN EINKORN WHEAT INDUCED BY X RAYS. S. Matsumura. *Ann. Rept. Natl. Inst. Genet.*, Mishima, Japan, **4**, 30-31(1954).

Adjustment in the thickness of the filter in inverse proportion to wave length changed the results of earlier experiments on Einkorn wheat.

8703

MUTATIONS IN TOBACCO INDUCED BY X RAYS. S. Matsumura and T. Fujii. *Ann. Rept. Natl. Inst. Genet.*, Mishima, Japan, **4**, 38-39(1954).

8704

GENE MUTATIONS IN EINKORN WHEAT INDUCED BY X RAYS. S. Matsumura and T. Fujii. *Ann. Rept. Natl. Inst. Genet.*, Mishima, Japan, **5**, 60-61(1955).

8705

MUTATIONS IN *NICOTIANA* INDUCED BY X RAYS. S. Matsumura and T. Fujii. *Japan. J. Breeding* **5**, 41-46(1955).

Chromosome aberrations included translocations, univalent and fragment formation and asynaptic figurations. Aberration frequency was linearly correlated with x-ray dose.

8706

RELATION BETWEEN QUALITY OF X RAYS AND CHROMOSOME ABERRATIONS. S. Matsumura. *Idengaku Zasshi* **24**, 28-29(1949).

Triticum monococcum was exposed to constant dose (8100 r) of x radiation, but under different conditions of voltage, time of irradiation and distance from the source. The number of aberrations was higher when higher voltages were used.

8707

THE PROTECTIVE PROPERTY OF THIOUREA AGAINST RADIATION-INDUCED CHROMOSOME ABERRATIONS. K. Mikaelson. *Exptl. Cell Research* **8**, 400-403(1955).

Concentrations of between 5×10^{-5} M and 10^{-3} M of thiourea were found to give marked protection against the deleterious effects of chronic γ irradiation on shoots of *Tradescantia paludosa*.

8708

PROTECTIVE PROPERTIES OF CYSTEINE, SODIUM HYPOSULFITE AND SODIUM CYANIDE AGAINST RADIATION-INDUCED CHROMOSOME ABERRATIONS.

K. Mikaelson. Proc. Natl. Acad. Sci. U.S. **40**, 171-178 (1954).

When added to the nutrient solutions in which cuttings of *Tradescantia paludosa* were kept during gamma radiation, each of the above chemicals had a protective effect upon chromosome fragmentation.

8709

CYTOLOGICAL EFFECT OF CHRONIC GAMMA IRRADIATION AND THE PROTECTIVE PROPERTY OF CERTAIN CHEMICALS AGAINST THE RADIATION-INDUCED CHROMOSOME ABERRATIONS. K. Mikaelson. Radiobiology Symposium, 1954. (Z. M. Bacq and Peter Alexander, (editors) page 316-20). Academic Press, Inc., N. Y. (1955).

Tradescantia paludosa was grown in nutrient solution during γ -irradiation for 48 hours at dose rates of 12.5, 25, 50, and 100 r/day. Addition of 10^{-5} to 1.5×10^{-3} M glutathione or thiourea to this solution reduced the frequencies of chromosome fragmentation. Cysteine, $\text{Na}_2\text{S}_2\text{O}_4$ and NaCN were also tested for possible protective effects. CA 49-9756

8710

THE COINCIDENTAL CHANGES IN ATOM-BOMBED BARLEY. C. C. Moh and L. Smith. J. Heredity **48**, 183-188(1952).

A mutant line, which on selfing gave 50% white seedling and 50% green plants which were heterozygous for both a reciprocal translocation and a mutant gene for white seedlings, was obtained from Trebi seed exposed to stomic radiation at Bikini.

8711

EFFECT OF URANIUM RADIATION ON VEGETATION. D. Montet. Compt. rend. acad. agr. France **18**, 28-31 (1932).

Wheat and balsam were grown in soil containing UO_2 . With small amounts of UO_2 , the yield was increased above that of controls. With larger quantities of UO_2 , the yields decreased, and with 1.7g. the plants were killed. CA 26-2005

8712

TRANSMITTED POLLEN AND CHROMOSOMAL ABERRANCIES INDUCED IN MAIZE BY TASSEL EXPOSURE IN A NUCLEAR REACTOR. R. Morris. Am. J. Botany **39**, 452-457(1952).

Mature tassels were exposed to thermal neutrons in a nuclear reactor for 0, 1, 2, 4, and 8 minutes, their pollen was then used to fertilize untreated plants.

8713

INDUCED RECIPROCAL TRANSLOCATIONS INVOLVING HOMOLOGOUS CHROMOSOMES IN MAIZE. R. Morris. Am. J. Botany **42**, 546-550(1955).

Eighteen interchanges involving opposite arms of homologous chromosomes were detected among 1636 plants raised from seeds treated with x rays or thermal neutrons.

8714

EFFECTS OF X-RAYS IN TRITICUM. J. W. Morrison. Heredity **6** (Suppl.), 83-91(1953).

Complete cell analysis of breakage and reunion was scored one to three days after x-ray treatment (100-800 r) of young root-tips of *T. monococcum*. BA 27-15129

8715

THE ACTION OF BETA RAYS ON ROOT MERISTEMS OF ALLIUM CEPA. M. M. Mouthinho-De-Oliveira and M. T. Cabral. Portugaliae Acta Biol., Ser. A. **4**, 297-314(1955).

Dispersion of the nuclei into particles, chromatic rarefaction, chromatic agglutination and lobed nuclei were produced in resting cells. Intense agglutination,

often leading to formation of bridges and pseudobridges, was observed in dividing cells.

8716

THE EFFECT OF X-RAYS ON THE PROTOPLASM, THE NUCLEUS, AND THE CHONDRIOME IN PLANT CELLS OBSERVED IN VIVO. G. A. Nadson and E. J. Rochlin. Protoplasma **20**, 31-41(1934).

Living cells of the epidermis of *Allium cepa* were x-irradiated and the sequence of events following are mentioned. These include an increase in protoplasm flow, fat droplets formation in the plasma, to the forming of a large vacuole in the cytoplasm. CA 28-1737

8717

POST-RADIATION STORAGE EFFECT ON CHROMOSOMES IN BARLEY SEEDS X RAYED AT NORMALLY INEFFECTIVE DOSAGES. R. A. Nilan. Genetics **40**, 588. Records Genet. Soc. Am. **24**, 588(1955).

Aberration frequency in treated seeds examined immediately was not significantly higher than in seeds that were stored. Storage did not affect the number of aberrations in nonirradiated seeds.

8718

A MUTANT LINE OF BARLEY INDUCED BY ATOMIC-BOMB RADIATION. THE EFFECT OF PARTIAL OVULE STERILITY ON THE INHERITANCE OF CREAM SEEDLINGS. R. A. Nilan. J. Heredity **46**(2), 49-52(1955).

The ovule sterility of the parental type plants averaged 40%. No pollen abortion occurred in these plants. (from abstract). BA 30-15778

8719

GENETICAL STUDIES ON PROGENIES OF RICE PLANTS ATTACKED BY AN ATOMIC BOMB. Y. Nishimura and M. Nakamura. Idengako Zasshi **24**, 72-73(1949).

Data on the degree of sterility, chromosome number and mutants.

8720

X-RAY INDUCED MUTANTS IN BARLEY. Y. Nishimura, H. Nuzeki, and T. Saito. Japan J. Breeding **1**, 193(1952).

Partial sterility associated with formation of multiple associations is described in the progeny of an x-irradiated barley sample.

8721

X-RAY INDUCED MUTATIONS IN BARLEY. Y. Nishimura, H. Nuzeki, and T. Saito. Japan J. Breeding **1**, 210-214 (1952).

Investigations on the X_1 and X_2 generations of x-irradiated samples of the Japanese barley Kanto 1 are reported.

8722

THE EFFECT OF X-RAY TREATMENT IN DORMANT SEEDS OF LUZULA PALLESCENS AND L. CAPITATA. H. Nordenskiöld. Kgl. Lantbrukshogskol. Ann., **22**, 257-267(1955).

Germination and seedling survival were normal at dosages up to 150,000 r. High tolerance of x-ray doses is attributed to possession of a diffuse centromere. Polyploidy appeared not to increase the tolerance as much as in some species with monocentric centromeres.

8723

GENETIC INVESTIGATIONS INTO BARLEY MUTATIONS INDUCED BY X RAYS. H. Notzel. Kuhn-Arch. **66**, 72-132 (1952)

Investigations on 34 morphological and 6 physiological mutants of Haisa barley are described. Purpose: to isolate mutant types and discover whether pheno-typically similar mutants are genetically similar.

8724

SOME EXPERIENCES FROM MUTATION EXPERIMENTS

IN CHLAMYDOMONAS. Nils Nybom. *Hereditas* 39, 317-324(1953).

Preliminary results from mutation experiments are described. Differences between lethal action of x-rays and u.-v. are described. Sensitivity to x-rays and u.-v. is decreased by lowering the redox potential and is increased by raising it. Mutations with increased resistance to sulfonamide and streptomycin are easily obtained. BA 27-18810

8725

THE PIGMENT CHARACTERISTICS OF CHLOROPHYLL MUTATIONS IN BARLEY. N. Nybom. *Hereditas* 41, 483-498(1955).

X ray sensitivity of presoaked germinating barley seeds was shown to be 6-7 times greater than that of dry dormant grains, suggesting some correlation between water content and sensitivity.

8726

NERVOUS CONTROL OF THE REACTION OF THE ANTERIOR HYPOPHYSIS TO X-IRRADIATION AS STUDIED IN GRAFTED AND NEWBORN RATS Z. M. Bacq, M. M. Martinovitch, P. Fischer, G. S. Shaditch, R. Pavlovitch and D. V. Rativojvitch. *Bull. de l'acad. roy. med. Belg.* (VI) 22, 328(1956).

X-irradiation does not act directly in the pituitary but through the hypothalamic centers that control the release of corticotropin (ACTH) by the anterior hypophysis. As radiation sickness develops, hypothalamic activation of the pituitary and adrenals is slightly beneficial. Among the observed results were: (1) grafted adrenals in adrenalectomized rats reacted normally to the ACTH discharged after irradiation, (2) hypophysectomized rats with pituitary transplants did not show the 2 drops in cholesterol content typical of normal or grafted adrenals after irradiation, (3) the first adrenal reaction of newborn rats to x-irradiation was favorable to survival and (4) the second had no relation to mortality or to the severity of radiation sickness.

8727

PROGRESS IN RADIOBIOLOGY (THE INTERNATIONAL PICTURE.) H. M. Patt. *Nucleonics* 12(12), 42-45(1954).

A report on new data and interpretations of papers presented at the Liege Conference (Aug. 30-Sept. 1st, 1954) on the second annual meeting devoted to radiobiology.

8728

EFFECT OF IRRADIATION ON DNA SYNTHESIS IN VICIA AS SHOWN BY AUTORADIOGRAPHS. S. R. Pelc and Alma Howard. *Acta Radiol. Suppl.* 116, 699(1954).

The proportion of cells synthesizing DNA during 12 hours postexposure period decreases with increasing radiation dose from 0 to 50 r of roentgen rays, then remains constant at 60% of the control value for doses up to 200 r. Synthesis prevented in cells in the first part of interphase at the time of irradiation. Slowing of growth rate and eventual recovery of roots after 140 r is described in different parts of the mitotic cycle.

8729

INFLUENCE OF RADIOACTIVITY ON GERMINATION. G. Petit and R. Ancelin. *Compt. rend.* 156, 903-5(1913).

Authors describe stimulatory effect of radiation on plant cell proliferation. CA 7-1893

8730

INHIBITION OF GROWTH OF CHLORELLA PYRINIDOSA BY BETA-EMITTING RADIOISOTOPES. J. W. Porter and H. J. Knauss. *Plant Physiol.* 29, 60-63(1954)

Cells were grown in concentrations of H_2O , P^{32} , S^{33} , and Sr^{90} - Y^{90} and then subcultured in nonradioactive inorganic nutrient solution. Growth rates of cells decreased in proportion to radiation dose above approximately 1000 rep/day. An increase in average cell size occurred during

the growth of algae in radioactive solutions. (from abstract). BA 29-9565

8731

CENTROMERE CONTROL OF CHROMOSOME SPLITTING AND BREAKAGE. H. Rees. *Heredity* 6(Suppl.), 235-245(1953).

Difficulty in the separation of anaphase chromosomes can be observed within a few hours of x-irradiation. BA 27-15131

8732

DEPENDENCE OF ACUTE RADIOSENSITIVITY ON AGE IN ADULT FEMALE MOUSE. G. A. Sacher. *Science*, 125, 1039-40(1957).

8733

THE COMPARATIVE EFFECT OF IONIZING RADIATIONS AND HEAT UPON THE STARCH CONTAINING CELLS OF THE POTATO TUBER. Edith A. Roberts and Bernard E. Proctor. *Food Research* 20, 254-63(1955).

A cathode ray dose of $2-3.0 \times 10^6$ rep, with a resulting temperature of less than $22^\circ C$, altered the middle lamellae, but did not weaken walls to the breaking point nor alter form of the starch grains. Dose of from $1-2.0 \times 10^6$ rep effected separation of cells but did not weaken walls to the breaking point or change physical appearance of the starch.

8734

INFLUENCE OF ANTAGONISTIC IONS ON INHIBITIVE ACTION OF RADIUM ON GROWTH OF ROOTLETS. A. Sartory, R. Sartory, J. Meyer, and E. Meyer. *Compt. rend.*, 198, 197-9(1934). (In French).

Rootlets of *Lens esculenta* moench were exposed to Rn while immersed in isotonic solutions of $MgSO_4$ or KCl , 24 hour exposure. Rootlets in $MgSO_4$ showed better protection against Rn effects than did rootlets in KCl . Effect is attributed to Mg. BA 28-27519

8735

THE PRODUCTION OF BENEFICIAL MUTATIONS IN BARLEY BY IRRADIATION. L. H. Skebeski, and T. Lawrence. *Can. J. Agr. Sci.* 34, 1-9(1954).

In view of a report that stiff straw in barley could be produced by radiation, an induced mutation program was initiated by treating the variety Montcalm with various sources of radiation. BA 28-27232

8736

EFFECT OF CATHODE RAYS ON GERMINATION AND EARLY GROWTH OF WHEAT. L. H. Soderholm and E. R. Walker. *Botan. Gez.* 116, 281-290(1955).

With a dose of 10,000-20,000 reps germination was not reduced, but subsequent growth was altered, 20,000-30,000 reps decreased the per cent germinating. With 40,000 reps mitosis ceased after three days. BA 30-20509

8737

THE EFFECT OF X-RADIATION ON THE FLOWERING OF CERTAIN CULTIVATED BULBS AND CORMS. J. L. Spencer. *Am. J. Botany* 42, 917-920(1955).

8738

INDUCED POLLEN LETHALS FROM SEEDS OF DATURA STRAMONIUM TREATED WITH THERMAL NEUTRONS. J. L. Spencer, W. R. Singleton, and A. F. Blakeslee. *Proc. Natl. Acad. Sci. U. S.* 39, 288-292(1953).

8739

ON THE GENETIC NATURE OF INDUCED MUTATIONS IN PLANTS. II. A HAPLOVIALE DEFICIENCY IN MAIZE. L. J. Stalder. *Missouri Univ. Agr. Expt. Sta. Bull.* 204, 1-29(1933).

8740

THE INFLUENCE OF RADIOACTIVITY ON THE PLANT ORGANISM. J. Stoklasa. *Proc. Intern. Congr. Plant Sci.* 1st Congr., Ithaca, 1926 2, 1149-1150(1929).

Author describes effects of radioactivity on energy exchanges and metabolism of plant and animal cells. CA 24-2161

8741

THE EFFECTS OF ULTRAVIOLET AND X-RADIATIONS UPON THE CENTROCHROMATIN OF *SACCHAROMYCES*. G. F. Townsend. *Cytologia* (Tokyo) **19**, 130-132(1954).

Unirradiated control cells commence budding ninety minutes after plating and complete development of at least one mature bud at the end of three hours.

BA 30-15722

8742

ON SOME CHROMOSOME ALTERATIONS INDUCED BY X-RAYS IN *CREPIS*. M. Navashin. *Proc. Intern. Congr. Botany*, 5th Congr., Cambridge. p. 241-242(1936).

8743

THE RESPONSIBILITIES OF THE MEDICAL PROFESSION IN THE USE OF X-RAYS AND OTHER IONIZING RADIATION. United Nations Scientific Committee on Effects of Atomic Radiation, *Radiation Research* **6**, 517-19(1957).

8744

EXCEPTIONALLY STRONG MUTAGENIC ACTION OF RADIOACTIVE ISOTOPES P^{32} AND S^{35} IN *EPILOBIUM*. P. Michaelis and R. W. Kaplan. *Naturwissenschaften* **40**, 534(1953).

Treatment of seeds of *Epilobium hirsutum* and *E. parviflorum* with radio-P or -S led to very high mutation rates depending on the dosage. BA 28-22672

8745

STUDIES ON THE RANJAN X-RAY MUTANT WHEATS. II. A PRELIMINARY ACCOUNT OF THE CYTOLOGY OF THE VARIANTS. S. P. Naithani, M. S. Mehrotra and K. P. Srivastava. *Proc. Natl. Acad. Sci. India* **16**, 24-7(1946).

Authors present cytological observations on the eleven wheat mutants described by Ranjan. Variations were observed in the sizes and shapes of the chromosomes but not in chromosome number.

8746

STUDIES ON THE BIOSYNTHESIS OF PENICILLIN.

D. Bonner. *Arch. Biochem.* **13**, 1-9(1946).

X-ray induced mutants of *Penicillium notatum* which produced little or no penicillin were investigated to study (1) possible production and identification of natural precursors of penicillin, and (2) response to compounds known to act as precursors. In tests of 53 mutant strains grown in mixed culture, in all combinations of two at a time, no penicillin production was observed.

BA 17-1593

8747

WHAT THE SCIENTISTS ARE DOING. X-RAY TREATMENT OF COTTON SEED. Anonymous. *Indian Farming* **7**, 360-1(1946).

Details are given of experiments carried out at the Institute of Plant Industry, Indore, on Treating the seed of M. U. 4 with X-rays, resulting in a new cotton variety with a higher ginning percentage and greater fibre length than M. U. 4.

8748

MUTATIONS IN AGRICULTURAL PLANTS. A. Gustafsson. *Hereditas* **33**, 1-100(1947).

Production of improved varieties of crop plants by means of X-rays induced mutation is reviewed. Improvements in yield, stiffness of straw, 1000-grain weight and earliness have been obtained in morphological mutants of the bright green or erectoid types. Physiological mutants have been obtained superior in yield to their parents.

8749

THE QUESTION OF THE PHYSICO-CHEMICAL STRUCTURE

OF THE CHROMOSOME. R. Kaplan. *Naturwiss.* **28**, 79-80(1940).

Physical constitution of the chromosomes is discussed and particular emphasis is placed on the energy relationships of thymonucleic acid, a subject which is discussed with special reference to X-ray induced mutations and chromosome breaks.

8750

RADIATION GENETICS. P. C. Koller. *Nature* **167**, 395-6(1951).

Author reviews papers given at the first unclassified information meeting for Biology and Medicine (March 26-27, 1948), sponsored by the Biology Division of the Oak Ridge National Laboratory. Papers deal with basic knowledge in the understanding of radiation effects and their consequences. Need for more information, particularly the need for additional cytogenetical research, is emphasized.

8751

CHROMOSOME CHANGES OBTAINED BY TREATMENT WITH NEUTRONS. D. Kostov. *Med. Fak., Godishnik, Sofia Univ.* **23**, 51-61(1943-44).

Cytological effects resulting from neutron irradiation of plants of *Crepis capillaris* are reported. Many seeds germinated but ultimately died. Possibly penetration of neutrons is impeded by the integument. Over 70% of the bombarded cells showed changes.

8752

GIANT JUTE PLANT GROWN BY X-RAY TREATMENT. Anonymous. *Crops and Soils* **2**, 25(1949).

Economically valuable mutants of jute and cotton produced by X-ray treatment at the Bose Research Institute, Calcutta are discussed.

8753

THE APPLICATION OF RESEARCH ON MUTATION OF FRUIT TREES. I. Granhall. *Sveriges Pomol. Foren. arsskr.* **50**, 105-26(1949).

A section of the paper reviews results obtained on induction of mutations in apples and pears by x-irradiation, neutron bombardment and treatment with radioactive phosphorus or mustard gas. Individual mutants are described.

8754

THE VIABILITY REACTION OF SOME INDUCED AND SPONTANEOUS MUTATIONS IN BARLEY. A. Gustafsson and N. Nybom. *Hereditas* **36**, 113-33(1950).

Data on the yield and other characters of seven mutants of Maja barley are analysed. These and other barley mutants are more productive, as compared with the parent strains; difference is greater is unfavorable than in favorable years. Maja mutants differ from Maja in response to different rates of manuring

8755

INFLUENCE OF LOW TEMPERATURE ON THE X-RAY MUTATION RATE OF DORMANT BARLEY GRAINS. R. W. Kaplan. *Naturwiss.* **34**, 316-17(1947).

Subjecting grains of the barley variety *Weihenstephaner II* to a temperature of -65°C , while being x-rayed produced no significant differences in the X-ray mutation rate.

8756

CHROMOSOME MUTATIONS AS A CAUSE OF STERILITY EFFECTS AFTER X-IRRADIATION OF BARLEY GRAINS. R. W. Kaplan. *Z. Induktive Abstammungs-u. Vererbungslehre* **83**, 203-19(1949).

Ripe barley grains were treated with X-rays. The results, when plotted to show distribution of frequencies of occurrence of ears with various degrees of sterility, exhibit maxima at 25%, at 45-55% and at 75-80%, i.e.,

values corresponding to Mendelian segregation frequencies.

8757

EXPERIMENTS ON A. MAJUS CONCERNING THE FREQUENCY OF FACTOR MUTATIONS AFTER X-IRRADIATION OF THE POLLEN IN DIFFERENT STATES OF TURGIDITY. R. Kaplan. Z. Induktive Abstammungs- u. Vererbungslehre 82, 164-86(1948).

Only mutations affecting leaf shape and in some cases also inducing chlorophyll deficiency reacted to soaking treatment, whereas the color factors were affected only by X-irradiation.

8758

INCOMPATIBILITY IN FLOWERING PLANTS. D. Lewis. Biol. Rev. 24, 472-96(1949).

Incompatibility is discussed with reference to the heteromorphic and homomorphic types, their genetic basis, incompatibility in polyploids and interspecific hybrids, and mutation of the S gene which determines incompatibility. Evidence is given that this gene consists of two parts which react to X-rays as independent units.

8759

THE BEHAVIOR OF X-RAY INDUCED RINGS OF FOUR WITH LARGE INTERSTITIAL SEGMENTS IN OE. HOOKERI. H. Marquardt. Z. Induktive Abstammungs- u. Vererbungslehre. 82, 415-29(1948).

In 22 plants with x ray induced translocations, two plants were discovered that exhibited (1) translocations resulting in two rings of four and (2) many cells showing other aberrant configurations not hitherto recorded in forms characterized by rings of four.

8760

PHOTOPERIODIC RESPONSE IN SOME X-RAY MUTANT WHEATS. G. Misra. Current Sci. (India) 18, 413-14 (1949).

Mutant strains Sarogini and Vijaya resemble other Indian wheats in the general trend of their photoperiodic response. Long day treatment during their vegetative phase accelerates their normal life cycle, although they tolerate short day conditions of India and set good grain

8761

BOSE RESEARCH INSTITUTE, OF CALCUTTA, CALCUTTA 9, INDIA, REPORT FOR 1951-52, 69p.

Reports on potato, cotton, jute, sesame, coconut, grape and mustard. Results of irradiation of jute, sesame, rape and mustard are described. BA 24-1720

8762

BOSE RESEARCH INSTITUTE OF CALCUTTA, CALCUTTA 9, INDIA, REPORT FOR 1952-53, 78p.

Corchorus olitorius types Chinsura Green (CG), R26 and a tall mutant, and *C. capsularis* types D154 and D386 were irradiated for 80 and 125 M. A. H. Plants resulting from these treatments and from seed of last season's X_1 plants were studied with regard to height, basal diameter and flowering period. Bengal types 10, 12, 16 and 20 and Madras types TMV 1 and 2 of sesame were irradiated with 100 and 14 M. A. H. The four Bengal types gave higher yields after treatment. BA 24-1721

8763

THE BIOLOGICAL EFFECTS OF PENETRATING RADIATIONS. F. G. Spear. Brit. J. Radiol. 20, 489 (1947).

A short review article based on the supplement to this journal, edited by this author.

8764

RADIUM EXPERIMENTS WITH DATURA. I. THE IDENTIFICATION AND TRANSMISSION OF LETHALS OF POLLEN-TUBE GROWTH IN F_1 'S FROM RADIUM-

TREATED PARENTS. J. T. Buchholz and A. F. Blakeslee. J. Heredity 21, 119-29(1930).

The following three conditions of genetic abnormalities obtained following radium treatment and which have become evident in the male gametophytes after pollination are described: (1) failure of half of the pollen grains to germinate, (2) early bursting of half the pollen tubes, (3) slower growth of half the pollen tubes to form a second mode of distribution.

8765

POLYEMBRYONY IN MAIZE AND LILY FOLLOWING X-IRRADIATION OF THE POLLEN. D. T. Morgan. J. Heredity 42, 91-93(1951).

Marked increases in the number of polyembryonic seeds and seedlings were obtained in maize and *Lilium regale* as a result of x-irradiation of pollen. Unattached and conjoined types were observed in both species. Root tip counts on polyembryonic maize seedlings from irradiated pollen crosses, and in twin seedlings in control plants, revealed diploid number of $2n = 20$ for each member. PBA 21-2635

8766

TWO NEW MUTANTS IN THE TOMATO, PROPELLER AND ROSETTE. L. Butler. J. Hered. 45, 25-7(1954).

Two mutant genes produced by X-rays were tested for monohybrid segregation and linkage relations. The character rosette (ro) shows a deficiency in its monohybrid ratio and a linkage with dwarf in group I. The mutant propeller (pr) shows good monohybrid ratios, but no linkage.

8767

MUTATIONS IN APPLES INDUCED BY X RADIATION. C. J. Bishop. J. Heredity 45, 99-104(1954).

Nine fruits that were sectorial chimeras for color were obtained from X-irradiated scions of Cortland. Observed color changes were in the direction of more or less red color compared with the fruits of the controls. PBA 24-3275

8768

EFFECT OF RADIOACTIVE SUBSTANCES ON PLANT GROWTH. S. Gericke. Landwirtschaft. Forsch., Suppl. 2, 72-6(1952). (In German).

Various American and German experiments on the stimulation of plant growth and yield by means of radioactive surface or fertilizer applications are summarized. Twelve references. NSA 7-1887

8769

POSSIBLE BIOLOGICAL SIGNIFICANCE OF THE ACTION OF IONIZING RADIATION ON NUCLEIC ACIDS. Joseph Weiss. Nature 169, 460-1(1952).

Nucleic acids in aqueous solution exposed to X-rays show definite chemical changes manifest as liberation of ammonia and inorganic phosphate and the formation of other low-molecular fragments. Author presents several conclusions regarding these experiments.

8770

EFFECT OF OXYGEN ON THE FREQUENCY OF CHROMOSOME ABERRATIONS PRODUCED BY 8-ETHOXYCAFFEINE. Bengt Kihlman. Nature 174, 561-2(1954).

Kihlman expands this subject by discussing recent experiments on the effect of oxygen on chromosome aberrations when 8-ethoxycaffeine is used. Results: 8-ethoxycaffeine is more effective in producing chromosome aberrations in oxygen than in nitrogen and while inhibition of mitosis by x-rays is increased by oxygen, no such increase was observed in the case of 8-ethoxycaffeine.

8771

EFFECT OF X-RAYS ON THE RESPIRATION ENZYME CHAIN. U. Hagen. Naturwiss. 42, 185(1955).

By detn. of the intensity of cytochrome bands in suspensions of *Escherichia coli* B and of bakers' yeast cells in reduced state the oxidation rate was found during O₂ addition. Cell metabolism was slowed in coli cells by cooling, in the baker's yeast cells by ethylurethan 0.82 M. Intensity of the 550 or 563 M bands, did not change before and after irradiation of the suspension with 10,000 to 40,000 r of x rays. CA 50-5803

8772

RADIATION INJURY FROM RADIOACTIVE PHOSPHORUS IN TRACER EXPERIMENTS WITH PLANTS. K. Strzemienski. New Zealand J. Sci. Technol. A34, 313-19(1952).

An experiment was made with short-rotation ryegrass grown in pots with four levels of P³² radioactivity, viz. 40, 160, 640, and 2560 µc per gram of phosphorus. No significant differences were found in either dry-matter production or phosphate absorption and distribution. NSA 7-2234

8773

THE PHYSIOLOGICAL ACTION OF α-, β- and γ-RAYS ON THE PROTOPLASM OF THE PLANT CELL. Julius Stoklasa. Naturwiss. 18, 567(1930).

Author's results do not agree with those obtained recently by Feichtinger (C. A. 24, 3261). CA 24-4808

8774

X-RAYS AND CELLS. P. C. Koller. Nature 155, 778-80(1945).

Koller gives a brief history of radiotherapy, discusses the use of x-rays for determining the properties of the cells.

8775

PHYSICO-CHEMICAL METHODS OF PROTECTION AGAINST IONIZING RADIATIONS. P. Alexander and A. Charlesby. Radiobiology Symposium, 1954 (Liege), 49, (Butterworth and Co., London, England, 362 pp., 1955). (Academic Press, Inc., New York in U.S., 1955).

8776

THE EFFECT OF HORMONES, X-RAYS AND CATHODE RAYS ON THE CAMBIUM ACTIVITY OF *BETA VULGARIS*. Helga Winter. Planta 44, 636-68(1954).

X-rays and fast electrons applied to 3-week-old plants in dosages varying from 500 - 10,000 r. Electron radiation was 0.4 as effective as X-rays. Low dosages decreased, higher doses completely inhibited all cambial activity. X-rays damaged dividing and resting cells equally; electrons (4-6000 r) damaged cambium more severely than the surrounding parenchyma. BA 30-2713

8777

THE STIMULATING EFFECT OF X RAYS ON PLANTS. A. I. Atabekova. Priroda 27, 56-62(1938).

Specific and general effects on the organism result from x radiation. Growth and development of the plant are also influenced by radiation. CA 34-7341

8778

CHRONIC ROENTGEN AND RADIUM DERMATITIS, AN ANALYSIS OF 259 CASES. T. S. Saunders and H. Montgomery. J. Amer. Med. Assoc. 110, 23(1938).

8779

EFFECT OF OXYGEN CONCENTRATION ON THE SENSITIVITY OF BARLEY SEEDLINGS TO GAMMA RAYS. T. Tanada. Am. J. Botany 39, 705-706(1952).

The inhibitory effect of gamma rays on growth of barley roots increased with increasing oxygen concentration up to about 2% O₂ in N₂. From 2 to 100% oxygen the inhibition increased only slightly. BA 27-10856

8780

STUDY OF FERTILIZER UPTAKE WITH RADIOACTIVE PHOSPHORUS. IV. THE AVAILABILITY OF PHOSPHATE CARRIERS IN CALCAREOUS SOILS. H. G. Dion, J. E. Dehm and J. W. T. Spinks. Sci. Agr. 29, 512-26(1949).

On wheat under semiarid conditions on soil containing a high level of Ca, the P³² tracer used did not affect plant growth. Total P taken up by plant showed a good correlation with amount of growth. NSA 4-3917

8781

PRELIMINARY INVESTIGATIONS WITH RADIOACTIVE ISOTOPE (P³²) ON JUTE SEEDS. R. K. Basu. Sci. and Culture (Calcutta) 19, 515-16(1954).

Exposing dry seeds of *Corchorus olitorius* to P³² resulted in three pure-green forms resembling the variety Chinsura Green, and three forms with deep scarlet stems, leaves and other organs. Treated population flowered one week earlier than the control plants.

8782

BLOOD CHANGES IN WORKERS WITH THE ROENTGEN RAY, AND APPARATUS FOR PROTECTION. M. M. Portis. J. Am Med. Assoc. 65, 20(1915).

8783

USE OF PARTIAL-CELL IRRADIATION IN STUDIES OF CELL DIVISION. R. E. Zirkle, W. Bloom and R. B. Uretz. Proc. Internat. Conf. on the Peaceful Uses of Atomic Energy, 11, 273-282(United Nations, New York, N. Y. 402pp., 1956).

Authors review the technique (and its uses) of selectively irradiating parts of cells as a means of studying the contributions of various cell components to radiation damage. The experiments described utilized Newt heart (*Triturus viridescens*).

8784

THE EFFECT OF TOTAL BODY IRRADIATION ON THE SURVIVAL OF HOMOLOGOUS SKIN GRAFTS ON CFW MICE. G. A. Hardin and A. A. Werden. Plastic and Reconstr. Surg. 13, 40-45(1954).

8785

THE INDUCTION OF CHROMOSOME ALTERATIONS BY INJECTION OF ACTIVE SUBSTANCES INTO THE BUDS OF *P. TENUIS*. J. L. A. F. Oehlkers and H. Marquardt. Z. Indukt. Abstamm. -u. Vererbhlehre 83, 299-317(1950).

A solution of m/20 ethylurethane + m/200 KC1 was injected into the flower buds in early stages of meiosis. The first noticeable effect was loosening of chromosomes, leading to various types of fragmentation, translocations and other aberrations similar to those produced by irradiation including half-chromatid translocation and various recombinations within a single chromosome.

8786

EVALUATION BY BREEDING OF MUTATIONS INDUCED BY X-RAYS IN PHYSIOLOGICAL CHARACTERS IN WINTER WHEATS. W. Oltmann. Z. Pflanzenz. 29, 76-89(1950).

Winter wheats Houter II, Heine IV and Walther I were irradiated by X-rays to obtain positive viable mutations for practical use and to evaluate mutants for breeding purposes. Induced mutations were found to be capable of effecting modifications in components of complex physiological characters. Variations were usually unfavorable, sometimes favorable. Some strains showed mutation in several characteristics.

8787

ABSORPTION OF X AND γ RADIATIONS AND THE

SECONDARY RADIATIONS WHICH ACCOMPANY THEM. Duc de Broglie. Brit. J. Radiol. 23, 55-62(1927).

The author stresses the importance of heavy elements in the transfer of energy to the biological medium. Observed effects are due to electrons and secondary radiations. CA 22-2113

8788

SOMATIC MUTATIONS IN ANTIRRHINUM PRODUCED BY CHRONIC GAMMA IRRADIATION. Arnold H. Sparrow, M. Denegre and W. J. Haney. Genetics 37, 627-8(1952).

F₁ plants of *Antirrhinum majus* with dark purple flowers but heterozygous for white, ivory, yellow, and lavender were exposed to chronic Co-60 gamma irradiation for several weeks at dose rates varying from a few roentgens to over 300 r/day. A mutation affecting any one of the factors observed causes corolla cells carrying the mutation to appear as a lighter spot.

8789

THE ANALYSIS OF CHROMOSOME BREAKS BY ENDOSPERM PHENOTYPE IN MAIZE. A. C. Faberge. Genetics 39, 966(1954).

Procedure: pollen carrying the dominant endosperm markers I, Sh, Bz, Wx, in the short arm of chromosome 9 was irradiated, the corresponding recessive was used as the female parent. A broken chromosome end may rejoin, rejoin with another free end to give an aberration, or remain free and give a chromatid breakage-fusion-bridge cycle. Since breakage-fusion-bridge cycle stems from a single break, the frequency of such breaks arising in marked chromosome segments may be used to constitute a map

8790

EFFECT OF TIME OF GAMMA RADIATION ON MICROSPORE MUTATION RATE IN MAIZE. W. R. Singleton and A. L. Caspar. Genetics 39, 993(1954).

Corn plants were irradiated at different stages in the microspore development with 1300 r from a Co⁶⁰ source. Meiosis was most sensitive period for pollen injury. Mutation production was most sensitive a few days before pollen shedding. Mutation production decreased sharply when irradiation occurred during the last 2 days before pollen shedding. Thus most mutations are produced at a time different from that of maximum chromosomal damage as measured by injury to pollen.

8791

INCREASED FREQUENCY OF X-RAY-INDUCED CHROMOSOMAL ABERRATIONS IN *TRADESCANTIA* PRODUCED BY A MINERAL-NUTRIENT TREATMENT. Dale Steffensen. Genetics 39, 996-7(1954).

After exposure to soft X-rays (100 KVP), chromatid exchanges were more frequent in buds grown in 1/10 concentrated Hoagland's solution than in those grown in regularly changed undiluted solution or in soil. Spontaneous aberration frequency of unirradiated plants grown in the depleted 1/10 concentration solution was no greater than that of the plants grown under either of the two other conditions.

8792

THE EFFECT OF PRE- AND POST-IRRADIATION CENTRIFUGATION ON THE CHROMOSOMES OF *TRADESCANTIA* AND *VICIA*. S. Wolff and R. C. Von Borstel. Genetics 39, 1001(1954).

Inflorescences of *Tradescantia* were irradiated with 200 r x-rays. Centrifugation of inflorescences within 30 seconds after cessation of irradiation increased the number of two-hit chromosome aberrations. Centrifugation prior to irradiation reduced the numbers of two-hit aberrations by a factor of two.

8793

MODE OF ADDITION OF X-RAY DOSES GIVEN WITH

DIFFERENT OXYGEN CONCENTRATIONS. John Read. Brit. J. Radiol. 25, 336-338(1952).

Mean growth of broad bean roots in the 10 days following x irradiation is a function of dose and of O₂ concentration. Graphs of mean growth vs. dose for all O₂ concentrations can be made to coincide by multiplying the dose scale by a factor F, a function only of the O₂ concentration. BA 27-4675

8794

THE EFFECT OF IONIZING RADIATIONS ON THE BROAD BEAN ROOT. XI. THE DEPENDENCE OF THE ALPHA RAY SENSITIVITY ON DISSOLVED OXYGEN. John Read. Brit. J. Radiol. 25, 651-661(1952).

Dissolved O₂ increased sensitivity of the bean roots to particles by a factor of about 1.4 as compared to 2.8 found with X rays. O₂ is considered to augment effectiveness of delta-rays which account for about half the ionization due to the α particles. BA 27-21498

8795

SOME UNRECOGNIZED DANGERS IN THE USE AND HANDLING OF RADIOACTIVE SUBSTANCES. H. S. Martland, P. Conlon and J. P. Knef. J. Am. Med. Assoc. 85, 1769(1925).

Observations on man: ingestion and inhalation of radium (360 μ g-5 mg for 6 months) resulted in pulmonary fibrosis, induration and neoplasia.

8796

PRELIMINARY REPORTS ON THE EFFECT OF CERTAIN CHEMICALS ON RADIATION DAMAGE TO CHROMOSOMES. H. P. Riley. Genetics 37, (5), 618-619(1952). Records Gent. Soc. Am. 21, 62-63(1952).

Onion roots, 1-3 cm. long were immersed in various solutions for 30 min., removed and irradiated with gamma radiation in air, returned to solutions for 10 min., transferred to H₂O for 3-4 days, then slides were prepared for study of chromosome aberrations. Solutions used: 0.02M, 0.002M, .0002M, .00002M and .000002M concentrations of sodium hydrosulfite or 2,3 dimer-captopropanol (BAL). Doses up to 280 r caused fewer aberrations than in *Tradescantia* microspores, in higher doses tended to inhibit or retard mitosis. Dose of 240 r produced .083 interchanges and 0.147 deletions/cell for roots in H₂O. Comparable results were found for same dose combined with .00002M + .000002M concentrations of both chemicals. Aberration frequency was reduced 1/2 in stronger concentrations. Dose of 420 r almost completely inhibited mitosis in roots in H₂O and in .0002M sodium hydrosulfite. About 1% of cells were in division in roots treated with .02M and .002M sodium hydrosulfite pre- and post-irradiation. Study indicates that certain concentrations of these 2 chemicals reduce the damage to onion root tip chromosomes caused by gamma radiation. BA 27-11840

8797

CYTOPLASMIC DAMAGE CAUSED BY GAMMA RADIATION IN *ALLOMYCES JAVANICUS*. Don Ritchie. Botan. Gaz. 115, 138-146(1953).

Mycelia of *Allomyces javanicus*, exposed to γ radiation from a Co⁶⁰ source showed no morphological changes after 96 x 10⁴ r or less. After 112 X 10⁴ r, mitochondria became swollen or vesiculate, after 128 X 10⁴ r, all mitochondria were severely damaged, death followed 144 x 10⁴ r. BA 28-25301

8798

LYMPHOPLNIA FOLLOWING EXPOSURES OF RATS TO SOFT X RAYS AND THE β RAYS OF RADIUM. J. C. Mottram and S. Russ. J. Exper. Med. 34, 271(1921).

Soft x rays are more penetrating than β rays, thus have a greater effect on lymphoid tissue. Small dose (1/150 rad) caused lymphopenia (50% decrease in

lymphocyte count.) Note: "rad" here is not the same as current unit of this name.

8799

THE SPECIFIC ABNORMALITY IN CELL DIVISIONS BY HIGHER DOSAGE OF IRRADIATION OF X RAY. II ON THE INTER-RELATIONSHIP BETWEEN THE DOSE OF X RAY AND ABNORMAL MATRIXES OF CHROMOSOMES. Tadashi Oyama. Jap. Jour. Genetics 30, 147-150 (1955). BA 30-30737

8800

IRRADIATION AND INTERSPECIFIC HYBRIDIZATION IN SECALE. Sam Price. Genetics 40, 651-667(1955).

Control Secale cereale L. X S. montanum Guss. F₁ hybrids exhibited maximum association of four bivalents plus a six-chromosome translocation chain. Univalents, laggards, and inversion bridges occurred infrequently. Original and induced chromosomal sterility was obscured by genic partial sterility. Variable intraspecific genic sterility may be the basis for interspecific sterility barriers. BA 30-12300

8801

THE EFFECT OF X RAYS AND OF ULTRAVIOLET LIGHT OF DIFFERENT WAVELENGTHS ON THE PRODUCTION OF CYTOCHROME-DEFICIENT YEASTS. Caroline Raut and W. L. Simpson. Arch. Biochem. Biophys 57, 218-228(1955).

Cytochrome-deficient "petite" yeast cells were shown to be due to loss or inactivation of nongenic self-duplicating elements from the cell. The number of such petites is only slightly increased among survivors of x irradiation. They are produced by UV irradiation with peak activity around 2600 Å. BA 30-12526

8802

THE EFFECTS OF TRANSLOCATIONS ON GROWTH IN ZEA MAYS. Lewis M. Roberts. Genetics 27, 166. Records Genet. Soc. Am. 10, 166(1942). BA 16-8769

8803

TRANSLOCATIONS INVOLVING "B" CHROMOSOMES IN MAIZE. Herschel Roman. Genetics 27, 167(1942). BA 16-8703

8804

RELATION OF MITOTIC ACTIVITY TO THE EFFECTS OF X RAYS AND NITROGEN MUSTARD AS INDICATED BY THE GROWTH OF CORN SEEDLINGS. Mary A. Russell and F. J. Michelin. Cancer Research 11, 687-693(1951).

Results: 1) seedlings which had greater numbers of dividing cells at the time of exposure to X-rays were damaged more than those with fewer; 2) seedlings with higher mitotic index were slightly more sensitive to methyl-bis (β-chloroethyl) amine hydrochloride, than were those with lower index. BA 26-5322

8805

INDUCTION OF RESISTANCE TO X-RAY INACTIVATION IN SACCHAROMYCES BY PRE-EXPOSURE TO 2537 Å ULTRAVIOLET RADIATION. A. Sarachek and W. H. Lucke. Experientia 9, 374-376(1953).

U. -V.-Induced resistance to X-ray inactivation depends on alteration in the cells. In Tradescantia and Drosophila u. -v. suppresses chromosomal alteration. By inference, yeast cell inactivation by x-rays depends on chromosome aberrations. BA 28-21625

8806

THE GENE AS A CHEMICAL UNIT. J. Schultz. Colloid Chemistry 5, 819-850(1944).

8807

BLAST-RESISTANT RICE. Anonymous. Indian Farming 2, 33(1941). BA 11-549

8808

STUDIES ON THE PHYSIOLOGY OF JUTE. J. C. Sen Gupta and N. K. Sen. Sci. and Culture (Calcutta) 9, 503-504(1944).

Delay in sowing time and the effects of photoperiod vernalization, storage and x-rays were studied in Corchorus capsularis and C. olitorius. Delay in slowing time reduced the vegetative phase, increased rate of growth in length, produced fewer internodes and leaves, reduced the branching and hastened shedding of leaves from the base. BA 19-1611

8809

THE EFFECT IN R₁, R₂, AND R₃ OF TREATING TOMATO SEEDS WITH X RAY AND P³². J. W. Lesley and Margaret M. Lesley. Genetics 40, 581-2(1955).

Seeds of inbred lines of tomatoes exposed to 10,000 r x rays or to P³² beta radiation, showed delayed irregular germination and growth. R₁ plants, especially after β irradiation, were variegated. Similar changes occurred in R₂. Some variegated R₁ plants gave albino seedlings in R₂. Seeds soaked for 5 days in solution containing 10.8 uc/P³² developed into plants with pheno-typically and cytologically different parts. Male sterility was frequent in R₁, mutants in R₂. BA 26-1881

8810

MUTANTS AND LINKAGE STUDIES IN TRITICUM MONOCOCCUM AND TRITICUM AEGILOPOIDES. Luther Smith. Missouri Univ. Agr. Exptl. Sta., Research Bull. 298, 1-26(1942).

Dormant seeds of T. monococcum variations vulgare and flavescens were subjected to 12,500 r of x-ray. Fifty-six of the 80 viable mutants are described. All mutations tested behaved as recessives except two that were possibly cytoplasmic. Crosses between mutants were studied to test for linkage. BA 17-280

8811

GENETICS AND PLANT BREEDING BY MUNTZING, A. in: Genetics in the 20th Century New York, The Macmillan Co., p. 473-492, L. C. Dunn, ed. BA 25-35579

8812

RECIPROCAL TRANSLOCATION IN RICE. A PRELIMINARY NOTE. HiKoichi Oka, T. T. Chang, and M. S. Hong. Japanese Jour. Genetics 28, 87-91(1953).

Several semi-sterile strains of rice plants were induced by x-ray irradiation. Their sterility was attributable to reciprocal translocations. BA 28-22674

8813

TRUE OR APPARENT SUB-CHROMATID BREAKAGE AND THE INDUCTION OF LABILE STATES IN CYTOLOGICAL CHROMOSOME LOCL. G. Ostergren and T. WaKong. Botan. Notiser 1954, 357-375(1954).

Sub-Chromatid structural changes of chromosomes may be due to full-chromatid changes that are masked by the matrix. Chromosome breaks induced by x rays and coumarin in Allium cepa were studied. Coumarin causes breakage only during mitosis, resting stage is insensitive. BA 30-15712

8814

STUDIES ON THE RIGHT-AND LEFT-HANDEDNESS OF SPIKELETS IN EINKORN WHEATS. V. EFFECTS OF X-RAY IRRADIATION. H. Ono, N. Sueoka, H. Suemoto and K. Kojima. Proc. Japan Acad. 30(3), 221-225(1954).

X-irradiation produces a disturbing effect in the manifestation of handedness. This effect is transmitted to subsequent generations. Radiosensitivity appears greater in lower spikelets. BA 30-8647

8815

ACTION OF URANIUM CHLORIDE AND OF GAMMA RAYS ON THE GEOTROPISM OF ROOTS. V. Bambacioni-Mezetti. Atti Soc. Ital. Progr. Sci. 22 (3), 56-57(1934).

The bean, *Vicia sativa*, showed no growth when exposed to uranium chloride solutions. The small roots did not show typical geotropism. Gamma rays did not have any effect. CA 28-6451

8816

ON THE ADAPTATION VALUE OF EXPERIMENTALLY PROVOKED HEREDITARY CHANGES IN YEASTS. J. M. Olenov. Arch. Mikrobiol. 7, 49-61(1936).

Growth of a basal race A and a mutant race G₁₁ derived from *Zygosaccharomyces mandshuricus* by radiation treatment was compared in pure and mixed cultures. Author concludes that basal Race A disappeared because of the "competition capability" in mutant G₁₁, an inheritable adaptation resulting from irradiation. BA 11-47

8817

THE EFFECT OF ROENTGEN RAYS ON THE RATE OF GROWTH OF SPONTANEOUS TUMORS IN MICE. J. B. Murphy and J. J. Morton. J. Exp Med 22, 800(1915).

Recovery from lymphopenia after x irradiation depends on extent of damage to lymphoid tissues and on the general condition of the animal. Studies were done on mice to determine whether total body exposures to a small x ray dose had the same effect on subsequent growth of spontaneously occurring cancer as the same dose delivered to the cancer in vitro. Mice with spontaneous cancer had the cancer removed surgically, then, received total body x ray followed by re-implantation of the cancer. In unirradiated mice the temporarily removed cancer grew briskly after re-implantation, in another site, while 26 of 52 x-rayed mice proved immune and the other 26 had a delayed "take" and slow cancer growth (partial immunity). The same dose to the tumor in vitro did not affect tumor growth following re-implantation. Immune mice had high peripheral blood lymphocyte counts.

8818

BREAKAGE OF CHROMOSOMES BY OXYGEN. Alan D. Conger and Lucile M. Fairchild. Proc. Natl. Acad. Sci. U. S. 28, 289-99(1952).

Dry pollen grains of *Tradescantia paludosa* were exposed in various ways to 99.5% O₂, then cultured on a lactose-agar-colchicine medium. By interpolation an equal effect was produced by 65% O₂ for 1 hr. and 350 r of X-rays. BA 26-33639

8819

CHROMOSOME AND GENE MUTATIONS IN *DATURA* FOLLOWING EXPOSURE TO RADIUM RAYS. C. Stuart Gager and A. F. Blakeslee. Proc. Natl. Acad. Sci. U S 13, 75-9(1927).

Offspring from one bud exposed to radium γ rays included a new compound chromosomal type, Nubbin, a high percentage of non-disjunctional chromosomal forms, and 2 new gene mutants, Albino and Swollen. BA 3-11046

8820

THE PROBABILITY OF A RADIOTROPIC RESPONSE. C. Stuart Gager. J. Biol. Chem. 4, xliii (1908).

Failure of the author and of other workers to secure a tropistic movement toward or away from the rays of radium is explained by the hypothesis that the rays are too penetrating to be felt, as a stimulus, unilaterally.

8821

ROENTGEN RAY IN PLANT BREEDING. Olov E. V. Gelin. Acta Radiol. Suppl. 116, 700-1(1954).

Two mutants are described in irradiated yellow looking peas: 1) a single gene mutant where all branches are fused and flowers and pods are on top of the plant and

grain yield is decreased about 15% and 2) a complex mutant differing from the parent strain by the yield (about 5% higher), 1,000 grain weight and number of branches.

8822

SOME REMARKS ON CHEMICAL PROTECTION AGAINST IONIZING RADIATION. A. Forssberg. Acta Radiol. 41, 56-8(1954).

Cysteine decreases x-ray damage of *Allium* roots by a factor of about 2. Chromosome disturbances (fragments, bridges) were reduced to 50% or less in cysteine treated roots and x-ray damage was repaired more rapidly than in untreated roots. BA 28-29623

8823

THE OXYGEN EFFECT AND CHROMOSOME BREAKAGE. C. P. Swanson. J. Cellular Comp. Physiol. 45, (Suppl. 2), 285-98(1955).

Author discusses possible levels at which oxygen can affect chromosome breakage. Oxygen participates in a reactive system that can modify the frequency of radiation-induced aberrations. Effect of O₂ tension on frequency of radiation-induced aberrations varies according to type of radiation. BA 26-825

8824

INHIBITION OF PLANT GROWTH BY IRRADIATION. IV. GROWTH ARREST VS. EFFECTS ON MITOTIC ACTIVITY. Henry Quastler, Ann M. Schertiger and Wilson N. Stewart. J. Cellular Comp. Physiol. 39, 357-69(1952).

Mitoses persist following irradiation even when growth is reduced to the radioresistant portion of the growth reserve; persist to a lesser extent, even when all measurable linear growth is stopped. Degrees of mitotic inhibition correlate poorly with degrees of linear growth inhibition.

8825

GROWTH RATE AND RADIOSENSITIVITY IN *TRITICUM* VULGARE. P. S. Henshaw and D. S. Francis. J. Cellular Comp. Physiol. 4, 111-22(1933).

Conclusions: 1) changing non-growing forms to growing by adding moisture (germination) enhanced radiosensitivity considerably; 2) changing growing forms to non-growing by lowering temperature did not change the susceptibility appreciably. A definite correlation between radiosensitivity and presence of mitotic cells was also observed.

8826

RADIOACTIVITY AND VEGETATION. G. Trauffaut. Gardener's Chronical 55, 378-9(1914).

Black oxide (U₃O₈) appears to increase plant growth though results are not conclusive. However, deleterious effects accompany the use of commercially made radioactive materials. CA 9-948

8827

EFFECT OF A BARBITURATE ON THE EARLY ADRENAL REACTION AFTER TOTAL BODY X-IRRADIATION OF THE RAT. P. Fischer. Arch. Intern. Physiol. 63, 134(1954).

8828

GROWTH INHIBITION BY RADIATION IN BEANS. Henry Quastler, Marianne Baer, Wilson N. Stewart, and Ann M. Schertiger. Cancer Research 9, 553(1949).

Irradiation inhibits growth in bean seedlings, irradiated plants falling into one of several well-defined reaction types that can be related to components of the normal growth mechanism. Thus radiation reactions can be used to study normal growth. By proper selection of exposure conditions, various types of reaction can be studied separately.

8829

EFFECT OF LARGE OXYGEN PRESSURES ON THE

X-RAY SENSITIVITY OF THE BROAD BEAN ROOT.

John Read. Brit. J. Radiol. 24, 635-6(1951).

When broad bean roots are x-irradiated in water containing 0-20 cc O₂/litre, each concentration increment acts like a simple multiplying factor on the dose when chromosome aberrations are used as the criterion of effect.

8830

EFFECTS OF ROENTGEN RAYS ON FUNGI IN VITRO.

H. P. Jacobson. Arch. Dermatol. and Syphilol. 38, 38-48(1938).

The results of investigation, while not conclusive, suggest that beneficial therapeutic effects of x-rays on clinical mycoses are due to the action of these rays on the tissues primarily. The tissues in turn, through some unidentified immune mechanism, have an adverse effect on the infecting parasites.

8831

CELL AND CHROMOSOME SENSITIVITY TO IRRADIATION.

P. C. Koller. Acta Radiol. Suppl. 116, 699-700(1954).

Author summarizes evidence indicating that the radiosensitivity of chromosomes is conditioned and influenced by the cytoplasmic environment or metabolic state of the cell. For example, 1) chromosomes of *Tradescantia* microspores are 5 times more breakable by x rays at end of mitotic interphase than at beginning, 2) chromosomes in the spermatogonial cells of *Drosophila* are less sensitive to x rays than are chromosomes in the mature sperm.

8832

THE EFFECT OF OXYGEN TENSION AND CHEMICALS ON ROENTGEN-RAY-INDUCED MUTATION PRODUCTION AND CHROMOSOME BREAKS. Alexander Hollaender. Acta. Radiol. Suppl. 116, 697(1954).

Author summarizes available information on X ray sensitivity of chromosome breaks and mutation production as influenced by air/N₂ ratio.

8833

THE LYMPHOCYTE IN NATURAL AND INDUCED RESISTANCE TO TRANSPLANTED CANCER. II. STUDIES ON LYMPHOID ACTIVITY. J. B. Murphy and J. J. Morton. J. Exp. Med. 22, 204(1915).

In mice, resistance to transplantable tumors is related to a lymphocytic crisis in circulating blood. Destruction of lymphoid tissue by x ray renders an animal susceptible to cancer inoculation.

8834

THE RADIUM IN AQUATIC ORGANISMS. V. Vernadskii. Compt. Rend. 191, 421-23(1930).

During the flowering season of *Lemna*, the radium concentration of the plant and the surrounding water was determined. There was considerably more radium in the plant than in the water. CA 25-315

8835

VITAMIN C CONTENT OF X-RAYED SEEDLINGS.

Friedl Weber. Phytol. Ann. Rei Botan. 4, 144-8(1952).

Seedlings of *Vicia faba*, developing from X rayed seeds (2000 r) contain, after 10 days of growth, much more vitamin C in the epicotyl, more in the cotyledons, and less in the apex of root, than do the control seedlings. BA 27-7718

8836

EFFECT OF EXPOSING GERM-CELLS TO THE RAYS OF RADIUM. C. S. Gager. Science 27, 335-6(1908).

Egg and sperm cells of *Onagra biennis* were exposed to radium rays. Results in the F₁ generation; 1) one side of the plant grew faster and more vigorously than the other, 2) on one side the leaves possessed characteris-

tics, not of the typical *O. biennis*, but of one of its mutants, 3) one of the shoot systems possessed the characteristics of the typical biennis, the other of one of its mutant derivatives.

8837

HIGH VOLTAGE CATHODE RAYS OUTSIDE THE GENERATING TUBE. W. D. Coolidge. Science 62, 84-7(1927).

With a specially designed hot cathode, high vacuum tube, it has been found possible to operate with as much as 200,000 volts and several milliamperes, using a metal window as large as 8 cm. in diameter. Many liquids and solids undergo marked chemical changes under the influence of the high speed electrons. Results occurred with castor oil, crystals of cane sugar, leaf of rubber plant, and ear of a rabbit, fruit flies, and bacteria.

8838

MUTATIONS IN BARLEY INDUCED BY X-RAYS AND RADIUM. L. J. Stadler. Science 68, 186-7(1928).

X-ray treatments were applied to germinating seeds, and the induced mutations recorded were in all cases somatic mutations affecting the progeny of only part of the plant.

8839

ARTIFICIAL TRANSMUTATION OF THE GENE. H. J. Muller. Science 66, 84-7(1927).

Drosophila melanogaster were exposed to x-rays. Treatment of the sperm with relatively high doses of x-rays induces true gene mutations in a high proportion. These mutants generally are stable in their inheritance, and behave in the manner typical of Mendelian chromosomal mutant genes found in organisms generally. Mutations (recessive for the lethal effects) greatly outnumbered the non-lethals producing a visible morphological abnormality.

8840

THE EFFECT OF THE FACTOR Ca₁ IN *ANTIRRHINUM MAJUS* (FROM GROUP A WITH INHERITANCE FACTORS MODIFIED BY RADIUM IRRADIATION). E. Stein. Z. Induktive Abstammungs- u. Vererbungslehre 74, 216-227(1938). (In German).

The factor Ca₁ acts like the complex GKD₁ but its destructive effects on tissues are less marked. BA 12-14147

8841

TRANSLOCATED SUGARLOAF, A PURE-BREEDING CHROMOSOMAL TYPE IN *DATURA* INDUCED BY RADIUM TREATMENT. A. D. Bergner, S. Satina, A. G. Avery and A. F. Blakeslee. Science 70, 562(1929).

As a result of radium treatment, the L chromosome of *Datura* was broken into two portions. One portion remained as an unattached fragment while the other, involving the Sugarloaf half of the 1 chromosome, became attached to one end of an M chromosome. By inbreeding, a race homozygous for the translocated Sugarloaf fragment was obtained, showing, at reduction divisions, four chromosomes consisting of two normal L chromosomes and 2 M chromosomes.

8842

PROGENIES FROM X-RAYED SEX CELLS OF TOBACCO. T. H. Goodspeed and A. R. Olson. Science 67, 46(1928).

Nicotiana tabacum var. *purpurea* in full flower were exposed to moderately hard X-rays. Within 48 hours all buds except those in which pollen was formed had fallen. At seedling stages variant plants were noted. At maturity over 20% were striking variants. With some marked exceptions, fertility in general parallels extent of total variation - the more abnormal, the more sterile.

8843

THE EFFECT OF X-RAYS ON GROWTH SUBSTANCE

AND PLANT GROWTH. Folke Skoog. Science 79, 256(1934).

Dosages varying from 20 to 5,000 r were given to growth substance in different media and solvents. A few species of plants were directly irradiated. Growth substance was inactivated by irradiation. Tips from irradiated plants, placed on agar blocks, showed a large decrease in growth substance. These experiments show that the primary action of x-rays on growth of plants is through the inactivation of growth substance.

8844

GENETIC AND NONGENETIC EFFECTS OF RADIATIONS IN NEUROSPORA. V. W. Woodward and C. M. Clark. Science 121, 641-2(1955).

Lethal effects of x-rays are mediated entirely through the nuclei in *Neurospora* conidia. Authors describe genetic and nongenetic effects of radiations in *N. crassa*, strain 74 A-3b. X-rays affect growth rate and conidial germinations similarly. Relationship between mutation rate and conidial survival is complex, the survival curve being a composite of conidial stimulation and activation. Survival value is a combination of both.

8845

THE INFLUENCE OF STIMULATING RADIATION ON THE GLANDS OF INTERNAL SECRETION. Manfred Fraenkel. Deutsch. Med. Wchnschr 49, 242(1921). (In German).

Improvement in cancer patients treated with x radiation is attributed to the stimulating effect of radiation on the endocrine glands. Author considers connective tissue to be an endocrine organ.

8846

DELAYED KILLING OF MAIZE SEEDLINGS WITH X-RAYS. G. N. Collins and Louis R. Maxwell. Science 83, 375-6(1936).

Seeds of dent corn received about 500 r per min. from Coolidge x-ray tube. Rate of elongation was progressively depressed following dosages of 1,000 to 20,000 r. Treatments above 40,000 r resulted in delayed killing. Percentage of germination remained unimpaired following doses of 60,000-100,000 r, but all plants died in the seedling stage. Dose of 2,000,000 r completely inhibited germination.

8847

INDUCTION OF ADDITIONAL HYBRID STERILITY IN *SECALE CEREALE* X *MONTANUM* BY IRRADIATION OF POLLEN. Samuel Price. Science 121, 625-6(1955).

The interspecific F_1 hybrids, *S. cereale* L x *montanum* Guss. exhibit great variability in pollen fertility and seed set. Of 26 r-hybrids, 17 contain additional induced translocations. Inversions have been induced in several plants. In r-hybrids, pollen fertility and seed set are weakly correlated, but neither is correlated with observable chromosomal irregularities.

8848

CONTRASTS IN THE GENETIC EFFECTS OF ULTRAVIOLET RADIATION AND X-RAYS. L. J. Stadler and G. F. Sprague. Science 85, 57-8(1937).

Ultra-violet radiation applied to mature pollen of maize induces mutation and deficiency, but unlike x-ray treatment, has little or no effect on frequency of translocation. Endosperm deficiencies induced by UV include a larger proportion of fractionals. Relative frequency of loss of specific marker genes differs distinctively from that following x irradiation.

8849

BREAKAGE OF CHROMOSOMES IN *TRADESCANTIA* WITH A CALCIUM DEFICIENCY. D Steffensen. Proc. Natl. Acad. Sci. U.S. 41, 155-160(1955).

Clonal divisions of a single plant of *Tradescantia paludosa* were grown in culture solutions containing 2, 5, 10 (suboptimal) and 250 (optimal) ppm. of Ca. There were 9.7% more chromosomal aberrations in plants grown

in suboptimal Ca than in those grown in optimal Ca, with a highly significant difference between the two groups.

BA 31-26752

8850

TISSUE DEGENERATION IN PLANTS AS A RESULT OF RADIUM IRRADIATION (RADIOMORPHOSIS OF ANTIRRHINUM). Emmy Stein. Biol. Zentr. 49, 112-126(1929).

One of the color and form defective clones (No. 789bV, grown in 1919 from seed exposed to Ra emanations and later propagated by cuttings) was studied cytologically. Tissue development is accompanied in all organs by such extreme degenerations that the regions involved are completely destroyed.

8851

FURTHER ANALYSIS OF INDUCED SOMATIC INHERITABLE VARIATIONS IN *ANTIRRHINUM MAJUS*. E. Stein and M. Weihe. Z. Induktive Abstammungs- u. Vererbungslehre 72, 519-539(1937).

By x-raying seedlings prior to plumule development, 2 plants showing different mutations for cancerous degeneration were obtained. BA 12-4052

8852

NEW RESULTS ON VEGETABLE GROWTH. H. V. Witsch. Naturwiss 36, 53-56(1949).

Mutations occurring as a result of roentgen and ultraviolet radiation are reviewed. Brief mention is also made of the application of radioisotopes in chemical and physiological studies. CA 44-4083c

8853

INVESTIGATIONS CONCERNING THE EXPERIMENTAL PRODUCTION OF MUTATIONS IN *ANTIRRHINUM MAJUS*. I. EXPERIMENTS WITH X-RAYS, ULTRAVIOLET LIGHT, TEMPERATURE SHOCKS, AND CENTRIFUGATION. H. Stubbe. Z. Induktive Abstammungs- u. Vererbungslehre 56, 1-38(1930).

Plants subjected to x-rays, ultraviolet light, and temperature shocks in the bud stage, and to centrifuging in an earlier stage, produced F_1 mutants about 10 cm taller than untreated plants. BA 5-22707

8854

THE EFFECT OF P^{32} RADIATION ON CROP GROWTH AND PHOSPHORUS UPTAKE. E. Penner. Can. J. Agr. Sci. 34, 41-47(1954).

Common cereal crops were grown under greenhouse conditions in soils fertilized with $NH_4H_2PO_4$ at 24 lbs. of P_2O_5 /acre at various P^{32} levels. With wheat radiation effects occurred at $12 \mu C P^{32}/g$ of P^{31} , causing altered weight and P absorption from soil. Slightly decreased absorption of P from soil was observed in oats and barley. BA 28-27210

8855

RADIUM FERTILIZER IN FIELD TESTS. C. G. Hopkins and W. H. Sachs. Science 41, 732-5(1915).

After experiments with corn and soy beans, it was found that radium afforded no foundation for expectation of increased crop yields, when financial possibilities are considered.

8856

SOME EFFECTS OF RADIOACTIVITY ON PLANTS. C. Stuart Gager. Science 25, 264(1907).

Experiments led to the conclusion that rays of radium act as a stimulus to the physiological processes of plants, accelerating, retarding, or inhibiting, either germination, growth, respiration, fermentation, cell division, starch formation and sensitiveness to gravity, according to the strength of the radium salt employed, the duration and distance of exposure, the intervention of screens, the nature of the tissue and, possibly, the species of the plant

8857

THE EFFECT OF RADIUM RAYS ON THE COLON BACILLUS, THE DIPHTHERIA BACILLUS AND YEAST. S. C. Prescott. Science 20, 246-8(1904).

Plate cultures of intestinal bacillus (*B. coli*) exposed to radium rays failed to show deleterious effects of radium on the bacteria. Radium rays also had no effect upon fresh cultures of *B. Diphtheriae* or *Saccharomyces cerevisiae* at a distance of one centimeter. Radium tubes for treatment of diphtheria are not recommended as a substitute for antitoxin.

8858

CONCERNING SOME PHYSICAL PROCESSES INVOLVED IN THE PRODUCTION OF GENE MUTATION BY RADIATION. K. G. Zimmer and N. W. Timofeeff-Ressovsky. Z. Induktive Abstammungs- u. Vererbungslehre 80, 353-72 (1942).

Additional data on the induction of gene mutations by x-rays and neutrons have been used to analyze the nature of "hits". It is concluded, after examining such phenomena as atom excitations and ion clusters, that the "hit" must still be regarded as the production of a single ion-pair, and not of an ion cluster. BA 18-5873

8859

EFFECT OF RADIUM RAYS ON MITOSIS. C. S. Gager. Science 27, 336(1908)

Root tips of *Allium Cepa* were exposed for various lengths of time to rays from radium bromide contained in sealed glass tubes. The α rays were eliminated. Sufficient exposure to radium completely inhibited nuclear division. With less active preparations and varying lengths of exposure various disturbances of the chromosomes resulted.

8860

USEFUL X-RAY MUTATIONS IN PLANTS. D. Lewis. Nature 158, 519-20(1946).

Many thousands of *Oenothera lamarckiana* plants are self-incompatible. Self-compatible plants have been produced, however, by pollinating from flowers following exposure to an x-ray dose of 500 r thirty-seven days previously. Authors doubt that this will be an advantage in seed-reproducing crops where heterozygosity, hence vigor, is maintained by cross-pollination. In such plants, self-compatibility would result in loss of vigor from inbreeding during a number of generations.

8861

THE EFFECT OF X-RAY IRRADIATION ON THE ORAL TISSUES OF THE MACACUS RHESUS MONKEY. H. Medak and G. W. Burnett. Oral Surg., 7, 778-86(1954).

Dose must exceed 6000 r to produce radioosteitis of the mandible and loose teeth.

8862

Naval Radiological Defense Lab., San Francisco. EFFECTS OF X-IRRADIATION ON LIPID METABOLISM. IV. LIPOGENESIS FROM ACETATE- C^{14} BY THE LIVER. W. L. Warner, S. R. Lerner, and C. Entenman Oct. 23, 1957. 29p.

Rats, mice, and guinea pigs were subjected to whole body x-irradiation and the uptake of C^{14} from acetate- C^{14} into liver lipids and exhaled CO_2 was determined. The conversion of acetate- C^{14} to lipid C^{14} in liver slices prepared 24 hours after irradiation was increased as much as 20 fold in rats, 2 fold in guinea pigs, and not at all in mice. The changes noted were roughly correlated with the levels of liver glycogen. The data offer a possible explanation for the previously observed increases in blood lipid levels following x-irradiation. NSA 12-4661

8863

THE MAIN PROBLEMS OF RADIOTHERAPY IN LUNG CANCER PATIENTS. L. M. Gol'dshteyn (Inst. of Oncology of the Academy of Medical Sciences of the USSR).

Problems Oncol. (USSR) (English Translation) 3, 474-82 (1957).

Indications and contraindications for radical and palliative radiotherapy in lung cancer are discussed. Modern methods of radiotherapy combined with surgery and chemotherapy are reviewed. Data are tabulated on the survival time of 58 patients with inoperable forms of lung cancer treated with x-ray therapy. Two patients were alive after four years. The influence of age on prognosis is discussed. NSA 12-16162

8864

ADVANCES IN RADIOBIOLOGY. Proceeding of the Fifth International Conference on Radiobiology held in Stockholm on August 15-19, 1956. George Carl de Hevesy, Arne Gunnar Forssberg, and John D. Abbatt, eds. Edinburgh, Oliver and Boyd, 1957. 513p.

Topics discussed at this conference include; the initial or primary effects of irradiation on enzymes and other cellular constituents, physiological and morphological changes induced by irradiation, alpha particle irradiation of single cells, modification of systemic irradiation effects, the time factor in radiobiology, studies on the distribution of isotopes in tissues, irradiation effects on the hematopoietic system, and radiation genetics. NSA 12-4669

8865

VERTEBRATE RADIOBIOLOGY (THE PATHOLOGY OF RADIATION EXPOSURE). C. C. Lushbaugh (Los Alamos Scientific Lab., N. Mex.). Ann. Rev. Nuclear Sci. 7, 163-84(1957). NSA 12-4667

8866

THE IRRADIATION OF MICE WITH RADIOACTIVE GOLD WITH AND WITHOUT PROTECTORS. A. Herve (Universite de Liege). Z. Med. Isotopenforsch. 1, No. 2, 128-31(1957) Nov. (In French).

The intraperitoneal injection of 0.5 mc radiogold in black mice (C57) caused death in 70% of the animals within 20 days. The injection of 1 mc killed all animals in 8 to 10 days. Different substances which especially protected against total radiation proved to be ineffective in a single intraperitoneal radiogold injection. Repeated cysteamine injections within 3 days gave a slight protective effect. This response was no longer present when the LD 50 was exceeded. NSA 12-6413

8867

California. Univ., Los Angeles. Atomic Energy Project. EVALUATION OF THE ACUTE INHALATION HAZARD FROM RADIOACTIVE FALL-OUT MATERIALS BY ANALYSIS OF RESULTS FROM FIELD OPERATIONS AND CONTROLLED INHALATION STUDIES IN THE LABORATORY. G. V. Taplin, O. M. Meredith, Jr., and H. Kade. June 1957. 26p. Project 37.3 (of) OPERATION TEAPOT. (WT-1172)

An evaluation of the acute inhalation hazard from radioactive fall-out materials has been made by analysis of results from animal exposures during field operations and from controlled inhalation studies in the laboratory. Rabbits and rats have been subjected to controlled inhalation exposures to dusts prepared by micropulverizing fused insoluble radioactive siliceous material obtained from Area 3 at the Nevada Test Site, Operation Upshot-Knothole. In these laboratory studies, field conditions were simulated in respect to duration of exposure, particle-size distribution, and levels of air-borne radioactivity involved. The relation between particle size, dust concentration, and duration of exposures to initial deposition in the lungs and gastrointestinal tract has been determined. In addition, the rates of removal have been measured. The laboratory studies demonstrate two important physiological-safety factors against the retention of dangerous quantities of inhaled particulate materials. These are, first, the filtration mechanism of the upper

respiratory passages which limits pulmonary retention to particles of small size (below 5.0μ), and, second, the normal clearance mechanisms of the upper and lower lung passages which remove initially deposited large and small particles at rapid rates. The results from exposing several groups of rabbits to fall-out material (by inhalation only) at stations located along two arcs, 7 and 106 miles from a tower detonation, are almost entirely negative. Urine specimens obtained during the first day following detonation contained minute but measurable amounts of soluble radioactive material which had a relatively short half life (1 to 2 days). Lung specimens had no detectable radioactivity when measured 60 to 21 days later, however, samples of intestine from the same animals still had measurable levels of beta activity. The total integrated internal radiation exposure could be expressed in millirep, even at the close stations, where the integrated external gamma-ray exposure was found to be 14 to 32 hr. At the 106-mile stations, no measurable radioactivity was present in specimens of lung or urine; however, the levels of radioactivity in intestine samples were either negative or several times lower than those found in animals at the near stations. The external gamma-ray dose was less than 4.0 r. From careful consideration of numerous pertinent physical and physiological factors and from analysis of field and laboratory investigations, it is evident that there is no apparent situation in nuclear warfare where, during the first few days after the detonation, one could inhale sufficient radioactive material to induce a serious radiation injury to lungs or intestines without simultaneously being subjected to supralethal doses of external beta-gamma radiation.

NSA 12-5850

8868

Rochester, N. Y. Univ. Atomic Energy Project. FATE OF INDIUM SESQUOXIDE AND OF INDIUM¹¹⁴ TRICHLORIDE HYDROLYSATE FOLLOWING INHALATION IN RATS. P. E. Morrow, F. R. Gibb, R. Cloutier, L. J. Casarett, and J. K. Scott. Oct. 9, 1957. 33p. Contract W-7401-eng-49. (UR-508)

Rats in groups of 2 or 3 were exposed to submicronic aerosols of indium sesquioxide (2.5 mg/M^3) and the hydrolysis products of indium¹¹⁴ trichloride ($<0.1 \text{ mg In/M}^3$) for periods of 30 to 180 minutes duration. The inhalation doses were invariably too low to permit toxicologic studies. Data are presented on the deposition and retention of the two indium preparations in the respiratory tract. Body burdens and urinary and fecal excretion rates were studied up to 14 days for the sesquioxide and up to 6 days for the In¹¹⁴ hydrolysate. Some tissue distribution data are presented which demonstrate small but significant absorption of indium particularly during the first 24 hours after either form is inhaled and that the absorbed indium is widely distributed with the greatest amounts going to the liver and kidney. Autoradiographic findings suggest the role of phagocytosis in lung clearance, an absence of systemic transport in particulate form and a concentration in compact bone.

NSA 12-7699

8869

California. Univ. Los Angeles. Atomic Energy Project. SEMI-ANNUAL PROGRESS REPORT FOR THE PERIOD ENDING DECEMBER 31, 1957. Jan. 15, 1958. 60p. Contract AT-04-1-GEN-12. (UCLA-420)

Progress is reported in the following studies, the effects of irradiation on the products of lipid metabolism, the infrared absorption spectra of unsaturated steroids, the characteristics of tobacco mosaic virus particles, the effects of hydration on the radiosensitivity of bacteriophage, the effect of x irradiation on the developing limb buds of tadpoles and on the retina of lizards and tadpoles,

the effects of x irradiation on muscle fatigue in rats, the toxicity and skin irritant effects of polyphenyl compounds used as reactor moderator-heat exchangers, chronic poisoning of rabbits subjected to repeated small doses of carbon tetrachloride, tracer studies on the gastrointestinal absorption of strontium sulfate by rats, rabbits, and guinea pigs, development of a method for separating polymorphonuclear neutrophils from lymphocytes; observations on radiation injuries, the early appearance of neoplasms, and the major causes of death in rats surviving 1000 r hypoxic total-body irradiation, development of procedures for the measurement of beta radiation skin dose from fresh fallout by means of special film pack dosimeters, the development of photographic film radiation dosimeters, the design and construction of a simplified low-cost extrapolation chamber, the development of design modifications for an electron microscope, the development of a time of arrival indicator for radioactive fall-out, and the development of chemical radiation dosimeters. Summaries are included of papers prepared for publication. (From preceding period see UCLA-399.) NSA 12-8253

8870

POST TREATMENT MODIFICATION OF X-RAY INDUCED INJURY IN BARLEY BY AEROBIC AND ANAEROBIC HYDRATION. Richard S. Caldecott, C. F. Konzak, and Elizabeth Bindloss Johnson (Univ. of Minnesota, Minneapolis and Brookhaven National Lab., Upton, N. Y.). Radiation Research 7, 308(1957) Sept.

Seeds of barley with either 4% or 16% water in the embryo were given x ray doses ranging from 5000 r to 45,000 r. Immediately after treatment they were plunged into boiled distilled water and aerated with either oxygen or nitrogen and permitted to hydrate at room temperature from 5 minutes to 8 hours. After hydration they were planted out in petri dishes and grown for 6 days after which time seedling height measurements were made. The seeds having an embryo water content of 4% at the time of x radiation manifested different degrees of growth inhibition dependent upon whether hydration occurred in the presence of oxygen or nitrogen, the former resulting in the greatest injury. Nonirradiated controls evidenced no injury modification attributable to the condition of hydration. A significant injury modification occurred during only 5 minutes of hydration and the maximum effect took place during 30 minutes of hydration. Subsequent studies have shown that if seeds with 4% water in the embryos are stored for 6 hours after x radiation, before hydration is initiated, the injury modification reported does not take place. In this same connection, it has been demonstrated that the greatest possible modification of injury occurs when the total dose of radiation is given in the shortest possible time. NSA 12-8265

8871

Columbia Univ., New York. TERMINATION REPORT - PART II FOOD IRRADIATION AND ASSOCIATED STUDIES. Apr. 15, 1956. 77p. Contract AT(30-1)-1186. (NYO-3320(Pt. 2; CU-3-56-AEC-1186-Chem.)

Results are summarized from the following studies: factor affecting the mean lethal dose of radiation required to kill microorganisms, a survey of current theories on the biological action of radiation, the protective effects of both organic and inorganic chemicals for microorganisms from the lethal effects of radiation, radiation dosage calculations for sterilization of food and pharmaceuticals, the development of a cellophane-dye dosimeter for the 10^5 to 10^7 roentgen range, and the radiation induced degradation of dextran in solution. A list of publications during the period is included. (For preceding period see NYO-3320). NSA 12-8250

8872

THE ACTION OF RADIATION ON DILUTE AQUEOUS SOLUTIONS. E. K. Rideal. Brit. J. Radiol. Suppl. 1-3, 41(1947-50).

8873

California. Univ., Los Angeles. School of Medicine. THE EFFECTS OF IONIZING X-IRRADIATION ON THE ADULT AND IMMATURE MAMMALIAN BRAIN. C. D. Clemente, J. Yamazaki, L. Bennett, R. McFall, and E. H. Maynard. 13p. (A/CONF.15/P/891)

Prepared for the Second U. N. International Conference on the Peaceful Uses of Atomic Energy, 1958. Data are presented from which it is concluded that the central nervous system is liable to severe damage from ionizing radiation. In general, the adult mammalian brain can withstand higher radiations without the development of neurological signs than the new born brain. In rats an apparent and significant radioresistance in the central nervous system is developed within the first 6 to 8 days of life. Although pathology is sometimes seen in older rats following irradiation, it requires a higher dose than the development of the same signs by head irradiation of the new born. After large dosage irradiation to the heads of adult monkeys, the vital centers in the brain stem (hypothalamus and medulla) seem to be more radiosensitive than other regions in the nervous system. In our experiments this was recognized by neuronal, and neuroglial pathology and by the profound changes in vascular permeability observed in the hypothalamus and medulla following irradiation. A direct explanation of the differences in radiosensitivity of the new born brain and the two week old brain cannot as yet be given. It is possible that there is a significant change in the water content of the nervous system during this period although we have not been able to uncover data along these lines to support this hypothesis. NSA 12-14493

8874

VERTEBRATE RADIOBIOLOGY (LETHAL ACTIONS AND ASSOCIATED EFFECTS). V. P. Bond and J. S. Robertson (Brookhaven National Lab., Upton, N. Y.). Ann. Rev. Nuclear Sci. 7, 135-62(1957). NSA 12-4666

8875

COMPARISON OF THE EFFECTS OF RADIUM AND ROENTGEN RADIATION ON HUMAN SKIN. F. Wachsmann. Strahlentherapie 90, 438-45(1953). (In German)

Human and animal skin was exposed to roentgen irradiation (45-200kv) and to radium-gamma radiation while conditions were kept constant. It was ascertained that for small doses, approximately 3 times as much, for large doses approximately 2-1.5 times as much gamma radiation has to be applied to elicit the same reactions elicited by roentgen irradiation.

8876

CONTRIBUTION ON THE SUBJECT OF "IMMUNIZATION" AGAINST EFFECTS OF IONIZING RADIATION. Liebknecht A. Dimitrow (Institut fur Pathologische Physiologie der Universitat Sofia, Bulgaria). Strahlentherapie 104, 436-41(1957). (In German).

The results of successive irradiation of dogs have confirmed the conjecture that a considerable resistance against ionizing rays can be produced, with the supra-renal gland apparently playing the mere part of an intermediate link in the total reaction of the organism. Remarkable in this connection are Kiselew's communications concerning antibody formation posterior to irradiation with sublethal doses. NSA 12-7667

8877

Naval Radiological Defense Lab., San Francisco. EFFECT OF FRACTIONATION OF BETA RADIATION UPON RAT SKIN. Elly M. Jacobsen, A. K. Davis, and Edward L. Alpen. Sept. 25, 1957. 25p. (USNRDL-TR-195)

Female rats were exposed to a $\text{Sr}^{90}\text{-Y}^{90}$ plaque at a skin dose rate of 14.6 rad/sec. Four dose fractions of 200, 400, 600, and 1000 rad were given at either 24 or 48 hour intervals to obtain total doses of 6,000 or 12,000 rad. A grading and scoring system was devised and the animals were observed daily until healing was complete. Data are tabulated. NSA 12-4662

8878

NONGENETIC EFFECTS OF RADIATION ON MICRO-ORGANISMS. R. F. Kimball (Oak Ridge National Lab., Tenn.). Ann. Rev. Microbiol. 11, 199-220(1957).

Recent studies on the physiological and biochemical effects of radiation on microorganisms are reviewed. NSA 12-4663

8879

SOME FACTORS INFLUENCING THE EXCRETORY PATTERN OF CESIUM-134 IN RATS. Frank R. Mraz and Homer Patrick (Univ. of Tennessee, Knoxville and U. S. Atomic Energy Commission, Oak Ridge, Tenn.). Arch. Biochem. Biophys. 71, 121-5(1957). Sept. NSA 12-1202

8880

SYMPOSIUM ON ANTIBODIES: THEIR PRODUCTION AND MECHANISM OF ACTION. Research Conference for Biology and Medicine of the Atomic Energy Commission, held at Gatlinburg, Tennessee, on April 8-10, 1957. J. Cellular Comp. Physiol. 50, Suppl. No. 1, 1-361 (1957). Dec.

The stimulation of radiation recovery by bone marrow injections and the immunological background for the study of bone marrow transplantation in mammals are reviewed. NSA 12-7688

8881

MODIFICATION OF X-RAY MUTAGENESIS IN DROSOPHILA. RELATIVE SENSITIVITY OF SPERMATIDS AND MATURE SPERMATOZOA. I. I. Oster (Indiana Univ., Bloomington). pp. 475-80 in "Proceedings of the 5th International Conference on Radiobiology held in Stockholm Aug. 15-19, 1957", by George C. de Hevesy, A. G. Forssberg, and J. D. Abbatt. London, Oliver and Boyd, 1957. 503p.

A series of experiments showed that spermatids represent the most radiosensitive stage of gametogenesis in *Drosophila*.

8882

General Electric Co. Aircraft Nuclear Propulsion Dept., Cincinnati.

METHOD OF ESTIMATING DOSAGE TO GROUND FROM A RADIOACTIVE CLOUD. C. C. Gamertsfelder and R. L. Waterfield. Oct. 1955. 27p. Contracts AF33(038)-21102 and AT(11-1)-171. (APEX-348)

Beginning with Sutton's diffusion equation, the authors develop mathematical expressions for the radiation dose to a point on the ground following the instantaneous emission of a point source of radiation. From a knowledge of weather conditions, reactor running history, and the power of the runaway, one can compute the beta and gamma dose to be expected from the following events: material inhaled into the lung; direct and scattered radiation from material in the air, and direct and scattered radiation from material deposited on the ground by rain-out or fall-out. NSA 12-4057

8883

RESEARCH ON A BIOLOGICAL PROTECTIVE SCREEN. PART XXI. FURTHER RESEARCH ON THE EFFECT OF CENTRAL NERVOUS SYSTEM STIMULATING AND DEPRESSING DRUGS ON THE RADIATION SENSITIVITY OF ANIMALS. Margarete Langendorff, Hans-Joachim Melching, Hanns Langendorff, Ruprecht Koch, and Roland Jaques (Universitat Freiburg/Br., Heiligenberg-

Instituts, Heiligenberg/Baden, Germany and CIBA A. -G., Basel). *Strahlentherapie* **104**, 338-44(1957). (In German).

The protective effects of Resperin against radiation injuries in mice are evaluated. Results are compared with those obtained by treatment with Cysteamine, β -Aminoethylisothiuronium, Isophen (Pervitin), Caffeine, Eventin (Cyclohexyl-isopropylmethylaniline), Mescaline, and BOL-148. NSA 12-7692

8884

Tennessee Eastman Corp., Oak Ridge, Tenn. SHG CALCULATIONS FOR ALPHA PARTICLE MAC FOR URANIUM BEARING AIR BORNE DUST IN Y-12. Notes on Health Physics Theory. John W. Morfitt. Apr. 4, 1947. Decl. Mar. 28, 1957. 13p. (A-7,390.29)

Calculations of the maximum allowable concentration of uranium α particles in airborne dust are presented. Several problems involving α exposure are included. NSA 12-1817

8885

PAST AND PRESENT RADIATION EXPOSURE TO RADIOLOGISTS FROM THE POINT OF VIEW OF LIFE EXPECTANCY. Carl B. Braestrup (Francis Delafield Hospital, New York). Am. J. Roentgenol. Radium Therapy Nuclear Medicine **78**, 988-92(1957) Dec. NSA 12-3516

8886

INVESTIGATION OF THE RADIOACTIVITY IN VEGETATION. Walter Herbst, Hans Langendorff, Kurt Philipp, and Kurt Sommermeyer. *Atomkern Energie* **2**, 357-67 (1957). Oct. (In German). NSA 12-2199

8887

Brookhaven National Lab., Upton, N. Y. GENETIC PLANT TUMORS IN NICOTIANA. Harold H. Smith. 1957. 2p. (BNL-3385)

The relation between tumor formation and somatic mutation were studied on synthesized plants on which both phenomena could be scored simultaneously. No correlation between the frequency of nodal tumors and gamma radiation dosage or frequency of somatic mutation was found in the three observed lines and within three ages of tissue. NSA 12-5148

8888

Army Medical Nutrition Lab., Denver. AN ASSESSMENT OF THE POSSIBLE TOXIC EFFECTS TO HUMAN BEINGS OF SHORT-TERM CONSUMPTION OF FOOD STERILIZED WITH GAMMA RAYS. Lester M. Levy, Lionel M. Bernstein, Eugene Francis, Richard S. Harding, Harry J. Krzywicki, Virginia E. McGray, Jean Nuss, Jacqueline H. Sellars, and Margaret E. Shipman. Mar. 25, 1957. 33p. Project No. 6-60-11-020. (AMNL-203; AD-126213)

Some 18 human volunteers consumed for short periods of time (15 days) food exposed to 3 million rep gamma rays and stored frozen until used. Four such studies were conducted in which 35%, 60%, 80%, and virtually 100% of the calories were supplied by irradiated items of food. Careful clinical and laboratory observations revealed no evidence that these irradiated food produced any toxic effects in the human beings consuming them. NSA 12-5147

8889

THE INFLUENCE OF IRRADIATION WITH RADIOACTIVE COBALT Co^{60} ON VITAMIN C CONTENT IN POTATOES. E. G. Sal'kova. Translated by T. Turton (U. K. A. E. A., Atomic Energy Research Establishment) from Doklady Akad. Nauk S. S. R. **114**, 757-9(1957). 4p. (AERE-Lib/Trans-785)

An early and a medium-late variety of potato were irradiated using Co^{60} (10,000 r), and the effect on vitamin C content was studied in connection with potato storage research. Vitamin C oxidation takes place immediately

upon irradiation, but the difference in content between control and irradiated potatoes vanishes with prolonged storage. The irradiated potatoes were in an excellent state of preservation at one year while the controls had sprouted and were of no food value. NSA 12-11232

8890

Army Medical Nutrition Lab., Denver. DETERMINATION OF METABOLIZABLE ENERGY OF IRRADIATED FOOD AS FED TO RATS OF THE FIRST GENERATION IN LONG-TERM TOXICITY STUDIES. Howard K. Cahall, Harry J. Krzywicki, Merrill S. Read, and Herman F. Kraybill. Mar. 18, 1957. 25p. Project No. 6-60-11-020. (AMNL-201; AD-125591)

The metabolizable energy (ME) of a composite diet compounded from nine irradiated foods was compared to that of a similar diet of non-irradiated foods. The ME of the irradiated diet was significantly higher than that of the non-irradiated control. This increase was due to the greater apparent digestibility of protein and, possibly, carbohydrate in the irradiated diet. Further studies will be conducted to confirm these observations. NSA 12-5146

8891

THE EFFECT OF PROPYL THIOURACIL ON THE RECOVERY OF RAT THYROID GLAND FROM IRRADIATION WITH ASTATINE-211. Patricia W. Durbin, C. Willet Asling, Muriel E. Johnston, and Joseph G. Hamilton (Crocker Radiation Lab. and Univ. of California, Berkeley and San Francisco). *Anat. Record* **129**, No. 1, 17-37 (1957) Sept.

The weight, histology, and iodine-131 uptake by thyroid gland in young female rats were studied for one month following induction of hyperplasia by the feeding of propylthiouracil, radiation damage induced by injection of astatine-211, and a combination of the two treatments. Systematic data were accumulated on the capacity of the thyroid gland to recover both functionally and structurally from a moderately injurious dose of astatine-211, and of the effects of propylthiouracil pre-treatment on that recovery. NSA 12-11236

8892

GENETIC AND CYTOLOGICAL STUDIES ON THE PROGENY OF RICE PLANTS EXPOSED TO THE ATOMIC BOMB AS WELL AS OF THOSE IRRADIATED BY X-RAYS. Yonehachi Nishimura (National Inst. of Agricultural Sciences, Hiratsuka, Japan). pp 265-70 in "Proceedings of the International Genetics Symposia, 1956, Tokyo and Kyoto, September, 1956". Tokyo, International Genetics Symposia, 1956, Science Council of Japan, 1957. 702p.

Rice seeds were gathered in the autumn of 1945 from paddy fields near the epicenter of the atomic bomb explosion at Nagasaki. The fields were situated about 600 to 2,000 meters from the center of the explosion. In 1946 the seeds were sown and transplanted into five plots representing various distances from the center of the explosion. At the ripening stage the plants with morphological changes or decreased fertility were counted in the field. Crosses were made in more than 100 combinations, including plants subjected to x-ray treatment. Data are tabulated on morphology and sterility of the plants. Comparison is made with data on plants grown from seed exposed to x-ray doses of 10,000 to 20,000 r under both wet and dry conditions. NSA 12-15269

8893

TRANSLOCATION OF A PIECE OF AN AUTOSOME TO THE W CHROMOSOME, AND INDUCTION OF A DOMINANT LETHAL FACTOR IN THE SILKWORM BY X-RAYS. Haruo Hasimoto (Ministry of Agriculture and Forestry,

Matumoto, Japan). pp 248-51 in "Proceedings of the International Genetics Symposia, 1956, Tokyo and Kyoto, September, 1956". Tokyo, International Genetics Symposia, 1956, Science Council of Japan, 1957. 702p.

The translocation induced by chromosome irradiation is probably a reciprocal interchange involving the W chromosome and a Zebra-lemon autosome, where a W chromosome segment bearing the female-determining factor is combined with a segment bearing the Zebra gene, while the rest of the W chromosome is united with the part of the autosome bearing the lemon locus. The lemon locus-bearing segment apparently carries the factor in question. In ordinary circumstances the W chromosome is transmitted in the female line, but when the segment enters a male as in the present case, it produces a lethal effect. Therefore, it may be concluded that the W chromosome has a regional differentiation, and the female-determining factor occupies a certain restricted region of the chromosome, while the other region has a lethal effect for the male which carries it. NSA 12-15266

8894

THE ACTION OF RADIATION ON CHROMOSOMES.

F. Ellis. Brit. J. Radiol. Suppl. 1-3, 65(1947-50).

8895

RADIUM THERAPY. J. C. Mottram and S. Russ. Proc. Roy. Soc. Med. 10, 121(1917).

Ascaris ova in the dividing stage are about ten times more radiosensitive than ova in the growing stage ("factor of vulnerability").

8896

Los Alamos Scientific Lab., N. Mex.

EFFECTS OF X IRRADIATION ON CHOLESTEROL, FATTY ACID AND PROTEIN SYNTHESIS. R. Gordon Gould, Virginia L. Bell, Edith H. Lilly, Patricia Keegan, Jean Van Ripper, and Mary Lou Jonnard. Jan. 1957. 46p. Contract W-7405-Eng-36. (LA-2179)

Whole-body x irradiation of rats has been shown to result in an increase in the rate of cholesterol biosynthesis in liver and adrenal glands. This has been demonstrated by determination of the incorporation of acetate-1-C¹⁴ both in the intact animal and in tissue slices, and by the incorporation of tritium labeled body water into cholesterol. The effect was evident 24 hours after irradiation but was much larger 48 hours after. The increase in rate in liver in intact rats was about 100% per 100 r over the range 300 to 2400 r. X irradiation decreased the cholesterol concentration by about 20% and increased the liver weight about 40%, 48 hours after irradiation. The effect on fatty acid and protein synthesis and on cholesterol biosynthesis in certain other tissues was also studied and found to be either unchanged or increased to a much smaller extent than cholesterol biosynthesis in liver and the adrenal glands. NSA 12-15218

8897

DAMAGE TO OFFSPRING OF IRRADIATED WOMEN.

Irwin H. Herskowitz. Progr. in Gynecology 3, 374-84 (1957).

Possible radiation hazards to the developing fetus due to diagnostic and therapeutic radiography are discussed. The pathological effects of radiation on the gonads are reviewed. NSA 12-11253

8898

A STUDY OF THE EFFECT OF GAMMA RADIATION ON APPLES. R. M. Smock and A. H. Sparrow (Cornell Univ., Ithaca, N. Y. and Brookhaven National Lab., Upton, N. Y.). Proc. Am. Soc. Hort. Sci. 70, 67-9 (1957).

Gamma radiation (cobalt source) of Rhode Island Greening apples did not lower the respiration rate. The

40,000 r lot had a higher than normal rate. This lot also softened more during the holding period at 74°F. Dosages over 10,000 r seemed to aggravate mealy breakdown. Dosages of 20,000 and 40,000 r reduced the production of ethylene and volatiles other than ethylene. The respiration rate of Cortland apples was reduced slightly by gamma radiation. Keeping quality of this variety in storage was not affected, except for the 30,000 r lot which was slightly softer. Weight losses were not affected by radiation. No commercially important benefits were observed with either variety. NSA 12-11250

8899

New England Deaconess Hospital, Boston and Harvard Univ., Boston. Medical School.

THE EFFECTS OF RADIATION ON DEVELOPMENT OF THE NERVOUS SYSTEM. Samuel P. Hicks. (1957).

12p. Contracts AT(30-1)-1454 and AT(30-1)-901.

(AECU-3612). NSA 12-5144

8900

EFFECTS ON IONIZING RADIATION ON THE ACTIVITY OF SALIVARY GLANDS. Yu. N. Uspenskii, T. A.

Timofeeva, and I. V. Shvartsler. (Astrakhan Medical Inst., U. S. S. R.). Med. Radiol. 2, No. 6, 37-41(1957) Nov-Dec. (In Russian). NSA 12-5168

8901

THE USE OF ION EXCHANGE RESINS IN THE EVENT OF INGESTION OF RADIOELEMENTS. Georges Michon and

Lucien Jeanmaire. Compt. rend. 244, 396-8(1957)

Jan. 14. (In French).

A part of ion exchange resins administered to the bone, following ingestion of a radioelement, is retained in the digestive canal thus reducing the fixation in the critical organ. NSA 12-5180

8902

A COMPARISON OF THE EFFECT OF 31 MEV AND 180 KEV X-RAYS ON THE MITOSIS OF VICIA FABA L. Hedi Fritz-Niggli. Translated from Oncologia 9, 269 (1956). 8p.

The biological effects of 31-Mev and 180-kev x radiation were compared on mitosis in root tips of Vicia. Radiation damage appeared earliest in the transition of metaphase to anaphase. Both types of x radiation induced a decrease in the number of cells in the anaphase. No difference was noted in the effects of x rays from the 31 Mev betatron and a 180 kev generator. NSA 12-16089

8903

EFFECTS OF X RAYS ON THE SEEDS OF MAIZE AT VARIOUS STAGES OF HYBRIDIZATION. M. R. Sarich. (Inst. of Agronomy, Zemun-Pole, Yugoslavia.). Doklady Akad. Nauk S. S. R. 116, 1026-8(1957) Oct. 21. (In Russian). NSA 12-5161

8904

ON THE FUNCTION OF LIVER IN PERSONNEL EXPOSED TO RADIOACTIVE SUBSTANCES. E. A. Denisova (Therapeutic Inst. of Acad. of Medical Sciences, U. S. S. R.). Med. Radiol. 2, No. 6, 44-9(1957) Nov.-Dec. (In Russian).

The disturbance of the protein-forming function of liver appears rather early in chronic exposure to radiation. It is most pronounced in personnel who are in constant contact with radioactive substances in doses which are 2 to 10 times above the permissible standards of irradiation. NSA 12-5169

8905

CHANGES IN MORPHOLOGICAL BLOOD PICTURE OF YOUNG RATS IN ACUTE RADIATION SICKNESS. T. V. Fokina (Inst. of Pediatrics, Acad. of Medical Sciences, U. S. S. R.). Med. Radiol. 2, No. 6, 26-36(1957) Nov.-Dec. (In Russian).

Studies made with young rats exposed to x rays of 100, 500, and 250 r revealed various specific features

in the peripheral blood which were related to the age of the rats. Leukopenia developed more rapidly in young rats irradiated at 3 to 6 weeks. In suckling rats, irradiated the first few days after birth, it developed more slowly but was usually pronounced. The most pronounced changes were observed in the red blood of suckling rats, where following irradiation by 250 r the concentration of haemoglobin decreased 68% of its initial value, while in adult rats the same dose decreased the haemoglobin only by 13%. NSA 12-5167

8906

BLOOD REACTION TO REPEATED X IRRADIATION. M. F. Aleksandrova. *Med. Radiol.* 2, No. 6, 12-18 (1957) Nov.-Dec. (In Russian).

Investigations revealed that preliminary irradiation of dogs by 120 to 600 r exposures decreases their resistance to repeated exposures to 275 r x rays and causes an increase in mortality rate. The peripheral blood and bone marrow changes were greater and developed more rapidly in repeatedly irradiated animals. Normalization after repeated irradiation was less active. NSA 12-5165

8907

Argonne National Lab., Lemont, Ill.
BIOLOGICAL AND MEDICAL RESEARCH DIVISION
SEMIANNUAL REPORT [FOR] JULY THROUGH DECEMBER 1957. Mar. 1958. 204p. Contract W-31-109-eng-38. (ANL-5841)

Progress is reported in the following studies: factors affecting the production of antibodies in irradiated rabbits; the effects of irradiation on the serological activity of ovalbumin, factors affecting the growth of transplanted mouse ascites carcinomas in rats, the effects of strontium-90 on the life span and incidence of bone tumors in mice, the effects of irradiation on xanthine concentration and xanthine oxidase activity in chicken liver homogenates; the stability under various biochemical conditions and hydrolysis of S-adenosyl-methionine, the biosynthesis and use as a growth factor substitute of S-adenosylmethionine by yeast mutants, design modifications of the Coulter counter, designed for red blood cells, for use in counting and sizing bacteria, electron microscope observations on fibrillogenesis in the regenerating achilles tendon of normal, scorbutic, and recovering guinea pigs, the response of mice to conditioning doses of whole-body gamma irradiation; the incidence of thymic lymphomas in mice exposed to low-dose daily cobalt-60 gamma irradiation, the relative effectiveness of cobalt-60 gamma rays and fusion neutrons for producing duodenal damage in mice, genetic factors affecting tail spotting in mice, the effect of deuterium oxide on kidney function in rats, the influence of the endocrine glands on radioinduced hyperpigmentation in mice, the protective effects of injected bone marrow against radiation injuries in mice, the biological effects of neutrons in the epidermal region from 0.1 to 100,000 ev, the effect of whole-body neutron irradiation on the voltinial activity of the mouse, developments in neutron-capture therapy, development of methods for estimating the body burden for various tracer radionuclides, the recovery of irradiated amoebae following injection of non-irradiated protoplasm; tracer studies employing phosphorus-32 in determination of the life span of neutrophils, the anti pyretic effects of salicylates and aurintricarboxylic acid, the use of chelating agents in the treatment of manganese poisoning, the tissue distribution and toxic effects following long-term ingestion of deuterium oxide in mice, measurements of the radioactivity of typical foodstuffs after pile irradiation for the purpose of sterilization, the production of heat by the neutron irradiation of boron-free glass, lime glass,

and quartz and its effect upon the condensation of phosphate, measurement of calcium-45 by liquid scintillation methods; tracer studies of protein turnover in rat liver, the effects of dietary cholesterol on cholesterol levels and cholesterol ester composition in liver and plasma of rats; characteristics of the Argonne National Laboratory population, and inbreeding in the European bison population. (From preceding period see ANL-5732). NSA 12-15216

8908

HISTOLOGICAL STUDIES ON THE EFFECT OF ROENTGEN RAYS ON CELL PROTOPLASM. CONTRIBUTION TO THE KNOWLEDGE OF PLASTOSOMES. L. Nurnberger. *Virchow's Arch. Path. Anat. Physiol. Klin. Med.* 246, 239-252 (1923). (In German).

Mitochondria in irradiated ova of mice were observed to clump and to decrease in number.

8909

THE MAXIMUM PERMISSIBLE INTAKE (M. P. I.) IN MILLIGRAMS AND MICROCURIES FOR DANGEROUS RADIONUCLIDES IN THE CHEMICAL INDUSTRY AND FOR A SINGLE EXPOSURE. Pierre-Octave Robert. *J. phys. radium* 18, Suppl. 12, 154A-7A (1957) Dec. (In French).

The maximum permissible intake in milligrams and millicuries is tabulated for the dangerous radioisotopes for different degrees and conditions of exposure.

NSA 12-7689

8910

MEASUREMENT OF RETENTION AND EXCRETION OF RADIOISOTOPES OF THE ALKALI METALS BY MICE AND RATS, USING AN ANNULAR LIQUID SCINTILLATION COUNTER. K. T. Woodward, C. R. Richmond, and W. Langham (Los Alamos Scientific Lab., N. Mex.). *Proc. Health Phys. Soc.* 79-88 (1957).

Measurements of Na²², K⁴², Rb⁸⁶, and Cs¹³⁴ retention in rats and mice are given. Measurements of Cs¹³⁴ retention in one man following oral administration are also given. The retention was studied in vivo by use of an annular liquid scintillation counter. NSA 12-8289

8911

Rochester, N. Y. Univ. Atomic Energy Project.
SUGGESTED URINARY TOLERANCE LEVELS FOR ENRICHED URANIUM. John B. Hursh. Dec. 26, 1957. 15p. Contract W-7401-eng-49. (UR-515)

The animal experimentation basis for estimates of permissible levels of airborne, soluble, and insoluble natural uranium is briefly reviewed. It suggested that permissible air and urinary levels for enriched uranium be set at values equivalent to those for natural uranium in terms of disintegrations per minute per unit volume. An attempt is made to calculate the safety factors introduced by this procedure. NSA 12-7680

8912

North American Aviation, Inc., Downey, Calif.
WBNS SURVEY. R. L. Koontz. Sept. 5, 1952. Decl. Mar. 11, 1958. 11p. (NAA-SR-Memo-406)

The radiation levels which exist at 100 milliwatts for 8 hr/day operation meet the required maximum permissible dosage rates of 1/10 the AEC standard dosage rates. On this basis a safe level of operation is considered 1000 milliwatt hrs/day or 5.0 watts-hrs/week. A simple explanation for the required 1/10 of the AEC maximum permissible exposure rate is the simultaneous existence of three so-called tolerance dosage rates and an unknown summative effect of fast neutrons, slow neutrons, and gamma radiation. In addition, there are potential exposures from other sources of radiation in the laboratory. It has been shown that the radiation levels existing are below the AEC permissible rates in working areas for each of the separate types of radiation. No attempt has been made to summate

the total exposure. If the WBNS is operated at the levels mentioned above, no harm to personnel in or around the WBNS should occur. NSA 12-7678

8913

General Electric Co. Hanford Atomic Products Operation, Richland, Wash.

DECONTAMINATION OF PIG SKIN CONTAMINATED WITH A PLUTONIUM SOLUTION. L. A. George, Jr., N. L. Dockum, and L. K. Bustad. Aug. 20, 1956. 14p. Contract [W-31-109-Eng-52]. (HW-44526)

Different methods of decontaminating plutonium contaminated skin were studied by contaminating localized areas of pig skin and then testing the different decontamination methods. Results indicate that the most effective of the decontamination methods tested involved the application of a plastic adherent material to the skin and its later removal by peeling. NSA 12-7672

8914

Columbia Univ., New York. Coll. of Physicians and Surgeons and School of Aviation Medicine, Randolph AFB, Tex.

MECHANISM OF EMESIS FOLLOWING X-IRRADIATION. S. C. Wang, A. A. Renzi, and Herman I. Chinn. Oct 11, 1957. 6p. (AF-SAM-58-34)

It has been observed that normal dogs exposed to lethal doses of total-body x irradiation exhibited emesis during the remaining period of survival. However, neither acute nor delayed emesis due to irradiation was observed in dogs with chronic destruction of the chemoceptive emetic trigger zone and abdominal deafferentation. Studies of the effects of various visceral deafferentation procedures on postirradiation emesis indicate that delayed vomiting was mediated through the centrally located trigger zone and the peripheral visceral afferent receptors of the vagus and sympathetic trunks. NSA 12-5145

8915

Texas. Univ., Austin. Radiobiological Lab. and School of Aviation Medicine, Randolph AFB Tex.

POSTIRRADIATION CREATINURIA IN MACACA MULATTA MONKEYS. George M. Krise, Clyde M. Williams, and Donald R. Anderson. June 25, 1957. 4p. (AF-SAM-57-150)

Four adult male Macaca mulatta monkeys were placed on a creatine-free diet for seven to nine days. After the urinary level of creatine excretion had reached a plateau, the animals were irradiated with 1,000 rep of x rays. A creatinuria of approximately four times normal was excreted over the first four days in a pattern similar to that previously found in the rat. On the second postirradiation day the average creatinuria was about seven times normal. This effect is compared with other species reported in the literature. NSA 12-4028

8916

Army Medical Research Lab., Fort Knox, Ky.

THE ROLE OF CERTAIN ORGANS IN FRACTIONATED TOTAL BODY X-IRRADIATION STUDIES. J. G. Kereiakes, W. H. Parr, and A. T. Krebs. Oct. 22, 1956. 14p. Project No. 6-59-08-014. (AMRL-273; AD-125586)

Intervals between each of five 140 r doses of 1, 3, 5, 7, and 9 hours resulted in survivals of 15, 35, 55, 45, and 40%, respectively, for fractionated total-body x irradiation of mice. A 700 r single dose was 100% lethal. The pattern of the intestinal dry weight response to fractionated doses was similar to that for survival. Fractionating the dose did not seem to significantly alter the 700 r single dose spleen wet weight value. The findings suggest that the fast recovery of the mitotic process and of the nucleic acid metabolism in the small intestine at about five hours after irradiation with doses between 100 and 200 r may be responsible for the observed results for the five hour interval fractionated total-body x irradiated mice. NSA 12-4030

8917

EFFECT OF GLUCOSIDATION ON RADIOMIMETIC ACTIVITY. COMPARISON OF HYDROQUINONE AND ITS GLUCOSIDE, ARBUTOSIDE. Guy Deysson and Rene Truhaut (Institut du Cancer Gustave Roussy et Faculte de Pharmacie). Compt. rend. soc. biol. 151, 1719-22(1957) Oct. (In French).

Investigations were made to compare the radiomimetic effects of hydroquinone and its natural glucoside arbutoside on the roots of Allium sativum L. The results of the study showed that arbutoside exercises a radiomimetic action of the same type as hydroquinone, but of an intensity 4 times less. The glucosidation diminishes the toxicity and the efficiency of hydroquinone, but it does not remove the effect exercised on the chromosomes. NSA 12-15210

8918

CHRONIC RADIATION HAZARDS. AN EXPERIMENTAL STUDY WITH FAST NEUTRONS. G. J. Neary, R. J. Munson, and R. H. Mole. New York, Pergamon Press, 1957. 198p.

Mice were subjected to chronic radiation exposure from a nuclear reactor for several years. The doses of fast neutrons, gamma radiation, and thermal neutrons were measured by the use of three chambers with different sensitivities to the three kinds of radiation. Quite precise estimates of the separate effects of the three kinds of radiation were possible by making use of an approximate value for the energy of the fast neutrons, and from this information the true tissue doses in rads could be obtained. The effect of 0.54 rads weekly of fast neutrons on the life span of mice was small and is statistically uncertain. The higher dose of 6.4 rads weekly did not effect the white blood cell count but caused a marked drop in body weight and shortened life by one third. After 2 to 5 months at 6.4 rads weekly, fertility in both males and females was seriously impaired. The reproductive function was found to be the most sensitive indicator of chronic radiation damage. Irradiation techniques and facilities are described. The interpretation of the results of chronic toxicological experiments are discussed. NSA 12-10318

8919

THE EFFECTS OF HEAVY GAMMA IRRADIATION UPON PITUITARY GLANDS TRANSPLANTED INTO HYPOPHYSECTOMIZED TADPOLES OF BUFO BOREAS. Bennet M. Allen (Univ. of California at Los Angeles). J. Exptl. Zool. 136, No. 1, 185-98(1957) Oct.

The pituitary gland retains its ability to secrete thyrotrophic hormone and intermedin up to 108 days after very heavy irradiation. In these experiments hypophysectomy had been performed as usual on tadpoles at the tail bud stage and the pituitary glands of irradiated recently metamorphosed toads were transplanted into them after they had reached a trunk length of 6 to 8 mm. The activity of the transplant was largely conditioned by the amount of trauma that occurred in the operation. In more favorable cases the pars anterior produced thyrotrophic hormone sufficient to induce the thyroid gland of the hosts to secrete enough hormone to cause well advanced development toward metamorphosis by the end of 42 days. Tadpoles killed at 108 days show still further average development. The thyrotrophic function of the pars anterior was maintained after an irradiation of 27,000 r but it is probable that a still heavier irradiation would not have completely destroyed its capacity to secrete during this period of time. Color change induced by the secretory activity of the pars intermedia is very pronounced at 45 minutes after transplantation and continues through the 108 days of the experiment. These color effects are fully maintained in spite of an irradiation

of 27,000 r only slight diminution resulting from a dosage of 40,000 r. NSA 12-11243

8920

THE DISTRIBUTION AND EXCRETION OF URANIUM IN MAN. S. R. Bernard, J. R. Muir, and G. W. Royster, Jr. (Oak Ridge National Lab., Tenn.). *Proc. Health Phys. Soc.* 33-48(1957).

The critical organ for radiation insult from storage of enriched uranium in the kidney when exposure is to a soluble substance. The disappearance of uranium from the body shows a slight dependence upon the amount injected into the bloodstream. The urinary excretion data can be described using the power function law. Integration of this function yields the retention as a function of time. The calculated retention agrees more closely with the retention in the critical organ than with retention in the body. A tentative MPC for exposure to soluble compounds is calculated to be 4×10^{-11} $\mu\text{C}/\text{cc}$ on the basis of the power function equation. A tentative MPC for urine is calculated using the power function law. The calculated value is 355 d/m/day, a factor of 5 greater than the present value employed, thereby indicating a margin of safety for exposure to soluble compounds. NSA 12-8285

8921

ERYTHROPOIESIS IN RADIATION DISEASE COMBINED WITH BURN. I. T. Abasov (Azerbaijani Inst. for Research in Roentgenology and Radiology). *Bull. Exptl. Biol. Med. (USSR) (English Translation)* 43, 799-801 (1957) July.

Experiments with radioactive iron have demonstrated that in rats subjected to x-ray irradiation (500 r) erythropoiesis is for the first ten days inhibited, and restored at the end of the first week. In rats with burns of the distal parts, caused by boiling water, erythropoiesis is enhanced during the first days and then with the development of inflammatory complications, is inhibited, not being restored even at the end of two weeks. In animals subjected to both irradiation and burns, release of erythrocytes ceases almost completely and in surviving ones restoration of erythropoiesis proceeds very slowly. NSA 12-11238

8922

THE GENETICS OF SOMATIC MAMMALIAN CELLS. Theodore T. Puck (Univ. of Colorado Medical Center, Denver). *Advances in Biol. and Med. Phys.* 5, 75-101 (1957).

New quantitative techniques have been described for rapid plating of isolated single cells from a wide variety of human tissues under conditions such that almost every cell produces a macroscopic colony. These methods make possible new kinds of studies of the growth and genetics of mammalian cells. Application of these methods to problems of growth rate analysis, cell morphology, mutant production and isolation, analysis of the action of ionizing radiations, study of virus-cell interactions, and to certain problems in clinical medicine has been indicated. (21 references). NSA 12-8921

8923

Rochester, N. Y. Univ. Atomic Energy Project. ON THE MECHANISM OF SKELETAL FIXATION OF STRONTIUM. J. Boyd, W. F. Neuman, and H. C. Hodge. Nov. 14, 1957. 16p. Contract W-7401-eng-49. (UR-512)

The results of the present investigations permit a provisional description of the mechanisms underlying the skeletal fixation of strontium. Strontium ions from the extracellular fluids, diffusing into the bone areas, enter into the hydration jackets surrounding the individual bone crystals and exchange with certain calcium ions in the surfaces of mineral crystals. With passing time, these strontium ions become incorporated to some extent within

the crystals, presumably as the result of thermal diffusion and recrystallization. NSA 12-8294

8924

CHANGES IN THE ANTIGENIC PROPERTIES OF TUMOR CELLS UNDER THE EFFECT OF X-RAYS IN VITRO. I. N. Maisky and G. V. Suvorova (Inst. of Experimental Biology, AMS, USSR, Moscow). *Bull. Exptl. Biol. Med. (USSR) (English Translation)* 44, 1121-3 (1957) Sept.

Changes in the antigenic properties of tumor cells induced by *in vitro* exposure to x radiation were demonstrated by observations on the anaphylactic reaction following injection in guinea pigs. Guinea pigs sensitized and desensitized with non-irradiated ascitic cells served as controls, as did guinea pigs which were used for testing the toxicity of the doses. NSA 12-11239

8925

THE EFFECT OF X-IRRADIATION ON THE ABSORPTION OF PLUTONIUM IN THE GASTROINTESTINAL TRACT. Harry Foreman, James Post, and Camille Finnegan (Los Alamos Scientific Lab., N. Mex.). *Radiation Research* 7, 267-9(1957) Sept. NSA 12-1177

8926

THE EFFECT OF NARCOSIS AND NATURAL HIBERNATION ON THE RADIOSENSITIVITY OF ANIMALS. M. D. Pomerantseva (Inst. of Genetics, Academy of Sciences, USSR). *Zhur. Obshchei Biol.* No. 3, 194-207 (1957) May-June.

The radiosensitivity of animals under deep narcosis and in a state of hibernation was investigated. Several hundred mice were exposed to doses of x radiation of 500, 1500, 4000, and 10,000 r. The protection afforded by the administration of sodium Nembutal, Barbamil, Hedonal, Urethane, and ether both before and after irradiation was investigated. The effect of hibernation on the radiosensitivity of animals was investigated in the rodent, *Citellus major*, following exposure to 600 r x radiation, and hedgehogs exposed to doses of 700 to 850 r. Data are tabulated and presented graphically. The use of narcosis after irradiation of the mice proved ineffective in reducing radiation damage. The use of Nembutal, Barbamil, and ether to produce narcosis during irradiation increased the resistance of mice to the action of 500 r x radiation as demonstrated by an increase in survival rate, delay in time of death, and faster restoration of body weight. The use of Hedonal and Urethane for narcosis was practically ineffective. The use of oxygen decreased in mice under narcosis induced by Nembutal and Barbamil. Deep Nembutal narcosis was found to delay, until the subject awakens, the early reactions against irradiation with massive doses of x radiation. The natural hibernation of animals did not increase their radioresistance to lethal doses of x radiation but delayed, until awakening, the onset of acute symptoms of radiation sickness. NSA 12-9646

8927

THE ACTION OF RADIUM ON THE BLOOD SUPPLY; THE WHITE REACTION. J. C. Mottram. *Brit. J. Radiol.* N35, 643(1932).

The primary effect is on the endothelial cells leading to stases and thrombosis. Studies are recorded on rats, mice and the allantoic membrane of the chick embryo.

8928

EXCHANGE AND CIRCULATION OF LABELLED IONS IN YOUNG INTACT PLANTS Presented at the International Conference on Radioisotopes in Science Research, Sept. 9-20, 1957 at Paris. No. UNESCO/NS/RIC/134. R. J. Helder. London, Pergamon Press, Ltd., 1957. 11p.

A continuous recording counter was used to trace the circuit of P in young barley plants. NSA 12-1205

8929

Naval Radiological Defense Lab., San Francisco.

STUDIES ON THE METABOLISM OF INHALED AEROSOLS OF STRONTIUM AND LANTHANUM. S. H. Cohn, W. B. Lane, J. K. Gong, L. Weisbecker, and W. L. Milne. May 27, 1957. 30p. Project NM-006-015.(USNRDL-TR-175)

The kinetics of the uptake, distribution, and retention in mice of two simulated fission product aerosols, $\text{Sr}^{86}\text{Cl}_2$ and $\text{La}^{140}\text{Cl}_3$ were studied. It was found that the gastrointestinal tract, as well as the alveolar tissue, can serve as an important portal of entry into the body for soluble fission product aerosols following inhalation exposure. NSA 12-1200

8930

Rochester, N. Y. Univ. Atomic Energy Project. METABOLISM OF INDIUM. II. THE DISTRIBUTION AND EXCRETION OF INDIUM^{114m} ADMINISTERED TO THE RAT BY SUBCUTANEOUS INJECTION. Geneva A. Smith and James K. Scott. Aug. 15, 1957. 21p. Contract W-7401-eng-49. (UR-507). NSA 12-1199

8931

REMOVAL OF INTERNALLY DEPOSITED RADIOCERIUM BY THE USE OF CHELATING AGENTS. A. Catsch and Du Khuong Le (Heiligenberg Inst., Baden). Nature 180, 609(1957) Sept. 21. NSA 12-1203

8932

MODIFICATION OF RADIATION-INDUCED INJURY BY POST TREATMENT WITH OXYGEN. Richard S. Caldecott, Elizabeth Bindloss Johnson, D. T. North, and C. F. Konzak (Univ. of Minnesota, Minneapolis and Brookhaven National Lab., Upton, N. Y.). Proc. Natl. Acad. Sci. U. S. 975-83(1957) Nov. NSA 12-1193

8933

ON THE CHARACTERISTIC FEATURES OF BRESLAU PARATYPHOID COMBINED WITH RADIATION SICKNESS IN MONKEYS. L. A. Yakovleva, B. A. Lapin, et al. (Sukhrim Medico-Biological Station). Med. Radiol. 2, No. 4, 58-65(1957) July-Aug. (In Russian).

Progressive leukopenia is a specific feature in the course of combined diseases. Preliminary specific immunization prevents the development of paratyphoid and decreases death among the infected animals. X irradiation with 400 r destroys the previously created artificial immunity while irradiation with 250 r is not able to destroy it. NSA 12-49

8934

EFFECTS OF GAMMA RAYS ON VARIOUS IMMUNITY FACTORS. J. Coursaget and G. Gaude. Rev. franc. etudes clin. et biol. 1, No. 6, 643-51(1956). (In French)

Total body irradiation of guinea-pigs with gamma irradiation from Co^{60} does not affect the phenomenon of phagocytosis as studied in vitro, although the same irradiation results in severe haematological disorders. Similar irradiation at doses equal to or greater than 400 r, considerably reduces the level of serum antibodies if the antigen is injected later than at least six hours after the irradiation. NSA 12-32

8935

California. Univ., Los Angeles. Atomic Energy Project. QUARTERLY PROGRESS REPORT FOR PERIOD ENDING JUNE 30, 1953. July 1, 1953. Decl. Mar. 6, 1957. 99p. Contract AT-04-1-GEN-12. (UCLA-260). NSA 12-1816

8936

SUPPLY OF RADIOACTIVE ISOTOPES TO THE PLANT BY WAY OF THE LEAVES. I. V. Gulyakin and E. V. Yudin-seva. Translated by T. Turton from Doklady Akad. Nauk. S. S. S. R. 111, 709-12(1956). 8p.(NP-tr-4). NSA 12-4066

8937

CHANGES IN BONES INDUCED BY THE INTRODUCTION

OF RADIOACTIVE STRONTIUM INTO RATS. L. A. Cherkassky. Translated from Voprosy onkologii 2, 275-84(1956). 15p. (AEC-tr-3088). NSA 12-4065

8938

UPTAKE OF RADIOACTIVE PHOSPHORUS IN EXPERIMENTAL TUMORS. II. EFFECT OF VASCULARITY ON RADIOACTIVE UPTAKE IN NEOPLASTIC, INFLAMMATORY, AND NORMAL OCULAR TISSUE. Charles I. Thomas, Mary Sue Bovington, Jack S. Krohmer, J. W. MacIntyre, and J. P. Storaasli. (Western Reserve Univ. School of Medicine and Univ. Hospitals, Cleveland, Ohio). Cancer Research 17, 1091-7(1957) Dec. NSA 12-4068

8939

THE EFFECT OF X-RAYS ON DIFFERENT QUALITIES ON THE ALKALINE PHOSPHATASE OF LIVING MOUSE BONE. II. EFFECTS OF 22.5-Mev X-RAYS. H. Q. Woodard and J. S. Laughlin (Sloan-Kettering Inst., New York). Radiation Research 7, 236-52(1957) Sept. NSA 12-1175

8940

EFFECT OF EXPOSURE TO GAMMA-RAYS ON THE HYGROSCOPICITY OF SITKA SPRUCE WOOD. J. M. Paton and R. F. S. Hearmon (Forest Products Research Lab., Princes Risborough, Aylesbury, Bucks). Nature 180, 651(1957) Sept. 28. NSA 12-1174

8941

STUDIES OF FACTORS CAUSING THE DISTURBANCE OF THE ESTRUAL CYCLE IN MICE FOLLOWING WHOLE-BODY EXPOSURE TO X RADIATION. N. I. Shapiro, N. I. Nuzhdin, and O. N. Kitaeva. (Inst. of Genetics, Acad. of Sciences, U. S. S. R.). Izvest Akad. Nauk S. S. S. R. Ser. Biolog. 537-55(1957) Sept.-Oct. (In Russian). NSA 12-1173

8942

INDUCED CHANGES IN FEMALE GERM CELLS OF DROSOPHILA. II. OVIPOSITION RATE AND EGG MORTALITY IN RELATION TO INTENSITY AND DOSAGE OF X-RAYS APPLIED TO OOCYTES. S. Abrahamson and Irwin H. Herskowitz (Indiana Univ., Bloomington). Genetics 42, 405-20(1957) July. NSA 12-1170

8943

INDUCED CHANGES IN FEMALE GERM CELLS OF DROSOPHILA. IV. DEPENDENCE OF INDUCED CROSS-OVER-LIKE EXCHANGES IN OOCYTES AND OOGONIA UPON X-RAY INTENSITY. Irwin H. Herskowitz and S. Abrahamson (Indiana Univ., Bloomington). Genetics 42, 444-53(1957) July. NSA 12-1171

8944

ELECTROPHORETIC INVESTIGATION OF THE BLOOD SERUM OF IRRADIATED AND HIBERNATING DORMICE. Gerhard Schubert, Hans A. Kunkel, and Heinrich Maab. Strahlentherapie 103, 368-75(1957). (In German). NSA 12-1183

8945

CHRONIC TOTAL BODY IRRADIATION OF WHITE MICE AT A SMALL DOSE RATE. Mario Dorneich and Boris Rajewsky. Strahlentherapie 103, 327-31(1957). (In German). NSA 12-1182

8946

THE COMBINED EFFECTS OF IONIZING RADIATION AND LOW TEMPERATURE ON THE METABOLISM, LONGEVITY, AND SOFT TISSUES OF THE WHITE RAT. II. HISTOLOGICAL CHANGES. P. C. Griffith, W. J. Scheyer, and S. W. Lippincott (Univ. of Washington School of Medicine, Seattle). Radiation Research 7, 288-97(1957) Sept. NSA 12-1180

8947

California. Univ., Berkeley. Radiation Lab. SOME EFFECTS OF RADIATIONS ON CELL PROLIFERATION. Cornelius A. Tobias. Aug. 19, 1957. 11p. Contract W-7405-eng-48. (UCRL-3735)

Some of the factors controlling tissue growth in animals and cell proliferation in unicellular organisms are reviewed. Radiation damage in diploid yeast cells manifests itself sometimes in delayed lethal effect and decreased cell division rate over several generations in the progeny of the irradiated cell. Recovery of the progeny of irradiated yeast cells from phenotypic expression of radiation damage can be delayed over many generations and is similar, in time rate of onset to the onset of radiation-induced animal tumors. A parallel suggests itself between the mechanism of somatic-radiation carcinogenesis and delayed recovery of unicellular organisms from radiation effect. NSA 12-1158

8948

Naval Radiological Defense Lab., San Francisco
TIME OF APPEARANCE OF SKIN LESIONS FOLLOWING EXPOSURE TO BETA RADIATION A. K. Davis and E. L. Alpen. June 21, 1957. 19p. Project NM-006-015. (USNRDL-TR-173)

Measurements of the response of rat, guinea pig, dog, and pig skin to beta radiation have been made at doses of 450 to 100,000 rad. The results indicate that above the threshold for wet desquamation the sequence of events is an early erythema, a latent period of five to seven days during which the skin appears normal, and a short period of dry desquamation, lasting only one or two days, followed by necrosis and sloughing of the skin in the irradiated area. The wet ulcer is then covered by a dry crust which persists until healing is complete. A dose of 15,000 rad produced edema of the irradiated site by the first day in all rats and occasional edema in guinea pigs and dogs. Higher doses reduced the latent time before ulceration and increased the intensity of the erythema. At 100,000 rad immediate effects of the irradiation causes an intense erythema and accelerates the course of injury described for the doses above 15,000 rad. NSA 12-1160

8949

Rochester, N. Y. Univ. Atomic Energy Project.
THE EFFECT OF IONIZING IRRADIATION ON LONGEVITY. John B. Hursh. Aug. 22, 1957. 29p. Contract W-7405-eng-49. (UR-506)

Among the important late effects of ionizing radiation is the shortening of average length of life. Experiments on rats and mice have shown that for single sub-lethal doses of x-rays, this life shortening is 25 to 50% per 1000 roentgens, the proportional amount of shortening increasing with dose size. For chronic irradiation an estimate is made of approximately 10% per 1000 r. Generalizations which summarize this experimental information are reviewed. Finally the possible significance of this effect for maximum permissible exposure levels is discussed. NSA 12-1159

8950

RADIOSENSITIVITY OF MOUSE SPLEEN AND KIDNEY TO CHRONIC ALPHA IRRADIATION. Leiv Kreyberg and Finn Devik (Univ. of Oslo, Norway). Brit. J. Radiol 30, 477-80(1957) Sept. NSA 12-1166

8951

THE INFLUENCE OF WHOLE BODY X-IRRADIATION OF THE BIOSYNTHESIS OF CHOLESTEROL IN LIVER. H. K. Hanel, G. Hjort, G. Johansen, and P. R. Purser (Radium Centre Copenhagen, Denmark). Acta Chem. Scand. 11, 1093-4(1957). NSA 12-1163

8952

Naval Radiological Defense Lab., San Francisco.
EFFECT OF PARTIAL SHIELDING OF RAT INTESTINE DURING X IRRADIATION ON CIRCULATING BLOOD VOLUME. M. N. Swift and S. T. Taketa Aug. 9, 1957 20p. Project NM 006-015. (USNRDL-TR-179). NSA 12-1161

8953

LEUKOCYTIC RESPONSE IN LAMBS EXPOSED TO

WHOLE-BODY X IRRADIATION. L. A. George, Jr., Patricia L. Hackett, and L. K. Bustad (General Electric Co., Richland, Wash.). Am. J. Vet. Research 18, No. 68, 631-3(1957) July. NSA 12-1164

8954

DYNAMICS OF THE DEVELOPMENT OF BONE SARCOMAS ORIGINATING UNDER THE INFLUENCE OF RADIOACTIVE SUBSTANCE. N. N. Litvinov. Translated by Zelda D. Knowles from Voprosy Onkologii 3, 285-94 (1956). 20p. NSA 12-1162

8955

AN ANALYSIS OF THE ROLE OF DOSE AND DOSAGE RATE IN THE EARLY RADIATION MORTALITY OF THE CHICK. S. P. Stearner and S. A. Tyler (Argonne National Lab., Lemont, Ill.). Radiation Research 7, 253-66(1957) Sept. NSA 12-1176

8956

A FATAL REACTION CAUSED BY IMPLANTATION OF ADULT PARENTAL SPLEEN TISSUE IN IRRADIATED F₁ MICE E. E. Schwartz, A. C. Upton, and C. C. Congdon (Oak Ridge National Lab., Tenn.). Proc. Soc. Exptl. Biol. Med. 96, 797-800(1957) Dec.

Implantation into irradiated F₁ hybrids of viable spleen cells from non-irradiated adult mice of the parental strains caused death within 2 to 4 weeks. The fatal reaction occurred even after sublethal doses of radiation or when the recipients were also injected with marrow cells from isologous hybrids or from mice of the same strain as that from which the parent-strain spleen tissue was obtained. The deaths are ascribed to the formation by the implanted cells of antibodies against the recipient. NSA 12-3525

8957

Texas. Univ., Houston. M. D. Anderson Hospital and Texas. Univ., Houston. Tumor Inst.
CHANGE IN PLASMA CLEARANCE RATE AND RED CELL UPTAKE OF RADIOACTIVE IRON IN PATIENTS FOLLOWING TOTAL-BODY X-RADIATION. W. K. Sinclair. Apr. 12, 1957. 7p. (AF-SAM-57-116)

Data are presented on changes in plasma clearance half-time and red cell uptake of Fe⁵⁵ in 12 patients irradiated with x rays at a nominal air dose of 200 r, corresponding to an average dose of 130 rads. These data show a maximum change occurring at 3 to 4 days after irradiation which lengthens the plasma clearance half-time to double or triple its previous value. A slight but definite depression, of the order of 10% on the average, is demonstrated in the red cell uptake. NSA 12-12

8958

FURTHER STUDIES ON DIURESIS IN NORMAL AND ADRENALECTOMIZED RATS FOLLOWING TOTAL-BODY X-IRRADIATION. E. Irene Pentz (Argonne Cancer Research Hospital and Univ. of Chicago, Ill.). Proc. Soc. Exptl. Biol. Med. 96, 829-33(1957) Dec. NSA 12-3500

8959

RETENTION AND TOXICITY OF RADIOSTRONTIUM IN MONKEYS. Presented at the International Conference on Radioisotopes in Scientific Research, Sept. 9-20, 1957 at Paris. No. UNESCO/NS/RIC/142. A. H. Ward. London, Pergamon Press, Ltd., 1957. 9p.

Experiments with Sr⁹⁰ administered to monkeys from a colony of 80 animals are described. Single doses, ranging from 1 to 0.001 mg/kg bodyweight were given to animals in three experimental groups distributed amongst three species. Relations between survival time and injection dose are discussed, and the lethal dose for 30 and 500 days estimated at 0.70 and 0.01 mc/kg bodyweight respectively indicates a higher toxicity in monkeys than in any other animal yet reported. A marked species difference is

seen in the toxicity of low injection doses. Excretion and retention of Sr^{90} and Y^{90} are discussed. NSA 12-57

8960

Rochester, N. Y. Univ. Atomic Energy Project. THE DISTRIBUTION AND EXCRETION OF POLONIUM²¹⁰ AFTER INHALATION. H. L. Berke and A. C. DiPasqua. May 31, 1957. 42p. Contract W-7405-eng-49. (UR-495).

Rats have been exposed in a specially designated inhalation chamber to a controlled NaCl aerosol contaminated with small amounts of Po^{210} ($3.17 \times 10^{-6} \mu\text{c}/\text{ml}$ air, geometric mean diameter 0.098μ , $\sigma_g 1.81$). About 53% of the inhaled aerosol was deposited in the animal, equally divided between the lung-trachea and the gastrointestinal tract after five hours exposure. About 20% of the total Po^{210} deposited in the respiratory tree was cleared during this time. The rate of post exposure lung clearance was exponential with time and quite rapid during the first 30 days (10 day half-time), slower and less regular at later times. The tissue distribution after inhalation is different from that observed after the intravenous, oral or intratracheal route of entry as seen particularly in blood and spleen. Total excretion was lower following inhalation than that after intratracheal or intravenous administration. An intermediate value of 6:1 was observed for the ratio of fecal to urinary Po^{210} . It is concluded that the distribution and excretion of Po^{210} in the rat after an inhalation exposure represents a balance between that observed after intratracheal injection and that after the oral route of entry. NSA 12-55

8961

Naval Radiological Defense Lab., San Francisco. THE EFFECT OF X-RAY DOSE ON THE PROTECTIVE ACTION AND PERSISTENCE OF RAT BONE MARROW IN IRRADIATED MICE. G. W. Santos, L. J. Cole, and P. L. Roan. Sept. 12, 1957. 20p. Project NM-006-015. (USNRDL-TR-181)

Rat bone marrow cell suspensions were injected intravenously into x-irradiated mice, with the addition of penicillin to the suspending medium. Various radiation dose levels in the midlethal, lethal, and supralethal range were employed (600 to 1000 r). This study shows that penicillin treatment on the day of irradiation significantly improved the 30-day survival of the rat marrow-treated mice, but not the 60-day survival. Treatment with rat bone marrow lowered the 30- and 60-day mortality (except at the 3 lowest doses, 600, 640, and 680 r, where there was no significant difference in mortality) as compared with control-irradiated mice injected with penicillin only. The 30-day mortality in rat marrow-treated mice was relatively constant, approximately 20 percent up to 870 r, at 1000 r mortality was 80 percent. The time of persistence of rat white blood cells, as detected by the alkaline-phosphatase reaction, was dose dependent up to 870 r, suggesting that the x-irradiated mouse is capable of recognizing and disposing of these foreign cells. The possible basis for difference between the present results and those of recent reports from other laboratories has been discussed. NSA 12-40

8962

THE EFFECT OF X-RAYS OF DIFFERENT QUALITIES ON THE ALKALINE PHOSPHATASE OF LIVING MOUSE BONE. H. O. Woodard and F. W. Spiers. Brit. J. Radiol., 26, 38(1953).

Localized irradiation results in loss of the enzyme from mouse bone *in vivo*, not after *in vitro* irradiation. Doses ranging from 900-2500 r were effective.

8963

Naval Radiological Defense Lab., San Francisco. NEOPLASMS OF THE GLANDULAR STOMACH IN MICE IRRADIATED WITH X RAYS OR FAST NEUTRONS. P. C. Nowell, L. J. Cole and M. E. Ellis. May 21, 1957. 24p. Project NM-006-015. 04. (USNRDL-TR-167). NSA 12-16

8964

Naval Radiological Defense Lab., San Francisco. THE ROLE OF FOOD CONSUMPTION IN THE MORTALITY RESPONSE OF IRRADIATED RATS SUBJECTED TO PROLONGED COLD EXPOSURE. B. D. Newsom and D. J. Kimeldorf. May 21, 1957. 15p. Projects NM 006-015 and BuMed 62-93-60. (USNRDL-172). NSA 12-17

8965

MEDICAL RADIATION BIOLOGY. Friedrich Ellinger. Springfield, Charles C. Thomas, 1957. 974p.

The fundamentals of radiation biology, the biology of ionizing radiations, the biology of ultraviolet radiation, and photobiology are discussed in detail. 4600 references. NSA 12-33

8966

THE EFFECTS OF IONIZING RADIATION ON PLANTS: MORPHOLOGICAL EFFECTS. James E. Gunckel (Rutgers Univ., New Brunswick, N. J. and Brookhaven National Lab., Upton, N. Y.). Quart. Rev. Biol. 32, 46-56(1957) Mar. NSA 12-30

8967

A RELATION OF NUCLEIC ACID SYNTHESIS TO RADIATION-INDUCED MUTATION FREQUENCY IN BACTERIA. F. L. Haas and C. O. Doudney (Univ. of Texas and M. D. Anderson Hospital and Tumor Inst., Houston, Texas). Proc Natl. Acad. Sci. U. S. 43, 871-83(1957) Oct. NSA 12-31

8968

GENETIC EFFECTS OF RADIATION ON HIGHER PLANTS. Calvin F. Konzak (Brookhaven National Lab., Upton, N. Y.). Quart. Rev. Biol. 32, 27-45(1957) Mar. NSA 12-29

8969

THE EFFECT OF IONIZING RADIATION ON CHROMOSOMES. Karl Sax (Harvard Univ., Cambridge, Mass.). Quart. Rev. Biol. 32, 15-26(1957) Mar. NSA 12-28

8970

EFFECT OF TOTAL BODY IRRADIATION ON IRON METABOLISM IN HUMAN BONE MARROW. H. D. Suit, F. Ellis, and R. Oliver (Churchill Hospital, Oxford). Brit. J. Radiol. 30, 553-9(1957) Oct.

Results of hematological and iron metabolism investigations on 17 patients who received total body x irradiation are presented. *In vivo* iron tracer studies indicate that 25 to 50 r total body irradiation to man 24 hours before an injection of Fe^{59} does not delay the appearance of the radioactive iron in the peripheral erythrocytes. One hundred roentgens total body irradiation to man does not delay the appearance of Fe^{59} in the peripheral erythrocytes if the tracer is given two hours after the irradiation, but if the tracer is given 24 to 72 hours after irradiation there is a definite delay in the appearance of the Fe^{59} in the erythrocytes. The probable mechanisms for producing the delay in the appearance of the Fe^{59} in the peripheral erythrocytes are discussed. NSA 12-21

8971

PHYSIOLOGICAL EFFECTS OF γ RAYS ON THE CORTEX OF CEREBRAL HEMISPHERES. Z. V. Demsova (Sechenov Inst. of Evolution Physiology). Med. Radiol. 2, No. 4, 3-11(1957) July-Aug. (In Russian).

Experiments with dogs showed the early susceptibility of the cortex of cerebral hemispheres to low doses of ionizing radiation. After irradiation a certain weakening of the inhibitory process in the higher nervous activity of the animals was observed. NSA 12-22

8972

GAMMA RADIATION EFFECTS ON REPRODUCTION OF WHITE RATS AND THEIR PROGENY. A. I. Osipovskii (Moscow Order of Lenin Med. Inst.). Med. Radiol. 2, No. 4, 30-8(1957) July-Aug. (In Russian).

Various changes were observed in the sexual cycles of rats exposed to single doses of 198, 360, or 520 r. The rhythm of their sexual cycle was disturbed and dioestrus greatly prolonged. After irradiation by 500 r the sexual life was completely interrupted. Anomalies of the skeleton, of skin derivatives, of vestibular apparatus, and dwarfism were observed in rats born to irradiated rats in the first and second generations. NSA 12-23

8973

Washington. Univ., Seattle. Applied Fisheries Lab. A RADIOLOGICAL STUDY OF RONGELAP ATOLL, MARSHALL ISLANDS, DURING 1954-1955. Aug. 15, 1955. 75p. Contract AT(45-1)-540. (UWFL-42)

The detonation of shot one at Bikini Atoll on March 1, 1954, produced a fallout of radioactive ash upon Rongelap Atoll, Marshall Islands. The distribution of the radioactive ash on the islands and in the plants and animals of the area has been studied and evaluated. During the first expedition to Rongelap Atoll on March 26, 1954, biological samples were collected and measurements made of the radiation contamination. On three additional expeditions extensive collections of material were made for this study, the last on January 25-30, 1955. The decline in radioactivity was measured in 1499 samples of fish, invertebrates, land plants, algae, birds, plankton, soil, and water from the Rongelap area. During this study particular emphasis was placed upon evaluation of the radioactivity in food used by the natives. Coconut milk collected on March 26, 1954, contained 1.03 microcuries per kilogram of wet tissue while the coconut meat had 1.16 $\mu\text{C}/\text{kg}$. By January 25-30, 1955, the level in coconut milk had declined to 0.041 $\mu\text{C}/\text{kg}$ and the meat to 0.036 $\mu\text{C}/\text{kg}$. Fish muscle on March 26, 1954, averaged 2.74 $\mu\text{C}/\text{kg}$ and fish liver 204.0 $\mu\text{C}/\text{kg}$. The decline to January 25-30 was 0.10 $\mu\text{C}/\text{kg}$ for the muscle and 3.52 $\mu\text{C}/\text{kg}$ for the liver of fish. Somewhat similar declines were found for clam muscle, bird muscle and liver, and for squash, papaya, arrowroot and pandanus. The level of radioactivity was highest in the northern portion of the atoll, except for samples of algae and fish-eating birds, collected during January 1955 from the southern part of the atoll, which had higher levels of radioactivity than samples collected from the northern islands on the same date. This may indicate a translocation of radioactive materials within the lagoon. NSA 12-18

8974

Naval Radiological Defense Lab., San Francisco. ELECTROLYTE EXCRETION IN THE RAT FOLLOWING SEVERE INTESTINAL DAMAGE BY X IRRADIATION. K. L. Jackson, R. L. Rhodes, and C. Entenman. June 20, 1957. 25p. Project NM-006-015.04. (USNRDL-TR-165) NSA 12-15

8975

THE EFFECTS OF IONIZING RADIATION ON PLANTS: BIOCHEMICAL AND PHYSIOLOGICAL ASPECTS. Solon A. Gordon (Argonne National Lab., Lemont, Ill.). Quart. Rev. Biol. 32, 3-14(1957) Mar. NSA 12-27

8976

CHANGES IN THE HARD TISSUE TISSUES AFTER MULTIPLE EXPOSURES TO SMALL DOSES OF IONIZING RADIATION. A. A. Prokhunchukov (Moscow Medical Stomatological Inst.). Med. Radiol. 2, No. 4, 74-7(1957) July-Aug. (In Russian).

The hard tissues of rat's teeth exposed 25 to 36 times to small doses of x radiation (25 r) were studied with the aid of radioactive isotopes of P^{32} and Ca^{45} . It was revealed that the changes in phosphorus-calcium metabolism depends on the total doses of irradiation. After a total dose of 700 r the phosphorus-calcium metabolism is activated in the hard tissues of teeth and with 900 r it becomes pronounced. NSA 12-26

8977

EFFECTS OF PRELIMINARY IRRADIATION ON DEVELOPMENT OF ANTI-TOXIC ANTIDIPHTERIC IMMUNITY. D. R. Kaulen (Gamalei Inst. of Epidemiology and Microbiology). Med. Radiol. 2, No. 4, 57-8(1957) July-Aug. (In Russian).

It was found that preliminary irradiation decreases the natural resistance of animals; however, double immunization given to guinea pigs not only restored their normal degree of resistance but, also, created a certain degree of natural immunity. This immunity, however, is much lower than in normal animals. NSA 12-25

8978

CONDITION OF THE CORTEX IN SUPRARENAL GLANDS DURING RADIATION SICKNESS. L. V. Bozhenko (Central Research Roentgen-Radiological Inst. of Ministry of Health, U. S. S. R.). Med. Radiol. 2, No. 4, 44-50(1957) July-Aug. (In Russian).

An active excretion of ascorbic acid was observed during the first hours after x irradiation with 300, 600, and 1500 r. Later the condition of the suprarenal changed according to the gravity of the pathological process. In subacute forms of radiation sickness (300 to 600 r), the process passed three stages: the period of enhancement, of depression, and normalization. In the acute form (1500 r) the function of the suprarenal cortex was depressed during the whole period of radiation sickness. NSA 12-24

8979

ON DISTURBANCE OF PIGMENT METABOLISM IN RADIATION SICKNESS. A. E. Ivanov. Med. Radiol. 2, No. 4, 18-23(1957) July-Aug. (In Russian).

Brownish pigment consisting of minute granules is frequently found in the tissues of irradiated animals. Evidently increased hemolysis of erythrocytes and their destruction takes place in the areas of hemorrhages resulting from irradiation. However, due to disturbed function of reticulo-endothelial cells and depression of erythropoiesis the iron is not utilized for erythrocytes and bile pigments; thus it accumulates in tissues in a form of brownish pigment in which iron is found in colloidal form. NSA 12-47

8980

EFFECTS OF RADIOACTIVE COBALT ON THE RESISTANCE OF THE ORGANISM TO IONIZING RADIATION. L. A. Dimitrov (Med. Inst. of Sofia, Bulgaria). Med. Radiol. 2, No. 4, 11-18(1957) July-Aug. (In Russian).

Conclusions on experiments with dogs exposed to lethal doses showed that Co^{60} introduced intravenously before the exposure gives a certain protection against radiation sickness. Changes observed in the suprarenal cortex reflect the general condition of the body. NSA 12-43

8981

RADIATION: WHAT IT IS AND HOW IT AFFECTS YOU. Jack Schuber and Ralph E. Lapp. New York, The Viking Press, 1957. 314p.

The biological effects of radiation due to fall-out following nuclear explosions are discussed. NSA 12-45

8982

STUDIES WITH RADIOIODINE. VI. EVALUATION OF RADIOIODINE TREATMENT OF CARCINOMA OF THE THYROID BASED ON THE EXPERIENCE AT THE UNIVERSITY OF CALIFORNIA FROM 1938 TO 1954. Glenn E. Shelme and Earl R. Miller (Univ. of California School of Medicine, San Francisco). Radiology 69, 527-45(1957) Oct.

Between September 1945 and June 30, 1954, 124 patients with histologically proved primary carcinoma of the thyroid gland were studied. Only patients with residual inoperable neoplastic tissue were accepted for

I^{131} treatment, and, as a rule, they were treated only after the establishment of some degree of radioiodine uptake of the neoplastic tissue. In most cases the aim was to administer 100 millicuries of I^{131} per month as long as evidence of tumor avidity for I^{131} could be shown. In these cases total doses of several hundred millicuries were given, distributed over several months. Results are summarized. Selected case histories are included.

NSA 12-53

8983

PROTON IRRADIATION OF THE PITUITARY. John H. Lawrence (Univ. of California, Berkeley). *Cancer* 10, 795-8(1957) July-Aug.

Observations on 26 patients indicate that it is possible to destroy the pituitary gland by proton beam irradiation.

NSA 12-52

8984

Technical Information Service, AEC.

BIBLIOGRAPHY ON METABOLISM AND TOXICOLOGY OF INTERNALLY DEPOSITED ELEMENTS AND THEIR ISOTOPES. Robert L. Shannon. Jan. 15, 1951. Decl Sept. 18, 1957. 31p. (TID-451)

A guide is presented to Atomic Energy Commission literature on the metabolism or toxicology of 57 elements of interest. A number of tracer studies are included. Studies employing U, Ra, Pu, and Po are omitted.

NSA 12-54

8985

PATHOLOGICAL ANATOMY OF LESIONS DUE TO La^{140} . V. N. Strel'tsova. *Med. Radiol.* 2, No. 4, 78-83(1957) July-Aug. (In Russian).

Pathological morphology of lesions due to intravenous or intraperitoneal injection of La^{140} was studied. In chronic radiation sickness due to La^{140} a peculiar subacute hepatitis was observed in 40% and with cirrhosis in 20% of all treated rats. Large slowly healing ulcers were found in the appendix, in the intestine, and in the rectum. Malignant and benign tumors appeared on the skin or on the liver in 35% of the cases. A short acute stage followed by almost complete recovery was typical even in acute cases of radiation lesions caused by La^{140} . Pathological-anatomical changes caused by La^{140} are identical to those produced by Ce^{144} and Pm^{147} .

NSA 12-50

8986

THE EFFECT OF TOTAL-BODY X-IRRADIATION ON THE CIRCULATION OF SPLENECTOMIZED DOGS. Shy Chien, Larissa Lukin, A. Phyllis Holt, Sheldon H. Cherry, Walter S. Root, and Magnus I. Gregersen (Columbia Univ., New York). *Radiation Research* 7, 277-87(1957) Sept. NSA 12-1179

8987

BACTERIOLOGICAL STUDIES ON MICE EXPOSED TO SUPRALETHAL DOSES OF IONIZING RADIATIONS. I RADIATION FROM A NUCLEAR DEVICE. Myron S. Silverman, Victor P. Bond, Vivian Greenman, and Paul H. Chin (U. S. Naval Radiological Defense Lab., San Francisco, Calif.). *Radiation Research* 7, 270-6 (1957) Sept. NSA 12-1178

8988

EFFECTS OF X RADIATION ON THE DISTRIBUTION OF DYE STUFFS INTRAVENOUSLY INTRODUCED INTO TISSUES OF MICE. E. Ya. Graevskii and L. I. Korchak (Severtsov Inst. of Animal Morphology). *Doklady Akad. Nauk S. S. R.* 115, 702-5(1957) Aug. 1. (In Russian). NSA 12-1167

8989

INFLUENCE OF POST IRRADIATION ADMINISTRATION OF METHIONINE ON THE EXCRETION OF CREATINE, CREATININE AND N-METHYL NICOTINAMIDE IN URINE OF RATS. U. S. Kumta, S. U. Gurnani, and

M. B. Sanasrabudhe (Atomic Energy Establishment, Bombay). *Experientia* 13, 372-3(1957). NSA 12-1169

8990

Naval Radiological Defense Lab., San Francisco.

EFFECT OF BONE MARROW-SPLEEN INJECTION AFTER FAST NEUTRON IRRADIATION IN MICE. L. J. Cole and M. E. Ellis. Sept. 25, 1957. 29p. Project NM-006-015. (USNRDL-183). NSA 12-1189

8991

ON THE METABOLISM OF CAESIUM, STRONTIUM AND A MIXTURE OF β -EMITTERS IN COWS. D. I. Il'm and Yu. I. Moskalev. *J. Nuclear Energy* 5, 413-20 (1957). NSA 12-1191

8992

THE EFFECT OF SOMATOTROPIC HORMONE AND OXYTETRACYCLINE ON WEIGHT AND MORTALITY OF IRRADIATED RATS. J. M. Bloodworth, Jr., Joseph L. Morton, Donald Shoffstall, and George J. Hamwi (Ohio State Univ. Coll. of Medicine Columbus). *Cancer* 10, 884-8(1957) Sept.-Oct. NSA 12-1190

8993

INTRAVENOUS INFUSION OF BONE MARROW IN PATIENTS RECEIVING RADIATION AND CHEMOTHERAPY. E. Donnell Thomas, Harry L. Lochte, Jr., Wan Ching Lu, and Joseph W. Ferrebee (Mary Imogene Bassett Hospital, Cooperstown, N. Y.; Children's Medical Center, Boston, Mass.; and Harvard Medical School, Boston, Mass.). *New Engl. J. Med.* 257, 491-6(1957) Sept. 12.

Observations from a year's experience in collecting, storing and using human bone marrow are recounted. The effects, in a small series of patients, of intravenous infusion of cellular suspensions of marrow are reviewed. Marrow may be obtained from fetal and adult cadavers and from biopsy and surgical specimens, preserved in glycerol at -80°C and administered, intravenously, to patients with safety. The indications, contraindications and general potential field of usefulness of marrow transplantations are discussed. NSA 12-1192

8994

RADIATION TREATMENT OF LARGE SKIN AREAS WITH RADIOPHOSPHORUS LACQUER. Eberhard Günsel and Karl-Heinz Liedtke. *Strahlentherapie* 103, 511-17 (1957). (In German). NSA 12-1196

8995

THE CONDITION OF NERVE ELEMENTS IN LYMPHOID TISSUE DURING ACUTE RADIATION SICKNESS. I. B. Soldatov (Kirov Military-Military Academy). *Doklady Akad. Nauk S. S. R.* 115, 803-4(1957) Aug. 1. (In Russian). NSA 12-1194

8996

THE EFFECT OF X RAY EXPOSURE ON THE NUCLEAR SYSTEM OF A WALKERS CARCINOMA CELL. Heinz Karl Parchwitz and Erika Parchwitz. *Strahlentherapie* 104, 6-20(1957). (In German).

By means of karyometric methods and cytological observations the authors have examined the change of form of the nuclear system after a single x-ray irradiation of 8000 r. They observed a change of the nuclear contents and a change of form of the nucleole. These reactions, which have to be considered as a consequence of the ray insults, may be divided into two phases. The first phase has to be explained as a morphological expression of an increased function, the second phase must be regarded as a morphological equivalent to the prelethal state of the cells. A discussion of the results is included.

NSA 12-3504

8997

MORPHOLOGICAL INVESTIGATION OF EXTRANUCLEAR CELL CONSTITUENTS OF WALKERS CARCINOMA CELL

AFTER SINGLE IRRADIATION. Heinz Karl Parchwitz. *Strahlentherapie* 104, 21-8(1957). (In German).

Changes are described in the form and disposition of the mitochondria of Walker's carcinoma-cell after local single irradiation with x rays of 8000 r. The alterations of these extranuclear cell constituents are ascribed to the morphological changes in the nuclear system. The course of the reaction towards irradiation may be subdivided into two phases. The author discusses the functional states on which the observations are based. NSA 12-3505

8998

ON EXPERIMENTAL TUMOR PRODUCTION IN IRRADIATED TISSUE. Reinhard Schober and Oleg Erdely. *Acta Radiol.* 48, 307-18(1957) Oct.

A subcutaneous injection of an oily suspension of methyl cholanthrene in rats caused fibroblastic sarcomas to develop after about 20 weeks. When the injections were performed in animals which had previously received whole body radiation or been subjected to more or less large doses of local irradiation at the injection site, it was found that the lesion developed more rapidly, furthermore, no reduction in the latent period (interval between the time of injection and first appearance of the tumor) occurred and no tumor developed after a local pre-irradiation dose of 4,000 r. The possible ways in which the changes might have been effected by the radiation are discussed. NSA 12-3487

8999

COMPARISON OF PRIMARY EFFECTS OF RADIO-MIMETRIC SUBSTANCES AND IONIZING RADIATION. Rolf Demmler. *Strahlentherapie* 103, 695-713(1957) (In German). NSA 12-3503

9000

AN ESTIMATE OF THE GENETIC DOSE FROM RADIOTHERAPY. P. R. Purser and C. F. Qvist (Radium Center, Copenhagen, Denmark). *Acta Radiol.* 48, 267-72(1957) Oct.

The roentgen-equivalent-genetic dose (reg) from radiotherapy was calculated to be 1 m reg per head of population. This figure is based on data from a survey of a population of 959,000 in Denmark and sample measurements of gonad doses. NSA 12-3510

9001

THE SHORTESTENING OF LIFE BY CHRONIC WHOLE-BODY IRRADIATION. G. Failla and Patricia McClement Am. J. Roentgenol. Radium Therapy Nuclear Medicine 78, 946-54(1957) Dec.

A statistical analysis was made of data on the effect of chronic irradiation on life span. Data on radiation injuries in mice were analyzed in terms of the Gompertz function in such a way that the resulting curves are internally consistent. Findings were extrapolated to man using available data. The present permissible limit for accumulated radiation dose for those occupationally exposed is 210 r at age 60. On the basis of the assumptions presented, life shortening of about 8 months is to be expected following chronic exposure to 0.05 r per day. If 500 r is assumed to be the average dose accumulated up to age 60, the life shortening is estimated at 1.5 years. NSA 12-3512

9002

INCREASED PROTHROMBIN CONSUMPTION FOLLOWING TOTAL BODY X-IRRADIATION IN MAN. Niel Wald (USAF School of Aviation Medicine, Randolph AFB, Texas). *Proc. Soc. Exptl. Biol. Med.* 96, 294-7(1957) Nov.

Hematological studies were carried out on 41 patients with disseminated neoplastic disease receiving therapeutic whole-body x irradiation. Increased prothrombin consumption, evidenced by an increase in the average serum

prothrombin time, and in the incidence of prolonged serum prothrombin times, was found after irradiation. Greater sensitivity resulted when pure fibrinogen was used in place of prothrombin-free plasma in the one-stage prothrombin time test. Possible explanations for these findings were discussed. NSA 12-3496

9003

THRESHOLDS FOR PAIN AND CONVULSIONS IN THE GUINEA PIG FOLLOWING MASSIVE WHOLE-BODY IRRADIATION. Howard L. Andrews (Department of Health, Education and Welfare, Bethesda, Md.). *Proc. Soc. Exptl. Biol. Med.* 96, 345-8(1957) Nov. NSA 12-3497

9004

THYMUS SPECIFICITY IN LETHALLY IRRADIATED MICE TREATED WITH RAT BONE MARROW. N. Gengozian, I. S. Urso, C. C. Congdon, A. D. Conger, and T. Makinodan (Oak Ridge National Lab., Tenn.). *Proc. Soc. Exptl. Biol. Med.* 96, 714-20(1957) Dec. NSA 12-3498

9005

INVESTIGATION OF THE EFFECT OF X-RADIATION ON THE CARBOHYDRATE METABOLISM OF TUMOR CELLS. Heinrich Maass and Gunther Heinz Rathgen. *Strahlentherapie* 103, 668-94(1957). (In German).

After irradiating some inoculation tumors of the rat and of a human carcinoma with doses of from 10 to 25 kr, an unequivocal depression of the respiration and particularly of the aerobic and anaerobic glycolysis could be observed. The carbohydrate metabolism of the rat liver remained uninfluenced. By determination of some metabolite concentrations, the mechanism of the ray-induced inhibition of the glycolysis could be elucidated to a great extent. Accordingly it is probable that the point of attack of the ray effect must be searched for within the glycolysis chain at the step of the dehydrogenation of the triosephosphate. NSA 12-3502

9006

THE GENETIC BASIS FOR THE LIMITATION OF RADIATION EXPOSURE. Bentley Glass (Johns Hopkins Univ., Baltimore, Md.). *Am. J. Roentgenol. Radium Therapy Nuclear Medicine* 78, 955-60(1957) Dec.

The chemical nature of hereditary material, and factors involved in the transmittance of genetic information are reviewed. The relationship between mutation frequency and man-made doses of ionizing radiation is discussed. It is pointed out that radiation acts blindly, not selectively on certain genes and not on others. The deleterious nature of the vast majority of mutations is discussed. NSA 12-3513

9007

Czechoslovakia.

INFORMATION SUBMITTED BY CZECHOSLOVAKIA.

Note by the Secretary-General [on Effects of Atomic Radiation. Includes also Review of Studies of Natural Radioactivity of Water, Air and Soil in the Czechoslovak Republic]. Sept. 20, 1956. 45p. (NP-6440)

Proposed topics for discussion by the United Nations General Assembly Scientific Committee on the Effects of Atomic Radiation include the status of studies on the genetic hazard and the present status of studies on, and the measurements of, the biological effects of small doses of radiation. Studies on the natural radioactivity of water, air, and soil in the Czechoslovak Republic are reviewed. No systematic research has been carried out. Available data are presented in tabular form. NSA 12-13

9008

ON THE EFFECT OF SMALL DOSE X RADIATION ON SEPTICEMIA CAUSED BY PNEUMONIAE FRIEDLANDER PART II. THE EFFECT OF SMALL TOTAL DOSE X

RADIATION ON A SUBCUTANEOUS INFECTION. Rudolf Birkner, Roelf-Diedrich Meyer, and Johannes Trautmann. *Strahlentherapie* 103, 552-8(1957). (In German).

The effect of small doses of whole-body x radiation on the septicemia caused by *Klebsiella pneumoniae* Friedlander in white mice depends on the moment of the irradiation, the dose, the temporal dose distribution, the age and the sex of the animals, as well as on the quantity of germs applied. Animals die more rapidly if irradiations have been applied previous to the infection, while irradiations after infections lead to longer life. NSA 12-3501

9009

THE INFLUENCE OF β RADIATION ON THE DEVELOPMENT OF *AZOTOBACTER* AND ITS PHYSIOLOGICAL ACTIVITY. E. N. Sokurova. *Mikrobiologia* 26, 519-25 (1957) Sept.-Oct. (In Russian).

Introduction of small quantities of β emitters into nutritive media on which *Azotobacter* is grown induced a temporary acceleration of the development of its cultures. NSA 12-2202

9010

New York Operations Office, AEC.

ANNOTATED BIBLIOGRAPHY ON LONG RANGE EFFECTS OF FALLOUT FROM NUCLEAR EXPLOSIONS. Allen G. Hoard. Nov. 1957. 23p. (NYO-4753(Suppl. 2)). NSA 12-2204

9011

EFFECTS OF Co^{60} IRRADIATION ON POTATO TUBER SUSCEPTIBILITY OF MICROORGANISMS. E. N. Mukhin and N. P. Panasenko. *Doklady Akad. Nauk S.S.S.R.* 115, 1209-12(1957) Aug. 21. (In Russian) NSA 12-2201

9012

Baylor Univ., Houston, Tex. Coll. of Medicine and Jefferson Davis Hospital, Houston, Tex. A STUDY OF THE EFFECTS OF TOTAL AND PARTIAL BODY RADIATION ON IRON METABOLISM AND HEMATOPOIESIS. Progress Report for Period September 1, 1956 to March 1, 1957. Vincent P. Collins. 16p. Contract DA-49-007-MD-428. (AD-123620)

Data are presented on the white blood cell and platelet counts in patients exposed to partial-body radiation doses of 25-r and above and whole-body x radiation doses of 100 r and above. NSA 12-3480

9013

Syracuse Univ., N. Y. Food Research Labs. THE CHEMICAL ENHANCEMENT OF BACTERIAL RADIO-SENSITIVITY IN THE RADIATION STERILIZATION OF FOODS. Report No. 5 (Annual) [for] October 19, 1955-August 31, 1956. A. W. Phillips. 100p. Contract DA-19-129-qm-524. (AD-127606)

Fluid milk was sterilized by heat-pasteurization in the presence of 0.2% by weight of ethylene oxide followed by irradiation with 16 to 70 kilorep. The taste of the product was found acceptable. The effects of various combinations of heat, ethylene oxide, chemical treatments, and irradiation on the sterility and taste of milk are discussed. NSA 12-3481

9014

American Meat Inst. Foundation, Chicago. RADIATION SENSITIVITY OF MEAT SPOILAGE MICROORGANISMS. Report No. 5 (Final Report) [for] January 14, 1956-April 14, 1957. C. F. Niven, Jr. 20p. Project No. 7-84-01-002. Contract DA-19-129-qm-574. (AD-130177)

A study was made on the radiosensitivity of the microorganisms that limit shelf life of cured meat products. Data are tabulated on the identity, radiation resistance, and factors affecting radiation resistance of organisms responsible for the spoilage of fresh beef and pork, and the production of slimes on the surface of frankfurters during refrigerated storage. NSA 12-3482

9015

School of Aviation Medicine, Randolph AFB, Texas and Oak Ridge National Lab., Tenn.

BIPHASIC HYPERFERREMIA INDUCED IN RATS BY X-IRRADIATION. G. S. Melville, Jr. and F. P. Conte. Nov. 27, 1956. 4p. (AF-SAM-57-74; AD-132264)

The hyperferremia that developed in rats after a single dose of 75 to 225 r of total-body x irradiation occurred in two distinct phases. A transient rise in plasma iron occurred within the first twenty-four hours after irradiation, and a more prolonged elevation took place during the second week after exposure. The concentration of plasma iron in normal rats varied from day to day and in relation to the hour of sampling. NSA 12-3484

9016

STUDIES ON X-RAY EFFECTS. IX. THE ACTION OF SERUM FROM X-RAYED ANIMALS ON LYMPHOID CELLS (IN VITRO). J. B. Murphey, J. Heng Liu, and E. Sturm. *J. Exp. Med.* 35, 373(1922).

Lymphoid cells (rat thymus and lymph nodes) suspended in serum of a rat x-rayed 2 hours previously proliferated, increasing 15 to 30 per cent in number (many mitotic figures were found) during 2 hrs. of incubation. Normal serum causes rapid disintegration of suspended, incubated, lymphocytes. The x-ray effects on the donors serum persisted for 2 hours after exposure; was no longer present at 72 hrs. *In vitro* irradiation of serum did not produce the effect observed with *in vivo* irradiation. Serum from irradiated rats was not toxic to recipients normal rats.

9017

EFFECT OF NITRIC OXIDE ON THE RADIOSENSITIVITY OF BACTERIA. P. Howard-Flanders (Univ. of California, Berkeley). *Nature* 180, 1191-2(1957) Nov. 30. NSA 12-3492

9018

INTESTINAL DAMAGE BY RADIATION AND ITS CHEMICAL MODIFICATION. R. H. Mole and Diana M. Temple (Atomic Energy Research Establishment, Harwell, Didcot, Berks). *Nature* 180, 1278(1957) Dec. 7. NSA 12-3493

9019

School of Aviation Medicine, Randolph AFB, Texas and Tennessee. Agricultural Experiment Station, Oak Ridge. EFFECT OF ACUTE TOTAL-BODY GAMMA IRRADIATION ON PLASMA IRON AND IRON UPTAKE IN THE BURRO AND THE SHEEP. George S. Melville, Jr. and Bernard F. Trum. June 27, 1957. 7p. (AF-SAM-57-154).

Groups of burros and sheep were exposed to the gamma radiations from zirconium⁹⁵-molybdenum⁹⁵ sources. Iron uptake in the red blood cells was depressed at all dose levels in both species, the maximum mean depression for all animals being 30%. A definite plasma hyperferremia was found in all the animals at all doses given. The response is of a double maximal nature: the first maximum occurred within 24 hr postexposure, the second, at approximately 1 week. NSA 12-3485

9020

DEPOSITION OF IRON IN NORMAL AND IRRADIATED LIVER OF FOETAL MOUSE. Habibollah Izadian and Jean Francois Duplan. *Compt. rend.* 245, 1756-8(1957) Nov. 13. (In French).

Irradiation of foetal liver resulted in increased iron content, the increase being directly proportional to the dose of x-rays. Proposed explanations: either (a) arrest of erythropoiesis and decreased utilization of iron or (b) excessive destruction of rbc. NSA 12-3488

9021

Kyoto Univ. Japan.

HEMATOLOGICAL INVESTIGATION OF THE ATOMIC BOMB SUFFERERS IN HIROSHIMA AND NAGASAKI CITY. Takehiko Kikuchi and Gyoichi Wakisaka. 1952. 33p. (NP-6435). NSA 12-2200

9022

BLASTOMATOGENIC EFFECTS OF RADIOACTIVE STRONTIUM (Sr^{90}). N. A. Kraevskii and N. N. Litvinov. Med. Radiol. 2, No. 5, 33-9(1957) Sept.-Oct. (In Russian).

The optimal blastomatogenic doses of Sr^{90} were determined for the majority of animals. The latent period of tumor development is in reverse proportion to the instituted dose and varies in different species. The period of development of bone tumors, their localization, and number depend not only on the dose but, also, on the condition of the organism at the moment of administration of the isotope and on the age of the animal. Primary multiple development of bone tumors, reticular or hemocytoblastic type leukemias as well as leukemias with signs of tumor growth, are characteristic effects caused by strontium. NSA 12-3489

9023

MODIFICATION OF ANTIBODY RESPONSE IN X-IRRADIATED RATS BY INJECTION OF SPLEEN HOMOGENATES. Mariano F. La Via, Melba Robson, and Robert W. Wissler (Argonne Cancer Research Hospital and Univ. of Chicago, Ill.). Proc. Soc. Exptl. Biol. Med. 96, 667-70(1957) Dec.

Antibody formation, which is inhibited by 500 r of total body x-irradiation into the rat, can be restored partially by spleen homogenates injected soon after irradiation. No striking difference in the degree of recovery is observed when spleen cells from rats stimulated earlier with a different antigen are used in place of normal spleen cells. NSA 12-3524

9024

BRAIN INJURY DUE TO ROENTGEN RADIATION. W. Brandenburg and H. J. Maurer. Strahlentherapie 95, 432-39(1954). (In German).

With sufficiently high dose of high intensity electrons, primary destruction of brain parenchyma occurs.

9025

AMINO ACIDURIA IN PRIMATES FOLLOWING IRRADIATION. C. G. Hunter (Univ. of Toronto). Proc. Soc. Exptl. Biol. Med. 96, 794-6(1957) Dec.

The daily urine amino N excretion of 4 monkeys was followed before and after whole body irradiation with doses in the lower lethal range. In 2 non-survivors, there was little change in the daily quantity excreted until terminally. In 2 survivors given the same food intake as in the irradiated study and sham irradiated, the daily urine amino N excretion during the first week differed but slightly from the values after irradiation, but in the second week more amino N was excreted after irradiation in one animal and less in the other. It would appear that amino aciduria in primates irradiated with doses in the lower lethal range is inseparable from the natural response of the over-all protein metabolism associated with any injury. NSA 12-3499

9026

RADIOACTIVE ISOTOPES AS CANCEROGENIC AGENTS. V. N. Strel'tsova and Yu. I. Moskalev. Med. Radiol. 2, No. 5, 39-51(1957) Sept.-Oct. (In Russian).

A comparative analysis is presented of the cancerogenic effects of 15 radioactive isotopes (Sr^{89} , Sr^{90} , mixture of Sr^{89} and Sr^{90} , Ba^{140} , Y^{90} , Y^{91} , mixture of β emitters, Cs^{137} , Ca^{45} , Nb^{95} , Ce^{144} , Pm^{147} , La^{140} , Ru^{106} , and Pu^{239}) which differ in their physical properties and distribution in the organism. The incidence of osteo-

sarcomas depends on the quantity of the radioactive substance introduced and on the period of actual fission, the higher the effective fission period the higher is the percentage of tumor development. The optimal osteosarcomagenic dose of absorbed energy is 10 to 20 krep, the minimum dose 2 to 3 krep. The incidence of leukemias induced by radioactive isotopes ranges from 3 to 10 per cent. The type of tumors, the location, and development processes depend on the character of distribution of the radioactive substances. NSA 12-3490

9027

BENEFICIAL EFFECT OF QUINOXALINE 1, 4-di-N-OXIDE IN RADIATION INJURY IN MICE. Thomas J. Haley, Anna M. Flesher, R. Veomett, and J. Vincent (Univ. of California at Los Angeles). Proc. Soc. Exptl. Biol. Med. 96, 579-82(1957) Dec.

It has been shown that premedication with Quinoxaline-1, 4-di-N-oxide is beneficial to irradiated mice, significantly increasing both the ST_{50} day and total number of survivors. The effect has been related to a significant reduction in number of enteric organisms causing the usual irradiation bacteremia. It has been demonstrated that lactobacilli were the predominating invaders under conditions of our experiments. The drug does not appear to have an effect on bone marrow. NSA 12-3523

9028

Arkansas. Univ., Little Rock. School of Medicine. STUDIES ON THE BIOCHEMICAL AND NUTRITIONAL ASPECTS OF X-IRRADIATION INJURY. Final Scientific Report, July 1, 1951-August 31, 1957. Paul L. Day, F. Douglas Lawrason, and John Tyler Caldwell. May 1, 1958. 6p. Contract AT(40-1)-1315. (ORO-175).

Results are summarized from studies on the biochemical effects of irradiation on chicks, rats, and rabbits. A list of publications during the period is included. NSA 12-11230

9029

INFLUENCE OF DIETARY POTASSIUM ON POTASSIUM-42, RUBIDIUM-86 AND CESIUM-134 RETENTION IN THE RAT. F. R. Mraz and Homer Patrick (Univ. of Tennessee Atomic Energy Commission Agricultural Research Program, Oak Ridge, Tenn.). Proc. Soc. Exptl. Biol. Med. 96, 497-9(1957) Nov.

An increase in dietary potassium has been shown to increase excretion of cesium-134, potassium-42 and rubidium-86. Interpretation of the first significant increase in excretion of these radionuclides as being the point at which dietary potassium is adequate would place the potassium requirement of the rat between 0.075 and 0.15%, probably between 0.1 and 0.15%. This is supported by the growth data. NSA 12-3538

9030

ON THE REVEALING TOXIC PROPERTIES IN THE BLOOD OF IRRADIATED ANIMALS IN EXPERIMENTS WITH ADRENALECTOMIZED MICE AND RATS. P. D. Gorizontov and S. A. Davidova. Med. Radiol. 2, No. 5, 51-5(1957) Sept.-Oct. (In Russian).

Effects of blood serum from irradiated and normal animals on the mortality rate of mice and rats are discussed. It is shown that the blood serum from animals exposed to ionizing radiation becomes toxic in large doses to adrenalectomized mice and rats. During the first 24 hours after irradiation the blood of irradiated rats and dogs was not toxic and even retarded the death of adrenalectomized mice. NSA 12-3535

9031

THE USE OF I^{131} IN THE TREATMENT OF GRAVES' DISEASE. Moses Berman, David V. Becker, and Richard S. Benua (Sloan-Kettering Inst. for Cancer Research, New York Hospital-Cornell Medical Center, and Department of Medicine Memorial Center, New York). J. Clin

Endocrinol. Metabolism 17, 1222-8(1957) Oct.
NSA 12-1195

9032

THE INACTIVATION OF VIRUSES IN RELATION TO THE MECHANISM OF BIOLOGICAL ACTION OF RADIATION. D. E. Lea. Brit. J. Radiol. Suppl. 1-3, 35(1947-50).

9033

THE CHANGE OF BIOLOGICAL ACTIVITY OF MEMBRANE UNDER ROENTGEN RADIATION. E. Saxe. Strahlentherapie 40, 125-132(1931).

9034

THE EFFECT OF VARIOUS APPLICATIONS OF X-RAYS ON BONE MARROW AND ITS CELL ELEMENTS INCLUDING A CONTRIBUTION TO THE TIME FACTOR PROBLEM. Robert Bauer. Translated for U. K. A. E. A. Atomic Energy Research Establishment from Strahlentherapie 67, 487-99(1940). 10p. (NP-tr-145).

Data are presented from a study of the sensitivity of rabbit bone marrow to various doses and various time distributions of the dose of x radiation. Results are compared with observations on the radiosensitivity of the skin and hematopoietic system. NSA 12-16091

9035

EFFECT OF ISOTOPIC AND NON-ISOTOPIC CARRIERS ON THE BEHAVIOR OF Sr^{90} IN THE RAT. (Über den Einfluss isotopischer und nichtisotopischer Träger auf die Verteilung von Radiostrontium in Organismus der Ratte. A. Catsch. Translated for Oak Ridge National Lab. from *Experientia* 13, 312-13(1957). 2p.

The influence of calcium and magnesium levels on the bone deposition of intraperitoneally injected strontium-90 and yttrium-90 was investigated in rats. NSA 12-15313

9036

MODIFICATION OF THE GENETIC EFFECTS OF X RAYS BY TREATMENT AFTER IRRADIATION. R. F. Kimball (Oak Ridge National Lab., Tenn.). pp. 252-5 in "Proceedings of the International Genetics Symposia, 1956, Tokyo and Kyoto, September, 1956" Tokyo, International Genetics Symposia, 1956, Science Council of Japan, 1957. 702p.

It has been demonstrated that the mutational process in *Paramecium* is not completed for 1 or 2 hours after irradiation but is completed well before the end of the interdivision interval in which the radiation is given. It is suggested that radiation initiates a mutational process that is irrevocably completed during late interphase and that this process is subject to spontaneous reversal before that time. Agents that delay the late interphase decrease mutation by allowing more time for spontaneous reversal. NSA 12-15306

9037

MALFORMATIONS OBTAINED IN EMBRYOS BY USING P^{32} . Yoshiro Kameyama (Univ. of Nagoya, Japan). Compt. rend. soc. biol. 151, 1803-4(1957) Oct. (In French).

From 2 to 20 $\mu\text{c/g}$ of P^{32} were injected into pregnant mice on the 8th day of gestation. The embryos were examined after 5 days on the 13th day of gestation. The embryos were dead in all the mice receiving 20 $\mu\text{c/g}$. With doses from 2 to 15 $\mu\text{c/g}$, there was an abnormal formation in 10 to 20%, but the doses of 3 to 6 $\mu\text{c/g}$ chiefly excited the malformation. The malformation was in the central nervous system. Even embryos with a natural exterior had malformations in the central nervous system. NSA 12-15290

9038

RADIOBIOLOGICAL EFFECTS OBTAINED WITH RADIATION FROM 30 MEV GENERATORS. H. R. Schinz and H. Fritz-Niggli. Translated for Los Alamos Scientific Lab., N. Mex. from Radiol. Clin. 25, 371(1956). 10p. (AEC-tr-3375).

No qualitative differences were observed in the biological effects on a number of test systems of x rays produced by a 31-Mev betatron and an electron beam of comparable energy produced by a betatron. Quantitative differences were observed between conventional x rays and x rays produced by the 31-Mev betatron. The effectiveness of the latter is smaller by a factor of 0.6 to 0.9 depending on the object examined. Similar differences were observed between electrons generated by the 30-Mev betatron and conventional x rays. NSA 12-16876

9039

IRRADIATION OF DEVELOPING PLANT EMBRYOS. L. EFFECTS OF EXTERNAL IRRADIATION (X RAYS) ON BARLEY EMBRYOGENY, GERMINATION, AND SUBSEQUENT SEEDLING DEVELOPMENT. Leo W. Mericle and Rae Phelps Mericle (Michigan State Univ., East Lansing). Am. J. Botany 44, 747-56(1957) Nov.

Barley embryos in varying stages of development were subjected in situ to single doses of x radiation of 50 to 800 r. At intervals following irradiation, part of the developing grains were sampled for histologic examination, those remaining were allowed to mature so that effects of irradiation could be followed on their subsequent germination and seedling development. In the histological study, irradiation effects increased in number and severity with an increase in radiation level. Evidence from the germination-seedling study indicates the occurrence of hidden effects. NSA 12-11235

9040

PROTECTIVE EFFECTS OF AZOIC THYMOLICS ON THE MORTALITY OF X-IRRADIATED MICE. J. F. Duplan, R. Royer, and R. Michelet (Laboratoire Pasteur de l'Institut du Radium). Compt. rend. soc. biol. 151, 1655-7(1957) Oct. (In French).

Male and female mice, at least 100 days old, were injected peritoneally 8 to 10 minutes before x irradiation with (dimethyl-2,5 pyrryl)-4 thymol, benzene azo-4 thymol, dibenzene azo-2,4 thymol, or benzene azo-2 methyl-4 thymol. The results are tabulated, and all show some protective effects. A possible mechanism for the protection is discussed. NSA 12-15288

9041

Tennessee. Univ., Knoxville. AGRICULTURAL RESEARCH PROGRAM. Semi-Annual Progress Report for January 1, 1957 to June 30, 1957. 54p. Contract AT-40-1-GEN-242. (ORO-169)

Seventy-eight samples were irradiated at the plant and seed irradiation facility, including 67 seed samples; budwood of peach, chestnut, and grape; johnsongrass rhizomes, and sweetpotato roots. Pre-packaged irradiated barley seed and a mimeographed information letter, were prepared for distribution to high school science classes. The program is included for a symposium on Radiation in Plant Breeding held at Oak Ridge in January, 1958. Data are included from the following studies: factors controlling the metabolism of cesium and strontium in both plants and animals, the metabolism of calcium and strontium in rats, factors affecting the metabolism of calcium and phosphorus in lambs, radiation effects on reproductive physiology in cattle and rats, the relationship of survival time and whole-body gamma radiation dosage in swine, burros, and cattle, and a comparison of radium and strontium-90 toxicity in sheep. A list of publications during the period is included. (For preceding period see ORO-163). NSA 12-8251

9042

OXIDATION RESYNTHESIS OF ADENOSINETRIPHOSPHORIC ACID IN THE LIVER OF IRRADIATED RATS. G. P. Torpova. Doklady Akad. Nauk 117, 266-9(1957) Nov. 11. (In Russian). NSA 12-5162

9043

RADIOPROTECTIVE PROPERTIES OF CYSTAMINE FOR THE YOUNG RAT AND CHICKEN. M. L. Beaumariage (Univ. of Liege). *Compt. rend. soc. biol.* 151, 1788-91(1957) Oct. (In French).

The behavior of young rats and chickens of the same age submitted to a minimum 100% lethal radiation with a dose of 100 r/min is very different. The deaths occur mostly in the first 48 hours in the chicken; in the rat it does not occur until the 6th day. Cystamine protects rats against the lethal effects of x rays, but it accelerates the death of the irradiated chickens. NSA 12-15289

9044

RADIATION SENSITIVITY OF EARLY EMBRYONIC STAGES OF DROSOPHILA MELANOGASTER. Hans R. Schinz and Hedi Fritz-Niggli (Radiotherapeutischen Klinik des Kantonsspitals, Zurich). *Strahlentherapie* 104, 328-37(1957). (In German). NSA 12-7666

9045

BIOCHEMICAL EFFECTS OF IONIZING RADIATION. Barbara E. Holmes (Univ. of Cambridge, Eng.). *Ann. Rev. Nuclear Sci.* 7, 89-134(1957). NSA 12-4665

9046

SPECIFIC CHANGES IN PERIPHERAL BLOOD OF PREGNANT ANIMALS AFTER A SINGLE X RAY DOSE. N. M. Andriyasheva (Academy of Medical Sciences, U. S. S. R.). *Med. Radiol.* 2, No. 6, 19-26(1957) Nov.-Dec. (In Russian). NSA 12-5166

9047

Office of the Quartermaster General, Fort Lee, Va. **STATUS REPORT TO MANAGEMENT ON RADIATION PRESERVATION OF FOOD.** W. D. Jackson. July 1, 1957. 16p. (PB-131171). NSA 12-4659

9048

DYNAMICS OF PERIPHERAL BLOOD CELLS IN MICE EXPOSED TO X RADIATION UNDER CONDITIONS OF SCREENED EXTREMITY AND IN A LOCAL EXPOSURE. Z. N. Faleeva (Severtzov Inst. of Animal Morphology, Acad. of Sciences, U. S. S. R.). *Doklady Akad. Nauk S. S. S. R.* 116, 785-7(1957) Oct. 11. (In Russian). NSA 12-4668

9049

DIFFERENCES BETWEEN MALE AND FEMALE TREATMENTS IN VISIBLE X-RAY INDUCED MUTATION RATES IN THE SILKWORM Yoshio Nakao (Kyoto Prefectural Medical Coll.). pp. 260-4 in "Proceedings of the International Genetics Symposia, 1956, Tokyo and Kyoto, September, 1956". Tokyo, International Genetics Symposia, 1956, Science Council of Japan, 1957. 702p.

A study was made of the pattern of the mutation rates of x-irradiated male and female silkworms exposed at two loci along the same chromosome. Data are tabulated. NSA 12-15268

9050

DIFFERENCES IN SENSITIVITY OF GERM-CELLS AND CHROMOSOMES TO RADIATION AMONG SOME MUTANT STRAINS OF THE SILKWORM. Yataro Tazima (Silk Science Research Inst., Tokyo). pp. 280-6 in "Proceedings of the International Genetics Symposia, 1956, Tokyo and Kyoto, September, 1956," Science Council of Japan, 1957. 702p.

A strain difference was found in the radiosensitivity of silkworms. NSA 12-15270

9051

EMBRYO MORTALITY AMONG THE PROGENY OF MALE DROSOPHILA FLIES FOLLOWING IRRADIATION WITH 180 kev AND 31 Mev. Rolf Steger. Translated for Los Alamos Scientific Lab. from *Oncologia* 9, 12-32(1956). 16p. (AEC-tr-3340)

A quantitative study was made of the effectiveness of x radiation produced by 180 kev and 31 Mev sources for including the occurrence of dominant lethal factors in the sex cells of male *Drosophila*. Following exposure to various radiation doses the male *Drosophila* were mated with previously unmated females and a count made of the ratio of hatched to unhatched eggs which resulted. A total of 94,389 eggs were counted. It is suggested that the enormous increase of unhatched eggs between days 6 and 12 may not have resulted from lethal factors, but to azoospermia induced by radiation. The 31 Mev betatron was shown to be only 0.8 times as effective as the stable voltage generator in producing dominant lethal factors. NSA 12-16088

9052

X-RAY INDUCED MUTATIONS IN EINKORN WHEATS WITH SPECIAL REFERENCE TO THEIR COMPLEX NATURE. K. Yamashita (Kyoto Univ.). pp. 287-9 in "Proceedings of the International Genetics Symposia, 1956, Tokyo and Kyoto, September, 1956". Tokyo, International Genetics Symposia, 1956, Science Council of Japan, 1957. 702p.

Results from studies on two species of wheats indicate that the species differences observed regarding sensitivity to x radiation are controlled by genetic factors. NSA 12-15271

9053

AFTER EFFECT OF IRRADIATION OF THE GERM CELL OF DROSOPHILA MELANOGASTER. Koiti Murati, Takashi Ito, Daigoro Moriwaki, and Yukihiko Yoshida (St. Paul's Univ., Tokyo and Tokyo Metropolitan Univ.). pp. 256-9 in "Proceedings of the International Genetics Symposia, 1956, Tokyo and Kyoto, September, 1956". Tokyo, International Genetics Symposia, 1956, Science Council of Japan, 1957. 702p.

Data are tabulated from a series of studies on the effect of irradiation on the germ cell of *Drosophila*. NSA 12-15267

9054

RADIOSENSITIVITY STUDIES IN PEANUTS (ARACHIS HYPOGAEA L.). Walton C. Gregory (North Carolina State Coll., Raleigh). pp. 243-7 in "Proceedings of the International Genetics Symposia, 1956, Tokyo and Kyoto, September, 1956". Tokyo, International Genetics Symposia, 1956, Science Council of Japan, 1957. 702p.

From the data presented it appears that differences in radiosensitivity to x rays among certain lines of peanuts do not appear in the same manner when the same lines are treated with fast neutrons. However, differences in sensitivity to neutrons appearing among the lines and their hybrids suggest a qualitative different behavior of the lines and hybrids with respect to x rays and neutrons. Evidence for the association of genotype with radiosensitivity can be derived from both x ray and neutron treatments with different genotypes responding different ways to the two radiations. NSA 12-15265

9055

STUDIES ON THE POTENTIAL GENETIC EFFECTS OF THE ATOMIC BOMBS. James V. Neel and William J. Schull (Univ. of Michigan, Ann Arbor). pp. 57-69 in "Proceedings of the International Genetic Symposia, 1956, Tokyo and Kyoto, September, 1956". Tokyo, International Genetics Symposia, 1956, Science Council of Japan, 1957. 702p.

Data are summarized from a survey of genetic effects of radiation observed on the offspring when one or both parents were exposed to radiation from the atomic bombings of Hiroshima and Nagasaki. NSA 12-15262

9056

CONSEQUENCES OF RADIATION-INDUCED CHROMO-

SOME BREAKAGE IN DROSOPHILA SPERM. William K. Baker (Univ. of Chicago and Oak Ridge National Lab., Tenn.). pp. 235-8 in "Proceedings of the International Genetics Symposia, 1956, Tokyo and Kyoto, September, 1956", Tokyo, International Genetics Symposia, 1956, Science Council of Japan, 1957. 702p.

Experiments are described which were designed to measure three criteria of radioinduced chromosome breakage. These criteria were measured on three types of Drosophila sex chromosomes. Correct interpretation of experiments using ring chromosomes are discussed. NSA 12-15263

9057

CHROMOSOME ABERRATIONS AND PHYSIOLOGICAL EFFECTS OF X RADIATION IN TRADESCANTIA MICROSPORES. Alvin V. Beatty (Emory Univ., Georgia). pp. 239-42 in "Proceedings of the International Genetics Symposia, 1956, Tokyo and Kyoto, September, 1956". Tokyo, International Genetics Symposia, 1956, Science Council of Japan, 1957. 702p.

Factors affecting the production of radioinduced chromosome aberrations in Tradescantia microspores are discussed. NSA 12-15264

9058

METHODS FOR THE DETECTION AND ENUMERATION OF MUTATIONS PRODUCED BY IRRADIATION IN MICE. J. B. S. Haldane (Indian Statistical Inst., Calcutta). pp. 35-9 in "Proceedings of the International Genetics Symposia, 1956, Tokyo and Kyoto, September, 1956". Tokyo, International Genetics Symposia, 1956, Science Council of Japan, 1957. 702p.

Eight types of study are outlined in which mice may be used in studies of radioinduced mutations. One method is recommended for the assessment of radiation effects on future human generations. NSA 12-15261

9059

CLINICAL PICTURE AND TREATMENT OF CHRONIC RADIATION SICKNESS. P. M. Kireyev. Translated from Med. Radiol. 2, No. 5, 72-9(1957). p. 85-93 [of] VARIOUS STUDIES ON THE USE OF RADIOACTIVE SUBSTANCES IN MEDICINE. 9p. (JPRS-210(p.85-93))

The clinical picture and treatment of chronic radiation sickness is reviewed. NSA 12-15229

9060

STUDIES ON HUMAN SPERM. C. A. Joël. Basel, B. Schwabe and Co. (1942). Vol. 1. 154p.

Author describes results of systematic examination of semen of men following testicular irradiation. Doses of about 200 r cause about 60 per cent abnormal sperm (in men with hereditary diseases of the nervous system). In mice, 200 r reduces the sperm count and increases abnormal forms. (In German)

9061

BLASTOGENIC EFFECT OF RADIOACTIVE STRONTIUM. N. N. Krayevskii (Krayevskiy) and N. N. Litvinov. Translated from Med. Radiol. 2, No. 5, 33-8 (1957). p. 27-34 [of] VARIOUS STUDIES ON THE USE OF RADIOACTIVE SUBSTANCES IN MEDICINE. 8p. (JPRS-210(p.27-34))

The properties of strontium-90 are reviewed. Data are summarized on the incidence of leukemia and bone tumors in young laboratory animals following the administration of various doses of strontium-90. NSA 12-15224

9062

SURVEY OF EFFECTS OF RADIATION ON CHROMOSOMES. N. G. Catchside. Brit. J. Radiol. Suppl. No. 1, 66-74(1947).

9063

GENERAL PRINCIPLES ON THE TREATMENT OF LESIONS CAUSED BY RADIOACTIVE SUBSTANCES. V. A. Sanotskii (Sanotskiy). Translated from Med. Radiol. 2,

No. 5, 14-22(1957). p. 1-10 [of] VARIOUS STUDIES ON THE USE OF RADIOACTIVE SUBSTANCES IN MEDICINE. 10p. (JPRS-210(p.1-10))

The causes, symptoms, and therapy of radiation sickness are discussed. NSA 12-15222

9064

Ames Lab., Ames, Iowa.

HAZARDS ASSOCIATED WITH THORIUM METALLURGY. A. F. Voigt. [1957]. 32p. Contract [W-7405-eng-82]. (ISC-771).

The permissible limits established for handling of thorium are discussed. The information is divided into sections on chemical toxicity, radiology toxicity (internal and external), and fires and explosions. NSA 12-12146

9065

A HANDBOOK ON RADIATION AND PROTECTION. N. G. Gusev. State Publishers of Medical Literature, Moscow, 1956. 127p. (In Russian).

Data are given on the physical properties of radioactive materials and on the dosage determination in U. S. S. R., as well as the universal measurement tables and complete tables of γ constants for radioactive elements. Corrections are given for the data on half-value layers for β particles and on γ ray self-absorption in cylindrical sources. The handbook is designed for the use of engineers and medical personnel working with radioactive materials. NSA 12-2704

9066

New York Operations Office, AEC.

ANNOTATED BIBLIOGRAPHY ON LONG RANGE EFFECTS OF FALLOUT FROM NUCLEAR EXPLOSIONS. Allen G. Hoard, Merril Eisenbud, and John H. Harley. Nov. 1956. 18p. (NYO-4753(Suppl. 1))

This bibliography is limited to published articles and speeches concerning the various aspects of radiation effects resulting from fall-out of nuclear explosions. Although some articles reflect instrumentation as used in respect to measuring the effects of fall-out, no major attempt was made to include the field of instrumentations. See also NYO-4753. NSA 12-38

9067

SYSTEMATIC AND CLINICAL EFFECTS INDUCED IN 263 CANCER PATIENTS BY WHOLE-BODY X-IRRADIATION WITH NOMINAL AIR DOSES OF 15 TO 200 R. L. S. Miller, G. H. Fletcher, and H. B. Gerstner. Rep't 57-92, Seventh Air Univ. School of Aviation Medicine (Randolph Air Force Base, Texas, 1957).

9068

Washington. Univ., Seattle. Applied Fisheries Lab. LAND CRABS AND RADIOACTIVE FALLOUT AT ENIWETOK ATOLL. Edward E. Held. May 27, 1957. 39p. Contract AT(45-1)540. (UWFL-50)

The pattern of changing levels of radioactivity is given for the tissues of land hermit crabs, *Coenobita perlatius*, from Belle Island, Eniwetok Atoll, during a period of nearly two years following the 1954 series of atomic tests. Sr^{90} + Y^{90} , and Cs^{137} were the principal long-lived fission products found. Sr^{90} levels in the skeleton remained constant throughout the period of study. NSA 12-5849

9069

ESTIMATION OF EFFECT OF RADIATION UPON HUMAN HEALTH AND LIFE SPAN. H. B. Jones (Univ. of California, Berkeley). Proc. Health Phys. Soc. 114-26 (1957).

The effect of radiation upon human health and life span are discussed and compared with other environmental and socio-economic factors affecting human health and life span. NSA 12-8275

9070

SUSPECTED CIRCULATING "RADIOTOXINS" IN ADRENALECTOMIZED IRRADIATED RATS. R. D.

Campo, V. P. Bond and E. P. Cronkite. Federation Proc., 16, 18-19(1957).

9071

Oak Ridge Gaseous Diffusion Plant, Tenn. BASIC PRINCIPLES OF NUCLEAR SAFETY-SUB-CRITICAL SYSTEMS. H. F. Henry. Pt. A [of] STUDIES IN NUCLEAR SAFETY. Lectures Presented at the Nuclear Safety Training School Conducted by Union Carbide Nuclear Company, June 3-14, 1957. 33p. Contract W-7405-eng-26. (K-1380(Pt. A))

In this general discussion of the problem of nuclear safety as it applies to normally subcritical systems, attempts have been made to emphasize the following basic points of general applicability: The potential hazard from an accidental chain reaction has been such that facilities where it is a problem have considered it necessary to take rather stringent steps to prevent the occurrence of such an accident. The problem of nuclear safety is amenable to the standard safety-type methods of control with obvious attention to special technical requirements which are somewhat more difficult of solution than are many types of safety problems. Where practicable, operations involving fissionable materials are conducted in equipment or other wise under conditions where accidental criticality is virtually impossible and as little dependence as feasible is placed upon routine personnel actions; in general, it is maintained as a principle that no accident is possible without the simultaneous occurrence of at least two un-likely and independent events. NSA 12-15273

9072

A FEW NOTIONS INVOLVED IN THE CLINICAL USE OF RADIOISOTOPES. Gould A. Andrews (Oak Ridge Inst. of Nuclear Studies, Tenn.). Ann. Internal Med. 47, No. 5, 922-38(1957) Nov.

Basic concepts in diagnostic and therapeutic applications of radioisotopes are reviewed. NSA 12-11278

9073

ON THE CONSEQUENCES OF THE FALLOUT OF THE RADIOACTIVE ISOTOPE OF STRONTIUM (Sr-90). A. V. Lebdinski (Lebdinskiy). Translated from Med. Radiol. 2, No. 5, 22-32(1957). p. 11-26 [of] VARIOUS STUDIES ON THE USE OF RADIOACTIVE SUBSTANCES IN MEDICINE. 16p.

Data are reviewed on the possible consequences to mankind of environmental strontium-90 from fall-out. NSA 12-15223

9074

BLOOD SUGAR AND LIVER GLYCOGEN LEVELS IN IRRADIATED AND NONIRRADIATED MICE. F. G. Sherman and F. M. Dwyer. Federation Proc., 15, 169(1956).

Blood sugar levels increased soon after whole body exposure of fed mice to 600 r X-ray dose. Sugar and glycogen in liver also rose.

9075

RADIATION NEPHRITIS. B. J. Grossman. J. Pediat., 47, 424-33(1955).

Author reviews experimental and clinical radiation nephritis concept. Human kidney develops sclerotic changes with doses greater than 2000 r, reaching fatal stage in 4-7 months after exposure.

9076

THE USE OF RADIOACTIVE ISOTOPES IN THE USSR. G. V. Kurdyumov, M. B. Neyman, and G. M. Frank. Atomnaya Energiya 3, 465-78(1957). (In Russian).

Some of the most important uses of radioisotopes in chemistry, biology, medicine, and agriculture in the Soviet Union are described. NSA 12-10283

9077

THE YEAR BOOK OF RADIOLOGY. Part I. RADIOLOGIC DIAGNOSIS. PART II. RADIATION THERAPY. John Floyd Holt, Fred Jenner Hodges, Harold W. Jacox,

and Morton M. Kligerman, eds. Chicago, The Year Book Publishers, Inc., 1957. 444p.

The biological hazards of diagnostic radiography for patients and clinical personnel are discussed. Recent technical developments and applications of radiography in diagnosis and therapy are reviewed. NSA 12-10337

9078

CATARACT FORMATION FOLLOWING BETA-RAY RADIUM THERAPY. G. M. Huak, L. Wood, R. L. Waugh, and G. Ellis. Am. J. Ophthalmol., 38, 465-70 (1954).

Sharply localized opacities developed in lenses of experimental animals after beta irradiation of eyes. This is apparently accounted for by the short penetration of the radiation.

9079

Brookhaven National Lab., Upton, N. Y. HOMEOSTATIC MECHANISMS. REPORT OF SYMPOSIUM HELD JUNE 12 TO 14, 1957. Brookhaven Symposia in Biology No. 10. 276p. (BNL-474)

Problems associated with studies on cellular equilibria are reviewed. Data are presented from studies on those homeostatic processes which are involved in controlling concentration of the formed elements of the blood. A subject index and lists of speakers and participants in the symposium are included. NSA 12-13652

9080

Brookhaven National Lab., Upton, N. Y. QUARTERLY PROGRESS REPORT [FOR] JULY 1 - SEPTEMBER 30, 1957. 56p. (BNL-473)

Progress in biology, chemistry, medicine, and physics research projects is briefly summarized. Accelerator development and operation is also reviewed. (For period preceding see BNL-455). NSA 12-7645

9081

RADIATION INDUCED LEUKEMIA CONTRACTED BY AN ASSISTANT PRACTITIONER. Heinz Bohlig (Des Bezirkskrankenhauses, Meiningen, Germany). Strahlentherapie 104, 600-4(1957). (In German).

The case history is reported of a doctor's assistant who developed leukemia following absorption of about 400 r of x radiation over a 25-year period. NSA 12-7107

9082

General Electric Co. Hanford Atomic Products Operation, Richland, Wash. CALCULATION OF MAXIMUM PERMISSIBLE CONCENTRATION IN AIR, MPC (air), FOR Ru¹⁰⁶ PARTICLES. W. J. Bair. Oct. 1, 1957. 11p. Contract W-31-109-Eng-52. (HW-52287)

The calculation of the concentration of Ru¹⁰⁶O₂ in air that at equilibrium will result in an average dose rate of 0.3 rem/week to the lung of man is presented. Since data from mouse experiments are used the calculations are extrapolated on the basis of differences in organ weights and do not allow for difference in physiology. These calculations necessarily assume uniform distribution of Ru¹⁰⁶ throughout the lung tissue although it is known that Ru¹⁰⁶ is retained as particulates following inhalation of insoluble ruthenium oxide particles. An MPC (air) of 5×10^{-9} $\mu\text{c}/\text{ml}$ obtained using exponential functions to represent retention is compared with 8×10^{-9} $\mu\text{c}/\text{ml}$ obtained using power function equations. NSA 12-2208

9083

Oak Ridge National Lab., Tenn. THE SUSPENDED MICROBIOTA OF THE CLINCH RIVER AND ADJACENT WATERS, IN RELATION TO RADIOACTIVITY IN THE SUMMER OF 1956. J. B. Lackey. Nov. 13, 1957. 36p. Contract W-7405-eng-26. (ORNL-2410)

The Clinch River enters the Oak Ridge area virtually free of plankton. It is fertilized in this area and develops a considerable plankton by the time it enters Watts Bar

Lake. This plankton may acquire considerable amounts of radioactivity from the very small amounts contributed by the Oak Ridge operations. Some figures are presented showing the radioactivity accumulated by various species, and the rate of accumulation as compared to reproductive rates. Diminution of radioactivity in both plankton and water is traced downstream. Conditions in the Clinch and Columbia Rivers are compared. The principal source of radioactive wastes for the Clinch River insofar as known is the effluent from the ORNL settling basin, which empties via White Oak Creek. Along with this small quantity of radioactive waste the river received some nutrient materials and a mixed population of microorganisms. A small amount of radioactive seepage from the ORNL disposal pits may enter the creek. The Clinch and neighboring waters yielded 425 species of algal or protozoan microorganisms, which are listed in an appendix, in the summer of 1956. NSA 12-1188

9084

THE DEPENDENCE OF THE ACTIVITY OF SECRETIONS ON THE CONCENTRATION OF RADIOACTIVE MATTER WITHIN AN ORGANISM. Yu. M. Shtukkenberg. Soviet J. Atomic Energy No. 5, 801-9(1956).

Detailed calculations of the dependence of the activity of excretion on the amount of radioactive matter contained within an organism are given, when the excretion of this matter follows the exponential law. NSA 12-1181

9085

Oak Ridge Inst. of Nuclear Studies, Inc., Tenn. ISOTOPES IN MEDICINE- ARE THEY WORTH THE TROUBLE? Marshall Brucer. May 1, 1957. 41p. Contract AT-40-1-GEN-33. (ORINS-17) NSA 12-51

9086

TISSUE CULTURE AS A RADIOBIOLOGICAL METHOD OF RESEARCH. Henni Gartner. Strahlentherapie 103, 620-7(1957). (In German).

On the strength of accumulated experience and taking into consideration the experimental results of his own, the author gives a critical description of tissue-cultivation as a radio-biological method of research. Not only the advantages of the method, but the limits of its possibilities are discussed. The methods of evaluation show, that the trial object permits a multiple, combined assertion about the radio-biological efficaciousness of the selected doses and kinds of radiation and that thus, in one single object the possibilities of tests and counter-tests are given. Tissue cultivations, however, only represent a biological model of simplified histological structure. Therefore, no conclusions as to possible reactions of the entire organism should be drawn forthwith. NSA 12-3539

9087

EXPERIMENTAL DETERMINATION OF URANIUM IN LIVING FRESH-WATER ALGAE. (Experimentelle Erfassung von Uran in Lebenden Susswasseralgen). Josef Hoffmann. Translated by W. H. Everhardy from Naturwissenschaften 29, 403-4(1941). 6p. (AEC-tr-3076) NSA 12-1201

9088

THE EFFECT OF ENVIRONMENTAL FACTORS ON THE RADIOSENSITIVITY OF LYMPH NODES CULTURED IN VITRO. O. A. Trowell. Brit. J. Radiol., 26, 302-09 (1953).

Lethal dose for lymphocytes was greater *in vitro* than *in vivo*, in contrast to author's earlier conclusions. Lymph node environment therefore may be said to be a major contributor to radiosensitivity of lymphocytes.

9089

Atomic Energy of Canada Ltd. Chalk River Project. Chalk River, Ont. A PLAN FOR THE STUDY OF FERTILITY OF RELATIVES

OF CHILDREN SUFFERING FROM HEREDITARY AND OTHER DEFECTS. PART I. OUTLINE OF THE PLAN. PART II. DETAILS OF THE PROCEDURES. H. B. Newcombe, S. J. Axford, and A. P. James. Nov. 1957. 79p. (CRB-739; AECL-511)

It has been assumed that the load of serious hereditary defects in human populations is maintained largely by reason of new mutations which occur in each generation. Present estimates of the increase in the load, which would be expected from radiation-induced increases in mutation rate, are based on this belief. However, it is recognized that the assumption represents an oversimplification, and that it could lead to an error of unknown magnitude in the estimate of damage. An increased fertility in apparently unaffected carriers of the genes for defects may well be a major factor in maintaining the incidence of the defects. If this is the case, it will be necessary to re-assess the estimates of genetic damage from radiation. Unfortunately, there is little or no direct evidence from human populations, as to which factor is predominant in maintaining the present load of defects. It is here proposed that the most effective method of obtaining concrete information on differentials of fertility is through the appropriate use of provincial or national statistics which are already routinely collected. The present report describes the techniques available for a fertility study within one Canadian province over a limited period of time. By these techniques, present records of marriages, births, ill health and deaths (in punchcard form) can be arranged into family groups, so that the fertility of families in which the defects occur can be compared with that of families which are unselected for defects. It is believed that such techniques will eventually prove suitable for routine use in a national vital statistics system, and that they can open the way for an understanding of the genetics of human populations which cannot be obtained in any other manner.

NSA 12-3479

9090

ACETYLATION OF SULFANILAMIDE IN LIVING ANIMALS EXPOSED TO X-RAYS. E. F. Romantsev and Z. I. Zhulanova. Biochemistry (U.S.S.R.) 21, 685-8(1956) Nov.-Dec. NSA 12-7657

9091

ON THE PROBLEM OF RADIATION PROTECTION FROM A MEDICAL VIEWPOINT Hermann Holthausen. Strahlentherapie 104, 317-27(1957). (In German).

The dangers to which mankind is exposed through artificial radiation sources are discussed. Particular attention is paid to the charge of the human organism in consequence of medical application of rays, as well as to the importance of the international recommendations concerning the maximum admissible doses. The severe judgment of the dangers resulting from ionizing rays depends on the fact that the former conception of the existence of a threshold value of ray damage, and thus of a tolerance dose, had to be given up. The individual nature of the genetic ray damage entails a new kind of responsibility. NSA 12-7691

9092

ATOMIC RADIATION-THEORY, BIOLOGICAL HAZARDS, SAFETY MEASURES, TREATMENT OF INJURY. Camden RCA Service Company, Inc., 1957. 120p. NSA 12-5127

9093

PROGRESS IN APPLIED RADIOISOTOPES AND RELATED FIELDS. E. H. Graul, ed. Heidelberg, Dr. Alfred Huthig Verlag, 1957. 253p. (In German).

The application and production of radioisotopes are reviewed in this book. K. J. Bohm of the Harwell Atomic Energy Research Establishment writes of the reactor structure and isotope separation, H. Bohm on the meas-

urement of radiation with counters or rate meters, K. Sommermeyer on the fundamentals and progress of isotope dosimetry, K. Kaindi on the application of radioisotopes to agriculture, and E. H. Graul on the estimation of the biological dangers from poisoning with radioactive fission products. NSA 12-5128

9094

School of Aviation Medicine, Randolph AFB, Tex. MILITARY AND CIVIL DEFENSE ASPECTS OF THE ACUTE RADIATION SYNDROME IN MAN. Herbert B. Gerstner. July 19, 1957. 30p. (AF-SAM-58-6)

From a comparative analysis of human data derived from nuclear accidents, Japanese bomb casualties, and radiotherapy patients, emerges the clinical picture of the acute radiation syndrome with its three subdivisions-hematopoietic, gastrointestinal, and cerebral forms. Dependency of the picture on dose level and individual susceptibility is discussed, and the therapeutic management is outlined. Since penetrating ionizing radiation represents a potential casualty-causing agent, problems facing the practical physician under catastrophic conditions are evaluated. NSA 12-5188

9095

RELATIONSHIP OF BORON NUTRITION TO RADIO-SENSITIVITY OF SUNFLOWER PLANTS. John Skok (Argonne National Lab., Lemont, Ill.). Plant Physiol. 32, 648-58(1957) Nov.

Seven-day-old Mammoth Russian sunflower seedlings were grown in nutrient solutions with or without boron, for 2 to 5 days, after which they were x irradiated and again supplied with boron. Withholding boron for short intervals prior to x irradiation with doses that normally produce pronounced radiation symptoms, had a marked alleviating effect on the development of radiation injury. The absence of boron resulted in retardation of some phase of cellular activity and rendered the plants more radioresistant. This normally radiosensitive phase of cellular activity which may be rendered relatively radioresistant by withholding boron is, then, boron-dependent. An attempt was made to identify this growth phase by irradiating a series of germinating seedlings at different growth stages. It appears to be the phase of cellular maturation rather than cell division, suggesting that boron is required for some process or processes concerned with cellular maturation or differentiation. The apparent effect of boron on sugar translocation appears to be related to the effect of boron on cellular activity rather than to a direct enhancement of diffusion through membranes through formation of a sugar-borate complex. NSA 12-11269

9096

Naval Radiological Defense Lab., San Francisco. RADIOLOGICAL HAZARD EVALUATION - A CRITICAL REVIEW OF PRESENT CONCEPTS AND A NEW APPROACH THERETO. E. L. Alpen. Oct. 22, 1957. 33p. Project NM-006-015. (USNRDL-TR-186)

Data are reviewed on the biological effects of whole-body radiation on human beings and the rate of recovery following whole-body exposure as a function of amount of injury. Tabulated data are presented on the estimated medical effects of radiation doses from 75 to 650 r expressed as percentages of working force affected for healthy, young adults for times up to three months post exposure, the acute effects of whole-body penetrating ionizing radiation on human beings, the biological effects of radiation on the skin, and the absorber characteristics of fabrics. An attempt is made to establish criteria based on present knowledge of radiobiological response of human beings for the prediction of radiation injuries. Two estimated dose required (EDR) values are proposed. The estimated effective dose to produce sickness in 24

hrs is 200 r and the estimated effective dose to produce death is 400 r. The estimated effective dose is based upon estimated prompt gamma dose, residual gamma dose, and the neutron dose in rep with no correction for rbe. Corrections should be made for any protection factors present. Findings are applied in the evaluation of hazards and mission accomplishment in military radiobiological situations. NSA 12-2629

9097

GRID DEPTH DOSE INVESTIGATION FOR 200 AND 400 KILOVOLTS AT THE CENTER AND EDGE OF THE FIELD. L. E. Jacobson. Am. J. Roentgenol. Radium Therapy, Nuclear Med., 69, 991-1000(1953).

9098

PERSONNEL PROTECTION DURING REPAIR WORK IN CONTAMINATED AREAS. S. M. Gorodinsky and V. L. Shcherpakov. Atomnaya Energiya 3, No. 8, 141-8(1957).

If repairs have to be carried out in radioactively contaminated areas, it is necessary to protect the personnel against γ radiation (by short working hours) and against their skin coming into contact with radioactive isotopes. This is done by protective clothing and face masks. The Russian protective suits LG-1 and LG-2 and the face masks ShB-1 and ShB-2 are described briefly.

NSA 12-8957

9099

APPLICATION OF IONIZING RADIATION IN THE PRODUCTION OF BACTERIAL PREPARATIONS. V. L. Troitskii (Troitskiy). Translated from Med. Radiol. 2, No. 5, 80-8(1957). p. 94-107 [of] VARIOUS STUDIES ON THE USE OF RADIOACTIVE SUBSTANCES IN MEDICINE. 14p. (JPRS-210(p.94-107))

Applications of radiation in the cold sterilization of bacterial preparations and pharmaceuticals are discussed. NSA 12-15230

9100

ALOE EMULSION-A NEW MEDICINAL AGENT. Ya. A. Aleshkina and B. K. Rostotskiy. Meditsinskaya Promyshlennost S.S.S.R. No. 4, 54-5(1957) Apr.

Aloe emulsion provided protection and proved effective in the treatment of second and third degree burns. Experiments on the radiosensitivity effects of the emulsion are described. NSA 12-9632

9101

I. SOME AFTER-EFFECTS IN FATS IRRADIATED WITH HIGH-ENERGY ELECTRONS AND X-RAYS. R. S. Hannan and H. J. Shepherd. (paper in Symposium on) The Chemistry of Biological After-Effects of Ultra-Violet and Ionizing Radiation Held in Cambridge, England in December, 1952. Brit. J. Radiol. 27, 36(1954).

9102

Texas. Univ., Austin. Radiobiological Lab. LETHALITY IN THE RAT AS A FUNCTION OF DOSE PATTERN. Quentin L. Hartwig, George S. Melville, Jr., and Thomas P. Leffingwell. Nov. 18, 1957. 3p. (AF-SAM-58-51)

Rats exposed 7 days to a chronic field of 2 r/hour of Co^{60} gamma rays immediately prior to or immediately after an acute dose of 800 r of Co^{60} gamma rays failed to exhibit a significant difference in either a 30-day or 90-day mortality. When compared to a group of rats receiving only an acute dose of 800 r of Co^{60} gamma rays, both acute-chronic groups evidenced different mortalities, however, these differences were not statistically significant. NSA 12-9570

9103

CERTAIN RESULTS OF INVESTIGATION IN THE STUDY OF THE EFFECT OF IONIZING RADIATION ON INFECTION AND IMMUNITY. P. N. Kiselev. Translated from Med. Radiol. 2, No. 5, 55-64(1957). p. 58-69 [of] VARIOUS STUDIES ON THE USE OF RADIOACTIVE SUBSTANCES IN MEDICINE. 11p. (JPRS-58-69)

A summary is presented of data on the character and nature of immunity and on the influence of immune mechanisms on the course of infection when an organism is subjected to large doses of ionizing radiation. NSA 12-15227

9104

A GENETIC EFFECT IN NATURE FROM THE RADIO-ACTIVITY IN URANIUM DEPOSITS? (Eine Gen-Beeinflussung in der Natur als Folge der Radioaktivität von Uranlagerstätten?) Otto Kraus. Translated from Natur. u. Volk 87, 399-401(1957). 3p. (AEC-tr-3194)

Specimens of the myriapod *Digitipes katangensis* were collected from the sub-soil in the region of the Jadatville uranium deposits of Katanga, Belgian Congo. Abnormalities were observed which may have been induced by the natural radioactivity of the soil in which they had existed for many generations. NSA 12-9576

9105

NUCLEAR MAGNETIC RESONANCE IN BIOLOGY AND MEDICINE. Erik Odeblad (Sabbatsberg Hospital, Stockholm). Z. Med. Isotopenforsch. 1, No. 1, 25-40(1956) Nov.

Since the discovery of nuclear magnetic resonance, this method has shown itself to be of great importance in the study of physical chemical problems. Examples are given to show that nuclear magnetic resonance is a powerful tool in the study of numerous problems of medicine, biology, biophysics, and biochemistry. 54 references. NSA 12-6390

9106

General Electric Co. Hanford Atomic Products Operation, Richland, Wash.

THE ABSORPTION OF FISSION PRODUCTS BY PLANTS. J. H. Rediske, J. F. Cline, and A. A. Selders. May 17, 1955. 17p. Contract W-31-109-Eng-52. (HW-36734)

Of the fission products, the isotopes of strontium were found to be the most important by virtue of their high concentration factor, long half life and low maximum permissible amounts for animals. Concentration factor tends to increase as the pH of the nutrient substrate is decreased. Addition of stable carrier to the substrate does not decrease the amount of the radioactive isotope that is absorbed into the plant. NSA 9-5837

9107

ATOMIC ENERGY UTILIZATION. AN INTRODUCTION TO THE TECHNICAL, MEDICAL, AND BIOLOGICAL PROBLEMS OF THE ATOMIC AGE. Niels Arley and Helge Skov. Copenhagen, Scandinavian University Books, 1957. 99p. (In Danish).

The engineering problems of atomic energy utilization and the biological dangers of ionizing radiation and atomic energy are discussed. In the area of engineering problems a survey of nuclear physics, neutron physics, reactor physics, health physics, radioactive fall-out, shielding problems, and use of radioisotopes is given. In the area of biological dangers the radiobiological physical fundamentals, effects of ionizing radiation on man, radiation dangers for the general population, comparative radio uptake of plant and animal organism, and progress in radiobiology are discussed. NSA 12-9566

9108

School of Aviation Medicine, Randolph AFB, Tex. AIRCRAFT NUCLEAR PROPULSION BIOMEDICAL RESEARCH PROGRAM. REPORT NO. 4. RADIO-BIOLOGIC PROBLEMS OF ANP. Robert M. Dowben, Daniel B. Williams, Edward M. Miller, and John E. Pickering. Oct. 1955. 11p. (NP-6763)

The biological effects of exposure to low radiation dose rates over a long period of time are discussed. Problems in the quantitative determination of the differences in biological response to physically equivalent doses of various radiations are reviewed. Factors to be considered in establishing permissible radiation levels for the crews of nuclear aircraft are discussed. NSA 12-10296

9109

RESPONSE OF PAH TRANSPORT AND OXYGEN CONSUMPTION IN THE RABBIT KIDNEY SLICE TO GRADED DOSES OF X-RAY AND SEVERAL METABOLIC INHIBITORS. M. L. Mendelsohn. Am. J. Physiol. 180, 599 (1955).

Pressure or absence of oxygen during irradiation did not affect dose required to produce a 50% decrease in concentration gradient of PAH. Doses greater than 25,000 r of x rays caused a progressive increase in oxygen consumption and the author discusses the possibility that this may reflect acute cytoplasmic damage of the renal tubule cell.

9110

ACUTE UPTAKE OF PLUTONIUM AND URANIUM FOLLOWING WOUND CONTAMINATION. E. L. Geiger and S. M. Sanders, Jr. (E. I. du Pont de Nemours and Co., Aiken, S. C.). Proc. Health Phys. Soc. 61-6(1957).

Urinary excretion of plutonium during a 487-day period after an acute uptake by wound contamination was followed by the analyses of 99 urine samples. The data may be approximated by the function $Y = 141 t^{-1.07}$ where Y is the plutonium disintegrations per minute in a daily voiding after t days. The probability that the Langham equation for the excretion of plutonium fits the Savannah River Plant data as well as the above equation is only 1 in 1,000. The data, however, differed no more from the Langham equation, which is a mean equation, than data from some of the cases used to calculate the mean Zirconium citrate solution, administered intravenously approximately 3 hours after the accident, and Ca-EDTA, administered intravenously during the first 6 days after the accident, produced only a slight increase in the rate of plutonium excretion. Ca-EDTA was again administered on the 131st to 135th days after the accident and only a slight increase in the rate of plutonium excretion was observed. A second case followed was that of an employee hospitalized for burns caused by hot uranyl nitrate solution. Contrary to excretion data obtained from persons injected with soluble uranium, the excretion rate in this case decreased only slowly for the first 9 days following the accident. Between the ninth and fifteenth days, however, the daily excretion rate dropped a hundredfold. From the fifteenth to the fortieth day, the biological half-life for elimination was approximately 6 days. The data may indicate that the uranium was leached slowly from the burned tissue into the blood. NSA 12-8288

9111

General Electric Co. Hanford Atomic Products Operation, Richland, Wash.

DEPOSITION AND RETENTION OF Ru¹⁰⁶ FOLLOWING ADMINISTRATION OF Ru¹⁰⁶O₂ TO MICE BY INHALATION AND INTRATRACHEAL INJECTION. W. J. Bair, L. A. Temple, D. H. Willard, J. L. Terry, and A. Graybeal. Oct. 1, 1957. 24p. Contract W-31-109-Eng-52 (HW-52285)

The deposition and retention of Ru¹⁰⁶ in mice following inhalation of Ru¹⁰⁶O₂ as dust and as a fog were studied for two days following exposure. Almost 25% of the ruthenium oxide inhaled was present in the lungs immediately after exposure. This was reduced by half in 24 hours. The remainder was removed from the lung at a much slower rate. Inhalation of ruthenium oxide particles was compared with administration by intratracheal injection. Inhalation produced more uniform distribution of particles in the lung than did administration by intratracheal injection and much greater distribution of Ru¹⁰⁶ to tissues other than the lung. This was attributed to the larger quantities of particles passing through the gastrointestinal tract. The turnover of intratracheally administered particles from the lungs was negligible the first two days. NSA 12-8293

9112

IMMUNOLOGY OF BONE MARROW TRANSPLANTA-

TION. Takashi Makinodan (Oak Ridge National Lab., Tenn.). J. Cell. Comp. Physiol. **50**, Suppl. 1, 327-51 (1957) Dec.

The role of the recognition factor of an antibody-producing cell and its relative sensitivity to x rays has a great implication, not only to radiation immunology but to general biology. Obviously, much work is still required to elucidate this problem. From an immunologist's point of view, one of the most fascinating phenomena of the bone marrow transplantation studies is the delayed foreign bone marrow reaction. The task of circumventing or subduing the reaction is a formidable one, considering the large number of immunologically distinct antigens existing in a given bone marrow suspension. Preliminary studies seem to indicate that the nuclear membrane or the nuclear material, or both, are mainly responsible for the delayed foreign bone marrow reaction. Should the nuclear material be found to be the chief agent involved in this delayed reaction, the problem then becomes even more challenging since the antigenic material is chemically impure and its solubility in aqueous medium is limited. NSA 12-8922

9113

EFFECT OF IONIZING RADIATION OF THE HEMOLYSIS OF ERYTHROCYTES A. P. Belousov. Vestnik Rentgenol. i Radiol. No. 3, 5-14 (1957) May-June.

The saponin hemolysis method is a very effective way of determining the resistance of erythrocytes to radiolysis. The irradiation of rabbits with a dose of 700 r induces the formation of erythrocytes resistant to chemical hemolysis and the rapid disappearance from the blood stream of non-resistant ones. In the case of burns produced by boiling water, blood cell-hemolysis is temporarily increased during a period of acute toxicosis. In rabbits irradiated with a dose of 1000 to 1300 r, intensive hemolysis of erythrocytes starts immediately and continues for up to 30 days. The appearance of resistant erythrocytes in the blood is preceded by a period of active hemopoiesis and the restoration of hemoglobin. Increased resistance of erythrocytes to saponin hemolysis has been observed in rabbits who suffered loss of blood and were subsequently irradiated. Irradiation of the blood *in vitro* in large doses, as contrasted to small doses, lowers the resistance of erythrocytes to chemical hemolysis. Changes in the resistance of erythrocytes to saponin hemolysis are conditioned by the direct action of radiation on the blood cells and the secondary effect of hemolysins. Thus, knowing the mechanism of the hemolysis of erythrocytes under the influence of ionizing radiation allows a better insight into the pathogenesis of radiation sickness and helps the development of protective means to prevent the onset of hemolysis. NSA 12-9624

9114

ANTIBODY RESPONSE OF MICE TREATED WITH 2-MERCAPTOETHYLGUANIDINE HYDROBROMIDE AND LETHAL DOSES OF X-RADIATION, AND ITS SIGNIFICANCE TO THE RELATION OF ANTIGEN TO HOST. Takashi Makinodan, Isabel C. Shekarchi, and Charles C. Congdon (Oak Ridge National Lab., Tenn.). J. Immunol. **79**, 281-7 (1957) Oct.

No important difference between sheep and rat agglutinin production was observed in normal and MEG (2-mercaptoethylguanidine hydrobromide) treated mice. The sheep agglutinin response was higher than rat agglutinin response in the 475-r, 700-r, 950 r-IBM (isologous bone marrow) treated, and MEG-950 r mice. Such difference was based on the induction period of agglutinin response, peak agglutinin titer, and on the mean total agglutinin response. The rate of recovery of the immune mechanism of MEG-950 r mice was almost

comparable to that of the 475-r mice. The rate of recovery of the immune mechanism of MEG-950 r mice was not significantly different from that of the 950 r-IBM mice. The results permit the deductions that MEG protects predominantly nonantibody producing cells, that either multiple types of antibody producing cells exist or some antibody producing cell has the ability to recognize the difference between homologous, closely related heterologous, and distantly related heterologous antigens, and that the degree of destruction of antibody forming cells by x-irradiation is in the order mentioned. NSA 12-11244

9115

THE EFFECT OF ACTIVE IMMUNIZATION AGAINST INTESTINAL INFECTIONS AND TUBERCULOSIS ON THE RADIORESISTANCE OF ANIMALS. N. N. Klemparskaya, V. F. Sosova, O. R. Nemirovich-Danchenko, and G. M. L'vitsina. Translated from Med. Radiol. **2**, No. 5, 65-72 (1957). p. 70-84 [of] VARIOUS STUDIES ON THE USE OF RADIOACTIVE SUBSTANCES IN MEDICINE. 15p. (JPRS-210(p.70-84))

Active immunization against tuberculosis prior to exposure increased the radioresistance of laboratory animals. Other living bacteria vaccines did not produce an increase in the survival as did the tuberculosis vaccine. NSA 12-15228

9116

CIRCULATION IN THE BLOOD OF TISSUE ANTIGENS PRODUCED BY RADIATION SICKNESS. P. V. Petrov and L. I. Ilyina. Bull. Exptl. Biol. Med. (USSR) (English Translation) **44**, 917-23 (1957) Aug.

Abnormal tissue antigens have been demonstrated as a product of irradiation of the organism. Proteins labelled with methionin-S³⁵ have been obtained from the bone marrow, spleen, testes, and intestinal mucosa. Their passage via the blood stream to the liver has been demonstrated. Irradiation diminishes antigenic differences. As irradiation sickness progresses, these abnormal antigens must play an important role in the progress of the disease. Adsorption of the antigens against the normal tissues opens a tentative path into very interesting future research for possible treatment of irradiation sickness. NSA 12-11275

9117

STUDIES ON THE DOSE REQUIRED FOR DEPILATION. Peter Hell. Translated for Los Alamos Scientific Lab., N. Mex. from Strahlentherapie **103**, 472-6 (1957). 5p. (AEC-tr-3373)

A consideration of the x-rays necessary to effect depilation in the region of hair papillae at the margin of depilated areas of hair along the back of the neck has led to the conclusion that the dose of soft x-rays below 50 kv required to bring about depilation in the region of the hair papillae may be up to half of the dose required for medium hard (80 to 85 kv) x-rays in use till now. NSA 12-16875

9118

RADIATION DOSE TO STAFF IN MEDICAL X-RAY DEPARTMENTS. G. M. Ardran, H. E. Crooks, F. H. Kemp, and R. Oliver (Atomic Energy Research Establishment, Harwell). Brit. J. Radiol. **30**, 600-1 (1957) Nov. NSA 12-2695

9119

Bureau of Ships.

GENERAL PRINCIPLES OF IONIZING RADIATION.

Roger G. Preston. June 1, 1955. 37p. (NAVSHIPS-250-348-1)

This information is intended for personnel only occasionally associated with the fields of nuclear power and atomic warfare. These notes are divided into three chapters, the nature of ionizing radiation, the detection

and measurement of ionizing radiation, and the biological effects of ionizing radiation. NSA 12-4060

9120

THE SIGNIFICANCE OF PARIETAL VESSEL LESIONS FOR HAEMATOPOIESIS INJURY TO RATS AFTER TOTAL BODY IRRADIATION OF 15 MeV ELECTRONS. Rudolf Stodtmeister, S. Sandkuhler, and Theodor M. Fliedner. Translated by B. Smith from *Strahlentherapie* 101, 308-17(1956). 10p. (NP-tr-12) NSA 12-4038

9121

Australia. Commonwealth X-Ray and Radium Lab., Melbourne.

ANNUAL REPORT FOR THE YEAR ENDED JUNE 30, 1957. D. J. Stevens. Sept. 1957. 22p. (NP-6529)

The Commonwealth X-ray and Radium Laboratory serves as the national center for radiological physics in Australia. The Laboratory provides advisory services on physical problems arising in the use of radium, x rays, and radioisotopes and also serves as a repository and dispersing center for radium, radon, and radioisotopes. Activities engaged in during the period are summarized. NSA 12-4025

9122

Northwestern Univ., Chicago. Medical School. EFFECTS OF SINGLE AND OF SPACED, MULTIPLE DOSES OF COBALT-60 GAMMA AND FISSION NEUTRON RADIATION ON THE INCORPORATION OF IRON-59 INTO THE RAT ERYTHROPOIETIC SYSTEM. W. A. Rambach, J. A. D. Cooper, and H. L. Alt. July 5, 1957. 17p. (AF-SAM-58-1) NSA 12-4029

9123

Naval Radiological Defense Lab., San Francisco. EFFECTS OF DONOR AND HOST LYMPHOID AND MYELOID TISSUE INJECTIONS IN LETHALLY X-IRRADIATED MICE TREATED WITH RAT BONE MARROW. G. W. Santos and L. J. Cole. Dec. 1, 1957. 30p. Project NM 006 015. 04. (USNRDL-TR-193) NSA 12-4061

9124

PROTECTIVE EFFECT OF 2-MERCAPTOETHYLGLUANIDINE ON BONE MARROW CELLS X-IRRADIATED IN VITRO. L. H. Smith (Oak Ridge National Lab., Tenn.). Exptl. Cell Research 13, 627-30(1957) Dec. NSA 12-4062

9125

CHANGES PRODUCED BY ROENTGEN RAYS IN INFLAMED CONNECTIVE TISSUE. A. A. Maximow. J. Exp. Med. 37, 319(1923).

Experimental studies on rabbits are described. Radiation depresses fibroblastic proliferation but not leukoblasts or polyblasts in connective tissue. Emigration of cells from the blood is decreased. Vascular changes are also described.

9126

EXPOSURE OF MAN TO IONIZING RADIATION ARISING FROM MEDICAL PROCEDURES. AN INQUIRY INTO METHODS OF EVALUATION. A Report of the International Commission on Radiological Protection and International Commission on Radiological Units and Measurements. R. M. Sievert, et al. Phys. in Med. Biol. 2, 107-50(1957) Oct.

In November 1956, the International Commission on Radiological Protection and the International Commission on Radiological Units and Measurements were invited by the United Nations Scientific Committee on the Effects of Atomic Radiation to consider and discuss the question of how to arrive at reliable data indicating the doses to different parts of the body received by individuals and, the aggregate, by large population groups due to the medical use of ionizing radiations. Dosimetry factors, methods of arriving at statistics, and methods for determining the gonad dose received

from diagnostic and therapeutic applications of radiation are discussed. Data received from fourteen countries are included. NSA 12-9633

9127

USE OF IONIZING RADIATION AGAINST PESTS OF STORED GRAIN. A. A. Peredel'skiĭ, P. D. Rumiantsev, A. V. Bibergalv, L. Z. Rodionova, and E. S. Pertsovskii (Academy of Sciences of the USSR and All-Union Grain Research Inst., Moscow). Biophysics 2, 209-13(1957). NSA 12-2644

9128

Utah. Univ., Salt Lake City. Radiobiology Lab. SEMI-ANNUAL PROGRESS REPORT. Sept. 30, 1957. 129p. Contract AT(11-1)-119. (AECU-3583)

Progress is reported in studies on the metabolism, radiation dose, radiation effects, and toxic effects of prolonged exposure of dogs following injection of various doses of Pu^{239} , Ra^{226} , Th^{228} , and Sr^{90} . An improved live dog gamma counter is described. (For preceding period see AECU-3522) NSA 12-2713

9129

THE AIR POLLUTION BIBLIOGRAPHY. VOLUME I. Jack R. Gibson, Wave E. Culver, and Mary E. Kurz. Washington, Library of Congress, 1957. 155p.

This bibliography consists of 750 references on the administrative, economic, engineering, legal, medical, and physical-chemical aspects of air pollution and its control. The subjects treated include the general field of air pollution, sources of air pollution, pathological and toxicological effects of air pollution, emission and diffusion of air pollutants, sampling, analysis, and measurement of air pollutants, air pollution surveys and statistical studies, atmospheric phenomena, legislation, administration, and enforcement, and urban planning and zoning. References concerning air pollution caused by agents of communicable disease, herbicides, insecticides, and radioactive materials are excluded. NSA 12-2721

9130

SOME RESULTS OF RADIO-IODINE DIAGNOSTIC TESTS FOR THYROID FUNCTION. D. Brinkley, J. L. Haybittle, and K. J. Plested (Addenbrooke's Hospital, Cambridge, Eng.). Acta Radiol. 48, 33-51(1957) July.

Measurements of maximum percentage uptake of radioiodine into the thyroid gland, the 48 hour plasma activity, and the 48 hour protein-bound I^{131} have been made in 99 patients. The value and shortcomings of the test as shown by comparison with the clinical findings in certain types of cases are discussed. NSA 12-2723

9131

THE DISTANCE THAT A RADICAL FORMED BY IONIZING RADIATION CAN DIFFUSE IN A YEAST CELL. Franklin Hutchinson (Yale Univ., New Haven, Conn.). Radiation Research 7, 473-83(1957) Nov. NSA 12-2675

9132

ALPHA-PARTICLE BOMBARDMENT OF THE HABRO-BRACON EGG. I. SENSITIVITY OF THE NUCLEUS. R. W. Rogers and R. C. Von Borstel (Oak Ridge National Lab., Tenn. and Florida State Univ., Tallahassee). Radiation Research 7, 484-90(1957) Nov. NSA 12-2676

9133

RADIATION SENSITIVITY OF ENZYMES IN WET AND IN DRY YEAST CELLS. Franklin Hutchinson, Angela Preston, and Beatrice Vogel (Yale Univ., New Haven, Conn.). Radiation Research 7, 465-72(1957) Nov. NSA 12-2674.

9134

CYTOLOGIC CHANGES IN THE MOUSE INTESTINE UNDER DAILY EXPOSURE TO GAMMA RAYS. S. Leshner (Argonne National Lab., Lemont, Ill.). J. Natl. Cancer Inst. 19, 419-49(1957) Sept. NSA 12-2662

9135

REGENERATIVE PROCESSES IN BONE MARROW BLOOD FORMATION IN ACUTE RADIATION SICKNESS. E. V. Shamshina, N. V. Nikolaeva, and B. F. Beliaeva (Ministry of Health, U.S.S.R.). *Problems of Hematology and Blood Transfusion* 2, 86-92(1957). NSA 12-2705

9136

ATOMIC ENERGY AND AGRICULTURE. C. L. Comar, ed. Washington, American Association for the Advancement of Science, 1957. 459p.

Topics discussed include tracer studies on soil-plant relations, tracer studies on plant metabolism, crop improvement based on response of biological systems to ionizing radiations, applications of radiation effects and radioisotopes in various aspects of agricultural entomology including work with insects and insecticides, applications of radioisotopes in studies on animal nutrition and metabolism, and the feasibility of food preservation by irradiation. 1035 references. NSA 12-2686

9137

PATHOGENESIS OF RADIATION SICKNESS. S. D. Kalenova, A. Iu. Tilis, E. G. Tepliakova, V. I. Kaluzina, and G. S. Levin (Uzbek Blood Transfusion Research Inst.). *Problems of Hematology and Blood Transfusion* 2, 93-9 (1957). NSA 12-2706

9138

PROTECTION OF GUINEA PIGS AGAINST RADIATION DEATH BY CELL-FREE MOUSE SPLEEN EXTRACT. F. Ellinger (Naval Medical Research Inst., Bethesda, Md.). *Science* 126, 1179-80(1957) Dec. 6. NSA 12-2703

9139

EARLY EFFECTS OF WHOLE BODY IRRADIATION ON CHOLINESTERASE ACTIVITY IN GUINEA-PIGS' BLOOD, WITH SPECIAL REGARD TO RADIATION SICKNESS. Johan Lundin, Carl-Johan Clemenson, and Arne Nelson (Research Inst. of National Defense, Sundbyberg, Sweden). *Acta Radiol.* 48, 52-64(1957) July.

Male guinea-pigs suffered a loss of cholinesterase activity in plasma amounting to about 30% during the first two days after whole-body roentgen irradiation with 400 r. No changes in the activity of acetylcholinesterase in erythrocytes to be ascribed to the irradiation could be demonstrated during the first two days. A routine method for determination of the cholinesterase activities has been tested but is found less suitable as a diagnostic tool for the early recognition of the effects of irradiation. (auth) NSA 12-2632

9140

RADIOACTIVITY AND PLANT GROWTH. M. Sutton. *Nature* 97, 411(1916).

Radium compounds do not have sufficient effect on plant growth to justify optimism about their practical usefulness in this respect.

9141

RADIATION RESISTANCE AND GENETIC SEGREGATION IN A LARGE CELL POSSIBLY POLYPLOID STRAIN OF *ESCHERICHIA COLI*. M. R. Zelle and James E. Ogg (Cornell Univ., Ithaca, N. Y.). *J. Bacteriol.* 74, 485-93 (1957) Oct.

Comparative tests were made of the resistance to radiation of *Escherichia coli* strain 82/r and a stable, large cell, possibly polyploid derivative, P6, produced by exposure of 82/r to camphor vapors. P6 was markedly more resistant to x rays, γ rays and ultraviolet. NSA 12-2658

9142

A COMPARISON OF THE CARCINOGENIC EFFECT OF INTERNAL AND EXTERNAL IRRADIATION ON THE THYROID GLAND OF THE MALE LONG-EVANS RAT. Virginia Kneeland Frantz, Morton M. Kligerman, W.

Arthur Harland, Mildred E. Phillips, and Edith H. Qumby (Columbia Univ., New York). *Endocrinology* 61, 574-81(1957) Nov. NSA 12-2654

9143

INDUCED CHANGES IN FEMALE GERM CELLS OF *DROSOPHILA*. V THE CONTRIBUTION OF HALF-TRANSLOCATION AND NONDISJUNCTION TO THE DOMINANT LETHALITY INDUCED BY X-RAYING OOCYTES. Irwin H. Herskowitz and Abraham Schalet (Indiana Univ., Bloomington). *Genetics* 42, 649-60(1957) Sept. NSA 12-2657

9144

EFFECT OF GAMMA RAYS ON THE SPROUTING OF STORED MANGOLDS. C. E. Cornford (Rothamsted Field Station, Dunholme, Lincoln) and D. B. Powell (Atomic Energy Research Establishment, Grove, Nr. Wantage, Berks). *Nature* 180, 996(1957) Nov. 9. NSA 12-2665

9145

ULTRAVIOLET AND X-RAY INDUCED CHROMOSOMAL ABERRATIONS IN WHEAT Lotti M. Steintz-Sears and E. R. Sears (Univ. of Missouri, Columbia). *Genetics* 42, 623-30(1957) Sept.

From wheat pollen given dosages of ultraviolet and x rays roughly comparable in capacity to break chromosomes, 56 and 124 plants, respectively, were obtained, all of which were analyzed cytologically. Reciprocal translocations and part- and whole-chromosome deficiencies were found following both types of treatment, but more of the ultraviolet translocations were deficient for an apparently terminal segment. This is regarded as evidence for less reunion and more healing of broken chromosomes following ultraviolet treatment. The virtual absence of translocations in previous ultraviolet experiments is attributed to the strong tendency of ultraviolet-induced translocation to involve deficiency. In diploid species these deficiencies would frequently cause inviability. The data suggest also that dicentric chromosomes are seldom lost in this material, but instead often break and give rise to chromosomes with terminal deficiencies. NSA 12-2656

9146

THE EFFECT OF X-RAY TOTAL-BODY IRRADIATION ON THE MAST CELL COUNT IN THE SKIN. AN EXPERIMENTAL INVESTIGATION ON GUINEA-PIGS. Tor Pettersson. *Acta. Pathol. Microbiol. Scand. Suppl.* 102, 1-62(1954).

The mast cell count of the connective tissue in the skin of the back of guinea pigs decreased about 50% following exposure to 600 r whole-body doses of x radiation. No further decrease occurred at doses of 1320 r. Since mast cells are sources of heparin, a possible correlation between the number of mast cells and the tendency to hemorrhage consequent to whole-body irradiation is suggested. 103 references. NSA 12-2630

9147

REPOPULATION OF HEMATOPOIETIC TISSUES AND BLOOD IN LETHALLY X-IRRADIATED MICE BY HOMOLOGOUS BONE-MARROW CELLS. Ruth M Merwin and Charles C. Congdon (National Cancer Inst., Bethesda, Md. and Oak Ridge National Lab., Tenn.). *J. Natl. Cancer Inst.* 19, 875-84(1957) Nov. NSA 12-2663

9148

X-RAY INDUCED CHROMOSOME ABERRATIONS IN NORMAL DIPLOID HUMAN TISSUE CULTURES. Michael A. Bender (Johns Hopkins Univ., Baltimore, Md.). *Science* 126, 974-5(1957) Nov. 8.

The aberrations in cultured epitheloid diploid human kidney cells after treatment with x rays are tabulated. Aberration counts were made on material fixed 42, 49, and 72 hours after treatment. Control material fixed at each

interval was also examined. Two doses, 25 and 50r, were used. NSA 12-2685

9149

THE GENETIC HAZARDS OF NUCLEAR RADIATIONS Bentley Glass (Johns Hopkins Univ., Baltimore, Md.). Science 126, 241-6(1957) Aug. 9.

Present concepts of the nature of mutations are reviewed. The role of radiation in inducing permanent alterations of hereditary material and the nature of these changes are discussed. NSA 12-2684

9150

DUGWAY FOOD IRRADIATOR USES 8 MTR ELEMENTS. Carl J. Christensen, Andrew Jacobsen, Quentin Klinger, and George Abel (Univ. of Utah, Salt Lake City). Nucleonics 15, No. 12, 94-6(1957) Dec.

Eight spent MTR fuel elements are the radiation source in the Dugway high-level γ irradiation facility, designed especially for canned-food processing. The system will accept any can up to the No. 10 size and deliver a specified uniform radiation dose between 25,000 and 10^7 r. Variation in total dose is limited to a few per cent. Provision is made for temperature control in the range 25 to 200°F. NSA 12-2624

9151

LATE EFFECTS OF WHOLE-BODY X-IRRADIATION IN THE MOUSE. SOME GROSS AND HISTOLOGICAL ASPECTS OF THE DEVELOPMENT OF MORBIDITY PRIOR TO THE TERMINAL STATE, WITH SPECIAL REFERENCE TO THE GONAD, UTERUS, HEART, LIVER, KIDNEY, AND SUBMAXILLARY GLAND. Henry I. Kohn, Robert F. Kallman, and Charles C. Berdjus (Univ. of California School of Medicine, San Francisco and Kenneth B. De Ome (Univ of California, Berkeley). Radiation Research 7, 407-35(1957) Oct. NSA 12-2673

9152

General Electric Co. Hanford Atomic Products Operation, Richland, Wash.

BETA RAY DOSE CALCULATIONS. W. C. Roesch. Oct. 8, 1957. 13p. Contract W-31-109-eng-52 (HW-51318(Rev.))

The dose rate near an infinite-line source was found. The numerical results fit a simple mathematical expression which can be integrated fairly easily in other problems of cylindrical geometry. This expression and its application in determining the beta ray dose to the wall of an intestine or of a blood vessel and to the thyroid of a sheep are described. NSA 12-2627

9153

RECENT CHANGES IN MAXIMUM PERMISSIBLE EXPOSURE VALUES. K. Z. Morgan (Oak Ridge National Lab., Tenn.). Arch. Ind. Health 16, 357-62(1957) Nov.

In April, 1956, the International Committee on Radiological Protection adopted the maximum permissible integrated absorbed dose as 50 rem to age 30 or 50 rem per decade thereafter. The National Committee on Radiation Protection set the maximum absorbed dose that could be accumulated from occupational exposure at 5(A-18) rem, in which A is the age in years of the occupationally exposed person. The effect of this standard on the others is evaluated and the reasoning and experience which led to these standards are discussed. NSA 12-2694

9154

INDUCED TOLERANCE AND "HOMOLOGOUS DISEASE" IN X-IRRADIATED MICE PROTECTED WITH HOMOLOGOUS BONE MARROW. J. J. Trentin (Baylor Univ. Coll. of Medicine and Univ. of Texas Dental Branch, Houston). Proc. Soc. Exptl. Biol. Med. 96, 139-44 (1957) Oct. NSA 12-2700

9155

CHEMICAL PROTECTION AGAINST X-RAY DAMAGE TO CHROMOSOMES. Herbert Parkes Riley (Oak Ridge National Lab., Tenn.). Genetics 42, 593-600(1957) Sept.

Onion root tips were treated with x-rays while immersed in water or in various chemical compounds. The effect of the radiation was determined from the frequency of chromosome interchanges or deletions or of anaphase bridges. Protection against the formation of interchange

and deletions was conferred by 4×10^{-2} M sodium sulfhydrate, sodium thiosulfate, sodium hydrosulfate, and sodium pyrosulfate, and 1.7 M ethanol but not by 2.8×10^{-1} glucose or 4×10^{-3} M sodium peroxydisulfate and uracil or by 2×10^{-3} M sodium bisulfite, sodium bisulfate, and tryptophan. Protection against deletions but not significantly against interchanges was conferred by 4×10^{-3} M sodium metabisulfite, cysteine, and cystine. Protection against anaphase bridges was given by 4×10^{-4} M cysteine and cystine but not by sodium bisulfite or sodium bisulfate. When primary roots less than 1 cm long from freshly germinated seeds were irradiated in water, they showed fewer chromosomal interchanges and deletions and fewer anaphase bridges than did root tips from bulbs. Roots from older seedlings about 8 cm long had fewer interchanges and deletions than roots from bulbs but more than young roots from seeds. There seems to be some inherent protection against radiation in freshly germinated seeds that disappears as the roots get older. NSA 12-2697

9156

THE MECHANISM OF DEATH FOLLOWING WHOLE BODY RADIATION. Edith Paterson (Christie Hospital and Holt Radium Inst., Withington, Manchester). Brit. J. Radiol. 30, 577-81(1957) Nov.

During the period of the radiation syndrome, the changes in the blood, however dramatic, are probably not basic to the mechanism of death, but are an inevitable secondary consequence. Death, at the critical stage, may be precipitated by hemorrhage or anoxia, or by the occurrence of bacteremia. The prime cause of death must surely be the exhaustion of one or more stem cell types from the reticulum. Individual differences in quality or quantity of this cell factor determine the individual sensitivity of the subject. Hibernation will postpone, but not prevent, the train of events. But replacement of this factor sufficiently early in the post-irradiation period can prevent the diverse changes. It would seem to be of the utmost importance to find the function or the identity of this cell type. This would not only give us a real understanding of the mechanism and treatment of total body irradiation but might also enable us to understand some of those diseases of the reticuloendothelial system in which bone marrow failure is a characteristic termination. NSA 12-2645

9157

THE EFFECT OF TOTAL-BODY IRRADIATION ON CATABOLISM OF UREA IN THE RAT. John H. Rust, Willard J. Visek, and Lloyd J. Roth (Univ. of Chicago, Ill.). Arch. Biochem. Biophys. 72, 189-93(1957). NSA 12-2633

9158

EXPERIMENTAL TREATMENT OF TOTAL-BODY IRRADIATION INJURY: A BRIEF REVIEW. C. C. Congdon (Oak Ridge National Lab., Tenn.). Blood 12, 746-54 (1957) Aug. NSA 12-5856

9159

HOMOLOGOUS BONE MARROW IN THE TREATMENT OF RADIATION INJURY IN MICE. C. C. Congdon and Irene S. Urso (Oak Ridge National Lab., Tenn.). Am. J. Pathol. 33, 749-67(1957). NSA 12-5854

9160

THE RADIOPROTECTIVE CAPACITY OF GASEOUS HYDROGEN. Jean-Michel Kirmann. Compt. rend. 245, 2413-14(1957) Dec. 16. (In French).

Hydrogen gas protects the frontal bone of the chicken embryo against a localized x irradiation producing abnormalities in the controls NSA 12-5858

9161

BONE MARROW TRANSPLANTATION IN ANIMALS EXPOSED TO WHOLE-BODY RADIATION. C. C. Congdon (Oak Ridge National Lab., Tenn.). J. Cellular Comp. Physiol. 50, Suppl. 1, 103-8(1957) Dec. NSA 12-5859

9162

EFFECTS OF X RADIATION ON THE MUTABILITY OF

ACTINOMYCES SUBTROPICUS (The producer of albomycin). S. I. Alikhanyan and F. S. Klepikova (All-Union Research Inst. of Antibiotics). Doklady Akad. Nauk. S. S. S. R. 115, 806-8(1957) Aug. 1. (In Russian). NSA 12-1168

9163
THE EFFECT OF HYPOTHERMIA ON THE RADIO-SENSITIVITY OF MICE TO WHOLE-BODY X-IRRADIATION. Shirley Hornsey (Hammersmith Hospital, London). Proc. Roy. Soc. (London) B147, 547-9(1957) Dec. 17. NSA 12-5862

9164
Oak Ridge National Lab., Tenn.
HEALTH PHYSICS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING JULY 31, 1957. Nov. 26, 1957. 131p. (ORNL-2384)

Progress is reported in the following studies; the construction of a body burden counter which employs activation analysis to measure directly U^{235} injected in rats and mice; the tissue distribution of U^{233} in mice following ingestion of 0.12 μ c/day in drinking water for periods of from 30 to 120 days, the testing of an atmosphere exposure chamber, the tissue distribution of U in dogs following inhalation of uranium fumes or the ingestion of uranium oxides, development of a procedure for the radiometric determination of U in urine following ion exchange separation as a uranyl chloride complex, radiobiological-ecological studies on the drained bed of White Oak Lake, an impoundment used as a holdup basin for low-level radioactive wastes, the development of procedures for use in the collection of arthropods and insects, the effects of irradiation on population growth of Collembola, Coleoptera, and Caloglyphus, the uptake of fission product waste seepage by trees and smaller vegetation, a review of data on maximum permissible concentrations of radioisotopes for the human body, the tissue distribution of Sr^{90} and Y^{90} in mice, the spectrographic analysis of human tissues for trace elements, the performance of an aerosol generator for dispersing U aerosols, the development of radiochemical methods for the determination of trace amounts of fission products in water and soil samples, investigations of waste processing by evaporation, storage in deep wells and waste pits, adsorption on soil columns, solvent extraction, and sintering, assays of the soil movement and dilution of wastes from storage pits, and a survey of possible waste disposal sites. A review is presented of the Ichiban Project for the determination of the absorbed doses of fast neutrons and γ radiation received by survivors of the nuclear bombing of Hiroshima and Nagasaki. Data are included from a preliminary study of γ attenuation by Japanese house components. Applications of the information theory in studies of radioinduced tissue damage are discussed. A quantum theory for the dielectric constant of metals is presented and discussed. A procedure is described for the preparation of thin uniform sources for a beta-ray spectrometer. Studies on the theoretical physics of radiation dosimetry and the development of instruments for use as dosimeters are reported. Education, training, and consultation activities during the period are reported, and a list of publications during the period is included. (For preceding period see ORNL-2151). NSA 12-2693

9165
EFFECTS OF RADIOCOBALT IRRADIATION OF RABBIT SPERMATOZOA IN VITRO ON FERTILIZATION AND EARLY DEVELOPMENT. M. C. Chang, Dorothy M. Hunt, and E. B. Romanoff (Worcester Foundation for Experimental Biology, Shrewsbury and Boston Univ. Mass.). Anat. Record 129, Oct. 2, 211-29(1957). Oct.

Rabbit semen irradiated with gamma radiation from a Co-60 source in vitro at 90 r to 65,000 r was inseminated

artificially to females. The ova were examined at pronuclear, segmentation, blastocyst, and late fetal stages. The mortality of spermatozoa was damaged only at very high doses of irradiation, 32,200 to 65,000 r. Though incapacity of sperm to reach the site of fertilization may occur at these dose levels, the fertilizing capacity per se appears to be undamaged. The segmentation of fertilized ova was very much disturbed. The disturbance is in proportion to the dose level and the higher the dose level the earlier the failure of segmentation. With irradiation of sperm at 90 r, the proportion of morphologically normal fetuses is not significantly lower than after normal mating; following irradiation of sperm at 800 r the formation of normal blastocysts was impaired but once a normal blastocyst is formed implantation and development are assured, following irradiation of sperm at 6,500 r, no normal blastocyst is formed. Delayed penetration of sperm, a high proportion of polyspermic ova, haploidy and triploidy of ova, and delayed syngamy were not observed following the irradiation of sperm at 32,200 to 65,000 r. Fragmentation of female and male pronuclei, an irregularity of nucleus formation at segmentation, and one possible gynogenetic ovum out of 32 ova were observed. NSA 12-11237

9166
THE DISTRIBUTION OF RADIOISOTOPES OF SOME HEAVY METALS IN THE RAT. Patricia W. Durbin, Kenneth G. Scott, and Joseph G. Hamilton. Univ. of Calif. (Berkeley) Publ. Pharmacol. 3, No. 1, 1-34 (1957)

A summary is presented of data on the biological half times and the principal deposition sites of 18 heavy metals in rats. Tracer techniques were used in the studies. Data are included on the following elements: Cd, Hg, In, Tl, Sn, Pb, Nb, Ta, Mo, W, Tc, Re Ru, Os, Rh, Ir, Pd, and Pt. NSA 12-5875

9167
USE OF SERUM FROM IRRADIATED RABBITS AND GUINEA PIGS AS COMPLEMENT IN BACTERICIDAL REACTIONS. Lottie Kornfeld (Univ. of Chicago). J. Bacteriol. 74, No. 6, 830-1(1957) Dec.

The preparation of serum for use in complement fixation studies is simplified by the in vivo radioinduced inactivation of normal antibodies in the blood of donor animals. Normal bacteridins for Bacillus subtilis disappeared from the sera of rabbits and guinea pigs following exposure to doses of x radiation ranging from 200 to 1000 r. The optimum time for bleeding seemed to depend on the size of the animal. Results are presented for bactericidal tests with a normal mouse serum pool in the presence of complements from several sources. A more sensitive reaction was obtained with serum from irradiated animals. NSA 12-11242

9168
THE EFFECT OF RADIATION ON THE NORMAL AND MALIGNANT CELLS IN MAN. (Paper from) Report of London Conference Held May 13-14, 1946 on Certain Aspects of the Action of Radiation on Living Cells. P. C. Koller. Brit. J. Radiol. Suppl. No. 1, 84-98(1947).

The author's observations on human malignant tumors in mice are included. Direct and indirect effects on mitosis and on chromosomes are described and discussed.

9169
CONFERENCE ON THE EFFECTS OF IONIZING RADIATION ON THE COURSE OF PREGNANCY, DEVELOPMENT OF THE FETUS, AND THE NEWBORN. N. A. Kalina. Med. Radiol. 2, No. 6, 87-9(1957). (In Russian). NSA 12-5171

9170
ON THE ABSORPTION OF RADIOACTIVE PHOS-

PHORUS FROM THE PLEURAL CAVITY. V. R. Faytel' berg-Blank and Yu. B. Sosyura. *Bull. Eksptl'. Biol Med.* No. 3, 64-8(1957) Mar.

Experiments on 15 rabbits indicate that radioactive phosphorus is very rapidly absorbed from the pleural cavity following intrapleural injection. Artificial pneumothorax slowed absorption of the radiophosphorus and increased deposition in the liver and lungs as compared with non-operated rabbits. The concentration of radiophosphorus was higher in the non-collapsed lung.

NSA 12-9655

9171

THE RADIOACTIVE HAZARDS FROM THE EXPLOSION OF A HYDROGEN BOMB AND AN ORDINARY ATOMIC BOMB. O. I. Leypunskiy. *Atomnaya Energiya* 3, 530-9 (1957).

The hazards for the total world population caused by the long-lived fission products from the explosion of an atomic or hydrogen bomb are estimated. The dose of irradiation on the body are computed, and the number of cases of radiation injury (especially leukemia) developing afterwards is estimated. For a hydrogen bomb C^{14} and H^3 are the dangerous isotopes, and for an atomic bomb Sr^{90} , Cs^{137} , and C^{14} . The total decay energy of the fission products from a hydrogen bomb is about three times higher than that from an atomic bomb. However, the irradiation doses and the fatalities during the decay of the radioactive isotopes are equally high for both bombs. It cannot be said that the hydrogen bomb is less dangerous than the atomic bomb from the viewpoint of radiation injuries. NSA 12-10288

9172

RADIOPROTECTORS AND TISSUE METABOLISM AFTER IRRADIATION. A. de Schryver, J. de Witte, I. Leusen, and P. M. van Vaerenbergh. *Arch. intern. pharmacodynamie* 106, No. 1-2, 181-3(1956). (In French).

The radioprotective effect of β -mercaptoethylamine on the utilization of oxygen by the spleen was studied in the rat. Rats were irradiated with 750 r, receiving 1 mg of β -mercaptoethylamine per 100 g of weight 2 min before the irradiation. Five days later the rats were decapitated and the spleen examined. The results showed that the rats treated with the β -mercaptoethylamine had a much higher utilization of oxygen than the untreated rats. The value was halfway between the non-irradiated rats and the unprotected rats. NSA 12-9625

9173

THE PRIMARY SUTURE OF WOUNDS IN EXPERIMENTAL RADIATION SICKNESS. B. L. Razgovorov. *Eksperimental' naya Khirurgiya* No. 2, 47-50(1957) Mar.-Apr.

After guinea pigs, rabbits, and dogs were subjected to toxic doses of x radiation, various wounds were inflicted. Data are presented on recovery of animals. NSA 12-9588

9174

THE TREATMENT OF CHILDRENS' HEMANGIOMA AND NEVUS FLAMMEUS WITH Sr^{90} AND Y^{90} . Hanns-Joachim Lossel and Alfons Jakob. *Strahlentherapie* 104, 90-3(1957). (In German).

The authors report the excellent results obtained in the radiotherapy of the hemangioma of the child and of the nevus flammeus by means of strontium-90 and yttrium-90. The method is preferred to others as it reduces the charge of rays on the growing skeleton of the child and on the gonads. In case of smaller lesions the application of strontium-90 (total dose 3000 to 5000 rep) and surface irradiation by means of yttrium-90 foils (total dose 3000 to 4000 rep) produce good results. The single dose should be around 1000 rep. The dosage has to be fixed according

to the erythema which appears with medium intensity. To judge from the gathered experiences the results of this therapy are equivalent to those of radium treatment or Chaoul's close irradiation. NSA 12-3532

9175

CHANGES IN THE HEART SENSITIVITY TO GLUCOSIDES IN RADIATION SICKNESS. G. S. Koroza (Inst. of Pharmacology and Chemical Therapy, Acad. of Sciences, U.S.S.R.). *Med. Radiol.* 2, No. 6, 41-4(1957) Nov.-Dec. (In Russian). NSA 12-5190

9176

TREATMENTS OF ACUTE RADIATION SICKNESS IN DOGS BY DRIP BLOOD TRANSFUSIONS. A. N. Gamaleya, A. A. Gyurdzhian, A. A. Zhgun, and P. V. Simonov (Burdenko Military Hospital of the Defense Dept., U.S.S.R.). *Med. Radiol.* 2, No. 6, 56-60(1957) Nov.-Dec. (In Russian). NSA 12-5192

9177

CHROMATOGRAPHIC CHARACTERIZATION OF SOLUBLE DEOXYPOLYNUCLEOTIDES RELEASED IN MOUSE SPLEEN BY X-IRRADIATION. R. K. Main, L. J. Cole, and M. E. Ellis (U. S. Naval Radiological Defense Lab., San Francisco, Calif.). *Nature* 180, 1285-6(1957) Dec. 7. NSA 12-3494

9178

HEMATOLOGICAL INVESTIGATION OF THE EFFECT OF PROTECTIVE MATERIAL. PART V. THE RADIATION REACTION OF SPLEEN AFTER THE USE OF PROTECTIVE MATERIAL. Helmut Hartweg. *Strahlentherapie* 103, 559-63(1957). (In German).

The author reports on investigations in which the influence of homologous bone marrow, cysteine and vitamin P on the x-ray reaction of the spleen was tested in rats. The effect of these substances on the spleen is not as plain as on the bone-marrow. Lead protection on a shank and preliminary treatment with vitamin P leads to a regeneration that sets in 48 hours earlier. All the protected animals show complete recovery of the spleen structure on the 45th day, the control animals on the 60th day only. NSA 12-3526

9179

THE ALKALINE PHOSPHATASE LEVEL OF THE PLASMA FOLLOWING RADIATION INJURY. Johannes Pany (Physiologischen Institut der Universität, Vienna). *Strahlentherapie* 104, 507-13(1957). (In German).

The author investigates the changes caused by x rays in the alkaline phosphatase of the blood plasma of rats. No effect having been detected after small doses, a heavier x ray load showed a dose dependence of the occurrence of ferment in the plasma (load of 500 and 1000 r). The probable origin of the ferment is discussed. NSA 12-7086

9180

California. Univ., Berkeley. Radiation Lab. BIOLOGY AND MEDICINE QUARTERLY REPORT [FOR] JULY, AUGUST, SEPTEMBER 1957. Oct. 14, 1957. 19p. Contract W-7405-eng-48. (UCRL-8031)

Data are presented from studies on Sr^{90} metabolism in monkeys and the deposition of Ce^{144} in the developing fetal skeleton in rats. Progress is reported in the study of radiation-induced reactions of proteins in aqueous solution. The process of thermal-neutron-induced activation of indium foils was adapted to the measurement of fast neutrons. A radiation survey was made at the 184-inch cyclotron and recommendations were made regarding additional shielding. Routine health chemistry and health physics activities during the period are summarized. (For preceding period see UCRL-3880.) NSA 12-3486

9181

Utah. Univ., Salt Lake City. Coll. of Medicine. EFFECT OF PRE-RADIATION IMMUNIZATION ON

RESISTANCE TO AEROSOL-INDUCED INFECTION IN X-IRRADIATED MICE. Eugene H. Perkins and Stanley Marcus. Aug. 13, 1956. 7p. (AF-SAM-57-33; AD-132262)

The effect of active immunization prior to x radiation (acute and chronic whole-body exposure) was determined in mice infected with an aerosol of *Klebsiella pneumoniae*. Adult mice were immunized by multiple injections and irradiated seven days following the final injection. Control and immunized animals were then challenged four and six days following radiation exposure. Immunization prior to x radiation increased resistance to infection. This protective effect was not destroyed at sublethal or near mid-lethal levels of x radiation exposure. A large total dose, given in increments, was found to be far less detrimental to the host defenses than the same dose actually administered. NSA 12-3483

9182

RECESSIVE LETHAL MUTATION INDUCED IN THE MOUSE BY CHRONIC γ -IRRADIATION. T. C. Carter (Medical Research Council's Radiobiological Research Unit, Harwell, Berkshire, Eng.). Proc. Roy. Soc. (London) B147, 402-11(1957) Dec. NSA 12-5829

9183

IONIZING RADIATION AND THE AGING PROCESS. A. C. Upton (Oak Ridge National Lab., Tenn.). J. Gerontol. 12, 306-13(1957) July. NSA 12-5825

9184

PATHOLOGY AND SYMPTOMATOLOGY OF THE RADIATION SYNDROME. (A summarizing report). Kurt Fochem (Universitäts-Frauenklinik, Vienna). Strahlentherapie 104, 416-35(1957). (In German).

The author gives a comprehensive synopsis of the irradiation syndrome. The different symptoms are detailed as regards to the time of their occurrence and of their intensity conditional upon the patients' age, type and degree of the affection. The theories regarding the mechanism of origin of the syndrome are discussed. In conjunction follows the assessment of investigations concerning the releasing factor of the acute irradiation disease. The differences between the kind of irradiation and the site of irradiation are pointed to. Finally, the therapeutic possibilities are discussed. NSA 12-7695

9185

A NEW GROUP OF BALANCING ATOMS. T. P. Feenstra. Koninkl. Akad. Wetenschappen 25, 37(1916).

Thorium can be substituted for K in Ringer's solution used to perfuse frog hearts.

9186

BIOCHEMICAL STUDIES ON BETA-IRRADIATED GUINEA PIG EPIDERMIS. C. Weiss and J. Tabachnik. Federation Proc. 15, 538(1956).

There was no observable change in epidermal RNase, DNase or phosphatase activities over a 40 day period following β irradiation. Sixteen days after irradiation there was an increase in total free amino acids in the irradiated epidermis.

9187

CHANGES IN RESPIRATORY GASES OF BURROS AFTER PROLONGED FRACTIONAL TOTAL BODY X IRRADIATION. J. L. Wilding, J. F. Lane, B. F. Trum, J. H. Rust, and J. C. Schoolar. Radiation Research 2, 64-70 (1955).

9188

THE INFLUENCE OF HEAT TREATMENTS ON THE INJURY AND CYTOGENIC EFFECTS OF X RAYS ON BARLEY. Richard S. Caldecott and Luther Smith. Genetics 37, 136-57(1952).

The following treatments were applied to dormant barley seeds to determine whether or not injury, chromosomal aberrations and mutations are necessarily correlated effects of x radiation, control, x irradiation

sublethal heat treatment; x irradiation followed immediately by heating; heat treatment followed immediately by x irradiation.

9189

ACTIVITIES INDUCED IN COMMON FOODS BY THERMAL-NEUTRON EXPOSURE. D. C. Peterson, S. H. Webster and E. J. Liljgren. Nucleonics 10(1), 33-36(1952).

It is possible to calculate neutron-induced radioactivities in foods from Na, K and P contents. Other elements are sometimes present in sufficient concentrations to increase activity over that calculated. Radioactivity induced in foods at 1700 ft. is so low that ingestion of a reasonable amount gives a radiation dose, insignificant compared to presently accepted tolerance doses. (from abstract). CA 45-10469

9190

DIFFERENCES IN THE EFFECTS OF X RAYS AND THERMAL NEUTRONS ON DORMANT SEEDS OF BARLEY. R. S. Caldecott, E. F. Frolk and Rosalind M. Morris. Genetics 37, 571-2(1952).

Dormant seeds of Himalaya barley subjected to 5,000, 10,000, 15,000 and 20,000 r of x radiation were compared with seeds exposed to thermal neutrons for 3, 6, 9 and 12 hours at a flux of 4.65×10^8 n th/cm²/sec. X-irradiated seedlings were much shorter 14 days after exposure.

9191

THE RELATIVE EFFECTS OF X RAYS, γ RAYS AND β RAYS ON TRADESCANTIA POLLEN. John S. Kirby-Smith and D. S. Daniels. Genetics 37, 596(1952).

Tradescantia pollen grains were irradiated with 250 Kvp x rays filtered by Al Cu, with γ rays from Co 60, and with β rays from P 32. In every instance the x rays were about twice as effective in producing chromosomal aberrations as equivalent roentgen doses of high energy γ rays or β rays. Thus, production of aberrations was not constant over the wave length range from medium-energy x rays to high-energy γ rays. Dose-aberration frequency curves are presented.

9192

THE NATURE OF CHROMOSOME DIVISION AND THE DURATION OF THE NUCLEAR CYCLE. A. Marshak. Proc. Natl. Acad. Sci. U.S. 502-10(1939).

Chromosome fragments containing a portion of only one chromonema are found after treating root tip of *Vicia faba* with neutrons or x rays. There are very few during the first 12 hours and later than 48 hours past exposure. There is a sharp maximum in frequency at 18 hours, attributed to a critical stage in the synthesis of new chromonemata in the "resting" nucleus.

9193

A COMPARISON OF THE SENSITIVITY OF MITOTIC AND MEIOTIC CHROMOSOMES OF *VICIA FABA* AND ITS BEARING ON THEORIES OF CROSSING-OVER. A. Marshak. Proc. Natl. Acad. Sci. 25, 510-16(1939).

Maximum number of chromosome abnormalities is observed at about 24 hours after x irradiation. The most sensitive stage in the meiotic cycle is pachytene. The sensitivity curve for meiotic chromosomes has almost exactly the same slope as that for somatic chromosomes. The relation of these observations to theories of crossing over is discussed.

9194

NATURAL AND INDUCED CHANGES IN CHROMOSOME STRUCTURE IN MAIZE ENDOSPERM. Donald F. Jones. Proc. Natl. Acad. Sci. U.S. 27, 431-5(1941).

Plants growing in the field were exposed to x rays, 75 to 78 hours after pollination. Doses of approximately

30 r increased the number of both single and paired losses in treated material. All the effects following radiation may also occur naturally, radiation increasing only the rate of occurrence.

9195

EFFECT OF X-RAYS ON CHROMATID ABERRATIONS. C. P. Swanson and Drew Schwartz. Proc. Natl. Acad. Sci. U. S. 39, 1241-50(1953).

Conclusions: (1) reduction in the number of chromatid deletions brought about by exposure of cells to 100 KVP, 15 ma, 50 r/min in nitrogen is less than for isochromatid deletions, (2) frequency of chromatid deletions in nitrogen is much higher than that induced in air. Other results are also reported.

9196

PHYSICAL AND CHEMICAL BREAKAGE OF CHROMOSOMES. C. D. Darlington. Pubbl. Staz. Zool. Napoli. Suppl. 22, 22-31(1950).

Breakage of chromosomes by physical and chemical means depends upon the influence which these agents have on nucleic acid and proteins. Chromosome effects vary according to the stage of the chromosome-cycle treated, the parts of the chromosome broken and the agent used. BA 25-22491

9197

GAMMA RAYS: THE HOPE OF RESEARCHERS TO LENGTHEN REFRIGERATED LIFE OF FRESH FOODS. L. E. Brownell, J. T. Graikoski, and L. L. Kempe. Refrig. Eng. March 42-7(1955).

Doses equal to 1 to 2% of the sterilizing dose can reduce population of microorganisms in foods 90 to 99 + per cent (pasteurization) without producing undesirable changes. Radiation pasteurization appears much more feasible at present than does radiation sterilization on the basis of freedom from undesirable changes, dose required and cost.

9198

PHYSICAL AGENTS IN THE "IMPROVEMENT OF PLANTS." A. Camara. Rev. Agron., Lisboa 3, 13-20(1944).

Author reviews studies on the induction of mutations, chromosome aberrations and polyploidy by means of heat or cold treatments, ultra-violet and x irradiation, and centrifuging, principally in *Triticum monococcum* and *Drosophila*. PBA 18-738

9199

REPORT UPON SOME PRELIMINARY EXPERIMENTS WITH ROENTGEN RAYS ON PLANTS. G. F. Atkinson. Science 7, 7-13(1898).

Various plants were exposed to x rays to determine whether or not injuries would result, as had happened when x rays were used for studying internal parts of the human body. In most cases no visible external injuries resulted, even where parts were exposed at close range a large part of the time for several days. The author concluded that plant tissues absorb x rays quite freely without injurious effects.

9200

DISTRIBUTION AND EXCRETION OF PLUTONIUM. p. 256-263. INDUSTRIAL MEDICINE ON THE PLUTONIUM PROJECT (NNES-IV-20). E. R. Russell and J. J. Nickson. Robert S. Stone, ed. McGraw-Hill Book Co., Inc. New York (1951).

A maximum permissible body burden of $1.0 \mu\text{c}$ was established for plutonium, and means were found to determine body plutonium content. Examinations were based on urinalysis, fecal analysis having proved unsatisfactory. Plutonium content was calculated on the basis of a urinary plutonium excretion rate of 0.01 per cent per day.

9201

EFFECTS OF CHRONIC EXPOSURE TO X RADIATION

ON THE PERIPHERAL BLOOD OF EXPERIMENTAL ANIMALS. M. Ingram and W. B. Mason. p-253-267 in: Biological Effects of External Radiation (NNES VI-2) Henry A. Blair, ed. McGraw Hill Book Co., Inc. New York (1954).

Hematological examinations were made on dogs, rabbits, rats and monkeys exposed to whole body x radiation of 0.1 to 10.0 r/day for 2 years. Lymphocytes are the most sensitive indicators of damage, mature erythrocytes are the least. There is a difference in the response of dogs and rabbits. Reticulocyte depression is less pronounced than with exposure to one dose.

9202

EFFECTS OF CHRONIC EXPOSURE TO X RADIATION ON GROWTH AND SURVIVAL. Robert D. Boche p. 222-252 in: Biological Effects of External Radiation (NNES VI-2) Henry A. Blair, ed. McGraw-Hill Book Co., Inc. New York (1954).

Experiments on survival of rats following radiation are described. Frequency of death among 10 r/day animals was the same as among the controls during the first year, subsequently there was a marked increase in death rate. The concept of mortality per roentgen is discussed. The author describes effects of radiation on weight and the reproductive system.

9203

PATHOLOGY IN ANIMALS SUBJECTED TO REPEATED DAILY EXPOSURE TO X RAYS. Roger G. Metcalf. p.268-338 in: Biological Effects of External Radiation (NNES-VI-2). Henry A. Blair, ed. McGraw-Hill Book Co., Inc. New York. (1954).

Rats were exposed to x irradiation of 0.1, 0.5, 1.0 and 10 r/day for 2 years. In animals that died pulmonary infection, testicular atrophy, ulcers and leukemia occurred. There was no hemorrhage in the bone marrow or lymph nodes. In sacrificed animals, testicular atrophy was equivocal, lymph node follicles were hypoplastic. Bone marrow did not show hypoplasia.

9204

INVESTIGATION OF THE THERAPEUTIC POSSIBILITIES IN RADIOACTIVE CONTAMINATION. I. THE EFFECT OF CHELATING AGENTS ON THE BEHAVIOR OF RADIO-CERIUM IN THE MAMMAL ORGANISM. Alexander Catsch and Du Khuong Le. (Heilighenberg-Instituts, Baden, Germany). Strahlentherapie 104, 494-506(1957). (In German)

Diethylenetriamine pentaacetic acid and diamino-diethylether tetraacetic acid, when administered either early or delayed, increase to a much higher degree the excretion of radiocerium from the organism than ethylenediamine tetraacetic acid and other chelating agents. Highly effective are also condensed phosphates, however only if administered at an early stage. NSA 12-7106

9205

Brookhaven National Lab. EFFECTS OF RADIATION ON BIOLOGICAL SYSTEMS. A. H. Sparrow and B. A. Rubin. Feb. 15, 1951. 54p. (BNL-97)

Authors present a review of the biological effects of radiation with 222 references. Includes review of mechanisms of effects at molecular and cellular levels, effects on semicellular and multicellular organisms, including embryos, and differences in radiosensitivity. NSA 5-4647

9206

INTRODUCTORY SURVEY OF EXPERIMENTAL DATA. C. B. Allsapp. Brit. J. Radiol. Suppl. 1-3, 43-45 (1947-50).

9207

THE LYMPHOCYTE IN NATURAL AND INDUCED RESISTANCE TO TRANSPLANTED CANCER. III. THE EFFECT OF X RAYS ON ARTIFICIALLY INDUCED

IMMUNITY. J. B. Murphy and H. D. Taylor. J. Expt. Med. 28, 1(1918).

Mice given an immunizing injection of transplantable cancer proved to be immune to it. They again became susceptible after whole body x irradiation.

9208

RESPONSE OF THE BURRO TO 100 r FRACTIONAL WHOLE BODY GAMMA RAY IRRADIATION. T. J. Haley, E. F. McCulloh, W. G. McCormick, B. F. Trum and J. H. Rust. Am. J. Physiol. 180, 403-7(1955).

General symptoms of radiation injury in burros exposed to 100 r of γ rays per day are similar to but slower in developing than symptoms when daily dose of radiation was higher. Pronounced lymphopenia occurred 1 hr after the first 100 r dose. The thrombocytes followed the pattern of response obtained when either 100 r fractional or a single LD₅₀ dose of irradiation was given. Generalized bleeding from small wounds did not occur until 21st day in 200 r series. Hyperferremia was observed when the total dose reached 400 r.

9209

THE BIOLOGICAL BASIS OF RADIATION PROTECTION. H. Langendorff (Univ. of Freiburg i. Br. and Heiligenberg Institutes, Heiligenberg/Baden, Germany). Radiol. Clin. 26, No. 5, 260-71(1957) Sept. (In German).

The biological factors such as age and sex of the irradiated object as well as the kind and structure of the cells which affect response to radiation are briefly reviewed. The various approaches to radiation protection by biological methods are discussed, and the experimental results of many tests on different animals are reviewed. NSA 12-8277

9210

NONINFECTIOUS IMMUNOLOGY IN THE PROBLEM OF PATHOGENESIS OF RADIATION SICKNESS. R. V. Petrov. Med. Radiol. 2, No. 6, 3-12(1957) Nov.-Dec. (In Russian). NSA 12-5189

9211

Office of the Adjutant General, Washington, D. C. FOOD PRESERVATION IN THE ATOMIC AGE. A Selected List of Titles. [1956]. 10p. (NP-6532)

A list of over 100 titles was compiled covering general aspects of preserving food by means of irradiation. Most of the papers have been published since 1952. NSA 12-4031

9212

THE EFFECTS OF RADIATION ON EXTRACTION-WOUND HEALING IN THE RAT. Murray Stein, Luther W. Brady, and Antohn Raventos (Univ. of Pennsylvania School of Medicine, Philadelphia). Cancer 10, 1167-81(1957) Nov.-Dec. NSA 12-2649

9213

FRACTIONATED DOSE EFFECTS ON SURVIVAL AND ORGAN WEIGHTS IN X-IRRADIATED MICE. J. G. Kereiakes, W. H. Parr, and A. T. Krebs (U. S. Army Medical Research Lab., Fort Knox, Ky.). Am. J. Physiol. 191, 131-4(1957) Oct. NSA 12-2635

9214

PERIPHERAL BLOOD OF THE X-IRRADIATED RHESUS MONKEY. A. J. Riopelle, H. W. Ades, and F. E. Morgan, Jr. (Emory Univ., Ga.). Radiation Research 7, 581-90 (1957) Dec. NSA 12-2682

9215

IONIZING RADIATION AND HUMAN HEREDITY. N. P. Dubinin (Laboratory of Radiation Genetics, Inst. of Biophysics, Acad. of Sciences, U.S.S.R.). Izvest. Akad. Nauk S.S.S.R. Ser. Biol., 743-55(1957) Nov.-Dec. (In Russian). NSA 12-4050

9216

EXTERNAL IRRADIATION OF THE THYROID GLAND IN DOGS. EFFECTS OF LARGE DOSES OF ROENTGEN RAYS UPON HISTOLOGIC STRUCTURE AND ¹³¹I METAB-

OLISM. Paul M. St. Aubin, Ralph M. Kniseley, and Gould A. Andrews (Oak Ridge Inst. of Nuclear Studies, Tenn.). Am. J. Roentgenol. Radium Therapy Nuclear Medicine 78, 864-75(1957) Nov. NSA 12-2638

9217

EFFECT OF RADIATION ON HUMAN HEREDITY. Geneva, World Health Organization, 1957. 168p. \$4.00.

The findings of a study group on the effect of radiation on human heredity are summarized. The group recommends the establishment of institutions and departments devoted to general genetics and human genetics. A registry of serious hereditary diseases and defects in various populations is suggested. It is pointed out that there is evidence that damage to body tissues produced by radiation after relatively small doses is, at least in part, mediated through effects on genes and chromosomes. There is also evidence that the life-span may be reduced in mammals even by relatively small radiation doses. The genetic hazards of man-made radiation from sources used in medicine, industry, commerce, and experimental science is stressed. The importance of reducing radiation exposures and shielding the gonads is emphasized. It is suggested that as both an approach to control and as a means of providing basic background information for relating quantitatively radiation exposure and effects on man, it is essential that methods be found of recording exposures to individuals and populations. Individual papers presented at the meeting of the study group are included.

9218

EFFECTS OF POTASSIUM CYANIDE ON THE SURVIVAL OF IRRADIATED ANIMALS. N. V. Luchnik and E. A. Timofeeva-Resovskaya (Inst. of Biology, Urals Acad. of Sciences, U.S.S.R.). Doklady Akad. Nauk S.S.S.R. 116, 407-10(1957) Sept. 21. (In Russian). NSA 12-4046

9219

Armed Forces Special Weapons Project, Washington, D. C. A SURVEY OF THEORIES AND EXPERIMENTS ON THE SHORTENING OF LIFE SPAN BY IONIZING RADIATION. Nathaniel I. Berlin and Frank L. DiMaggio. June 28, 1956. 65p. (AFSWP-608)

The effect of total-body radiation, both acute and chronic, on life span has been reviewed from the standpoint of the Gompertz function, Sacher, Blair and Smith theories. The equations of Strandqvist, Hoffman and Reinhard, and the French EAW purporting to calculate the effective dose resulting from chronic irradiation have been reviewed. NSA 12-7652

9220

THE PUBLIC HEALTH IMPLICATIONS OF THE ATOMIC AGE. Clinton C. Powell (U. S. Dept. of Health, Education, and Welfare, Washington). Minerva Nucleare 1, 217-19 (1957) Oct. NSA 12-5861

9221

THE POSSIBILITY OF FORECASTING THE RELATIVE RATE OF INDUCED LOSS FOR ENDOSPERM MARKERS IN MAIZE. A. C. Faberge (Oak Ridge National Lab., Tenn.). Genetics 42, 454-72(1957) July. NSA 12-1172

9222

General Electric Co. Hanford Atomic Products Operation, Richland, Wash.

TURNOVER AND TISSUE DISTRIBUTION OF RADIO-RUTHENIUM OXIDE IN THE LUNGS OF MICE. D. H. Willard, L. A. Temple, and W. J. Bair. Oct. 1, 1957. 18p. Contract W-31-109-eng-52. (HW-52286)

Whole-body turnover and tissue distribution of ruthenium in mice were studied for 427 days after single intratracheal injections of Ru¹⁰⁶O₂. Because of a continuously changing rate of turnover several values for the biological half life were calculated. Following the early

period of high turnover rate the biological half life was 280 days when estimated by resolution of the turnover curve into a series of three exponentials. The retention of Ru^{106} was best represented by a power function and the average biological half life obtained by integration of the power function curve over a period of 230 days was 170 days. Integration of the exponential curve over the same period gave an average half life of 110 days. After 164 days a portion of the animals were sacrificed to determine the tissue distribution of Ru^{106} . The total-body burden was 12% of the initial dose with 92% of the body burden in the lungs. Other tissues showing high concentrations of Ru^{106} were the lymph nodes, spleen, kidney, and ovaries. NSA 12-2722

9223

Argonne National Lab., Lemont, Ill.

RADIOLOGICAL PHYSICS DIVISION SEMI-ANNUAL REPORT FOR JANUARY THROUGH JUNE 1957. July 1957. 86p. Contract W-31-109-eng-38. (ANL-5755)

Progress is reported in the following studies: the autoradiographic mapping of the deposition of Ca^{45} in cortical bone in dogs, measurement of fission-product activity present in soil, factors affecting the performance of ionization chambers, calibration tests on the dibutyl phosphate method of isolating Th^{228} from solutions of ashed bone; microradiographic demonstration of changes in mineral density in dog bones, radiometric determination of radon in bone and in the atmosphere, changes produced in xylene by exposure to massive doses of Co^{60} γ radiation, applications of the human spectrometer in *in vivo* measurements of Cs^{137} build-up in humans, determinations of Cs^{137} atmospheric content as a function of time, development of a tracer method using K^{42} for measurement of exchangeable potassium in humans, determinations of the radium body burdens in former dial painters, and the atmospheric diffusion of stack particles. A meteorological model towing tank is described which was constructed as an alternative to a wind tunnel for model studies of atmospheric turbulent diffusion. Preliminary studies employing the apparatus are described. (For preceding period see ANL-5679). NSA 12-1186

9224

INFLUENCE OF TOTAL BODY X-IRRADIATION ON THE LEVELS OF CREATINE PHOSPHATE, INORGANIC PHOSPHORUS AND ATP IN MUSCLE AND ON THE LEVELS OF CREATINE, CREATININE, N¹-METHYL-NICOTINAMIDE AND NITROGEN IN URINE. U. S. Kumta, S. U. Gurnani, and M. B. Sahasrabudhe (Atomic Energy Establishment, Bombay). J. Sci. Ind. Research (India) 16C, 179-81 (1957) Sept.

The influence of total-body irradiation on the levels of creatine phosphate (CP), adenosine triphosphate (ATP) and inorganic phosphorus (IP) in muscle has been investigated in rats. CP and ATP levels decrease by about 33% while those of IP increase 4 times in irradiated rats. Studies on the influence of irradiation on the excretion of creatine, creatinine and N¹-methyl-nicotinamide is increased two-fold while that of creatinine is increased by 160%. It is suggested that the low levels of creatine phosphate are probably due to an impairment in the phosphorylation of creatine or due to an adaptive breakdown of creatine phosphate leading to increased excretion of creatine and creatinine. NSA 12-2664

9225

Washington. Univ., Seattle. Applied Fisheries Lab. RADIOACTIVITY IN THE REEF FISHES OF BELLE ISLAND ENIWETOK ATOLL APRIL 1954 TO NOVEMBER 1955. Arthur D. Welander. May 17, 1957. 42p. Contract AT(45-1-540). (UWFL-49)

Studies of the radioactivity in reef fishes of Belle (Bogomongo) Island, Eniwetok Atoll, were made during a

period of about one year following the atomic detonations in 1954. Thirty-four different collections were made and 693 specimens were analyzed to determine the trend or decline of radioactivity. The decline of radioactivity during the period under study was generally similar in all species. The relative amount of radioactivity per gram of tissue was greatest in the alimentary tract, with the liver, skin, bone and muscle having successively lesser amounts. This relationship prevailed throughout the period. The rate of decline was greatest during the first 100 days, with a loss of 90% of the radioactivity during the period. Studies were made on the variation of total radioactivity in the tissues and species, on comparisons of the amount of radioactivity in the species and in their food, and on comparisons of the decline of radioactivity during the period with the decay of radioactivity in tissues collected soon after the shots. NSA 12-4034

9226

Naval Radiological Defense Lab., San Francisco.

ALTERATION OF BETA RADIATION LESIONS OF THE SKIN BY CYSTEINE, NITRITE, HYPOXIA, SPLEEN HOMOGENATE, AND BONE MARROW HOMOGENATE. A. K. Davis, D. Cranmore, and E. L. Alpen. Aug. 15, 1957. 17p. Project NM-006-015. (USNRDL-TR-184)

The purpose of this investigation was to evaluate some of the more common agents which are known to reduce the lethal effects of whole-body ionizing radiation in terms of their specific action on radiation damage to skin. Hypoxia, cysteine, and nitrite were administered before or during radiation, and spleen and bone marrow homogenates were studied for their action when administered after irradiation. Rats were exposed to a dose of beta radiation which produced ulceration in all untreated rats (ED_{100}), and graded daily by the gross appearance of the irradiated area. The most effective protection was obtained by exposure of the rat to a 95 percent nitrogen-5 percent oxygen mixture during irradiation. Cysteine, 1.0 mg/gm body weight, as well as hypoxia prevented ulceration of the exposed area, nitrite was less effective. However, all the pretreatment procedures reduced the severity of the lesion. Injection of spleen or bone marrow homogenates had little effect on the damage to the irradiated area. None of the procedures prevented the occurrence of erythema or epilation in the exposed area. It would appear that beta radiation injury to skin could serve as a useful measure of radiation protection only when this protection is of a general nature. If the action is one involving a critical tissue, i. e., hematopoietic, skin injury is unlikely to provide an adequate estimate of the potential radiation protection that could be obtained. NSA 12-3508

9227

GAMMA-RADIATION AND LONGEVITY OF THE FLOUR BEETLE. J. M. Cork (Univ. of Michigan, Ann Arbor). Radiation Research 7, 551-7 (1957) Dec. NSA 12-2681

9228

THE EFFECTS OF IRRADIATION WITH PHOSPHORUS-32 ON THE VIABILITY AND GROWTH OF RAT EMBRYOS. Melvin R. Sikov and Thomas R. Noonan (Univ. of Rochester, N. Y.). Radiation Research 7, 541-50 (1957) Nov. NSA 12-2680

9229

STUDY ON THE EFFECTS OF CORTISONE AND ACTH ON REVERSED ANAPHYLAXIS IN NORMAL AND IRRADIATED ANIMALS. Douglas E. Johnstone and Joe W. Howland (Univ. of Rochester School of Medicine and Dentistry, N. Y.). J. Allergy 28, 418-22 (1957) Sept. NSA 12-2621

9230

BIOLOGICAL BASES FOR MAXIMUM PERMISSIBLE EXPOSURES. S. T. Cantril. pp. 36-74 in Industrial Med-

icine on the Plutonium Project R. S. Stone Ed. NNES, Div. IV Vol. 20, McGraw, Hill(1951).

9231

HISTOPATHOLOGY OF THE EFFECT OF CORTISONE ON THE IRRADIATED RAT LUNG. Charles C. Berdjis and Reynold F. Brown (Univ. of California School of Medicine, San Francisco). *Diseases of the Chest* 32, No. 5, 12p. (1957) Nov. NSA 12-2651

9232

BASIC MECHANISMS IN RADIOBIOLOGY. V. MAMMALIAN ASPECTS. PROCEEDINGS OF AN INFORMAL CONFERENCE, HIGHLAND PARK, ILLINOIS, MAY 14-16, 1956. NUCLEAR SCIENCE SERIES REPORT NUMBER 21. PUBLICATION NUMBER 513. Howard J. Curtis and Henry Quastler, ed. Washington, National Academy of Sciences-National Research Council, 1957. 209p.

The effects of radiation on mammals are discussed. Both chronic and acute effects are considered. Topics discussed include the radiosensitivity of cells, carcinogenesis, the effect of irradiation on life-span in mammals, and the mechanisms of action of radiation in mammalian systems. NSA 12-2687

9233

Michigan. Univ., Ann Arbor. Fission Products Lab. GAMMA-RAY SPROUT INHIBITION OF POTATOES. Report No. 10 (Annual) [for] Period November 1, 1955-October 31, 1956. L. E. Brownell. 94p. Project No. 7-84-01-002. Contract DA-19-129-qu-349. (AD-123944)

Sebago variety potatoes given as little as 5,000 rep of γ radiation show no signs of sprouting, but Russett Rurals given 20,000 rep show occasional evidence of arrested sprout development. Tiny sprouts (1 mm) form but do not proliferate. Nonirradiated potatoes, except those stored at 35°F, show definite sprout development. Most of the potatoes, irradiated and nonirradiated, except those stored at 35°F, show slight softening, usually confined to the skin. Weight losses during storage for irradiated and control Sebago and Russett Rural variety potatoes were determined as a function of radiation dose, temperature of storage, and duration of storage. 19 references. NSA 12-4027

9234

California. Univ., Berkeley. Radiation Lab. BIOLOGY AND MEDICINE QUARTERLY REPORT [FOR] APRIL, MAY, JUNE 1957 July 29, 1957. 33p. Contract W-7405-eng-48.

Data are tabulated on the incidence of and classification of tumors induced in female mice following administration of $\mu\text{C/g}$ body weight of At^{211} . Progress is reported in studies on the radiation chemistry of proteins, formic acid, and acetic acid. The effect of dose rate in the radiolysis of aquo-organic systems was investigated. Radiobiological studies reported include back-mutation studies of irradiated yeast, studies of hypothalamic-irradiated rats, the effects of x irradiation on egg hatch and egg-laying in wasps, tracer studies on the rate of formation and life span of lymphocytes, and studies on the embryonic nucleoprotein fraction that stimulates growth in tissue cultures. Health chemistry and health physics activity for the period are summarized. (For preceding period see UCRL-3758). NSA 12-2628

9235

A REVIEW WITH SPECIAL REFERENCE TO RADIATION TUMOURS IN THE PHARYNX, LARYNX, AND THYROID. A. W. G. Goolden (Hammersmith Hospital, London). *Brit. J. Radiol.* 30, 626-40(1957) Dec.

Twenty-four cases of radiation cancer in the deep tissues of the neck have been recorded in the literature, of these 18 have developed in the pharynx, five in the larynx, and one in the thyroid. A further 18 cases of radiation cancer of the pharynx are reported here. NSA 12-2647

9236

TREATMENT OF MALIGNANT BLOOD DISEASES BY RADIOACTIVE PHOSPHORUS. PART II. HEMATOLOGICAL ASPECTS. Ingmar Bergstrom. *Acta Radiol.*, Suppl. 150, Part II, 1-98(1957).

Changes in the bone marrow picture and in the blood picture observed during P^{32} treatment of malignant blood diseases are reported. 41 references. NSA 12-2634

9237

THE INFLUENCE OF OXYGEN ON THE RADIOSENSITIVITY OF MAMMALIAN TISSUES. E. A. Wright and P. Howard-Flanders (St. Mary's Hospital Medical School and Hammersmith Hospital, London). *Acta Radiol.* 48, 26-32(1957) July.

The radiosensitivity of growing bone in the tail of week-old mice has been determined when the tissues were made anoxic by compression and when the animals were breathing partial pressures of oxygen ranging from half an atmosphere of air to three atmospheres of oxygen. When irradiation doses in the form of fast electrons, delivered in approximately one second, were used the tail reached minimum sensitivity following compression in four seconds. The changes in radiosensitivity found under these conditions are discussed in relation to the special anatomy and physiology of the sensitive cartilage cells concerned with the growing of the bones. The relation of these results with other work on mammalian tissue and cells is also discussed and some possible practical applications to radiotherapy are considered. NSA 12-2631

9238

THE EFFECT OF IONIZING RADIATIONS ON THE REGENERATION AND BEHAVIOR OF MAMMALIAN LYMPHATICS. IN VIVO STUDIES IN SANDISON CLARK CHAMBERS. H. A. S. Van Den Brenk (Royal Coll. of Surgeons of Eng.). *Am. J. Roentgenol. Radium Therapy Nuclear Medicine* 78, 837-49(1957) Nov.

Observations are reported in vivo on the regeneration and behavior of lymphatics in repair tissue in the rabbit following the administration of ionizing radiations. NSA 12-2636

9239

THE EFFECT OF OXYGEN ON THE RADIOSENSITIVITY OF GROWING BONE IN THE TAIL OF THE MOUSE. P. Howard-Flanders and E. A. Wright (Hammersmith Hospital, London). *Brit. J. Radiol.* 30, 593-9(1957) Nov. NSA 12-2646

9240

EFFECT OF NITROGEN AND HYDROGEN GAS UNDER PRESSURE ON THE RADIOSENSITIVITY OF THE BROAD BEAN ROOT. Michael Ebert and Alma Howard (Hammersmith Hospital, London and Mount Vernon Hospital and Radium Inst., Northwood, Middlesex, Eng.). *Radiation Research* 7, 331-41(1957) Oct. NSA 12-2669

9241

ACCELERATION OF ORGAN FORMATION IN PLANTS BY X RADIATION. I. M. Vasil'ev (Inst. of Biological Physics, Acad. of Sciences, U.S.S.R.). *Doklady Akad. Nauk S.S.S.R.* 116, 401-3(1957) Sept. 21. (In Russian) NSA 12-4049

9242

THE EXPERIMENTAL EFFECT OF X-RADIATION AND CORTISONE ON SERUM PROTEINS. Alvar A. Werder, Creighton A. Hardin, and Perry Morgan (Univ. of Kansas School of Medicine, Kansas City). *Radiation Research* 7, 500-7(1957) Nov. NSA 12-2678

9243

AMYLOIDOSIS IN MICE EXPOSED TO DAILY GAMMA IRRADIATION. S. Leshner, D. Grahm, and A. Sallase (Argonne National Lab., Lemont, Ill.). *J. Natl. Cancer Inst.* 19, 1119-31(1957) Dec. NSA 12-4052

9244

TUMOR OF THE BONE TISSUE INDUCED BY RADIO-ACTIVE SUBSTANCES. N. N. Litvinov. *Bull. Exptl. Biol. Med. (U. S. S. R.)* 41, 703-7(1956) Aug. NSA 12-4042

9245

DIETARY CALCIUM LEVELS AND RETENTION OF RADIOSTRONTIUM IN THE GROWING RAT. R. H. Wasserman, C. L. Comar, and Daphne Papadopoulos (Oak Ridge Inst. of Nuclear Studies, Tenn.). *Science* 126, 1180-2(1957) Dec. 6. NSA 12-2729

9246

FATE OF SKIN HOMOGRAFTS IN X-IRRADIATED MICE TREATED WITH HOMOLOGOUS MARROW. Joan M. Main and Richmond T. Prehn (National Cancer Inst., Bethesda, Md.). *J. Natl. Cancer Inst.* 19, 1053-64(1957) Dec. NSA 12-4051

9247

THE REACTION OF THE SKIN OF RABBITS TO FRACTIONATED RADIATION EXPOSURE TO 60 KV ROENTGEN RAYS AND 5 MEV ELECTRONS. G. Barth, G. Katrakos and F. Wachsmann. *Strahlentherapie* 92, 644-648(1953).

Individual doses total 200-500 r x rays and 285-715 r for electrons (assuming dose equivalence of 0.7). There was virtually no difference in response to the two radiations over a period of 150 days.

9248

THE PREVENTION OF PSEUDOMONAS AERUGINOSA INFECTIONS IN IRRADIATED MICE AND RATS. F. Wensinck, D. W. Van Bekkum, and H. Renaud (National Defense Research Council T. N. O., Rijswijk, Netherlands). *Radiation Research* 7, 491-9(1957) Nov. NSA 12-2677

9249

EXPERIMENTS ON THE METABOLISM OF CERTAIN FISSION PRODUCTS IN DAIRY COWS. Presented at the International Conference on Radioisotopes in Scientific Research, Sept. 9-20, 1957 at Paris. No. UNESCO/NS/RIC/143 Helen M. Squire, L. J. Middleton, B. F. Sansom, and C. R. Coid. London, Pergamon Press, Ltd., 1957. 13p.

Dairy cows have been fed with separated carrier free I^{131} , Sr^{89} , Te^{132} , and Ru^{106} . The amounts of these isotopes recovered from the milk, urine and feces, and their rates of secretion and excretion, have been measured; estimates have also been made of the amounts retained in the body. Nineteen administrations of iodine have been made, twelve of strontium, five of tellurium and one of ruthenium. Wide variations in the amounts of I^{131} and Sr^{89} secreted into the milk have been observed. These were partly due to the variations in milk yield. Similar experiments have been carried out with fission products collected from trials of atomic weapons. There was no apparent difference between the metabolism of the fission products from the two sources. NSA 12-58

9250

THE SENSITIVITY OF MICROORGANISMS TO IRRADIATION UNDER CONTROLLED GAS CONDITIONS. P. Howard-Flanders and Tikvah Alper (Hammersmith Hospital, London). *Radiation Research* 7, 518-40(1957) Nov. NSA 12-2679

9251

THE EFFECT OF BREATHING OXYGEN ON THE RADIO-SENSITIVITY OF THE RABBIT LENS AND USE OF OXYGEN IN X-RAY THERAPY. P. Howard-Flanders and Antonette Pirie (Hammersmith Hospital, London, and Nuffield Lab. of Ophthalmology, Oxford, Eng.) *Radiation Research* 7, 357-64(1957) Oct. NSA 12-2670

9252

PROCEEDINGS OF NINTH OAK RIDGE REGIONAL SYMPOSIUM. "RADIATION IN PLANT BREEDING." Oak Ridge, Oak Ridge Institute of Nuclear Studies, 1957. 70p.

The present status of research programs in the application of radioactivity to plant breeding is reviewed. Gamma radiation fields for use in the irradiation of plants are described. Findings are summarized from studies on radioinduced mutations in plants and the various factors affecting the genetic effects of radiation on plants.

47 references. NSA 12-2689

9253

POSTIRRADIATION MODIFICATION OF MUTAGENESIS IN PARAMECIUM BY STREPTOMYCIN. R. F. Kimball, Nenita Gaither, and Stella M. Wilson (Oak Ridge National Lab., Tenn.). *Genetics* 42, 661-9(1957) Sept. NSA 12-2698

9254

SURVIVAL OF LABELED PLATELETS IN X-IRRADIATED RABBITS. Edward H. Reisner, Jr. and Richard P. Keating (St. Luke's Hospital, New York). *Proc. Soc. Exptl. Biol. Med.* 96, 112-14(1957) Oct. NSA 12-2667

9255

EFFECTS OF X RADIATION ON THE DUODENUM AND THE INTRAMURAL GANGLIA OF PLEXUS MYENTERICUS (AUERBACH) AND PLEXUS SUBMUCOSUS (MEISSNER). L. B. Levinson, N. V. Pankova, and N. I. Shapiro. (Lomonosov Moscow State Univ.). *Doklady Akad. Nauk S. S. S. R.* 116, 404-6(1957) Sept. 21. (In Russian).

Studies were made of the order of the alterations in the nerve tissues induced by radiation in various organs. Comparisons were made of the changes taking place in the epithelium capillary cells, in the Brunner glands, and in the nerve cells in the intestinal intramural ganglia. Changes in the nerve cells induced by exchange disturbances were studied in mice, and determination was made of the desoxy-ribonucleic acid, ribonucleic acid, and alkali and acid phosphatase. NSA 12-4045

9256

ATOMIC ENERGY IN MEDICINE. K. E. Halnan. London, Butterworths Scientific Publications, 1957. 173p.

Applications of radioisotopes and particle accelerators in diagnosis and therapy are reviewed. 22 references. NSA 12-2712

9257

STEROL SYNTHESIS AFTER WHOLE BODY ROENTGEN IRRADIATION. H. K. Hanel, G. Hjort, G. Johansen, and P. R. Purser (Radium Centre, Copenhagen, Denmark). *Acta Radiol.* 48, 227-38(1957) Sept.

Male rats were irradiated with 400 r whole body irradiation. The *in vivo* incorporation of 2- C^{14} -acetate in liver cholesterol decreases during the first day after irradiation and subsequently increases. The hepatic cholesterol concentration falls immediately, rises above normal and slowly falls again. Histology shows no change in cell population. Total radioactivity incorporated in liver tissue, as shown by autoradiographs reaches a maximum at 1 day after irradiation. Incubation of rat liver slices with 2- C^{14} -acetate shown an increase in the metabolism of acetate of carbon dioxide, and an initial increase followed by a fall in the synthesis of digitonine-precipitable sterols from acetate. NSA 12-2633

9258

CERTAIN IRREGULARITIES IN THE GROWTH OF MACROCOLONIES AFTER IRRADIATION OF YEAST CELLS WITH GAMMA RAYS FROM RADIO-COBALT. V. I. Korogodin (Moscow State Univ.). *Biophysics* 2, 180-8 (1957). NSA 12-2642

9259

HEMATOLOGIC RECOVERY OF ADULT AND WEANING RATS FOLLOWING WHOLE BODY ROENTGEN IRRADIATION. Roberts Rugh and Joan Wolff (Columbia Univ., New York). *Am. J. Roentgenol. Radium Therapy Nuclear Medicine* 78, 887-900(1957) Nov. NSA 12-2639

9260

THE INFLUENCE OF RADIUM EMANATION ON THE ACTIVITY OF VITAMINES. Cosimir Funk. Proc. Soc. Exptl. Biol. and Med. 14, 9(1916).

Radium emanation did not destroy the beri-beri vitamin or the vitamin that stimulates growth in young rats. It had almost no effect on the agent of chicken sarcoma, even when very large dose were delivered in vitro.

9261

INFLUENCE OF TOTAL BODY X-RAY IRRADIATION ON THE IN VITRO GLYCOGEN SYNTHESIZING CAPACITY OF RAT LIVERS. A. J. Baxi and M. B. Sahasrabudhe (Indian Cancer Research Centre, Bombay). J. Sci. Ind. Research (India) 16B, 207-9(1957) Nov. NSA 12-6397

9262

Chicago. Univ. Air Force Radiation Lab.
QUARTERLY PROGRESS REPORT NO. 25. Oct. 15, 1957.
129p. Contract AF-41(657)-25. (NP-6491)

Data are presented on the survival time, weight loss, and mortality of mice treated with 70 chemical compounds immediately prior to the administration of a lethal dose of whole-body x radiation. Marked protective effects were observed following the pre-irradiation intraperitoneal administration of dimethyldithiocarbamic acid dimethylammonium salt, diethyldithiocarbamic acid diethylammonium salt, 2-aminoethanol, dithiol, monothiohydroquinone, and furfuryl mercaptan. Significant although lesser protective effects were seen following the administration of various doses of some of the other chemicals tested. Exposure of rats to fast neutron irradiation at a dose rate of 3.5 rep/hr caused a dose-dependent increase in adenosine triphosphatase activity of the spleens and thymus glands throughout the range of 79 to 350 rep. A similar relationship between dose and enzyme alterations was noted after γ radiation under the same conditions of exposure in the dose range from 300 to 500 rep. Sublethal doses of fast neutron and Co^{60} γ irradiation were found to have effects qualitatively similar to x irradiation in depressing the endogenous respiration of spleen and thymus tissues of rats and these effects were found to be entirely reversible during a 14-day period. Data are included from studies on the effect of various steroids on the survival of x irradiated mice, studies on the antagonistic action of aminethylisothiuronium dichloride on the hyperglycemia induced by thiourea derivatives, and studies on the influence of fractionated exposures to low levels of γ and fast neutron irradiation on the mortality, survival time, and weight changes in mice. (For preceding period see NP-6398.)

NSA 12-2692

9263

UTILIZATION OF OXYGEN BY THE SPLEEN AND SMALL INTESTINE OF THE RAT AFTER X IRRADIATION. A. de Schryver, J. de Witte, I. Leusen, and P. M. van Vaerenbergh. Arch. intern. pharmacodynamie 106, No. 1-2 178-80(1956). (In French).

Three to four hours after a total x irradiation of 750 r in the rat, a slight depression of the oxygen utilization of the spleen developed while the absorption of oxygen by the intestinal tissues was not significantly depressed. Five days after the irradiation the respiration of the splenic tissue was sharply diminished. NSA 12-8939

9264

THE ROLE OF SULFHYDRYL GROUPS AND PEROXIDE COMPOUNDS IN THE MECHANISM OF THE BIOLOGICAL ACTION OF IONIZING RADIATION. M. B. Gintsburg, E. M. Pandre, and N. M. Binus (Ukrainian Scientific Research for Sanitary Chemistry, Kiev). Biochemistry (USSR) (English Translation) 22, 431-8 (1957) May June.

Peroxide is formed under the action of x-rays in the excised tissues of irradiated rats, and the reactivity of the sulfhydryl groups contained in the enzyme systems is apparently increased. NSA 12-9584

9265

EFFECT OF WHOLE-BODY IRRADIATION ON THE CIRCULATION OF THE DOG. I. Leusen, G. Demeester, and P. M. Van Vaerenbergh. Arch. intern. physiol. biochem. 63, No. 4, 441-4(1955). (In French).

Dogs, weighing from 8 to 16 kg, received 400 r of whole-body irradiation. The arterial pressure and the cardiac flow were measured and the results are tabulated. No important modifications of the pressure or flow were observed either immediately after or for some days after the irradiation. However, in the terminal phase a large diminution of both these values was observed. NSA 12-8936

9266

X-IRRADIATION AND BONE MARROW. A. de Schryver, G. Demeester, and I. Leusen. Arch. Intern. physiol. biochim. 65, No. 4, 599-606(1957).

At 24 hours after a 600 r whole-body irradiation, the concentration of Fe^{59} , intracardially injected immediately after the irradiation appears to be significantly increased in the bone marrow of the rat. At the same time, the radioactivity in the peripheral blood cells is depressed to 2/3 of the activity found in the control animals. From these observations and from the study of the plasma clearance of Fe^{59} , it is concluded that this increased radioactivity of the bone marrow 24 hours after irradiation, the Fe^{59} having been injected immediately after the irradiation, is caused by the decreased output of Fe^{59} tagged cells into the circulation. At 48 and 72 hours after irradiation, the uptake of Fe^{59} in the bone marrow and in the blood is equally strongly depressed. NSA 12-8937

9267

MATERIALS FOR THE STUDY OF THE SPECIFICITY OF THE RESPONSE OF AN ORGANISM TO IRRADIATION. P. Domshlak, G. A. Avrunina, Yu. G. Grigor' yev, and N. G. Darenskaya. Vestnik Rentgenol. i Radiol. No. 2, 3-10(1957) Mar.-Apr.

The specificity of response of organisms to irradiation is discussed and substantiated by experimental data from studies using 400 mice and 115 rats. The biological effects of the same dose of radiation when administered internally and when administered externally were compared. The variation encountered was primarily in weight decrease. When irradiated internally by isotopes, animals started losing weight after 3 to 5 days, whereas under external irradiation, they lost weight from the very first day. Data are included on the radiosensitivity of the head, chest, and abdomen of rats. Encephalograms made on 17 patients undergoing roentgenological treatment were surveyed for direct and indirect effects of irradiation, on the central nervous system. Data are summarized from a survey of 4000 encephalograms. NSA 12-9623

9268

β -RADIATION OF THE FETAL FLUID IN MAN. A. I. Danilenko (A. A. Bogomolets Inst. of Physiology, Academy of Sciences of the Ukrainian SSR). Bull. Exptl. Biol. Med. (USSR) (English Translation) 43, 330-2(1957) Mar. NSA 12-9583

It was experimentally proved that the activity of naturally-occurring β -radiation of the fetal fluid is different depending upon the sex of the embryo. Thus, radiation activity of the fluid in which a fetus of the female sex was developing, was found to be significantly higher than that of the fluid in which a fetus of the male sex was developing. NSA 12-9583

9269

ON THE CAUSES OF REGENERATION ABILITY LOSS

IN THE AXOLOTL EXTREMITY AFTER X-RAYING.

V. F. Sidorova (Lab. of Growth and Development, Inst. of Experimental Biology, Academy of Sciences, USSR, Moscow). *Bull. Exptl. Biol. Med. (USSR) (English Translation)* 43, 215-19(1957) Feb.

It was demonstrated that the amputation of an irradiated organ does not bring about its regeneration in the case of the denervation of the axolotl extremity x-rayed with the dose of 5000 r. Under the conditions of provisional denervation of the intact extremity followed by visual denervation of the intact extremity followed by irradiation, and amputation after innervation restitution, no regeneration was found. The loss of regeneration ability in the axolotl extremity is, apparently, unconnected with the change of peripheral nerve fibers in the stump. NSA 12-9582

9270

THE EFFECT OF IONIZING RADIATION ON THE PROTEINS OF STRUCTURAL ELEMENTS OF THE CYTOPLASM OF THE LIVER CELLS. L. I. Ilyina, V. O. Blohina, and M. S. Uspenskaya. Translated by Lydia Venters from *Med. Radiol.* 2, 23-30(1957). 13p. (AEC-tr-3234)

The yield of mitochondria and microsomes of rat's liver cells does not change in radiation sickness. The moisture content of these structures likewise remains normal. There is a change in the quantity of ribonucleoproteids and lipoproteids in mitochondria and microsomes of the liver cells in radiation sickness. The quantity of water-soluble proteins remains within the normal limits. The most abrupt changes in ribonucleoproteids and lipoproteids in radiation sickness are found in their protein component. This is manifested in much greater changes in the nitrogen contents, as compared with phosphorus. NSA 12-8929

9271

EFFECT OF IONIZING RADIATION ON THE ACTIVITY OF DIGESTIVE ORGANS IN DOGS. Yu. N. Uspenskiy. *Fiziol. Zhur. S.S.S.R.* No. 4, 328-35(1957) Apr.

The abdominal regions of six dogs were exposed to 660 r x radiation for 30 min. Five of the dogs died on the 5th, 18th, and 22nd days. The other five were alive after 2 months but in a state of extreme emaciation. Observations were made on digestive processes in the irradiated dogs by means of a Pavlov stomach and surgical fistulas. Disturbances in the secretory activity of the gastric glands fluctuated in all of the dogs. Hunger periodicity showed shorter rest periods and an intensification of hunger contractions. Determinations were made on the protein and protein fraction content of the blood serum and digestive juices. The sharpest changes in hemopoiesis were found to coincide with the most striking disturbances in the function of the digestive organs. NSA 12-9589

9272

Massachusetts Inst. of Tech., Cambridge.
QUARTERLY PROGRESS REPORT FOR THE PERIOD JULY 1, 1957-SEPTEMBER 30, 1957. Bernard E. Proctor, Samuel A. Goldblith, and Philip M. Richardson. Sept. 30, 1957. 100p. Contract AT(30-1)-1952.

A selected bibliography of radiation applications for the period July-Dec. 1956 is presented. Applications are grouped into physical effects, penetration of matter, biological effects, insect and fungus control, radiation chemistry, and isotopes. (For preceding period see NYO-4745) (NYO-4746) NSA 12-12108

9273

CHANGES IN THE HISTOLOGICAL STRUCTURE OF EAR POLYPI CAUSED BY X-RAY TREATMENT. N. V. Zavodskiy. *Vestnik Oto-Rino-Laringologii* No. 3, 38-41 (1957) May-June.

Changes are described in the histological structure of the middle ear observed during a course of x-ray treatment for ear polyps. NSA 12-9622

9274

BIOCHEMICAL CHANGES IN THE PLANT ORGANISM AFTER IONIZING IRRADIATION Ye. V. Budnitskaya. *Uspekhi Sovremennoi Biol.* No. 3, 280-91(1957) May-June.

A summary is presented of results from studies on the effects of ionizing radiation on plants. 84 references. NSA 12-9621

9275

PRODUCTION OF EPITHELIAL TUMOURS BY A COMBINATION OF BETA RADIATION AND PAINTING WITH BENZOPYRENE. J. C. Mottram. *Amer. J. Cancer* 38, 76-79(1938).

9276

Argonne Cancer Research Hospital, Chicago.
PROCEEDINGS OF THE CONFERENCE ON RADIO-IODINE SPONSORED BY THE ARGONNE CANCER RESEARCH HOSPITAL, UNITED STATES ATOMIC ENERGY COMMISSION, AND THE CLINICS OF THE UNIVERSITY OF CHICAGO, NOVEMBER 5 AND 6, 1956, CHICAGO, ILLINOIS. Dwight E. Clark, ed. 218p. (ACRH-100)

Applications of the various iodine isotopes in diagnosis and therapy are discussed. Problems of dosimetry and radiation exposure to patients and hospital personnel are considered. Some quantitative aspects of radiation damage in mammals relevant to the clinical use of radioiodine are reviewed. Emphasis is placed on applications of iodine-131 in diagnosis and therapy of hyperthyroidism and hypothyroidism, in the treatment of thyroid carcinoma, and in thyroid ablation for cardiac disease. 54 references. NSA 12-10338

9277

Rochester, N. Y. Univ. Atomic Energy Project.
HORMONE INDUCED LYMPHOCYTE RELEASE FROM THE ISOLATED PERFUSED DOG SPLEEN. Marvin Goldman and L. W. Tuttle. Oct. 1, 1957. 35p. Contract W-7401-eng-49. (UR-511)

Data are presented on the effects of adrenal cortex extract, hydrocortisone, and cobalt-60 gamma irradiation on the release of splenic lymphocytes into the circulation. NSA 12-12915

9278

THE INFLUENCE OF NON-IONIZING RADIATION ON THE CATALASE AND HEMATOLOGICAL INDICES IN THE BLOOD, IN ANIMALS UNDER NOVOCAINE ANAESTHESIA. I. P. Neshchadimenko, M. S. Kostenko, and V. A. Shkapina. *Zdrav. Belarus.* No. 11, 51-2 (1956). (Translated from *Referat. Zhur. Biol.* No. 16, 1957, Abstract No. 71263).

The general clinical picture, activity of catalase, and blood morphology of irradiated animals, subject to amital or Novocain anesthesia of the skin of the back or belly, is the same as in irradiated control animals. In the development of radiation syndrome, at first there occurred reduction of the white and then red blood cells, and also the lowering of catalase activity. NSA 12-12135

9279

INFLUENCE OF IONIZING RADIATIONS ON THE SORPTION PROPERTIES OF THE TISSUES OF VARIOUS ORGANS IN VIVO. A. M. Kuzin and E. A. Ivantskaya (Inst. of Biophysics, Academy of Sciences of the U.S.S.R. Moscow). *Biophysics (USSR) (English Translation)* 2, 311-20(1957).

The sorption capacities of rat tissues were investigated *in vivo* 2, 24, and 48 hr after x irradiation using P^{32} -labeled colloidal chromic phosphate, I^{131} -labeled iodinated globulin, and Ag^{110} -labeled colloidal silver

solution. It is shown that about 70% of the colloid injected was absorbed by the liver. Within 24 to 48 hr after irradiation the absorptivity of the liver decreased. From 48 to 75 hr the sorption capacity of the liver again increased. It is suggested that this reduction may be due to physico-chemical changes in the macromolecules which form the surfaces, and in the protoplasm of cells in the reticuloendothelial system, and that it is closely linked with changes in antibody synthesis. NSA 12-9581

9280

Utah. Univ., Salt Lake City. Coll. of Medicine. THE EFFECT OF X-IRRADIATION ON PREFORMED ANTIBODY AND ITS ROLE IN THE PROTECTION OF X-IRRADIATED MICE. Eugene H. Perkins and Stanley Marcus. Aug. 15, 1957. 7p. (AF-SAM-58-18)

Induced agglutinin titers for human type A erythrocytes were not decreased by exposure to 300, 500, or 700 r of total-body x irradiation 3, 7, 11, or 15 days following radiation exposure in albino rats. Antibody derived from mice exposed to x irradiation did not lose capacity to effectively protect against infection. Passive immunization of normal (nonirradiated) or 300 or 400 r x-irradiated animals proved just as effective a measure for protection as did active immunization. At higher levels antibody (passive immunization) afforded no protection. The possible roles of antibody and cells in the irradiated animal are discussed. NSA 12-4671

9281

PHYSICOCHEMICAL PROPERTIES OF CIRCULATING RED BLOOD CELLS OF LETHALLY X-IRRADIATED MICE TREATED WITH RAT BONE MARROW. Takashi Makinodan and Norman G. Anderson (Oak Ridge National Lab., Tenn.). Blood 12, 984-92(1957) Nov.

Two months after injection of rat bone marrow into lethally x-irradiated mice (950 r-RBM mice), 100% of the circulating RBC were serologically of the rat type, indicating that the surface molecular configuration of RBC from these experimental mice are of the rat type. The hemoglobin was found to be also very much like the rat type in its ease in crystallization, its alkali denaturation property, its electrophoretic property, and its tendency to form a paracrystalline state at low temperature. These cells possessed dual osmotic properties, the relative hemoglobin concentration released when cells were lysed in water was more comparable to the rat type, but its temperature dependency was more comparable to the mouse type. NSA 12-8959

9282

STUDIES DIRECTED TOWARD THE USE OF ANTIBODIES AS CARRIERS OF RADIOACTIVITY FOR THERAPY. William F. Bale and Irving L. Spar (Univ. of Rochester School of Medicine and Dentistry, N. Y.). Advances in Biol. and Med. Phys. 5, 285-356(1957).

The relationship of immunological reactions to the growth of normal and abnormal tissues are reviewed. The highly selective localization of a radioactivity-carrying antibody in a particular normal or neoplastic tissue depends on the existence of an antigenic substance accessible to intravenously administered antibody. Procedures likely to be involved in using antibodies for the tissue-specific localization of radioisotopes in therapeutic dosage ranges are discussed. (156 references). NSA 12-8969

9283

THE CHANGES IN THE OXYGEN INTAKE OF BRAIN TISSUE AFTER X-IRRADIATION. A. D. Snezhko. Biofizika No. 2, 67-78(1957).

X irradiation of various parts of the body of rabbits was found to induce changes in the concentration of oxygen in brain tissue. Changes were observed in blood circulation indicative of suppression of oxidizing activi-

ties in the cerebral cortex following exposure to ionizing radiation. NSA 12-9580

9284

X IRRADIATION AND SUCCINODEHYDROGENASE. A. de Schryver. Arch. intern. physiol. biochim. 64, No. 4, 587-93(1956). (In French).

A dose of 750 r of whole-body x irradiation in the rat causes in the liver a decrease of the succinodehydrogenase activity, which reaches 37% on the fifth day. This depression is in large part suppressed by the protection of the animal with a dose of cysteamine. Immediately after irradiation one observes no modification of the enzymatic activity. *In vitro* the succinodehydrogenase is very radioresistant. A dose of 100,000 r, however, inhibits it 33%. Cysteamine added at the ratio of 1 mg per 150 mg of tissue in the culture before its irradiation protects the enzymatic activity. NSA 12-9577

9285

Columbia Univ., New York. Radiological Research Lab. ANNUAL REPORT ON RESEARCH PROJECT. July 1, 1957. 128p. Contract AT-30-1-GEN-70. (NYO-2087)

Radiological Physics. Measurements of the tissue doses produced by radioisotopes variously distributed were continued. The average energy lost by S^{35} β rays per ion pair produced, or W , was determined to be 33.6 ± 0.3 ev. The value of W for water vapor relative to air was measured for β rays from S^{35} and from Ni^{63} . A new method for determining the disintegration rate of K-capture isotopes from their γ rays was tested with Au^{198} . A tissue-equivalent ionization chamber was developed and tested. Progress was made in applications of tissue equivalent ionization chambers for neutron dosimetry. Investigations were made of the mechanism of production of spontaneous and radioinduced mutants in *E. coli*. **Radiobiology.** Research in progress is summarized briefly. Progress is reported in studies on the protective effect of splenic plasma injected intraperitoneally into irradiated rabbits; the effect of hibernation and tranquilizing drugs on radiosensitivity of mice, the effect of radiation on the gonads in mice, and the effects of radiation on the developing mouse fetus. Lists are included of research published and submitted for publication during the period. (For preceding period see NYO-4698). NSA 12-4032

9286

A NEW GROUP OF BALANCING ATOMS. T. P. Feenstra. Koninkl. Akad. Wetenschappen 24, 1822(1916).

Perfused frog hearts stopped by perfusing with K-free fluid can be started by perfusing with a fluid containing $U(NO_3)_4$. Large concentrations of U are toxic but can be neutralized by $CaCl_2$.

9287

USE OF γ -RADIATION FOR PREVENTING THE SPROUTING OF POTATOES. W. G. Burton and R. S. Hannan. J. Sci. Food Agr. No. 12, 707-15(1957) Dec.

Gamma irradiation at doses as low as 3500 r suppresses the sprouting of potatoes, but it may also have harmful effects. After storage for 6 months or more, sweetening rendered the tubers unsuitable for crisp or chip production. After 15 months, a great accumulation of sugar and complete breakdown were observed. Irradiation at 20,500 r and over increased the initial rate of water loss and subsequent wilting. Irrespective of irradiation, there was an apparent direct correlation between the rate of water loss and the cumulative loss which occurred. NSA 12-16114

9288

OBSERVATIONS ON THE MICROFLORA OF MINCED CHICKEN MEAT IRRADIATED WITH 4 Mev CATHODE RAYS. Margaret J. Thornley (Univ. of Cambridge,

Eng. and Dept. of Scientific and Industrial Research).
J. Appl. Bacteriol. 20, 286-98(1957) Aug.

Results are reported from experiments in which minced chicken meat, packed anaerobically, was irradiated at room temperature and in the frozen state with a wide range of doses of 4 Mev cathode rays. NSA 12-16111

9289

New York. State Agricultural Experiment Station, Geneva. THE INDUCTION AND TESTING OF SOMATIC MUTATIONS IN APPLES, GRAPES AND OTHER ECONOMIC PLANTS. Progress Report for the Period February 1, 1956 to January 31, 1957. Charlotte Pratt and John Einset. 10p. Project No. 42. Contract AT(30-1)-1541. (AECU-3413)

Preliminary data are presented from observations on the response of three varieties of apples and one variety of grapes subjected to a wide range of radiation damage at growth stages ranging from seed to mature plants. Ultimate objectives of the study are the radioinduced production of mutations in apples and grapes. NSA 12-5812

9290

ANNUAL REPORT OF EXPERIENCES WITH TELECOBALT THERAPY. Arduino Ratti (Istituto di Radiologia dell' Università, Milan). Minerva Nucleare 1, 332-4 (1957) Nov. -Dec. (In Italian).

A report is made of the observations concerning the history-during and following treatment- of 319 patients with malignant new growths treated with a telecobalt therapy unit with an initial activity of slightly more than 1000 curies. The data referring to the blood picture, the local reactions and accidents are presented. The role of this form of therapy in the modern roentgenologic treatment of tumors is considered. NSA 12-6418

9291

TELECOBALT THERAPY OF DEEP TUMORS. E. Benassi and C. Sinistrero (Istituto di Radiologia dell' Università, and Centro di Telecobaltoterapia-Clinica Pinna Pintor, Turin). Minerva Nuclear 1, 308-21(1957) Nov. -Dec. (In Italian).

An apparatus for telecobalt therapy is briefly described, and the physical and biological properties of radio-cobalt are considered. A personal method of treatment is presented and the necessity is stressed of the physical and geometrical study of the mass to be irradiated. The various techniques employed in order to obtain correct centering are described, together with a series of tables of the various plans of treatment for the various localizations. The indications of the form of treatment are considered, together with the doses and the local and general reactions. Both immediate and long term results are discussed. The fundamental problem is finally considered: total sterilization of the tumor with sufficient respect for the healthy tissues. NSA 12-6417

9292

RADIATION DURATION AND TISSUE REACTIONS. Anton Kautzky. Strahlentherapie 104, 558-70(1957). (In German).

The tissue reactions, particularly the skin reactions, run in an autonomic rhythm, which is characteristic of the individual and can only be influenced within certain limits by changing physical irradiation conditions. The first course of reaction is promptly followed by a second reaction if appropriate irradiation is applied. Irradiation beyond the first course of reaction without obtaining a second reaction leads to gradual waste. NSA 12-7088

9293

Los Alamos Scientific Lab., N. Mex. ESTIMATION OF WHOLE BODY DOSE (REM) FROM TRITIUM IN BODY WATER. James N. P. Lawrence. Nov. 15, 1957. 22p. Contract W-7405-eng-36 (LA-2163)

A detailed procedure is given for estimating the whole-body exposure from a known concentration of

tritium in body water. The permissible body burden of 3.7 mc, a 43.4 kg critical organ (total body water), and 1.7 RBE for tritium in the body are based on the accepted standards of 1956. NSA 12-5200

9294

THE ACTION OF VARIOUS DRUGS ON THE SUPRARENAL RESPONSE OF THE RAT TO TOTAL-BODY X-IRRADIATION. Z. M. Bacq and P. Fischer (Univ. of Liege, Belgium). Radiation Research 7, 365-72(1957) Oct.

A chemical protector, cysteamine (100 mg/kg intraperitoneally), inhibits the second irreversible drop in cholesterol and ascorbic acid which, in the controls, begins on the second day after a total-body exposure of rats to 800 r of x rays (250 kv). Morphine (20 mg/kg) preceded by Nembutal (20 mg/kg) is known to inhibit the hypothalamo-pituitary-adrenal response to stress. This pharmacological treatment prior to total-body irradiation prevents any change in ascorbic acid and cholesterol values in the rat's suprarenal during the first 24 hours after irradiation, but it does not decrease the mortality, and does not change the profound depression of these two values at the third day after irradiation, even if a morphine injection (40 mg/kg) is given daily. It is suggested that the first reversible reaction (during the 24 hours after irradiation) is a simple reaction to the physical stimulus of irradiation acting as a stress. The significance of the second reaction is not so clear because it happens at the third or fourth day when the general condition of the irradiated rat deteriorates. NSA 12-2701

9295

EFFECTS OF RADIATION QUALITY, TARGET-AXIS DISTANCE, AND FIELD SIZE ON DOSE DISTRIBUTION IN ROTATION THERAPY. Edith H. Qumbly and Beverly S. Cohen (Coll. of Physicians and Surgeons, New York). Am. J. Roentgenol. Radium Therapy Nuclear Medicine 78, 819-30(1957) Nov.

Calculated values of the ratio of maximum skin dose to axis dose in rotation therapy are presented for lesions in various positions in head, pelvis, and chest. Radiation qualities cover a range of copper half value layers from 1.0 to 15.0 mm., the last corresponding to the radiations from radioactive Co⁶⁰. Target-axis distances of 65 and 85 cm. are used for most problems, and 115 cm. for a few. A suitable range of field sizes is studied for each anatomic location. NSA 12-2708

9296

THE INFLUENCE OF X-RAYS, SIMULTANEOUSLY AND PREVIOUSLY ADMINISTERED WITH O₂ PARTIAL PRESSURE, INVESTIGATED WITH RESPECT TO FRACTIONATION ON YOSHIDA LOCAL TUMORS OF RATS. Gunther Grussner (Der Stadtkrankenhauses, Kassel, Germany). Strahlentherapie 104, 514-23(1957). (In German). NSA 12-7087

9297

Naval Radiological Defense Lab., San Francisco. THE EFFECT OF SUBLETHAL TOTAL BODY IRRADIATION ON THE BACTERICIDAL ACTIVITY OF RAT LEUCOCYTE MITOCHONDRIAL EXTRACTS. M. Fishman and M. S. Silverman. Dec. 2, 1957. 14p. Project No. NM-006-015.04. (USNRDL-TR-192)

Two different groups of rats were exposed to 300 and 500 r total-body x irradiation. Mitochondrial extracts were prepared from the leucocytes of these animals at various post-irradiation days. The bactericidal activity of these extracts was determined and compared to the activity obtained with extracts prepared from leucocytes from non-irradiated animals. The results showed that irradiation decreased the bactericidal activity per leucocyte, with the maximum depression occurring between the 3rd and 5th days after exposure. Recovery of the bactericidal activity was evident between the 8th and 12th post-

irradiation day in the 300 r group but was not noted in the 500 r group even on the 30th day after irradiation. NSA 12-4660

9298

Texas. Univ., Austin and School of Aviation Medicine, Randolph AFB, Tex.

LONG-TERM EFFECT OF RADIATION ON CREATINE METABOLISM IN THE RAT. George M. Krise, Clyde M. Williams, and Donald R. Anderson. June 27, 1957. 5p. (AF-SAM-57-151)

The urinary output of creatine and creatinine was measured intermittently for 6 months in 3 female Sprague-Dawley rats surviving 435 rep of mixed radiation (neutron; gamma ratio of 3:1) and in 3 animals surviving 1,500 rep of Co⁶⁰ gamma radiation. No changes in output of creatine and creatinine were observed in the former group once the initial (5-day) postradiation interval was over. In the case of the animals surviving 1,500 rep of Co⁶⁰ gamma radiation, creatinine output was significantly depressed following radiation, and creatine output was significantly elevated during both intervals examined for the first 2 months postradiation. It was tentatively concluded that radiation does not have any immediate effect on creatine synthesis at doses up to 1,500 rep and that 1,500 rep of gamma radiation may permanently destroy tissue containing creatine. NSA 12-8248

9299

Rockefeller Foundation, New York.

FREQUENCY OF BONE SARCOMA IN THE UNITED STATES IN RELATION TO LOW LEVEL RADIATION EXPOSURE. John C. Bugher and Pauline A. Mead. 16p. (A/CONF.15/P/1060)

Prepared for the Second U. N. International Conference on the Peaceful Uses of Atomic Energy, 1958. Between areas of the United States differing in natural background radioactivity by a factor of two, there is no corresponding relationship in the incidence of deaths from malignant tumor of bone as observed over the period 1949-1955. No evidence is found in this study which supports the assumption of linear relationship of bone tumor incidence and ionizing radiation at low doses. If a threshold exists for causation of bone tumors, it must lie well above 20 rads and probably nearer 1000 rads. The mortality experience from malignant tumors of bone in the United States can be described in terms of two populations, each exhibiting a Gompertz type of mortality. One of these populations is a small one behaving as though all of the individuals were destined at birth to die of bone sarcoma at an early age. NSA 12-14531

9300

Texas. Univ., Austin. Radiobiological Lab.

CONDITIONED FOOD AVOIDANCE ON A T-MAZE IN IRRADIATED RATS. Robert K. White and W. Lynn Brown. Nov. 12, 1957. 5p. (AF-SAM-58-48)

Two groups of rats, one irradiated and one sham-irradiated, were deprived of food for 21 hours preirradiation and 66 hours postirradiation before training on a T-maze. The irradiated group avoided the food arm of the maze a significantly greater number of times than the sham-irradiated group and also significantly more than by chance. This demonstrates that the avoidance motivation of irradiated rats is sufficient to motivate learning on a T-maze, that eating during irradiation is not a necessary condition for avoidance behavior at lethal levels, and that the value of food shifts from a pulse value to a minus value and not to zero. NSA 12-8924

9301

Texas. Univ., Austin.

THE EFFECT OF WHOLE-BODY RADIATION UPON ASSOCIATION OF PERIPHERAL CUES. W. Lynn Brown, Richard M. Carr, and John E. Overall. Nov. 5, 1957. 5p. (AF-SAM-58-47)

Object-quality stimuli were presented as discrimination problems to rhesus monkeys of three treatment groups: nonirradiated, low-dose irradiated, and high-dose irradiated. The experiment was designed to determine whether the subjects associated peripherally placed stimuli and whether normal and irradiated subjects differed in the extent to which such association was made. The performance of nonirradiated subjects gave evidence of association of peripherally placed stimuli, no significant evidence of such association was observed in the performance of the irradiated monkeys. The results are interpreted as supporting the hypothesis of a shift in response thresholds to extraneous stimuli and the hypothesis of a narrowing of attention in irradiated subjects. NSA 12-8923

9302

Texas. Univ., Austin. Radiobiological Lab.

IRON-59 METABOLISM AS AN INDEX OF HEMATOPOIETIC DAMAGE AND RECOVERY IN MONKEYS EXPOSED TO NUCLEAR RADIATION. Quentin L. Hartwig, George S. Melville, Jr., Thomas P. Leffingwell, and Robert J. Young. Dec. 4, 1957. 7p. (AF-SAM-58-59)

Monkeys exposed to ionizing nuclear radiations were studied for changes in iron metabolism. Twenty-eight hours after exposure, iron-59 was injected, and 24 hours later the first blood sample was drawn. Iron uptake in the irradiated animals reflected marked depression of erythropoiesis. The average uptake in all irradiates 48 hours postexposure was 2.1% as compared to 10.7% in the controls. Only 3 of the original 10 irradiates survived. Repeating the iron-59 injection technic 34 days after exposure indicated repair and active erythropoiesis in survivors. Plasma iron exhibited periods of both hyper- and hypoferrremia. Those animals destined to die were consistently hypoferrremic for 2 to 3 days prior to death. Postexposure implications of iron-59 incorporation levels and plasma iron values are discussed. NSA 12-8926

9303

THE DOSIMETRY AND LETHAL EFFECTS OF MATERNALLY ADMINISTERED PHOSPHORUS-32 AFTER 14 AND 17 DAYS OF GESTATION IN THE RAT. Melvin R. Sikov and James E. Lofstrom (Wayne State Univ. Coll. of Medicine, Detroit). Phys. in Med. Biol. 2, 157-68(1957) Oct.

Pregnant female albino rats were given graded doses of radiophosphorus after 14 or 17 days of gestation and sacrificed at intervals after injection through birth. One millicurie or less of P-32 did not increase prenatal mortality after administration on either of these two days. Two millicuries produced prenatal deaths when administered after 14 days of gestation but not after 17 days, some deaths attributable to the trauma of partition were noted in both cases. A depression of the growth curve and of birth weight was produced by doses of 0.4 mc and larger after 14 days and by doses of 0.6 mc and above after 17 days of gestation. The curves of accumulated radiation dose to the whole fetus and to various organs and systems as interpolated to one millicurie are presented and discussed. NSA 12-9607

9304

INVESTIGATION OF THE BIOLOGICAL DOSE EQUIVALENCE BETWEEN HARD X-RAYS OF 180 Kv AND THE ELECTRONS OF Sr⁹⁰ ON MONOCELLULAR OVA OF ASCARIS MEGALOCEPHALA. Richard Kurt Kepp and Gunter Oehlert. Strahlentherapie 103, 392-7(1957). (In German). NSA 12-1184

9305

ABSENCE OF LETHAL RADIATION EFFECTS FOLLOWING MASSIVE ORAL ADMINISTRATION OF PLUTONIUM. Maurice F. Sullivan and Roy C. Thompson (General Electric Co., Richland, Wash.). Nature 180, 651-2(1957) Sept. 28. NSA 12-1197

9306

EFFECT OF EXPOSURE TO RADIOACTIVE COBALT ON NUCLEIC ACID CONTENT IN SPLEEN TISSUES. N. V. Luchnik (Ural Branch of the Academy of Sciences, USSR, Sverdlovsk). *Biochemistry (U.S.S.R.)* **21**, 689-91 (1956) Nov.-Dec. NSA 12-7658

9307

S^{35} -METHIONINE UPTAKE BY PROTEINS OF THE STRUCTURAL ELEMENTS OF TISSUE CELLS IN IR-RADIATED RATS. L. I. Ilyina. *Bull. Exptl. Biol. Med. (USSR) (English Translation)* **44**, 1204-8 (1957) Oct.

Methionine labeled with sulfur-35 was used in studies on disturbances in protein metabolism in liver and intestinal mucosa of rats following exposure to 800 r x radiation. A group of control animals was also examined for radioactive protein synthesis, and results are compared with those for irradiated animals. NSA 12-10303

9308

THERAPEUTIC USE OF RADIOACTIVE COBALT IN LARYNGOLOGY. K. N. Chochia and A. B. Polezhayev. *Vestnik Oto-Rino-Laringologii* No. 4, 52-6 (1957) July-Aug.

Two hundred patients with malignant tumors of the larynx were treated with a teletherapy unit employing cobalt-60 as a gamma source. Daily irradiation doses ranging from 250 r up to total doses of 10,000 r were used. Clinical results are reported. NSA 12-9650

9309

YEAR BOOK OF RADIOLOGY. p. 730 (1933) The Year Book Publishers, Inc., Chicago, Ill. C. A. Waters and I. I. Kaplan.

Author of this section, reviewing the effects of irradiating women (for various disorders) on subsequent pregnancies and children, asserts that there is no contraindication to properly administered therapeutic radiation for the various benign conditions considered.

9310

COMBINED ROENTGEN AND SUNSHINE TREATMENT OF GRANULOMA. Lohmann. *Munchen. Med. Wchnschr.* **69**, 1249 (1921).

Patients with malignant lymphomatous granulomas responded better to x ray plus sunshine than to x ray alone.

9311

RADIO-ACTIVE FALL-OUT AND ITS HAZARDS TO MAN. W. R. McMurray (South African National Physical Research Lab.). *S. African Med. J.* **31**, No. 49, 1246-52 (1957) Dec. 7.

The facts concerning radio-active fall-out from the testing of fission-type nuclear weapons are reviewed and summarized in a form convenient to the assessment of the resultant effects on man. These are seen to be twofold, namely the genetic effect and the effects of ingested strontium-90. The genetically effective dose from fall-out is compared with the very variable naturally occurring background radiation dose and it is concluded that the genetic aspect of fall-out hazard is relatively unimportant. The remaining uncertainties in the estimates of the effects of ingested strontium-90 are not sufficient to completely invalidate conclusions based on the available data. It is shown that should nuclear-weapon testing continue at its present rate of 10 Megatons per year, the dose of strontium-90 to the bone should not exceed the average dose from natural sources. The strong dependence of the intensity of natural background on the human environment is emphasized as a very relevant consideration. NSA 12-12189

9312

Air Force Special Weapons Center, Kirtland AFB, N. Mex.

THE INTERNAL DOSE TO VARIOUS ORGANS AS A FUNCTION OF ISOTOPIC COMPOSITION OF THE FISSION PRODUCTS IN A REACTOR WITH A SPECIFIC HISTORY OF OPERATION. James O. Alderman and Kent C. Humpherys. May 1957. 63p. Project 1809. (AFSWC-TN-57-22; AD-134699)

An evaluation was made of the relative importance of the various isotopes formed in a reactor to the radiation dose which might result from internal deposition following a reactor accident. Tabulated data and graphs are presented for use in making calculations of the internal dose which might be expected in any specific case, regardless of reactor power level and mode of operation. For the case of the reactor with a history of operation used in this report, and neglecting (n,γ) reaction, it is concluded that the external dose resulting from a 10 curie-sec/m³ exposure in an infinite cloud is 4.2 roentgens, a definite upper limit. The internal hazard is markedly greater than the external hazard from a 10 curie-sec/m³ exposure to U²³⁵ fission products at times greater than 4 hours after a reactor accident. NSA 12-12144

9313

ON A RELAPSE IN RADIATION SICKNESS. V. N. Borob'yev. *Vestnik Rentgenol. i Radiol.* No. 3, 3-5 (1957) May-June.

An attempt was made to produce a relapse of radiation sickness in guinea pigs just recovered from acute radiation sickness by means of a fracture of the femur. During the subsequent ten days only a slight increase was observed in number of leukocytes, the weight remained normal, and the general condition remained good. NSA 12-9644

9314

NERVOUS CONTROL OF THE REACTION OF ANTERIOR HYPOPHYSIS TO X-IRRADIATION AS STUDIED IN GRAFTED AND NEWBORN RATS. Z. M. Bacq, P. Martinovitch, P. Fischer, M. Pavlovitch, D. S. Sladitch, and D. V. Radivojevitch. *Radiation Research* **7**, 373-85 (1957) Oct. NSA 12-2671

9315

KINETIN, A CHEMICAL PRODUCT AFFECTING THE MAMMALIAN CELL DIVISION RATE AFTER TOTAL BODY X-IRRADIATION. Gustavo Cudkowicz (Istituto per Ricerche Terapeutiche «Carlo Erba», Milan). *Minerva Nucleare* **1**, 326-7 (1957) Nov.-Dec. (In Italian).

The effect of kinetin (6-furfurylaminopurine), a substance which markedly promotes cell division in plant tissues, on mitotic activity of mouse jejunum mucosa after a single total body irradiation with 100 r of x rays was studied. The intraperitoneal injection of 2.5 mg of kinetin after the exposure to x rays does not modify the value of mitotic delay, expressed in terms of number of mitoses per 100 crypts of Lieberkuhn at a given post-irradiation time. Nevertheless in the mice treated with kinetin after irradiation the recovery of mitotic activity was more active and the mitotic indexes are increased in comparison to those of the control animals. The results of these preliminary experiments are briefly discussed. NSA 12-6408

9316

THE COURSE OF EXPERIMENTAL HEMOTHORAX IN RADIATION SICKNESS. Chzhu Chzhun lin. *Vestnik Khirurg.* No. 5, 104-9 (1957) May.

Experimental hemothorax induced by injecting 10 to 12 ml of autogenous blood into the pleural cavity of healthy rabbits was born well without any marked general reaction. Rabbits irradiated with 600 r were more affected by experimental hemothorax. Instead of absorption, exudation accumulated in the pleural cavity. In rabbits irradiated with 600 r, experimental hemo-

thorax markedly shortened the latent period of radiation sickness and hastened its climax. NSA 12-9643

9317

EFFECTS OF SOME CHELATING AGENTS ON THE SURVIVAL OF IRRADIATED MICE. C. Corradi, R. Paoletti, and E. Pozza (Universita Milan). Atti soc. lombarda sci. med. biol. 12, No. 3, 3p(1957). (In Italian).

White male mice were irradiated with a single dose of 1,000 r. Ten min. before the irradiation, the mice received an interperitoneal injection of some chelating agent equivalent to 1/3 or 1/6 of the lethal dose of the compound. Some of the chelating agents show a protective effect of the x-irradiated mice. Sodium diethyldithiocarbamate, sodium ethylenediaminetetraacetate, ammonium nitroso-phenyl-hydroxylamine, and sodium nitrilotriacetate show a more protective effect than the same quantities of cysteamine (with respect to the toxic doses). NSA 12-9629

9318

STUDIES ON THE MECHANISM OF ACQUIRED RADIO-RESISTANCE IN CANCER. Alan D. Conger and Helen J. Luippold (Oak Ridge National Lab., Tenn.). Cancer Research 17, 897-903(1957) Oct.

The problem of the mechanism by which radio-resistance of a tumor can be acquired is examined. Three hypotheses to explain the phenomenon are commonly proposed, namely, radiation selection of spontaneous mutant resistant cells in the tumor population, radiation-induced mutation in a tumor cell to resistance, followed by selection, and a complex of radiation effects on the host that interact with the tumor to give the appearance of resistance to the tumor. An experiment with mouse ascites tumor, specifically designed to maximize the likelihood of producing a true, or genetically, radio-resistant tumor line is described, radioresistance was not produced. NSA 12-2650

9319

THE ENDOCRINE DEPENDENCY OF CERTAIN THYROID CANCERS AND THE DANGER THAT HYPOTHYROIDISM MAY STIMULATE THEIR GROWTH. George Crile, Jr. (Cleveland Clinic Foundation and Frank E. Bunts Educational Inst., Cleveland, Ohio). Cancer 10, 1119-37 (1957) Nov.-Dec.

Thyroidectomy or treatment with I^{131} or thiouracil may stimulate the growth of well-differentiated thyroid cancers or may even convert them to anaplastic carcinomas. Probably it is not the radiation from the I^{131} but the secondary hypothyroidism and the increased output of thyroid-stimulating hormone (TSH) that stimulates the cancer. Desiccated thyroid in doses of 3 gr or more daily inhibits the production of thyrotropic hormone and often causes regression of differentiated thyroid cancers. Most inoperable thyroid cancers should not be treated by I^{131} until they have been given a trial on treatment with desiccated thyroid. All patients operated on for thyroid cancer should be given desiccated thyroid to prevent recurrences. NSA 12-2709

9320

X IRRADIATION AND TISSUE RESPIRATION: EFFECTS OF CYSTEAMINE. A. de Schryver. Arch intern. phys. biochim. 64, No. 4, 594-600(1956) (In French).

Five days after whole-body x irradiation of rats, weighing from 160 to 240 g, with a fatal dose of 750 r no modifications in the tissue respiration of the kidney and liver were observed. An average decrease of 25% was observed in the respiration of the myocardiac tissues. The preliminary administration of cysteamine suppresses the diminution of the respiration of the myocardiac tissues. Six hours after irradiation with

750 r, the utilization of oxygen by the spleen is depressed 21%. The preliminary administration of cysteamine reduces the diminution to 16%. The injection of cysteamine, considered as a radioprotector, does not seem by itself to affect the respiration of the spleen, myocardium, or liver. The injection of cysteine appears equally devoid of effects in the same conditions.

NSA 12-9626

9321

EFFECTS OF X-RAYS AND TRYPAN BLUE ON RETICULO-ENDOTHELIAL CELLS. N. R. Di Luzio, K. A. Simon, and A. C. Upton (Oak Ridge National Lab., Tenn.). Am. Med. Assoc. Arch. Pathol. 64, 649-56(1957) Dec.

NSA 12-5813

9322

ATOMIC ENERGY IN AGRICULTURE. William E. Dick. London, Butterworths Scientific Publications, 1957. 158p.

Applications of atomic energy in agriculture are discussed. These include the production of new and improved varieties of agricultural plants, the destruction and control of pests and diseases, tracing the path of carbon and other elements during plant metabolism, radioactive tracers in forestry, and applications of radiation for the sterilization and wholesale preservation of drugs and medicines and many food items. NSA 12-7092

9323

THE EFFECTS OF X-RAYS ON THE EMBRYONAL GROWTH AND DEVELOPMENT OF HORDEUM VULGARE L. A. M. Eunus (Michigan State Coll., East Lansing). J. Exptl. Botany 6, No. 18, 409-21(1955) Oct.

The effects of x rays on the developing embryos in barley plants were manifested by a number of abnormalities such as enlargement and vacuolation of cells, disturbances in cell walls, disintegration of cells leading to the formation of cavities, disturbances in distribution of meristematic tissues, a number of proliferations in different parts of the embryo, and retarded growth of the embryo during the early post-radiation period. In addition to these, deeply stained globular cytoplasmic bodies were observed in radiated embryonic cells. Very similar kinds of abnormalities were produced by softer x rays starting from 400 r and including 800 r. The frequency of occurrence and degree of proliferations in embryos irradiated with 800 r were relatively higher than those produced by 400 r and 500 r. Treatments with 300 r units of irradiation induced only the appearance of deeply stained globular bodies within cytoplasm and no effects were visible with dosages below 300 r. Comparative measurements of cell-lengths of the treated and control embryos at undifferentiated as well as at differentiated stages showed an increase in cell-lengths within radiated embryos. Radiated embryos showed defective pattern of germination. Harder x rays were found to be less effective in inducing embryonic abnormalities than softer rays when equal calculated dosages of the two were applied to the flowering spikes of *Hordeum vulgare* L. NSA 12-8946

9324

ACCUMULATION OF DIETARY BORON AND STRONTIUM IN YOUNG AND ADULT ALBINO RATS. R. M. Forbes and H. H. Mitchell (Univ. of Chicago, Ill.). Arch. Ind. Health 16, 489-92(1957) Dec. NSA 12-2620

9325

EFFECTS OF ANDROGENS ON THE CYTOLOGY OF X-IRRADIATED SEMINAL VESICLES. W. Fleischmann (Veterans Administration Hospital, Memphis, Tenn.). Exptl. Cell Research 13, 604-7(1957) Dec.

NSA 12-4048

9326

CHANGE IN CEREBELLUM TISSUE METABOLISM WITH IRRADIATION BY X-RAYS. A. V. Golubtsova, E. V. Moiseenko, and M. I. Safronova (M. V. Lomonosov State

Univ., Moscow). Bull. Exptl. Biol. Med. (USSR). 41, 763-6(1956) Sept. NSA 12-4043

9327

School of Aviation Medicine, Randolph AFB, Tex. PRELIMINARY STUDY OF THE EFFECTS OF X-IRRADIATION ON THE ANTIBODY-COMBINING CAPACITY OF HUMAN PROTEINS. William G. Glenn and Iowa W. Marable. Nov. 1, 1957. 4p.

Lyophilized human plasma, immune globulin, serum albumin, and pooled normal human serum were exposed in vitro to x radiation up to 200,000 r. These antigens were then titrated with homologous rabbit antisera by the alpha procedure and the extent of reactivity measured by the photorefractometric or light-scattering method. Only in irradiated serum albumin was any appreciable difference in affinity for homologous antibody observed. Such difference was apparently transitory. Serum agar analyses failed to confirm the observation of other workers that x radiation dimerizes protein. Except for serum albumin, highly concentrated human proteins, exposed to large doses of x radiation, undergo no change in antigenicity, as measured by affinity for homologous antibody. NSA 12-7071

9328

BIOLOGICAL RESPONSE TO MIXED RADIATIONS. Daniel S. Grosch, Robert L. Sullivan, and Leo E. LaChance (Marine Biological Lab., Woods Hole, Mass. and North Carolina State Coll., Raleigh). Nucleonics 15, No. 12, 64, 66(1957) Dec.

In reactor and certain accelerator situations radiation is often present as a mixture of radiations. To study the additive effects of such mixtures, a series of experiments was made on the combined sterilizing effects of external x rays and ingested β emitters (P^{32} and Sr^{89}) on the ectoparasitic wasp, Habrobracon juglandis. NSA 12-2666

9329

GENETIC VARIATION IN THE RESPONSE OF MICE TO TOTAL BODY X-IRRADIATION. I. BODY WEIGHT RESPONSE OF SIX INBRED STRAINS. D. Grahn. J. Exptl. Zool. 125, 39-61(1954). BA 55-23055

9330

TOXICITY OF AUTOXIDIZED SQUALENE AND LINOLEIC ACID, AND OF SIMPLER PEROXIDES, IN RELATION TO TOXICITY OF RADIATION. V. J. Horgan, J. St. L. Philpot, Barbara W. Porter, and D. B. Roodyn (A. E. R. E., Harwell, Didcot, Berks). Biochem. J. (London) 87, 551-8 (1957) Dec. NSA 12-5816

9331

RADIOISOTOPES IN BIOLOGY. J. A. Henry, A. Herve, and H. Maisin. J. belge radiol. 40, 564-77(1957). (In French).

The radio-isotopes are used in biology either as internal and external radiation sources or as tracers. A study is presented of the possible uses of tracer radioelements in experimental research on the whole body, on certain organs and tissues in vivo and in vitro, on cellular elements and finally on certain molecules of biological interest. (auth) NSA 12-2725

9332

BIOLOGICAL EFFECTS OF IONIZING RADIATION VIEWED IN THE PRESENT LIGHT ON THE NATURE OF DNA. A. M. Kuzin. Izvest. Akad. Nauk S.S.S.R., Ser. Biol. No. 3, 273-84(1957) May-June.

Examination of data from a study of radioinduced changes in living organisms led to the conclusion that the predominant effect of ionizing radiation is on high polymeric nucleoproteins and nucleic acids. Disturbances in the structure of the nucleic acids are reflected in the synthesis of specific albumin enzyme systems which produce in turn a general metabolic disturbance. NSA 12-9590

9333

INVESTIGATION OF VARIOUS RADIOACTIVE PHOSPHATE SUSPENSIONS AS TO THEIR THERAPEUTIC USE. Heinrich Kutzim (Der Hautklinik der Universität Cologne). Strahlentherapie 104, 551-7(1957). (In German).

The author examined numerous phosphate combinations as to their suitability for use in interstitial, intrapleural, and intraperitoneal therapy. Specially prepared chromium- and aluminum-phosphate suspensions proved singularly appropriate. Contrary to what happened in the case of the remaining combinations, these two were nearly insoluble in the animal organism and remained practically lying unchanged in the injected spot. They showed but a minimum move towards the organs. Even after injection into the venter cavity there was only a very reduced migration into the inner organs. NSA 12-7111

9334

RADIOBIOLOGICAL INVESTIGATIONS AT THE BIOLOGICAL INSTITUTE OF THE ACADEMY OF SCIENCE OF THE U. S. S. R. IN 1956. A. M. Kusin. Atomnaya Energiya 3, No. 8, 178-80(1957).

The following problems were investigated at the Biological Institute of the Academy of Science of the U. S. S. R. in 1956: what physical-chemical structural changes occur in the tissue shortly after irradiation and what is the influence exercised by radiation on the central nervous system. A total of 25 works were published by the Institute. NSA 12-8940

9335

Texas. Univ., Austin. Radiobiological Lab. LATENT EFFECTS OF CHRONIC WHOLE-BODY IRRADIATION ON THE PERFORMANCE OF MONKEYS ON THE SPATIAL DELAYED-RESPONSE PROBLEM. A. A. McDowell and W. Lynn Brown. Nov. 18, 1957. 4p. (AF-SAM-58-50)

Eight normal, 13 low-dose irradiated, and 13 high-dose irradiated rhesus monkeys were tested for 24 trials a day over a 16-day period on a 10-second delayed-response problem. Previous delayed-response testing had failed to differentiate these groups during the first 100 days following the radiation exposure to which the experimental animals had been subjected two years prior to the initiation of the present experiment. The results of the present experiment demonstrated that the hypothesis of a facilitation of delayed-response performance by monkeys as a latent effect of whole-body irradiation is tenable. Normal monkeys can and do perform as efficiently at some points in time as chronic irradiated monkeys, but they appear to suffer interference from stimulus factors extraneous to solution of the problem at hand. NSA 12-8925

9336

Texas. Univ. Austin. Radiobiological Lab. SOME EFFECTS OF NUCLEAR RADIATION EXPOSURE ON THE BEHAVIOR OF THE RHESUS MONKEY. A. A. McDowell and W. Lynn Brown. Dec. 4, 1957. 5p. (AF-SAM-58-58)

The behavior of rhesus monkeys was studied after they had been exposed to nuclear radiation. Deficits were shown in nondirected locomotor activity and in object-directed activity; an increment was shown in self-directed activity. This behavioral syndrome is comparable to that produced in monkeys by laboratory exposure to radiation. NSA 12-10294

9337

FATE OF INJECTED RAT BONE MARROW CELLS IN IRRADIATED MICE. Takashi Makinodan (Oak Ridge National Lab., Tenn.). J. Cell. Comp. Physiol. 50, Suppl. 1, 157-61(1957) Dec.

The circulating platelets, red blood cells, and granulocytes of lethally irradiated mice treated with rat bone marrow were analyzed at various intervals. On the basis of the observations, it was concluded that transplantation

and proliferation of granulocyte, platelet, and erythrocyte precursors take place when bone marrow cells are injected into lethally irradiated recipients. NSA 12-8962

9338

HEALING BONE FRACTURES AND SIMULTANEOUS ADMINISTRATION OF RADIOISOTOPES OF SULFUR, CALCIUM AND YTTRIUM. N. S. MacDonald, P. C. Lorick, and L. I. Petriello (Univ. of California, Los Angeles). *Am. J. Physiol.* 191, 185-8(1957) Oct.

A mixture of carrier-free radioisotopes, Ca^{45} , Sn^{95} and Y^{91} , was injected into rats bearing left tibial fractures, in states of repair varying from 3 to 18 days. Twenty-four hours after injection, both tibias were removed and analyzed for content of each radioisotope. At all intervals up to 18 days, postfracture, the injured bone contained more of all three isotopes than the intact, contralateral mate. A maximum in 24 hours retention of radiosulfate in tissue at the fracture site, was reached by the 7th to 10th day, after which retentions of a dose of S^{35} declined rapidly. Retentions of a dose of Ca^{45} in the fractured bone also rose rapidly during the first 3 to 10 days of healing. Thereafter, 24 hour retention values continued to rise but at a reduced pace. The avidity of healing bone for yttrium increased sharply during the same 3 to 10 day interval during which radiosulfate deposition became most effective. After this time 24-hour retention values for Y_{91} increased only slightly, if at all. The data suggest that formation of the sulfated mucopolysaccharides of osteoid matrix and fibrocartilaginous callus began by at least the 3rd day, if not earlier. The healing fracture made its greatest demands for plasma sulfate during the 7th to 10th day, postfracture. New calcium was laid down at the fracture site just as early as new sulfate, but the demands for plasma Ca continued throughout the 18 days of observation, as might be expected for a mineralizing callus. Yttrium fixation in the healing bone appeared to be more closely related to events leading to organic matrix formation than to mineralization of the new tissue. NSA 12-2724

9339

THE EFFECT OF IRRADIATING THE EXTERIORIZED SMALL BOWEL ON SUGAR ABSORPTION. William T. Moss (Northwestern Univ. and Veterans Administration Research Hospital, Chicago, Ill.). *Am. J. Roentgenol Radium Therapy Nuclear Medicine* 78, 850-4(1957) Nov.

Irradiation of the exteriorized small bowel prolongs gastric emptying. It also decreases the rate of glucose and arabinose absorption from the small bowel but absorption of the glucose is influenced more severely. This suggests that phosphorylation is disturbed as well as the process of diffusion. However, the magnitude of the change in the absorption of both sugars suggests that a decrease in the rate of diffusion is the major factor. NSA 12-2637

9340

GAMMA-RAY SENSITIVITY OF SPERMATOGONIA OF THE MOUSE. Eugene F. Oakberg (Oak Ridge National Lab., Tenn.). *J. Exptl. Zool.* 134, 343-56(1957) Mar.

Hybrid male mice were given a range of doses from 5 to 100 r of Co^{60} gamma rays, killed 72 hours after irradiation, and all spermatogonia counted in 100 tubule cross sections per mouse. Young primary spermatocytes at stages VII and VIII in the cycle of the seminiferous epithelium also were counted. Late type A, intermediate, and early type B spermatogonia were uniformly sensitive, with an LD_{50} of approximately 20 to 24 r of Co^{60} gamma rays. Scoring of all type A spermatogonia gave survival comparable to intermediate and type B cells at 5 to 23 r, and a significantly higher survival at 30 to 100 r. The curve obtained for type A cells has been interpreted as resulting from a mixed population of cells with at least

two different levels of sensitivity. These differences in sensitivity could not be correlated with specific stages in the cycle of the seminiferous epithelium, but appeared to exist even in the dormant period, where uniform radiation response might have been expected. Earlier work had shown that intermediate spermatogonia can be identified cytologically at stages II and III. On the basis of radiation data of the present investigation, this differentiation can be detected one stage earlier in the cycle of the seminiferous epithelium, namely, at late stage I to early stage II. Differentiation of intermediate spermatogonia from type A cells appears to be unaffected by radiation. NSA 12-8947

9341

THE COURSE OF EXPERIMENTAL LEPTOSPIROSIS IN IRRADIATED ANIMALS. R. V. Petrov. *J. Microbiol. Epidemiol. Immunobiol. (U. S. S. R.) (English Translation)* 28, 478-83(1957). NSA 12-5826

9342

RADIATION NEPHRITIS. R. W. Luxton. *Quart. J. Med.* 22, 215-42(1953).

Describes the nephrosclerotic lesion following heavy irradiation; glomerular and hyaline obliteration and scarring. Almost all glomeruli are involved and there is generalized interstitial fibrosis.

9343

DEVELOPMENT OF RADIATION AFTER-EFFECTS. G. G. Polikarpov. *Biophysics*, 2, 176-179(1957). NSA 12-2641

9344

MULTIPLE CARCINOMATA FOLLOWING CHRONIC X-RAY DERMATITIS. C. A. Porter and C. J. White. *Ann. Surg.*, 46, 649-671(1907).

9345

THE TRANSPORT OF BIVALENT CATIONS INTO THE YEAST CELL IN RELATION TO POTASSIUM AND PHOSPHATE UPTAKE. A. Rothstein, Rochester, N. Y. Univ. Atomic Energy Project, Contract W-7405-eng-49. (UR-502) July 15, 1957. 21p. NSA 12-56

9346

RADIATION PNEUMONITIS AND FIBROSIS; A COMPLICATION OF RADIOIODINE TREATMENT OF PULMONARY METASTASES FROM CANCER OF THE THYROID. J. E. Rall, J. B. Alpers, C. G. Lewallen, M. Sonenberg, M. Berman, and R. W. Rawson (Sloan-Kettering Inst. for Cancer Research, New York). *J. Clin. Endocrinol. and Metabolism* 17, 1263-76(1957) Nov.

The course of cancer of the thyroid with pulmonary metastases treated with radioiodine has been reviewed in 15 cases. Two patients died from what was presumed to be radiation pneumonitis. In 4 other patients there was x-ray evidence of pulmonary fibrosis. Nine patients are still alive one and a half to eight years after I^{131} therapy of pulmonary metastases from carcinoma of the thyroid. NSA 12-2710

9347

THE RADIOTOXIC EFFECTS OF S^{35} IN GROWING CARTILAGE. CONSIDERATION OF RADIOACTIVE SULFUR (S^{35}) AS A POSSIBLE RADIOTHERAPEUTIC AGENT IN CHONDROSARCOMAS. Philip Rubin, Kirkland C. Brace, Hazel Gump, Richard Swarm, and J. Robert Andrews (National Cancer Inst. and Dept. of Health, Education, and Welfare, Bethesda, Md.). *Radiology* 69, 711-19(1957) Nov. NSA 12-2683

9348

TESTES WEIGHT LOSS AS A QUANTITATIVE MEASURE OF X RAY INJURY IN MOUSE, HAMSTER AND RAT. H. L. Kohn and R. F. Kallman. *Brit. J. Radiol.* 27, 586-91(1954).

Demonstrates fallacy of previously reported studies believed to show that 500 r local irradiation of scrotum

caused no testicular injury while the same dose of whole body irradiation caused atrophy.

9349

CONCERNING BRAIN LESIONS IN RADIATION SICKNESS. S. Shershever. Zhur. Nevropatol. i Psikhiatr. No. 3, 393-401 (1957).

Three dogs were subjected to doses of 1000 and 1500 r x radiation exposure of the head. Ten dogs were subjected to head irradiation of 1500 r repeated in two or three days and 510 r irradiation of the back along the spine. Morphological examination of tissues revealed predominant lesions of nerve cells of cortex, disorders of the permeability of the vascular walls, and effects on the cerebellum, Ammon's horn, pons varoli, and medulla oblongata. NSA 12-9645

9350

EFFECT OF X-RAYS ON THE PERMEABILITIES OF BLOOD-ORGAN BARRIERS. L. S. Shtern, C. Ia. Rapoport, M. M. Gromakovskaya, and S. R. Zubkova (Academy of Sciences of the USSR, Moscow). Biophysics 2, 188-97 (1957). NSA 12-2643

9351

ACCELERATION OF ORGAN FORMATION IN PLANTS BY X RADIATION. I. M. Vasil'ev (Inst. of Biological Physics, Acad. of Sciences, U. S. S. R.). Doklady Akad. Nauk S. S. S. R. 116, 401-3 (1957) Sept. 21. (In Russian). NSA 12-4044

9352

THE ISOTOPE K^{40} AND ITS ROLE IN BIOLOGY. A. P. Vinogradov (Inst. of Geochemistry and Analytical Chemistry, Academy of Sciences, USSR, Moscow). Biochemistry (U. S. S. R.) 22, 12-18 (1957) Jan.-Apr.

The effect of the radioactivity of potassium-40 upon the growth and development of *Aspergillus niger* was studied under strict control in 9 series of experiments with different potassium content of the medium and varying isotope concentration. It was concluded that the radioactivity of naturally occurring potassium-40, and probably other radioactive substances usually contained in organisms, has no detectable influence on growth and development of the organism. NSA 12-8949

9353

X RADIATION EFFECTS ON THE CORRELATIVE VARIATIONS IN PLANTS. I. M. Vasil'ev (Inst. of Biophysics, Acad. of Sciences U. S. S. R.). Doklady Akad. Nauk S. S. S. R. 116, 49-51 (1957) Sept. 1. (In Russian). NSA 12-2652

9354

FACTORS IN THE CAUSATION OF LEUKEMIA. Shields Warren (New England Deaconess Hospital, Boston, Mass.). J. Mt. Sinai Hosp., N. Y. 24, 1331-4 (1957) Nov.-Dec.

Analysis of data on 183 cases of leukemia indicates that ionizing radiation is a cause of leukemia in man. The dose required appears to be on the order of several hundred r delivered either as a single large dose or multiple small doses. Exposure of a major portion of the hematopoietic or lymphopoietic tissue appears necessary. However, radiation doses approaching the lethal range fail to produce leukemia in many persons. NSA 12-8948

9355

DATA ON TOXICOLOGY OF RADIOACTIVE MATERIALS. I. CESIUM, STRONTIUM, RUTHENIUM, AND RADON. Institute of Sanitation and Occupational Disease, Academy of Medical Sciences, U. S. S. R. 1957. (In Russian).

A series of articles are presented on the subject of absorption, distribution, and excretion of radioactive materials of Sr, Cs, Ru, and Rn. The radiotoxic effects of Ru, Ce, Sr, and Rn under acute and chronic conditions are analyzed, and the experiments in stimulating the excretion of Sr and Ce from the organism are discussed. NSA 12-1198

9356

ROENTGENKYMOMOGRAPHY OF THE HEART IN ACUTE RADIATION SICKNESS UNDER EXPERIMENTAL CONDITIONS. (Order of Lenin Central Inst. of Hematology and Blood Transfusion). Med. Radiol. 2, No. 6, 49-56 (1957). Nov.-Dec. (In Russian). NSA 12-5191

9357

LESIONS IN SWINE EXPOSED TO TOTAL BODY GAMMA RADIATION FROM AN ATOMIC BOMB SOURCE. J. L. Tullis, B. G. Lamson and S. C. Madden. Am. J. Pathol. 28, 545 (1952).

Microscopic alterations were similar to those produced by 600 r total body x-radiation. Lymphocytes, erythroblasts, myeloblasts, spermatogonia and selected epithelial cells of small intestine showed the most extensive change. Capillary congestion, edema, hemorrhage, and growth of bacterial colonies were present in many organs in all animals dying spontaneously

9358

SECONDARY RAYS FROM LIPIODOL AND BISMUTH SUBNITRATE PASTES ON *STAPHYLOCOCCUS AUREUS* AND *BACILLUS COLI COMMUNIS*. M. Fries and M. Lenz. Proc. Soc. Exptl. Biol. Med. 26, 14-16 (1928).

Secondary rays from $BiONO_3$ powder, but not Bion $_3$ paste or Lipiodol inhibited growth of *Staph. aureus* or *B. coli*. Even when the iodine-containing Lipiodol was in contact with the surface of the culture during irradiation, inhibitory effect of secondary rays was slight. CA 23-4239

9359

MUTATIONS AT THE Yg_2 LOCUS IN MAIZE. D. Schwartz. Genetics 40, 594-5 (1955).

Mutagenic effects of ionizing radiations were studied by means of pseudoallelic series of chlorophyll markers on short arm of chromosome 9. Plants of the constitution $WdYg_2$ Py/wd df, heterozygous for an irradiated normal chromosome 9, and one deficient for the terminal 6 chromomeres, were scored for mutations (yellow-green phenotype) at the Yg_2 locus. Irradiation did not significantly increase incidence of yellow-green mutations. Accelerated transformation of genes to allelic forms by ionizing radiations was not proved.

9360

AN INDUCED GENE TRANSFER FROM *AEGILOPS* TO *TRITICUM*. E. R. Sears. Genetics 40, 595 (1955).

Plants with an added derived isochromosome involving the resistance-carrying arm were x rayed prior to meiosis, later used to pollinate normal, untreated plants. Of 6091 progeny, only 132 were resistant. Of these, 50 had a translocation involving the Aegilops chromosome. Pairing behavior of one translocated chromosome showed that resistance gene locus is near the centromere, thus reciprocal translocations involved almost the entire arm of this chromosome.

9361

EFFECT OF CHRONIC GAMMA-RADIATION ON SOMATIC MUTATIONS IN MAIZE. W. R. Singleton and A. L. Caspar. Genetics 40, 595-6 (1955).

Corn plants with genetic constitution P^{Tr}/p grown at different distances from a Co^{60} source received γ ray doses of 0.8 r - 185 r/day. Plants exposed to highest doses grew poorly and produced no seed. Frequency of mutations (greater than trace) increased linearly with increasing doses above 5 r/day; no increase at lower doses. Mutations involving a kernel or more were rare; showed little increase with increasing doses.

9362

IMMEDIATE EFFECT OF X RAYS ON THE DPN-DPNH RELATIONSHIP IN GRASSHOPPER EGGS. T. N.

Tahmisian and B. J. Wright. *Federation Proc.* **15**, 184 (1956).

Partial reduction follows irradiation. When the biological material is irradiated in the presence of O₂, more oxidative than reducing radicals are formed.

9363

STUDIES WITH RADIOACTIVE TRACERS IN PLANT NUTRITION. I. PROBLEMS IN THE USE OF RADIOACTIVE TRACERS. R. Scott Russell and R. P. Martin. *J. Exptl. Botany* **1**, 133-40 (1950).

Tracer methods can yield valid results only if the behavior of the tracer within the plant is indistinguishable from that of the normal element. Valid radioactive tracer studies require information about (a) isotope's chemical and physical behavior before disintegration, (b) effects of new substances formed by isotopic disintegration; (c) effects of the radiation emitted.

NSA 4-5164

9364

COMPARATIVE GENE STABILITY IN GLOMERELLA AND NEUROSPORA. C. L. Markert. *Genetics* **36**, 564 (1951).

More than 100 auxotrophic mutants of Glomerella were induced by mutagenic radiations - u-v, x-rays, and fast neutrons and by specific nutritional requirements of 74 mutants determined by methods comparable to those used with Neurospora. There were no qualitative differences in types of mutants induced by the three radiations, but u-v appeared to induce the most easily repaired type of genetic damage.

9365

CHROMOSOME STUDIES ON TRILLIUM KAMTSCHATICUM PALL. AND ITS ALLIES. IX. CHROMOSOME ABERRATIONS INDUCED BY X-RAY TREATMENT. H. Matsuura and T. Haga. *Cytologia (Tokyo)* **16**, 37-47 (1950).

First meiotic and pollen grain divisions after x-irradiation of resting T. kamtschaticum pollen mother cells showed breakage and reunion of chromosomes and chromatids. At the first meiotic metaphase, there was evidence of union between two broken chromosomal ends or between broken and unbroken end. (from abstract). PBA 21-2358

9366

CHROMOSOME STUDIES ON TRILLIUM KAMTSCHATICUM PALL. XVI. ALTERATIONS OF THE NUCLEOLUS-CHROMOSOME SYSTEM DUE TO IRRADIATION. H. Matsuura. *Cytologia (Tokyo)* **12**, 271-88 (1942).

Pollen grains from x-irradiated pollen mother cells showed (1) disturbed relationship between chromosomes and nucleoli, often so profound that every chromosome end might function as a nucleolar organizer and (2) translocations and inversions involving terminal segments, the nucleolus organizing regions taking intercalary positions, thus giving rise to SAT constrictions. PBA 21-89

9367

THE RELATIONSHIP OF CHIASMATA AND CROSSING OVER IN LILIUM FORMOSANUM. Spencer W. Brown and Daniel Zohary. *Genetics* **40**, 850-73 (1955)

Frequency of a single chiasma in the deficient arm corresponded closely to equational separations at anaphase in plants heterozygous for either of two terminal deficiencies induced by x-irradiating pollen. Assuming random relationship among chromosomes involved, crossing over frequency at anaphase I did not vary from that expected on the basis of chiasma formation at diakinesis.

9368

DELAYED EFFECTS IN CHROMOSOME BREAKAGE BY X-RAYS IN TRADESCANTIA BRACTEATA. K. C. Bora. *J. Genet.* **52**, 140-151 (1954).

Chromosome breakage is delayed, not simultaneous with the passage of the ionizing particle. Mechanism of x ray induced breaks is indirect, probably through a series of biochemical processes. Most breaks either reconstitute or reunite within a short time after induction. Chromatid breaks and triradials occurring with chromosome aberrations suggests that some breaks may remain open.

9369

THE INFLUENCE OF TEMPERATURE ON THE PRODUCTION OF CHROMOSOME ABERRATIONS BY FRACTIONAL X-RAY DOSES IN THE MICROSPORES OF TRADESCANTIA BRACTEATA. I. EFFECT AT 25°C. K. C. Bora. *J. Genet.* **53**, 29-40 (1955).

Tradescantia microspores received fractionated x ray doses, total doses being 180, 300, 312, 340 and 360 r with corresponding intensities of 60, 3.26, 480, 170 and 18 r/min, temperature 25°C., 1-32 hour intervals separating the fractional doses. Tissue was fixed 36, 48, 72, or 120 hours. post exposure. No recovery of the breakage frequency was observed even with 32 hr. interval.

9370

THE INFLUENCE OF TEMPERATURE ON THE PRODUCTION OF CHROMOSOME ABERRATIONS BY FRACTIONAL X-RAY DOSES IN THE MICROSPORES OF TRADESCANTIA BRACTEATA. II. EFFECTS AT 10°C. K. C. Bora. *J. Genet.* **53**, 41-8 (1955).

Tradescantia microspores show no recovery of chromosome breakage frequency when two equal fractions of a 340 r dose (170 r/min.) are separated by intervals of 1-32 hr. Fractionation effect is independent of temperature during irradiation and the interval, and of the nuclear stage to which the radiation is delivered.

9371

SPLITTING THE GENE. D. Lewis. *Discovery* **8**, 168-73 (1947).

Incompatibility (physiological barriers to self fertilization and certain cross fertilizations in plants) is determined by an incompatibility gene that may be split by x irradiation. Thus, irradiation might make a small increase in economic fruit production.

9372

EFFECT OF X IRRADIATION ON FORMATION OF ROOTS IN BEAN CUTTINGS. R. G. Trudova. *Doklady Akad. Nauk SSSR* **85**, 429-32 (1952). (In Russian).

Meristem tissue growth is highly radiosensitive. Doses of 250-500 r delay and 2000 r and higher suppress cell division. Purpose of experiment: to study ability of meristem cells and specialized cells to undergo fission after X irradiation. No great difference in x ray sensitivity of meristem cells and specialized cells was observed, although meristem cells recovered more completely. (resumed cell division after irradiation)

9373

SENSITIVITY OF THE TISSUES OF POTATO TUBERS TO X RAYS DEPENDING ON THEIR PHYSIOLOGICAL CONDITION. O. S. Engel. *Doklady Akad. Nauk SSSR* **85**, 437-9 (1952). (In Russian).

Doses of 4000 to 6000 r, 610 r/min., increasing in geometric progression were delivered to parenchyma of potato tubers. Radiosensitivity was found to depend on physiological conditions during irradiation. Greatest sensitivity: onset of growth of tuber of the maternal plant. During resting period, parenchyma of potato tubers is less sensitive.

9374

EFFECT OF DEEP COOLING DURING IRRADIATION ON THE DISRUPTION OF THE SYNTHESIS OF GLUTATHIONE AND ASCORBIC ACID IN WHEAT KERNELS DURING

GERMINATION. S. D. Chigirev. Doklady Akad. Nauk SSSR 101, 1055-7(1955). (In Russian).

During germination in darkness, the speed of mobilization of reserve matter of wheat kernels is diminished; synthesis of glutathione and ascorbic acid is depressed by x ray doses of approximately 52,000 r. Irradiation of germinating kernels during deep cooling affects the expenditure of reserve matter, and synthesis of glutathione and ascorbic acid to a lesser degree.

9375
THE EFFECT OF X-RAYS ON THE TISSUE. F. Pordes. Fortschr. Roentgenstr. 31, 287-297(1923). (In German).

This is a general consideration of the biological effects of x rays. Specific cell structures are considered to vary in radiosensitivity according to their "stability," cytoplasm being unstable therefore easily injured, the nucleus being more stable therefore less easily injured. The author emphasizes, however, that the effect of radiation on chromatin and chromosomes is of central importance because of the genetic effects. Secretory cells are easily injured. Roentgen sickness is attributed to disturbed cellular function of spleen, liver and intestinal cells.

9376
ON THE ACTION OF ROENTGEN AND RADIUM RAYS ON TRYPANOSOMA LEWISII. Waldemar Loewenthal and Walter von Rutkowski. Brit. J. Radiol. 13, 317(1908).

T. Lewisii was propagated by intraperitoneal injection in rats. Blood from the tail was observed microscopically in hanging drop preparations to determine the effect of in vitro irradiation on the living parasites. Parasites showed no effects of exposures (as long as 22 hr) to Ra. In contrast, 15-30 min. x ray exposure immobilized, but did not kill them. The injured trypanosomes contained a characteristic vacuole which the author considered to represent disturbed osmotic function of the protozoa

9377
INHIBITION OF MITOSIS IN THE ROOT OF THE BROAD BEAN (VICIA FABA) BY NITROGEN MUSTARD. B. Wolff and J. Read. Brit. J. Radiol. 25, 560(1952).

Author compares effects of x rays on % mitotic cells in the bean root with effects after immersion for various times in solutions of N. mustard in μ mole range. Earlier studies comparing effects of the 2 agents on growth of the roots indicated that 50 r was equivalent to 1 μ mole hr. Present study shows that 46 and 47 r = 1 μ mole hr. when mitosis is the biological variable.

9378
EARLY RADIATION DEATH. K. C. Brace and H. L. Andrews. (United Nations Publication A/CONF. 8/11 United Nations, N.Y.). Proc. Internat. Conf. on Peaceful Uses of Atomic Energy; Geneva 11, 115-117(1956).

Adult guinea pigs were irradiated with 200 Kvp X-rays. Following a dose of 5000 roentgens they showed progressive depression leading to death in 120 hours. Above 6000 roentgens, hyperactivity replaced depression. First signs of radiation were observed after 2000 roentgens, a drop in rectal temperature and slight bradycardia. Changes in blood chemistry were comparatively small.

9379
INFLUENCE OF CATALYTIC FERTILIZERS AND OTHER LITTLE USED SUBSTANCES ON THE GROWTH OF THE SUGAR BEET. O. Munerati, Mezzadrolì and T. V. Zapparoli. Staz. Sper. Agrar Ital. 46, 486-498(1913).

Plants grown in the field and in pots were treated with uranium sulfate. Other salts used were those of Mn, B, and Al. There was no observed effect of uranium sulfate on plants grown in pots. Results of experiments with field plants indicated that the value of catalytic fertilizers is uncertain. CA 8-1482

9380
BLOOD CHANGES IN ROENTGENOLOGISTS. V. Jagic, N. G. Schwarz and L. Siebenrock. Berl. klin. Wschr. 48, 1220(1911).

Blood changes indicate narrow injury which may progress to a true aplasia.

9381
THE EFFECT OF FRACTIONATED X RAY DOSAGE ON THE FREQUENCY OF CHROMATID AND CHROMOSOME ABERRATIONS. Karl Sax, Edward D. King and Henry Luippold. Radiation Research 2, 171-9(1955). NSA 9-4352

9382
ON THE GENERAL EFFECTS OF EXPOSURE TO RADIUM ON METABOLISM AND TUMOR GROWTH IN THE RAT AND THE SPECIAL EFFECTS ON TESTIS AND PITUITARY. J. C. Mottram and W. Cramer. Quart. Exptl. Physiology 13, 209-226(1924).

Rats were given small doses of radiation over a long period to (1) whole body (2) testis (3) the pituitary. Animals gained weight due to increased adipose tissue. Following testicular exposure hypertrophy of seminiferous tubules and hypertrophy of interstitial cells of testis were followed by changes in all three parts of pituitary gland. Irradiated rats were more resistant to tumor inoculation than were control animals.

9383
PRESERVATION OF FOOD BY IONIZING RADIATIONS. F. H. Banfield. Nature 176, 731(1955).

Ionizing radiations, their generation, properties and technical problems associated with use are reviewed. Most suitable type of radiation and its optimum dose, the possibility of reactions initiated by dosage involving production of undesirable and toxic substances or the destruction of some essential constituent, all these need to be studied extensively.

9384
ACTION OF X RAYS ON THE TESTICLE OF THE WHITE RAT. J. Bergonie and L. Tribondeau. C. R. Soc. Biol. 58, 154(1905). 3rd note.

9385
URANIUM NITRATE AND MANGANESE SULPHATE, THEIR ADVANTAGEOUS EMPLOYMENT IN CULTURE OF FRUIT TREES. J. Ray and G. Pradier. L. engrais 24, 1029(1909).

Fertilizing with MnSo₄ increased the vegetation of apricot trees and the tree produced larger fruit. Nitrate and uranium favored development of young cherry and pear trees when spread about the trees in solution containing 0.0002 part per thousand. Treatment had no appreciable effect on trees five or six years old. (from abstract). CA 4-807

9386
ON THE MECHANISM OF LEUKOPENIA PRODUCED BY EXPERIMENTAL X IRRADIATION. Ch. Aubertin and E. Beaujard. Comptes rend. Soc. Biol. 64, 410(1908).

Studies on guinea pig bone marrow are reported. Authors observed stimulation of marrow, especially erythroid series, in irradiated animals. Leukopenia was attributed to destruction of mature circulating cells in excess of formation of new cells.

9387
ACTION OF X RAYS ON BLOOD AND BONE MARROW. Ch. Aubertin and E. Beaujard. Arch. de med. exper et d anat. pathol. 20, 273(1908). (In French).

Studies on the marrow of irradiated guinea pigs are reported.

9388
DISTRIBUTION OF LEAD IN THE CAT AFTER INTRAVENOUS INJECTION OF A COLLOIDAL LEAD PREPARATION

AND THE EFFECT OF RADIATION ON THIS DISTRIBUTION. B. L. Crawford, H. Stewart, C. Willoughby and F. Smith. *Am. J. Cancer* **33**, 401-422(1938).

Cats receiving i. v. lead preparation and x irradiation showed greater toxic manifestations than cats receiving Pb alone. The increased effect appears to be due to additive effects of Pb and x ray rather than to altered Pb distribution in the irradiated animal.

9389
SYNTHESIS OF PYRIDOXIN BY A "PYRIDOXINLESS" X RAY MUTANT OF *NEUROSPORA SITOPHILA*. J. L. Stokes, J. W. Foster, and C. R. Woodward. *Arch. Biochem.* **2**, 235-245(1943).

The ability of the mutant to synthesize pyridoxine in the pH range 5.8-7.3 and in the presence of ammonium N is limited by the x-ray-induced gene mutation. Pyridoxine is synthesized independently of pH and N source by the normal parent strain. CA 37-5441

9390
SYNTHESIS OF ALL TYPES OF RING COMPLEXES IN Einkorn wheats. K. Yamashita. *Genetics* **37**, 637-8 (1952).

9391
VITAMIN CHANGES IN DAIRY PRODUCTS AND PLANTS ON GAMMA IRRADIATION. Anonymous. *Nutrition Revs.* **12**, 138-9(1954).

Irradiation of fresh milk products at dosages of 80,000 to 2,000,000 r destroyed vitamins A and E, carotenoids, ascorbic acid and riboflavin. Phosphatase was inactivated slightly. In contrast to the rapid destruction of ascorbic acid in dairy products, there was an increase of ascorbic acid in green plants irradiated with gamma-rays from Co 60.

9392
RADIOACTIVE ISOTOPES IN THE SERVICE OF PLANT BREEDING. C. Kjørven. *Norsk. Landbruk* **20**(9) 192-3 (1954).

Author reviews the use of radioactive isotopes to induce mutations in economic plants. Irradiation of the barley *Domen* has produced plants 14 days earlier than the parent variety. During the previous year mutants were obtained in cereals, clover and tomatoes.

9393
ON RECENT INVESTIGATIONS OF THE ACTION OF RADIUM ON PLANTS AND ANIMALS. Louis Hussakof. *Med. Record* **72**, 89-94(1907).

Characteristics of alpha, beta, and gamma rays are discussed. Author then considers whether the change produced in living tissues by either the rays or the emanation is a physical or chemical change. Conclusion: it appears that the action is chemical.

9394
SOMATIC CHANGES INDUCED BY X RAYS IN THE NUMBER OF COTYLEDONS OF *ERANTHIS HIEMALIS*. B. Haccius and E. Reinholz. *Naturwiss* **40**, 533(1953)

Eranthis hiemalis embryos are very immature at seed maturity, development continues in mature seed through the summer. Seeds were irradiated before cotyledon development began. Cotyledon abnormalities, including polycotily, became numerous with doses of 2000 r or more. Treatment of seeds with growth substance solutions caused tricotily. BA 28-26939

9395
GENETIC RESEARCH ON VORSTENLAND TOBACCO N. P. Badenhuizen. *Landbouwk. Tijdschr (Wageningen)* **60**, 179-86(1948).

Seed treated with 0.2% colchicine in petri dishes between filter paper readily gave tetraploids, which are smaller than diploids. Haploids, obtained by irradiating

pollen, resemble diploids but flowers and cells are smaller. Doubling of these haploids by treating the growing point was difficult. PBA 19-1969

9396
MUTATION AND POLYPLOIDY IN PLANT BREEDING. W. Hoffmann. *Kuhn-Archiv* **67**, 17-32(1953).

Evolution by chance mutation and the importance of mutations in plant breeding are discussed. Under natural conditions, polyploid strains adopt to new or unfavorable conditions more readily than do diploids. (from abstract). PBA 24-1752

9397
AN UNUSUAL ASSOCIATION OF TWO MUTANT CHARACTERS. C. C. Moh, R. A. Nilan and F. C. Elliott. *J. Heredity* **46**, 35-40(1955).

A mutant line of barley characterized by a high frequency of yellow-green seedlings arising from partially sterile green plants was induced by atomic bomb radiation at Bikini in 1946. Average percentage of ovule and pollen abortion in the partially sterile green plants were 29.4 and 26.6. Three types of gametes produced by parental type plants were viable.

9398
WHAT IS A GENE? M. Demerac. *J. Heredity* **24**, 369-78(1933).

Literature concerning the size and behavior of genes is reviewed. Gene is likened to a single organic molecule and gene string to groups of organic molecules, such as occur in chain hydrocarbons. BA 8-17158

9399
CHROMOSOME BREAKAGE AND THE NUCLEIC ACID CYCLE. APPENDICE II: POLLEN GRAINS AND POLLEN TUBES. C. D. Darlington and L. F. LaCour. *J. Genet.* **46**, 263-267(1945).

Irradiation affects the time scale of development. Since radiation-induced chromosome breakage is variably measured referable to this time scale, single-time comparisons have shown discordant results. Comparison of pollen grains and pollen tubes shows their chromosomes have a similar breakability and inherent rejoinability.

9400
CHROMOSOME BREAKAGE AND THE NUCLEIC ACID CYCLE. APPENDICES I. THE CALCULATION OF SISTER-REUNION FREQUENCY (BU K. MATHER). C. D. Darlington and L. F. LaCour. *J. Genet.* **46**, 252-63 (1945).

Broken ends of *Trillium erectum* pollen grains show a higher rate of sister reunion when carried by acentrics than by centrics. Sister reunion of a break is independent of other breaks in the nucleus. Multiple breaks in one nucleus do not interfere with one another in the chromosome arms in which they occur. (from author's

9401
CHROMOSOME BREAKAGE AND THE NUCLEIC ACID CYCLE. C. D. Darlington and L. F. LaCour. *J. Genet.* **46**, 180-267(1945).

X rays act directly on nucleus and cytoplasm, and indirectly on each, through the other. The difficulty of separating these nuclear and cytoplasmic effects has been so great that the effects have been considered as being independent. By separating them in experiment and comparing experimental and spontaneous breakage, they are found to be associated by way of nucleic acid cycle. They can be used to study variations in this cycle.

9402
CYTOGENETICAL STUDIES ON THE STERILE WILD SENNA (*CASSIA TORA* L.). PRODUCED BY THE ATOMIC

BOMB EXPLOSION. IV. ON THE GIGAS MUTANTS SEGREGATED FROM THE ASYNAPTIC WILD SENNA (CASSIA TORA L.). T. Katayama. J. Fac. Agr. Kyushu Univ. 10, 119-32(1953).

The Gigas mutants had a later flowering date, high sterility, larger leaves and rachis, greater height and stem width and branched more frequently than the normal plants. They were trisomics with 27 chromosomes and showed various aberrations at meiosis. PBA 24-2354

9403

THE ACTION OF BURIED TUBES OF RADIUM EMANATION ON NEOPLASIAS IN PLANTS. Isaac Levin and Michael Levine. J. Cancer Research 7, 163-70(1922).

In normal adult tissue the only perceptible result of an insertion of a radium emanation tube is complete destruction of tissue in immediate vicinity of the capillary. Insertion of radium emanation tubes into crown gall tissue is followed by inhibited tumor development, mainly due to effect of soft B rays.

9404

ANALYSIS AND SYNTHESIS OF RECIPROCAL TRANSLOCATIONS IN BARLEY. Y. Nishimura and H. Kurakami. Japan J. Breeding 3, 45-7(1953). (In Japanese).

By intercrossing lines with 4-membered and 6-membered chromosome rings (obtained by x radiation), further lines with rings of 6, 8, 4 + 4 and 4 + 6 chromosomes were obtained. Data on the fertility of each line are given. PBA 24-2960

9405

MUTATIONS IN RICE INDUCED BY X IRRADIATION. Y. Nishimura and H. Kurakami. Japan J. Breeding 2, 65-71(1952).

Soaked seeds of four varieties Noain 8, 20, 25, and 29 were treated with approximately 20,000 r. Distribution and inheritance of sterility in the X1 and X2 generation is described. Partial sterility in X2 was associated with presence of multiple associations of 4 chromosomes, presumably due to reciprocal translocation in preceding generation. PBA 24-1120

9406

IRRADIATION OF SPIROGYRA CHROMOSOMES. M. B. E. Godward. Heredity 8, 293(1954).

After 3000r, each nucleus showed fragments, the mean per nucleus being 6. After 15,000 r about 90 fragments were found. They passed to the mitotic poles, and survived nine days. At this degree of fragmentation an occasional chromosome fragment was left on the equator of the mitotic spindle, suggesting the presence of non centromere material in chromosomes.

9407

THE EFFECT OF FRACTIONAL X-RAY DOSAGE ON THE FREQUENCY OF CHROMOSOME ABERRATIONS. Karl Sax and Henry Luippold. Heredity 6, 127-31(1952).

Experiments have not confirmed conclusions that reduction of chromosome aberration frequency following fractional dosage can be attributed to a "depressing effect on sensitivity to breakage." Effect of fractional dosage can be attributed to failure of breaks induced at first exposure to survive longer rest periods. Broken ends from first exposure cannot unite with broken ends from second exposure to produce the 2-hit chromosome aberrations. (from author's summary.)

9408

STRUCTURE OF THE INCOMPATIBILITY GENE. III. TYPES OF SPONTANEOUS AND INDUCED MUTATION. D. Lewis. Heredity 5, 399-414(1951).

Four alleles of incompatibility gene in *Oenothera organensis* have been tested for mutation. Two of these alleles have not mutated, either spontaneously or after

x irradiation, in a total of 80×10^6 gene divisions tested. The two other alleles have given both permanent and revertible mutations, which may occur spontaneously and are induced by x rays.

9409

THE CHEMICAL BREAKAGE OF CHROMOSOMES. C. D. Darlington and P. C. Koller. Heredity 1, 187-221(1947).

Dilute vapor of mustard gas applied to anthers for 2 minutes has a prolonged toxic action on cell, especially the nucleus, like that of continuous low intensity radiation. Mustard gas and x ray breaks differ from spontaneous breaks, the former being associated with a higher frequency of sister-reunion among acentrics, and a lower frequency of sister-reunion in cells with more breaks.

9410

SIGNIFICANCE OF RADIOACTIVITY IN PHYSIOLOGY OF PLANTS. J. Stoklasa. Centr. Bakteriöl. Parasitenk Abt. II. 40, 266-280(1914).

CO₂ production of O₂ consumption are increased in daylight under Ra emanation. The greatest increase in gas exchange was observed in plants exposed to 150-160 units of Ra emanation per 1 of air, 50,000 - 60,000 units per 1 produced harmful effects long after exposure. Roots were most resistant, blossoms less so, buds and leaves were least resistant. CA 8-2739

9411

RADIOACTIVITY OF POTASSIUM AND ITS SIGNIFICANCE IN NONCHLOROPHYLLOUS AND CHLOROPHYLLUS CELLS. I. J. Stoklasa. Biochem Z. 108, 109-139(1920).

Germination is stimulated by natural radioactivity much more effectively than by induced or artificial radioactivity derived from Ra emanations. Emanations of K can stimulate the processes of germination to a great degree. CA 15-248

9412

ANALYSIS OF DATURA STRAMONIUM PLANTS GROWN FROM SEEDS EXPOSED TO X-RAYS. A. S. Blakeslee, A. D. Bergner, S. Satina, A. G. Avery, J. L. Cartledge, and J. S. Potter. Anat. Record 44, 281(1929)

Plants grown from *Datura* seeds x irradiated for (1) 50 or (2) 65 minutes, showed chromosomal and pollen disturbances and gene mutations among their offspring. Abnormal chromosomal configurations and bad pollen were obtained from (parts only) three P1 plants.

9413

A COMPARISON OF THE LETHAL EFFECT ON THE IMMEDIATE PROGENY OF POLLEN TREATED WITH X-RAYS AND RADIUM. J. T. Buchholz and A. F. Blakeslee. Anat. Record 51(suppl.), 105(1931).

Pollen of normal plants of *Datura stramonium* were subjected to x-rays and gamma rays of radium from 15 minutes to nearly 18 hours. Untreated *datura stramonium* pollen was compared with x and γ irradiated (15 min nearly 18 hrs) pollen in self fertilization experiments. Irradiations reduced seed yield per capsule by 0 to 100 per cent of controls. Relative effectiveness of the two kinds of radiation was comparable.

9414

THE RATE OF INDUCED MUTATION IN RELATION TO DORMANCY, TEMPERATURE AND DOSAGE. L. J. Stadler. Anat. Record 41, 97(1928).

About 90% of x ray induced mutations in barley may be detected in the seedling stage. Mutation rate was much lower in irradiated dormant seed than in irradiated germinating seed. Dormant seed are more radioresistant than germinating seed. Radiation intensity, but not temperature, influenced mutation rate.

9415

EFFECTS OF X RAYS UPON GREEN PLANTS. IN:

BIOLOGICAL EFFECTS OF RADIATION. E. L. Johnson. B. M. Duggar, ed. 2v. 2, 961-85(1936) New York, McGraw-Hill. BA 10-18025

9416

ARTIFICIAL INDUCTION OF HAPLOID DURUM WHEATS BY POLLINATION WITH X RAYED POLLEN. A. K. Efeikin and B. I. Vasil'ev. Trudy Priklad. Botan. Genet. 1. Seleksiya 9, 39-5(1936). (In Russian with English summ).

Emasculated flowers of wheat were pollinated by pollen treated with 2200-2500 r. Among the few seeds produced some were normal diploids and others were haploid. One haploid plant was obtained from an Emmer wheat and one from T. persicum fuliginosum. Phenotypically they differed widely from the parents and showed morphological similarities to T. monococcum. BA 11-2665

9417

ARTIFICIALLY INDUCED MUTATIONS IN OATS. K. J. Frey. Agron. J. 46, 49(1954).

Mutants of agronomic value obtained from x irradiated huron include: (1) shorter and stiffer straw; (2) earlier maturity by 4-6 days; and (3) "field tolerance" to crown rust and resistance to stem rust apparently caused by race 7. PBA 24-1893

9418

INVESTIGATIONS IN THE BIOPHYSICS AND BIO-CHEMISTRY OF THE CELL NUCLEUS. Alfred Marshak. Trans. N. Y. Acad. Sci. 17, 506-19(1955).

The author reviews biophysical and biochemical studies dealing with (1) response of nuclei and chromosomes to ionizing radiations and (2) effects of ionizing radiation on meiosis and mitosis, including chromosome abnormalities, inhibition of mitosis and the behavior of chromosomes.

9419

THE EFFECTS OF RADIUM EMANATION ON THE CROWN GALL TISSUE. Michael Levine. Am. J. Roentgenol. Radium Therapy 14, 221-33(1925).

Small amounts of radium emanation sealed in glass capillaries and implanted in the crown gall tissue for short periods produced little effect on surrounding tissues. Longer exposures and larger doses induced necrosis of tissues, within a radius of 0.5 to 5mm.

9420

PRESERVATION OF FOODSTUFFS WITH IONIZING RADIATIONS. R. S. Hannan. Times Science Rev. no. 17, 6-8(1955).

The author discusses the use of ionizing radiations in extending the storage life of perishable foods. Potentially the most useful property of the ionizing radiations for the processing of foods is their ability to inactivate micro-organisms capable of cell division. Although inactivation of micro-organisms can be readily achieved, much more research is required before radiation is used commercially for food storage.

9421

THE FREQUENCY OF MUTATION OF SPECIFIC GENES IN MAIZE. L. J. Stadler. Anat. Record 47, 381(1930).

Frequency of 8 well known recessive mutations (C, I, Pr, R, Sh, Su, Wx and Y) was determined in x irradiated maize. Mutations were found for all genes tested except Wx. X irradiation of young ear shoots before megasporogenesis, in intensity sufficient to induce numerous recessive mutations for seedling characters, did not affect rate of mutation of R. Among 17, 292 x rayed gametes tested, 23 mutants were found.

9422

THE INHERITANCE OF TWO CHLOROPHYLL DEFICIENCIES IN ASIATIC COTTONS. R. Balasubrahmanyam

(Central Cotton Comm.). 1947. p.97-99 of THIRD CONFERENCE ON COTTON GROWING PROBLEMS IN INDIA, 1946.

An albino mutant of G. herbaceum var. frutescens and a xantha mutant of G. arboreum var. neglectum f. indica occurred as the result of x irradiation. Both types are lethal in the homozygous condition; normal green is completely dominant. (from abstract). PBA 19-1098

9423

ION DENSITY AND BIOLOGICAL EFFECTIVENESS OF RADIATIONS. Lars Ehrenberg. Acta. Radiol. Suppl. 116, 680(1954).

Dry dormant or presoaked germinating seeds were exposed to 175 k-v unfiltered x rays or neutrons. Observations on the following are reported: chromosome disturbances in first mitotic division, growth rate in green-house, field germination, number of maturing plants, fertility and mutation rate (number of chlorophyll deficient mutants in second generation.)

9424

NEW METHODS IN PLANT BREEDING. A. Gustafsson. Svensk Jordbruksforskning 39-44(1953).

Induction of polyploidy and of changes in particular genes or parts of chromosomes and the use of ionizing radiation as exemplified by research at Svalof and Kjeller's experiments in Norway on the treatment of seeds with slow neutrons, are reviewed. PBA 24-36

9425

TWO X RAY INDUCED AUXO-HETEROTROPHICS. N. Fries. Svensk. Botan. Tidskr. 39, 270-8(1945).

Two mutants of Ophiostoma multiannulatum obtained by x irradiating the ascospores, were unable to synthesize biotin and p-aminobenzoic acid. Details of growth response of strain 225 to inositol, malt extract and various doses of biotin, and of strain 617 to various doses of p-aminobenzoic acid are given. PBA 19-161

9426

ON STERILITY IN CASSIA TORA INDUCED BY THE ATOMIC BOMB. III. CYTOLOGICAL OBSERVATIONS ON THE ASYNAPTIC PLANTS. T. Katayama. Sci. Bull. Fac. Agr. Kyushu Univ. 14, 205-15(1953). (In Japanese, with English summary).

A detailed description of meiosis in the asynaptic plants is presented. PBA 24-3250

9427

ON STERILITY IN CASSIA TORA INDUCED BY THE ATOMIC BOMB. II. CROSSING EXPERIMENTS INVOLVING ASYNAPTIC PLANTS AND THE INHERITANCE OF THIS CONDITION. T. Katayama. Sci. Bull. Fac. Agr. Kyushu Univ. 14, 195-204(1953). (In Japanese with English Summary).

An asynaptic strain of C. tora obtained at Nagasaki following the 1945 atomic explosion was pollen sterile but partially fertile when pollinated by normal plants. A 3:1 ratio of normal: asynaptic plants was obtained in the F2, indicating that asynapsis depended on a single recessive gene. PBA 24-3249

9428

THE EFFECTS ON FERTILITY AND THE SEX-RATIO OF SUB-STERILITY EXPOSURES TO X RAYS. A. S. Parkes. Proc. Roy. Soc. (London) B98, 415-436(1952).

Male mice were irradiated before mating. Histologic changes in testes were: (1) large numbers of spermatocytes in tubules (2) abnormally large numbers of spermatids. Sex ratio of male/female offspring depended upon conception time after irradiation.

9429

THE EFFECTS OF IONIZING RADIATION IN BARLEY. L. Ehrenberg and A. Gustafsson. Acta. Radiol 41, 101-4(1954).

Studies on cytoplasmic and chromosomal changes directed towards producing useful mutants in barley are considered with respect to: immediate effects, later effects and second generation properties of mutation frequency and mutant viability.

9430

SOME BIOLOGICAL ASPECTS OF THE FACTOR IN BONE MARROW RESPONSIBLE FOR HEMATOPOIETIC RECOVERY FOLLOWING SYSTEMIC IRRADIATION.

Mary B. Brown, Barbara B. Hirsch, C. Susan Nagareda, Sarah K. Hochstetler, William G. Faraghan, Paul Toch and Henry S. Kaplan. *J. Natl. Cancer Inst.* **15**, 949-73 (1955).

Results of an extensive series of experiments are reported.

9431

COMPARATIVE EFFECT OF RADIOACTIVITY OF URANIUM COMPOUNDS ON GERMINATION AND DEVELOPMENT OF SEEDS. P. Verducci. *Boll. Soc. Ital. Biol. Sper.* **20**, 333-334 (1945).

The effects of uranium nitrate, uranium sulfate and uranyl acetate on grain were dependent on time of exposure, distance of seeds from the chemicals and free surface exposed. Sulfate was more effective than nitrate. *CA* 40-6123

9432

THE EMPLOYMENT OF RADIOACTIVE SUBSTANCES IN AGRICULTURE. J. A. de Vera. *Quim. E. Ind. (Barcelona)* **6**, 55-61 (1929).

Corn, cabbage, pimento, beans, potatoes and lettuce are fertilized with monazite, and the effects are described. Potatoes, tomatoes, wheat, barley, oats, beets and corn are fertilized with uranium and thorium. Monazite is more effective than uranium as a radioactive fertilizer. *CA* 23-2778

9433

LONG-TERM SURVIVAL FOLLOWING X IRRADIATION AND THE IRRADIATION OF THE α PARTICLES FROM RADON AND ITS DECAY PRODUCTS. Joanne Weikel Hollcroft, Egon Lorenz, Marion Matthews and Charles C. Congdon. *J. Natl. Cancer Inst.* **15**, 1059-69 (1955).

Male mice were: (1) x rayed (400 r), (2) radon treated (400 r), (3) controls. Mean survival time: (1) 425; (2) 165; and (3) 377 days. Radon damage is described, including unique alteration in renal cortex. *NSA* 9-2564

9434

NEW EVIDENCE FOR A TOXIC SUBSTANCE ELABORATED AFTER IRRADIATION. A. Edelmann. *Federation Proc.* **14**, 42 (1955).

Adrenalectomized rats, injected intraperitoneally with 4 ml of serum from other adrenalectomized rats which had been exposed (whole body) to 1000 r of x rays 24 hrs. earlier, die sooner than controls given serum from adrenalectomized (but not irradiated) rats.

9435

EFFECT OF RADIOACTIVITY ON THE DEVELOPMENT OF PLANTS. J. Stoklasa. *Compt. Rend.* **155**, 1096-1098 (1912).

Radioactive H_2O caused marked stimulation in the germination and growth of plants, roots, stalks and leaves of *Triticum vulgare*, *Hordeum disticum*, *Vicia faba*, *Pisum sativum*, *Lupinus angustifolius*, *Trifolium pratense* and *Pisum arvense*. Radioactive H_2O hindered growth of *B. mycoides*, *B. Fluorescens*, *liquefaciens* and *B. filifaciens*. *CA* 7-811

9436

NEUTRON AND X-RAY EXPERIMENTS IN WHEAT AND A REVISION OF THE SPELTOID PROBLEM. J. Mackey. *Hereditas* **40**, 65-180 (1954).

In experiments to compare induced mutability at diploid and polyploid levels, common wheat was used as the polyploid representative and barley as diploid. Dry seeds were subjected to treatment with x rays or neutrons. Mutations in wheat showed pronounced groupings, in contrast to random distribution of those in barley. Other results are included.

9437

IRRADIATION EFFECTS, SEED SOAKING AND OXYGEN PRESSURE IN BARLEY. L. Ehrenberg, A. Gustafsson, V. Lundqvist, and N. Nybom. *Hereditas* **39**, 493-504 (1953).

Seeds treated with X rays or neutrons were studied with respect to germination, the chromosomes in seedlings, seedling growth, fertility, and frequency of mutant characters in the X2 and X3, a low dosage of x irradiation increased frequency of mutation in pre-soaked seeds, high dosages caused a marked reduction. Other results are given. *PBA* 24-325

9438

BIOLOGICAL EFFECTS OF X-IRRADIATION AT LOW TEMPERATURES. N. Nybom, V. Lundqvist, A. Gustafsson and L. Ehrenberg. *Hereditas* **39**, 445-57 (1953).

Barley seeds were placed in liquid air (ca -190°C.) or water at 20°C., then X-irradiated. Chromosome distribution in X, Seedlings, growth and fertility of the X, and frequency of mutant characters in X2, indicated that low temperature, (-190°C) acted protectively against both physiological and genetical effects of irradiation. *PBA* 24-326

9439

MODIFICATIONS IN A CALLUS CULTURE OF *SEQUOIA SEMPERVIRENS* AFTER GROWTH OF P32 AND S35. Ernest Ball. *Growth* **17**, 215-28 (1953).

In calluses of *Sequoia sempervirens* treated with sublethal dose of P 32 or S 35 all cells except new initials of tracheid group failed to proliferate. Meristematic groups built up large masses of tissues separated by necrotic materials after several growth periods on a nonradioactive medium. Some treated calluses showed growth-recovery in marginal meristems and formation of normal tissues.

9440

THE EXPERIMENTAL ALTERATION OF HEREDITY. L. J. Stadler. *Growth* **3**, 321-2 (1939).

Mutation and various chromosomal derangements including deficiencies, interchanges, inversions, and intercolations are induced by x ray. Irradiation with UV of appropriate wave lengths results in embryo abortion, endosperm deficiency, and mutations. These may occur without appreciable effect upon frequency of translocation, hence the induced mutations are not merely effects of changed positions of genes.

9441

EVIDENCE FOR SISTER-STRAND CROSSING OVER IN MAIZE. Drew Schwartz. *Genetics* **37**, 623-4 (1952).

A large ring chromosome involving almost the whole of chromosome 6, the nucleolar organizer chromosome, was induced by x irradiating maize pollen. Gametophytes possessing the ring, thus deficient for chromatin in terminal regions of chromosome 6, are viable. Crossing over in heterozygote between ring and its homologous rod chromosome results in bridges in both A1 and A 11. Other results are included.

9442

AN ANALYSIS OF COMBINED INFRA-RED AND X-RAY EFFECTS ON *TRADESCANTIA* CHROMOSOMES. H. T. Yost, Jr. *Genetics* **35**, 700 (1950).

Increases of 50-120% in chromosomal aberrations were observed in infra-red treated cells. Treatments have been given as late as 96 hours after x ray with no

apparent decrease in the infra-red effectiveness. Type of aberration recovered is independent of time of recombination, and depends solely upon singleness or doubleness of chromosome at time of x-irradiation.

9443

ESTIMATION OF WHOLE-BODY RADIATION DOSES IN ACCIDENTAL FISSION BURSTS. J. G. Hoffman and L. H. Hempelmann. Am. J. Roentgenol. Radium Therapy 77, 144-160(1957).

9444

A FRAGMENTED CHROMOSOME IN TRITICUM MONOCOCCUM AND ITS USE IN STUDIES OF INHERITANCE. Luther Smith. Genetics 32, 341-9(1947).

X rays broke a chromosome in the centromere, producing two telocentric fragments. One later formed a secondary trisome. Plants with 14 normal chromosomes plus the telocentric chromosome and plants with 13 normal chromosomes plus two fragments were vigorous and fertile but differed from each other and from normals in macroscopic and cytologic characteristics.

9445

PEACEFUL USES OF ATOMIC ENERGY, BIOLOGY AND MEDICAL SESSIONS AT GENEVA. L. F. Lamerton. Nature 765-767(1955).

A review of papers in the field of biology and medicine.

9446

BIOCHEMICAL MUTATIONS IN THE CRUCIFER ARABIDOPSIS THALIANA (L) HEYNH. J. Langridge. Nature 176, 260-261(1955).

Plant biosynthesis was studied by the mutational block method, using x ray doses of 6000 r., 130 KV, to induce mutations in seeds. One mutation inhibits thiamine synthesis. Mutant plants have mottled cotyledons, and white leaves. All plants die above 27° C. Three lethal mutations prevent formation of plastids from proplastids. Formation of chlorophyll is prevented by another mutant.

9447

EFFECTS OF CATHODE RAYS ON VARIOUS MATERIALS. E. J. Lawton. Science 112, 420(1950).

A dose of 1 million r is lethal to most molds and bacteria. Absorption of 10^6 r produces a temperature rise of about 2° C/g of water. Sterilization dose in some cases produces undesirable changes in odor, taste and color of foods. Enzyme systems are deactivated by cathode rays. Plants from seeds irradiated with electrons produce flowers with color mutations. Chemical changes are produced in other materials irradiated with cathode rays. Enzyme systems mentioned are from both natural and isolated states.

9448

THEORY OF REVERTIBLE MUTATIONS. D. Lewis and Leslie K. Crowe. Nature 172, 501(1953).

Incompatibility gene complex in Oenothera organensis revealed: (1) inactivation, (2) revertible changes including delayed mutations, both induced by x rays. Incompatibility complex consists of two genes; one controls pollen the other style reactions. A seedling of Prunus avium was tested by self-pollination with pollen carrying an x ray-induced mutation. Revertible mutation occurred when irradiation period included prophase. Revertible mutation is due to a loss of polypeptide chains of the gene followed by recovery of the unaffected remainder.

9449

CHROMOSOME ABERRATIONS CAUSED BY RADIOACTIVE THYMIDINE. Henry A. McQuade, Morris Friedkin, and Alice A. Atchison. Nature 175, 1038-1039(1955).

Chromosome aberrations in onion root tips treated with 2-14 C-thymine deoxyriboside and 2-14 C-thymine were studied. Seeds of Allium cepa were germinated, and placed in contact with radioactive solutions. Radiothymidine (19 hr exposure) was more effective in causing chromosomal aberrations than was radiothymine. Chromosome aberrations increase with increased exposure to radiothymidine.

9450

STUDIES ON THE EFFECTS OF X-RAYS ON YEAST CELLS OF DIFFERENT PLOIDY. Robert Mortimer. Radiation Research 1, 225(1954).

Yeast cells exposed to x rays often develop into enlarged two-cell units, with a nucleus in only one cell, indicating cytoplasmic growth without nuclear division. X irradiation produces recessive lethal mutations in diploid cells. Probability that cell bearing recessive lethal mutations would survive increases with ploidy.

9451

ACTION OF GAMMA-RAYS ON SEEDS OF CANNABIS SATIVA L. J. Moutschen and J. Govaerts. Nature 172, 350-351(1953).

Seeds of Cannabis sativa were irradiated by tubes containing 200 mgm. radium. Root tips were fixed in acetic-alcohol, followed by Feulgen squashes. Giant cells with the following characteristics were produced: many nucleic, nuclear polymorphism, variability of chromatic bodies, presence or absence of nucleolus, atypical mitosis. High sensitivity of heterochromatin X to γ -rays is indicated by these results.

9452

HOMOLOGY PATTERNS OF X-RAY INDUCED LETHAL MUTATIONS IN NEUROSPORA. Frank Mukal. Radiation Research 1, 125(1954).

Nuclei of Neurospora bearing induced recessive lethal mutations can be propagated under a condition of heterokaryotic symbiosis with other nuclei not carrying the same mutation. When simple two-component heterokaryons bearing recessive lethals form complex heterokaryons, new combinations of lethal nuclei result, involving qualitatively different genetic determinants.

9453

AN EXCEPTIONAL X-RAY DOSE-MUTATION RELATIONSHIP. H. B. Newcombe. Radiation Research 1, 225(1954).

Deviations from linearity in dose-effect curves for x-ray-induced genetic changes for which two successive treatments have a greater than additive effect can be interpreted on the assumption that two or more separate events cause the effect. Deviations in opposite direction (two successive treatments having a less than additive effect) have been found in variants of Streptomyces, both with high and low doses of x rays.

9454

IONIZING RADIATION AND THE CELL. G. Pontecorvo. Nature 176, 1204-1205(1955).

Comparing loss of function by irradiation, one can infer something about size, shape and molecular stability of structures examined in a cell. A new use of ionizing radiations is probing structure by radiation "sounding" in which a series of beams of increasing energy are used to probe deeper and deeper into the system.

9455

THE EFFECT OF TRITIUM OXIDE ON SOME SYNTHETIC PROCESSES OF CHLORELLA PYRENOIDOSA. J. W. Porter and H. J. Knauss. Radiation Research 1, 253-261(1954).

Chlorella were grown 3 days in 20mc/ml of tritium oxide. Then for 30 hours in nonradioactive inorganic nutrient solution containing tracer quantities of C^{14} bicarbonate. Cells were then fractionated into several gross fractions. Irradiated cells synthesized 2-7 times more triglycerides than did controls.

9456

RADIATION INACTIVATION OF ENZYMES INSIDE AND OUTSIDE INTACT CELLS. Wilson F. Powell and Ernest Pollard. *Radiation Research* 2, 109-118(1955).

Enzyme invertase was bombarded by deuterons and electrons in intact yeast cells. No differences between in vivo and in vitro states were observed. Two respiratory enzymes are inactivated with a three ionizing requirement. Effect of 140,000 r on the respiratory enzymes and of 200,000 r on invertase in the intact cells in aqueous suspension is not measurable.

9457

THE ABSORPTION OF FISSION PRODUCTS BY PLANTS. J. H. Rediske, J. F. Cline, and A. A. Selders. Hanford Atomic Products Operation, *Biol. Research Ann. Report*. HW-35917 p 40-46(1954).

Concentration factors for nine fission products and plutonium indicate that radioisotopes of strontium are hazardous to agriculture. Iodine, barium, and cesium also have high concentration factors, with increased absorption as Ph decreases. As carrier concentration is increased the concentration factor for a particular fission product tends to increase. Concentration of fission product is greater in leaves than in any other organ.

9458

COMPARATIVE METABOLISM OF PROTIUM, DEUTERIUM AND TRITIUM IN THE BEAN PLANT. J. H. Rediske and J. F. Cline. Hanford Atomic Products Operation, *Biol. Research Ann. Rept.* HW-35917 p40-46(1955).

Red Kidney bean plants were grown from germination in a constant tritium oxide-labeled nutrient environment. After 28 days, concentration of H3 in water from the leaves was about 80% of the concentration present in the nutrient environment. Two factors may be responsible for differentiation of tritium and protium oxide in plants: absorptive mechanism of the root and transpiration.

9459

THE EFFECT OF X RAYS UPON THE GROWTH OF AVENA SEEDLINGS. Edgar F. Riley, Jr. *Radiation Research* 1, 227-228(1954).

Inhibition of growth by exposures to x rays was related to mitotic activity in Avena seedlings. Inhibition of elongation was due to inability of cells to utilize the growth regulators. Aqueous solutions of indole acetic acid were inactivated partially by exposures of 10,000 r or more, completely by 50,000 r.

9460

REPRODUCIBILITY OF THE LETHAL EFFECT OF TOTAL BODY IRRADIATION IN MICE. F. Ellinger, J. E. Morgan and E. S. Cook. *Radiology* 64, 210-18 (1955).

With certain experimental precautions, the mortality among mice exposed to a stated x ray dose given as total-body irradiation can be reproduced over a period of several years. At certain points of dose response curve, biological discrimination of lethal effects of various x ray doses differing by $\pm 2.5\%$ can be accomplished with good accuracy. Procedural measures prerequisite to such accomplishments are within the reach of every laboratory and are not prohibitively costly nor do they require excessive numbers of experimental animals.

9461

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF VARIOUS HIGHLY IONIZING RADIATIONS ON YEAST CELLS. Joseph A. Sayeg and Ann C. Birge. *Radiation Research* 1, 560(1954).

The 120-Mev carbon nuclei penetrate 540 μ of tissue and have nine times the rate of energy loss of α -particles of the same velocity. Haploid *Saccharomyces cerevisiae* in dextrose buffer were irradiated. Results: increase in RBE with increasing rates of energy loss to maximum value of 2 and 3.2- MEV α -particles. For higher rates of energy loss produced by low energy carbon ions the RBE decreases to approximately 1.

9462

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF X-RAYS AND β RAYS WITH BROAD BEAN ROOT. J. F. Spalding, Ernest C. Anderson and Wright Langham. *Radiation Research* 3, 348-349(1955).

Groups of broad bean roots were exposed to 200, 238, 336 and 400 r of x ray. Other groups were exposed in tritium water to 178, 229, 293, 371 and 471 rep. The MLD of x rays was 381 r; that of tritium β rays was 248 rep; the RBE of β rays from tritium 1.54. (from author's abstract).

9463

CURRENT RESEARCH IN RADIOBIOLOGY. A. Howard and M. Ebert. *Nucleonics* 11(12), 18(1953), see also *Acta Radiol. Suppl* 116(1954).

9464

VARIOUS EFFECTS OF X RAYS ON THE BONE MARROW CELLS AND A CONTRIBUTION TO THE TIME FACTOR PROBLEM. R. Bauer. *Strahlentherapie* 67, 424(1940).

Thighs of rabbits were exposed to doses of 50 r - 500 r administered as acute single, as fractionated and as protracted doses. Author concludes that erythroblasts are more sensitive than myeloid cells and that basophils are more resistant than eosinophil series. Cell depletion was proportional to dose. (In German)

9465

EXPERIMENTAL STUDIES OF THE HEMORRHAGIC DIATHESIS INDUCED BY ROENTGEN RAYS. J. Fabricus-Moller. Levin and Munksgaard, publishers. Copenhagen (1922).

Guinea pigs were exposed to large (usually lethal) doses of x rays. Post-exposure studies of bone marrow are described. Severe depletion of myeloid and megakaryocytic elements are described but the erythroid cells showed little injury.

9466

THE QUESTION OF THE TREATMENT OF BLOOD DISEASE WITH ROENTGEN RAYS. R. Milchener and M. Mosse. *Berlin. klin. Wschr.* 41, 1267(1904).

Authors report studies on bone marrow changes in irradiated hind limbs of rabbits. (In German)

9467

THE EFFECT OF ROENTGEN RADIATION ON THE BONE MARROW IN VIVO AND IN VITRO. A. Gregori. (In German). *Strahlenther.* 65, 163(1939).

Bone marrow from irradiated guinea pigs was studied in tissue culture. Irradiation decreased the ability of marrow cells to divide and regenerate and caused irreversible changes in most of the cells.

9468

ON THE EFFECT OF HARD ROENTGEN RAYS ON BLOOD AND BONE MARROW AND EXPERIMENTAL STUDIES OF THEIR EFFECTS IN THE CORRECTION OF ANEMIA. F. Shigeto. *Ref. Zbl. Ges. Radiol.* (1940).

Changes in the red and white cells of bone marrow in (rabbits) were observed after x irradiation and are described.

9469

ON THE REACTION PATTERNS OF HEMOTOPOIESIS IN THE BONE MARROW DUE TO ROENTGEN IRRADIATION. (EXPERIMENTAL STUDIES ON THE WHITE MOUSE.) W. Papperitz. Sonderabdruck Berichten Naturforsch. Gesellsch. zu Freiburg i. Br. 37, 1(1939). (In German).

Two days after total body exposure to 400 r, bone marrow of white mice was aplastic.

9470

EXPERIMENTAL STUDY OF THE EFFECT OF ROENTGEN RAYS ON BLOOD. E. Helber and P. Linser. Munch. med. Wochschr. 52, 689(1905).

Rats, rabbits and dogs received whole body exposures to x rays. Blood and bone marrow changes are described. Bone marrow aplasia is considered to be secondary to leukopenia due to deficiency imposed by the formation of leukocytes.

9471

HISTOLOGICAL, CYTOLOGICAL AND SEROLOGICAL STUDIES OF THE EFFECTS OF X-RAYS ON GUINEA PIGS. E. Frankel and W. Budde. Fortschr. Geb. Roentgenstr. 20, 355(1913). (In German).

Guinea pigs were exposed to large x ray doses and histopathological studies were carried out on many tissues including blood, bone marrow, spleen, lymph nodes, adrenals, testes and ovaries.

9472

EXPERIMENTAL INVESTIGATION OF THE EFFECT OF ROENTGEN RAYS ON INTERNAL ORGANS. H. Heineke. Mitteil. Grenzgeb. Med. U. Chir. 14, 21-94(1904-05). (In German)

Histopathological studies of many tissues in experimentally irradiated guinea pigs and rabbits are reported.

9473

EXPERIMENTAL INVESTIGATION OF THE EFFECT OF ROENTGEN RAYS ON BONE MARROW AND ROENTGEN TREATMENT OF LEUKEMIA, PSEUDOLEUKEMIA AND SARCOMAS. H. Heineke. Dtsch. Zschr. Chir. 78, 196(1905). (In German).

Great radiosensitivity of blood forming organs accounts for favorable response to therapy.

9474

ON THE EFFECT OF RADIUM RAYS ON INTERNAL ORGANS. H. Heineke, Munch. med. Wochschr. 51, 1382(1904). (In German).

A 150 gram radium capsule was applied to the left ventral side of guinea pigs. Animals were killed after 18 hours and sections of spleen and bone marrow were studied. Bone marrow changes occurred somewhat later than lymphoid tissue changes and required larger dose.

9475

HOW THE BLOOD BUILDING ORGANS ACT IN THE CASE OF MODERN DEEP X-RAY. H. Heineke. Munch. med. Wochschr. 60, 2657(1913). (In German).

Blood and hematopoietic tissues of dogs and guinea pigs were studied after administration of radium to the animals. Lymphoid tissues were found to be highly sensitive, showing nuclear pyknosis and fragmentation following even very small doses (15 min roentgen irradiation and 5 sec contact of intestinal and splenic follicles with a 20 mg radium bromide capsule.)

9476

ON THE THEORY OF X-RAY EFFECT PARTICULARLY ON THE LATENT PERIOD. H. Heineke. Munch. med. Wochschr. 61, 807(1914). (In German).

Author reviews experimental observations on the effects of x rays and radium rays on living plant and animal cells including rats, mice, guinea pigs, rabbits

and dogs. Studies on histopathologic effects of various doses at various times after exposure are reported.

9477

A CYTOLOGIC STUDY OF THE INTESTINAL EPITHELIUM OF THE MOUSE AFTER TOTAL-BODY X IRRADIATION. William Montagna and J. Walter Wilson. J. Natl. Cancer Inst. 15, 1703-35(1955).

X irradiation with 1000 r (200 kv., 20 Ma, 20 cm. dist. 1/2 mm Cu to 1 mm Al) stops mitosis in crypts of Lieberkuhn. Nuclear and cytoplasmic changes, goblet cells and "mucoid" changes and distribution of lipids are described. Mice irradiated with 550 r show qualitatively similar changes, but less severe damage, which is repaired 96 hrs. post-exposure.

9478

MECHANISM OF ACTION OF X-RAYS ON SEEDS. J. Maisin and S. Masy. Compt. Rend. Soc. Biol. 98, 886-8 (1928). (In French).

Growth was markedly inhibited in seeds of *Pisum Sativum* by x irradiation, but seeds did not die. Root remained dwarfed and microscopic examination revealed nuclear lesions. Results of studies on infra-red reversal of growth inhibition indicates that x rays probably destroyed some substances (factors A) whose presence is essential to elaboration of factors B which are essential for growth. Infra-red could restore activity of factor A CA 22-3193

9479

ISOTOPES AS TRACERS IN PLANTS. R. H. Burris. Botan. Rev. 16, 150-80(1950).

This review covers: radioactive tracers in studies of ion absorption and exchange, transport of nutrients, photosynthesis, heterotrophic fixation of carbon dioxide, biological nitrogen fixation, nitrogen and phosphorus metabolism, phytopathology, and plant-growth regulator mechanisms; compares stable and radioactive tracers. NSA 4-2976

9480

"BECQUEREL RAYS" AND THEIR PHYSIOLOGICAL AND PATHOLOGICAL EFFECTS. E. S. London. Berl. Klin. Wschr. 40, 523(1903).

Radium rays killed mice after a few days of continuous exposure. Author feels death was due to effect on central nervous system.

9481

THE IMPORTANCE OF MERCAPTOETHYLAMINE IN PROTECTION AGAINST THE OROPHARYNGEAL SYNDROME AND SERIOUS CUTANEOUS LESIONS. P. Maldague, A. Dunjic, H. Maisin and J. Maisin. Compt. Rend. Soc. Biol. 150, 1637(1956). (In French).

9482

COMMITTEE FOR COMPILATION OF REPORT ON RESEARCH IN THE EFFECTS OF RADIOACTIVITY. RESEARCH IN THE EFFECTS AND INFLUENCES OF NUCLEAR BOMB TEST EXPLOSIONS, VOL. I AND II. (Japan Society for the Promotion of Science, Veno, Tokyo, 823 and 1824 pp. (1956).

9483

THE PHYSIOLOGY OF SPORE GERMINATION IN FUNGI. D. Gottlieb. Botan. Rev. 16, 229-57(1950).

Review discusses following topics: water relations, nutrition, oxygen and CO₂, temp. pH, enzymes, dormancy, radiation, tropisms, time for germination, senescence, BA 25-2944

9484

ADDITIVITY OF X-RAYS AND ULTRAVIOLET LIGHT IN THE INACTIVATION OF HAPLOID AND DIPLOID YEAST. Robert B. Uretz. Radiation Research 2, 240-252 (1955).

Haploid and diploid yeast were inactivated by 250 Kv x rays and U-V light of 2537 Å. Diploid cells have duplicate sensitive sites and either member of a pair of sites is sufficient to maintain cell function. Lessened sensitivity in diploids is due to replication of sensitive sites of haploid. Sensitive sites in x ray and U-V inactivation are the same.

9485

RADIATION AND PLANT CYTOGENETICS. T. H. Goodspeed and Fred M. Über. *Botan. Rev.* 5(1), 1-48(1939).

This paper reviews physical nature and biological effects of x-rays, particulate and U-V radiation, including physical effects, wave-length, quantitative relationships, quantum hit theory, and variation of cytologically effective dosages and reviews the literature on non-heritable, cytoplasmic, and nuclear alterations and of cytogenetic consequences of chromosomal alterations. BA 13-8933

9486

ADDITIVITY OF X-RAYS AND ULTRAVIOLET LIGHT IN THE INACTIVATION OF HAPLOID AND DIPLOID YEAST. Robert B. Uretz. *Radiation Research* 1, 564-565(1954).

Haploid and diploid yeast were exposed to 250-Kv X rays and U-V light of 2537 Å. Additivity experiments showed interaction between two radiations for inactivation of diploid yeast but no interaction in haploid.

9487

RADIATION SENSITIVITY OF YEAST CELLS GROWN IN AEROBIC AND ANAEROBIC ENVIRONMENTS. Ann C. Birge and Cornelius A. Tobias. *Arch. Biochem. Biophys.* 52, 388-93(1954).

The survival curve of haploid yeast is exponential whether irradiation be carried out under aerobic or anaerobic conditions, but anaerobic conditions (a few minutes before and throughout exposure) gave dose reduction factor of approximately 2.

9488

DELAY OF CHROMOSOME REJOINING IN *Vicia faba* INDUCED BY IRRADIATION. Sheldon Wolff. *Nature* 173, 501-502(1954).

Fractionation of x ray dosage given to *Vicia faba* soaked in water causes no decrease in two-hit chromosome aberrations. When dose administration is protracted over more than 2 hrs there is a decrease in aberrations. Seeds pre-soaked for 1 hr. in 2×10^{-3} M, 2,3-dimercaptopropanol, had fewer aberrations.

9489

ON THE REJOINING OF RADIATION-INDUCED CHROMOSOME BREAKS IN *Vicia faba*. Sheldon Wolff. *Radiation Research* 1, 567(1954).

In vacuo radiation-induced chromosome breaks in seed of *Vicia faba* remain open for 1/2 hr., then rejoin. To determine whether an enzyme system is involved in the rejoining, dose-fractionation studies were performed. Author concludes that an enzyme system is involved. Whether it rejoins broken ends directly or only provides energy is unknown.

9490

THE ROLE OF OXIDATIVE METABOLISM AND ATP PRODUCTION ON THE REJOINING OF RADIATION-INDUCED CHROMOSOME BREAKS. Sheldon Wolff and H. E. Luippold. *Radiation Research* 3, 358(1955).

Soaked seed of *Vicia faba* was irradiated *in vacuo* to produce chromosome breaks that normally rejoin within 1/2 hour. A second dose was administered 75 minutes later. Inhibition of oxidative metabolism by low temperatures, cyanide, 95% CO + 5% O₂ in the dark but not in the light, or O₂ removal prevented rejoining.

Breaks treated with ATP rejoined in 30 minutes.

9491

STRUCTURE AND CONTENTS OF THE SEX CHROMOSOMES. Gerhard Lorbeer. *Ber. Deut. Botan. Ges.* 59, 369-418(1941).

Three genes are postulated, α for o, γ , for $\frac{O}{\gamma}$ and σ for synoecious plants. The γ -gene may be transformed into α by X-rays, the transformation into σ occurred by spontaneous mutation; an asexual mutant was also observed. A general cytogenetic theory of structure of sex chromosomes is developed. BA 22-22923

9492

CHANGES IN THE BLOOD DUE TO ACTINIC THERAPY. H. Treber. *Strahlentherapie* 6, 398(1915). (In German).

Patients with leukemia were treated with x ray and their blood pictures following exposure are described and related to dose administered.

9493

COMPARATIVE STUDIES OF X RAY-INDUCED FORWARD AND REVERSE MUTATION. Norman H. Giles, Frederick J. de Serres, and C. W. H. Partridge. *Ann. N. Y. Acad. Sci.* 59, 536-52(1955).

Attempts to reverse, by means of x-irradiation, mutations (inositol-less and purple adenine-less) originally induced by U-V irradiation of *Neurospora* indicated that x-rays can induce dominant, positive mutations resulting in the restoration of specific biochemical synthesis.

9494

SYMPOSIUM ON APPLICATIONS OF IONIZING RADIATION TO FOOD AND PHARMACEUTICAL PRESERVATION. W. D. Bellamy, S. A. Goldblith, G. C. Colovos, and C. F. Niven, Jr. *Bacteriol. Revs.* 19, 266-9(1955).

Drugs under proper conditions are stable to sterilizing doses of cathode rays. Many difficulties must be overcome before cold sterilization can be used for foods.

9495

ON THE ROENTGEN RAY EFFECT IN LEUKEMIA. T. Dale. *Nord. Med. Tidsskr* 5, 298(1933)

9496

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF COBALT⁶⁰ GAMMA RADIATION AND FAST NEUTRONS. Howard H. Vogel, Jr., John W. Clark and Donn L. Jordon. *Anat. Record* 117, 529-30(1953).

Fast neutrons were 4-20 times more effective than physically equivalent doses of Co⁶⁰ gamma rays. The relative biological effectiveness of neutron and γ radiation appears related to their specific ionizations. Positive bacteremia was demonstrated in blood and spleen of 30-50% of neutron irradiated mice, 4-8 days after exposure. This period seems to be correlated with peak of high mortality. Preliminary experiments have been carried out to test effects of streptomycin on mice that previously were exposed to fast neutrons.

9497

A NEW METHOD OF ROENTGEN TREATMENT IN LEUKEMIA. T. Dale. *Acta Radiol.* 12, 263(1931).

Author maintains that general irradiation of the body from a distance of 1 meter, with head, neck and genitals shielded, is superior to local roentgen therapy.

9498

DIRECT ACTION OF X-RAYS ON TRANSPLANTABLE CANCERS OF MICE. E. Hill, J. J. Morton and W. D. Witherbee. *Jour. of Exper. Med.* 29, 89-96(1919).

Tumor was irradiated *in vitro* before transplantation to new host mouse. Direct action of x rays in doses greater than can be used therapeutically injuries but does not kill cancer cells. Furthermore, cancer cells

develop a resistance to irradiation after repeated doses. Softer x rays appeared to be more effective than harder x rays.

9499

THE ROENTGEN TREATMENT OF AGRANULOCYTOSIS. U. Friedemann and A. Elkeles. Dtsch. med. Wschr. 56, 947(1930). (In German).

9500

INFLUENCE OF CHELATES ON THE METABOLISM OF RADIOYTRIUM (Y-90). H. C. Dudley. J. Lab. Clin. Med. 45, 792-9(1955).

Rats and rabbits were injected with a solution of $Y^{90}Cl_3$. By selecting the proper reagent one may promote preferential deposition in selected tissue within 48 hrs. Yttrium complexed with a minimum quantity of ED-o1 is markedly concentrated in the stomach wall. Author suggests injection of Y-90 to deliver radiation of high energy to selected tissues, especially bone and stomach. NSA 9-4693

9501

BIOLOGICAL ACTION OF MESOTHORIUM, INFLUENCE OF THORIUM -X ON BLOOD COAGULATION. D. Grineff. Strahlentherapie 3, 94(1913). (In German).

Intravenously administered thorium X caused an increase in plasma fibrinogen and fibrin. Studies on dogs are included with results of fibrinogen and fibrin determinations.

9502

DEVELOPMENT OF DOSIMETRY (AN HISTORICAL SKETCH). E. Lorenz. Radiology 14, 340(1930).

A review of dosimetry, biological, chemical and the importance of dosimetry to radiation therapy.

9503

X-RAYS AND BLOOD COAGULATION. P. Pagniez, A. Ravina and I. Solomon. Presse Med. 32, 545-548(1924). (In French).

Studies on blood coagulability in patients receiving radiation therapy are presented and discussed. Radiation is considered to be an important hemostatic agent.

9504

ACTION OF X RAYS ON LEUKEMIC BLOOD. Ch. Aubertin and E. Beaujard. LaPresse Medic. 12, 533(1904). (In French).

Studies on the hematological responses of leukemic patients treated with x ray are reported.

9505

ON THE AMPLITUDE OF VARIATIONS IN RADIO-SENSITIVITY DURING THE FIRST SEGMENTATION DIVISIONS. P. Vintemberger. Compt. rend. soc. biol. 98, 536(1928).

There is a 6-fold difference in radiosensitivity between the stages of minimal sensitivity (resting nucleus) and maximum sensitivity (metaphase through telophase) in the fertilized egg of *Rana fusca*.

9506

VARIATIONS IN URINARY EXCRETION IN RABBITS AFTER X IRRADIATION. Loiseleus and VanderSchueren. Compt. rend. Soc. de Biol. 113, 1377(1933).

There is retention of chloride in the first few days after x irradiation. Potassium excretion is increased during this period.

9507

DIRECT OR INDIRECT ACTION OF X-RAYS. STUDY OF SURVIVING LYMPHOID TISSUES. A Lacassagne and G. Gricoureff. Compt. rend. soc. biol. 96, 862(1922). (In French).

Thymus, spleen, lymph nodes and bone marrow from rabbit show the same relative radiosensitivity in vitro as in vivo (with respect to differences in radiosensitivity between lymphoid elements and cells of fibro-

conjunctival stroma). Action of x rays on cells is a direct one. CA 21-2331

9508

ON THE VARIATIONS IN RADIOSENSITIVITY DURING THE FIRST SEGMENTATION DIVISION OF THE EGG OF *RANA FUSCA*. P. Vintemberger. Compt. rend. soc. biol. 98, 532(1928).

There are cyclic variations in radiosensitivity between the stage of fertilization and the 8 blastomere stage. The period of the variation is the same as the mitotic rhythm. During each division, a given stage of mitosis shows the same radiosensitivity. Sensitivity is minimal during the resting stage between mitoses; maximal during metaphase through telophase.

9509

RADIUM TREATMENT OF THE NASAL LESIONS OF LEPROSY. R. P. Sandidge and M. N. Neill. U. S. Publ. Health Service Public Health Bull. No. 168, 36(1927).

Radium treatment shrinks the nasal lesions of leprosy. Effect on the leprosy bacilli in the nose was uncertain. CA 22-3703⁹

9510

LATENT PERIOD OF X-RAYED DORMANT SEEDS. F. Weber. Wien. Klin. Wochschr. 36, 147-148(1923).

Growth-inhibiting effect of x ray treatment on air-dried seeds of *Vicia faba* is the same whether seeds are allowed to germinate immediately after radiation or after a passive latent period up to 5 months. (Total length of stalk plus main root stem is criterion used.) Primary injury of the nucleus by x rays can be effected in the resting, non-mitotic cell, and injury is not repaired during long passive rest periods. CA 17-2903

9511

EFFECT OF ZINC AND IRON COMPARED WITH THAT OF URANIUM AND COBALT ON GROWTH OF *ASPERGILLUS*. R. A. Steinberg. Botan. Gaz. 70, 465-468(1920).

Iron and zinc are requirements for the growth of *Aspergillus niger*. These elements can be partially replaced by chemical stimulants such as uranium and cobalt. CA 15-695

9512

SOME EFFECTS OF HIGH VELOCITY ELECTRONS ON WOOD. E. J. Lawton, W. D. Bellamy, R. E. Hungate, M. P. Bryant, and E. Hall. Science 113, 380-382(1951).

Irradiation of basswood with high velocity electrons makes insoluble carbohydrate components available to rumen bacteria. Cellulose is unaffected by enzymatic action of rumen microbes, digestibility is not increased by irradiation up to 6.5×10^6 r. At 10^8 equiv. r. maximum fermentability is reached. Lignin is unaffected by irradiation. Acids, sugar, and particle size are also discussed.

9513

A STUDY OF X-RAY INDUCED LETHAL DAMAGE IN YEAST. Robert K. Mortimer. Radiation Research 3, 338-339(1955).

Irradiated vegetative haploid cells of *Saccharomyces cerevisiae* were paired by micromanipulative techniques to unirradiated haploid cells opposite mating type. Zygote survival was high. Many haploid cells sustain damage which cannot be expressed in a diploid cell containing a normal set of alleles. Irradiation of both parents before conjugation results in greatly reduced zygote viability.

9514

DIMINUTION OF THERMAL NEUTRON EFFECT BY INCORPORATED NITROGEN-15. Thad Pittenger and K. C. Atwood. Radiation Research 1, 558(1954).

N15 was incorporated into the conidia of *Neurospora crassa* by growing cultures on a medium containing

nitrate with 65 atoms % N15 as nitrogen source. Conidia were exposed in a graphite reactor. Surviving fractions of irradiated N 15 conidia were higher than in controls. The n p reaction of N caused 20% of the biological effect.

9515
CONCERNING THE LOCAL AND GENERAL EFFECTS OF X RAY. G. Baermann and P. Linser. Munch. med. Wochschr. 51, 996(1904). (In German).

A group of patients receiving x ray therapy were studied to determine effect of x rays on skin. General changes such as temperature, were also studied and are reported. There was no change in leukocytes in irradiated segment of doubly ligated vein.

9516
BLOOD CHANGES AFTER WIDE FIELD IRRADIATION. K. Heim. Arch. Gynakol. 116, 291(1923). (In German).
RBC decreased following large doses.

9517
THE ACTION OF ROENTGEN RAYS ON HORMONES AND ORGAN POISONS. Bunjiro Terata and Ryoichi Ito. Folia Pharmacol. Japan 12, 67-73(1931).

X-rays increase activity of pituitrin, thyroid extracts and adrenalin on blood pressure. Large doses inhibit such action. Many organ poisons affecting blood pressure are hindered by x-rays. CA 25-3395

9518
HUMORAL ALTERATIONS IN CANCER AND PRECANCER. Slosse and Reding. Bull. acad. roy. med. Belg. (5), 7, 405-38(1927).

Patients with cancer have abnormally high glucose tolerance curves, no matter what the type of cancer, x irradiation reduces blood sugar level to normal. Radiation not only kills cancer cells but also has some effect on metabolism. CA 22-1386

9519
MODIFICATION OF GLYCEMIA IN NORMAL SUBJECTS BY IRRADIATION OF THE PANCREAS. F. Fonseca, et al. Compt. rend. Soc. Biol. 98, 1591-2(1928). (In French).

Blood sugar falls after exposing the pancreas to 1/2 E. d. of x rays. Effects are attributed to hyper-insulinism. CA 22-3180⁹

9520
EFFECT OF IRRADIATION OF THE PANCREAS ON THE LEVEL OF GLUCOSE IN BLOOD AND URINE OF DIABETICS. F. Fonseca, et al. Compt. rend. Soc. Biol. 98, 1593-4(1928). (In French).

Author cites his studies on patients following x-irradiation of the pancreas, and concludes that x rays stimulate the endocrine function of the pancreas and perhaps may have a place in the treatment of diabetes.

9521
PROGRESSIVE MUTATIONS INDUCED IN GOSSYPIUM HIRSUTUM BY RADIATIONS. W. R. Horlacher and D. T. Killough. Am. Naturalist 67, 532-538(1933).

Progressive mutations, produced by x-irradiation of dry seeds included: mutation from forked-leaf to normal-leaf shape, from virescent yellow leaf and plant color to normal green leaf and plant color. Evidence of reversible mutations in cotton is also presented. BA 8-12842

9522
TISSUE CHANGES IN LYMPHOCYTIC AND MYELOGENOUS LEUKEMIA AND THE INFLUENCE OF ROENTGEN RAYS. B. B. Varschawskata. Fortsch. a. d. Geb. d. Roentgenstrahlen 39, 458-468(1929). (In German).

Potassium excretion is increased after therapeutic radiation. QCI 6, 1434(1929).

9523
MUTATION PRODUCTION IN ANTIRRHINUM MAJUS. E. Baur. Z. Botan. Oltmanns Festschrift 23, 676-702 (1930). (In German).

The homozygous strain of snap-dragon used showed a spontaneous mutation rate of 1.5%. Stems of plants 6 to 8 weeks old were immersed in various solutions including solutions containing radioactivity. Of these, 216 flowered and set seed, two of the 216 became heterozygous for easily observed mutant characteristics. Neither kind nor strength of stimuli had any relation to the mutants found. BA 6-15185

9524
VARIATIONS IN THE COAGULABILITY, GLUCOSE AND CALCIUM OF THE BLOOD DUE TO RADIUM. E. Zunz and J. LaBarre. Compt. rend. Soc. biol. 96, 712(1927). (In French)

Rabbits received doses of 7.5 to 75 millicuries of radium. This decreased coagulation time of the blood and increased calcium and glucose content. The coagulation time of the blood was increased by 90 to 180 millicuries of radium. CA 21-1849

9525
EFFECTS OF X RAYS ON SNAILS, CRUSTACEA AND ALGAE. K. Bonham and R. F. Palumbo. Growth 15, 155-188(1951).

The dose required to kill 50% of the organisms was greater for shorter survival periods; thus 20 Kr were required to kill 50% of adult snails within 1 wk., while 8 Kr was the LD₅₀ for Radix in 6 wks. and 13 Kr for Thais at 23 wks. Algae grown on liquid media required a greater dose than algae on solid media. Hard x rays were twice as lethal as soft.

1 celled algae, LD₅₀/1 wk (hard x rays); chlorella, 8 Kr (plated), 18 Kr (liquid); ankistrodesmus, 11 Kr (liquid); chroococcus, 8 Kr (liquid); synechococcus, 100 Kr (liquid). BA 26-14402

9526
ROENTGEN RAY INTOXICATION. I. UNIT DOSE OVER THORAX NEGATIVE, OVER ABDOMEN LETHAL; EPITHELIUM OF SMALL INTESTINE SENSITIVE TO X RAYS. S. L. Warren and G. H. Whipple. J. Exptl. Med. 35, 187-202(1922).

Radiation dose of 512 ma min. to the thorax of dogs did not cause clinical signs of intoxication. Abdominal exposure to 350 ma min. almost invariably caused fatal intoxication. The significant lesions are found in the highly radiosensitive small intestine where epithelium of crypts and villi show almost complete necrosis. Thorax irradiation destroys much of the body's marrow, hence marrow hypoplasia is ruled out as a major factor in the characteristic systemic disturbances seen after abdominal irradiation. Intestinal epithelium is considered far more sensitive than cellular elements of abdominal lymph nodes and Peyer's patches. Spleen shows moderate atrophy after abdominal exposure but "plenty of cells" remain even after intensive irradiation.

9527
THE RESISTANCE OF THE THYROID GLAND TO THE ACTION OF RADIUM RAYS. THE RESULTS OF EXPERIMENTAL IMPLICATIONS OF RADIUM NEEDLES IN THE THYROID OF DOGS. J. O. Bower and J. H. Clark. Am. J. Roentgenol. and Radium Therapy 10, 632-42(1923).

Thyroid was found to be relatively radioresistant; nuclear degenerative changes and toxic symptoms were not observed post-exposure. Primary histological changes were hemorrhage and necrosis. Radiation effects are compared with effects produced by (1) quinine, (2) urea hydrochloride and (3) boiling H₂O. Parathyroids showed no changes.

9528
FACTORS INFLUENCING RESULTS OF RADIUM THERAPY. J. Ewing. Radium 5, 11, 73-79(1918).

Tissues differ markedly in their response to radium radiation. Factors influencing radiosensitivity are the

structural type of tumor, the complicating inflammatory and nutritive conditions of the tumor tissue and the environment in which it is growing.

9529

THE ORIGIN OF ALBINA AND XANTHA MUTATIONS IN BARLEY. Ake Gustafsson. Acta Radiol 27, 300-7(1946).

Albina mutations arise independently of x1 sterility and chromosome disturbances. Xantha mutations cannot arise from normally fertile x1- plants, but require special conditions that decrease fertility. The two types of mutation behave strikingly differently whether in fertile or in highly sterile series.

9530

DISTURBANCES IN THE ANIMAL ORGANISM DURING CHRONIC DAMAGE BY URANIUM FISSION PRODUCTS IN SMALL DOSES. En^U Klimova. p.71-74 of SUMMARIES OF PAPERS PRESENTED AT THE CONFERENCE ON THE REMOTE CONSEQUENCES OF INJURIES CAUSED BY THE ACTION OF IONIZING RADIATION. (1956). (NP-tr-207)

Uranium fission products in daily doses of 1×10^{-3} and 1×10^{-5} curie/kg were given to rats and dogs. Results: slight changes in behavior, slight decrease of leukocytes, decrease in weight after eight months. There was a decrease in lifetime. Causes of death: emaciation, bronchiectasis, disturbances of the reproductive system and infection due to decreased resistance.

9531

THE CHRONIC ACTION OF SMALL DOSES OF RADIOACTIVE STRONTIUM ON DOGS. L. N. Burykina. p.61-65 of SUMMARIES OF PAPERS PRESENTED AT THE CONFERENCE ON THE REMOTE CONSEQUENCES OF INJURIES CAUSED BY THE ACTION OF IONIZING RADIATION. (1956). (NP-tr-207)

Dogs were given daily doses of the chloride of Sr^{88} . There were no clinical signs of toxic effects. Death occurred in a state of apparent well-being. Changes were found in leukocytes, changes in neutrophils being less pronounced. Erythrocyte and hemoglobin did not change. Bone marrow cellularity decreased. There was a decrease of spermatogenesis. All pups of the females died within two months.

9532

CHANGES IN THE BLOOD DURING PROLONGED CHRONIC ACTION OF SMALL DOSES OF X RAYS. Laptera-Popova. p.66-70 of SUMMARIES OF PAPERS PRESENTED AT THE CONFERENCE ON THE REMOTE CONSEQUENCES OF INJURIES CAUSED BY THE ACTION OF IONIZING RADIATION. (1956). (NP-tr-207)

Hematopoiesis during chronic action of ionizing radiation passes through phases: lability of hematopoiesis, depression of hematopoiesis, temporary adaptation of hematopoietic processes to the irritant factor, then hematopoiesis becomes pathological. Duration of periods depends on radiation dose and individual resistance to ionizing radiation.

9533

INFLUENCE OF IONIZING RADIATION ON THE ACTIVITY OF DOG SPERMATOOZOA. N. E. Trusova. p.51-53 of SUMMARIES OF PAPERS PRESENTED AT THE CONFERENCE ON THE REMOTE CONSEQUENCES OF INJURIES CAUSED BY THE ACTION OF IONIZING RADIATION. (1956). (NP-tr-207)

Male dogs were exposed to x rays, neutrons and incorporated radioactive substances. Disturbance of testes occurred 3 months after x ray irradiation. Aspermia occurred and amount of ejaculate became 5-15 times as small. After 30 months spermatozoa returned to normal. Repeated irradiation weakened sexual potency. Progeny of these dogs showed weak sexual potency.

9534

PATHOMORPHOLOGICAL CHANGES IN ANIMALS AT LONG INTERVALS AFTER THE ACTIONS OF SMALL

DOSES OF RADIOTHORIUM. E. V. Etieksova. p.29-31 of SUMMARIES OF PAPERS PRESENTED AT THE CONFERENCE ON THE REMOTE CONSEQUENCES OF INJURIES CAUSED BY THE ACTION OF IONIZING RADIATION. (1956). (NP-tr-207)

Dogs and rats were given radiothorium. No sickness was observed for many months after receiving doses from 0.001 to 0.0005 microcurie/g. Signs of disease occurred during the last 2-3 months of life. Prolonged local irradiation in doses of 0.0001 microcurie/g leads to growth of malignant neoplasms. With 0.0005 microcurie/g, when death occurred earlier, there were no malignant growths.

9535

CHANGES IN THE PERIPHERAL BLOOD AND HEMATOPOIETIC ORGANS IN THE PROGENY OF ANIMALS POISONED BY URANIUM FISSION PRODUCTS. T. A. Ivanova. p.57-60 of SUMMARIES OF PAPERS PRESENTED AT THE CONFERENCE ON THE REMOTE CONSEQUENCES OF INJURIES CAUSED BY THE ACTION OF IONIZING RADIATION. (1956). (NP-tr-207)

One year after receiving uranium fission products, parents did not show abnormalities. Pups showed pronounced anemia accompanied by activation of erythropoiesis in bone marrow and spleen and absence of a high degree of leucocytosis. Bone marrow had an abundance of reticular cells. Ratio of erythroblast to leucoblast portions was below unity. All deviations are of a temporary character.

9536

THE REMOTE CONSEQUENCES OF COMBINED DAMAGE CAUSED BY SILICON DIOXIDE AND RADON TO ANIMALS. V. S. Kushneva. p.32-35 of SUMMARIES OF PAPERS PRESENTED AT THE CONFERENCE ON THE REMOTE CONSEQUENCES OF INJURIES CAUSED BY THE ACTION OF IONIZING RADIATION. (1956). (NP-tr-207)

Quartz dust, and especially radon, have a very pronounced effect on the general state of the animals. Death rate was greatest in animals given dust and radon. Peripheral blood showed greatest changes with quartz dust and radon. Lung changes were of the silicotic type. Epithelial cells in the bronchi showed morphological changes. Pneumonia also developed.

9537

DISTURBANCE OF HEMATOPOIESIS IN THE REMOTE PERIOD OF CHRONIC RADIATION SICKNESS INDUCED BY POLONIUM, RADIOTHORIUM AND RADON. A. A. Kanarenskaya and S. Yu. Poshetstnik. p.14 of SUMMARIES OF PAPERS PRESENTED AT THE CONFERENCE ON THE REMOTE CONSEQUENCES OF INJURIES CAUSED BY THE ACTION OF IONIZING RADIATION. (1956). (NP-tr-207)

Changes in blood in chronic radiation sickness caused by polonium, radiothorium and radon are described. Chronic radiation sickness develops with disturbances of hematopoiesis and activation of hematopoiesis was observed. Sites of compensatory hematopoiesis appear in the thorax and in diaphyses of tubular bones, normally containing fat marrow.

9538

SOME FEATURES OF THE STATE OF THE PERIPHERAL BLOOD AND HEMATOPOIETIC ORGANS IN DOGS AT LONG INTERVALS AFTER SINGLE X RAY EXPOSURES. A. N. Balashova. p.12-13 of SUMMARIES OF PAPERS PRESENTED AT THE CONFERENCE ON THE REMOTE CONSEQUENCES OF INJURIES CAUSED BY THE ACTION OF IONIZING RADIATION. (1956). (NP-tr-207)

Hematopoietic state of 24 dogs subjected to single x ray exposures in doses of 275, 400, 500 and 600 r was studied. Animals were active, hair was glossy weight normal. RBC and WBC counts were increased. Lymphocytes and percentage of young cells in bone marrow were below normal, number of mature cells was higher.

9539

REMOTE CONSEQUENCES OF THE ACTION OF FAST NEUTRONS ON THE ANIMAL ORGANISM. V. V. Sokolov. p.5-8 of SUMMARIES OF PAPERS PRESENTED AT THE CONFERENCE ON THE REMOTE CONSEQUENCES OF INJURIES CAUSED BY THE ACTION OF IONIZING RADIATION. (1956). (NP-tr-207)

Dogs and rabbits were exposed to fast neutrons. Changes in hair, weight, general condition, fertility and peripheral blood picture are described. Some rabbits developed cataracts.

9540

EXPERIMENTAL INVESTIGATIONS ON THE EFFECTS OF ROENTGEN RADIATION ON THE TUBERCLE BACILLUS AND TUBERCULOUS TISSUE. Hans Ritter and Moje. *Strahlentherapie* 15, 283(1923).

The effect of x radiation on tuberculosis in guinea pigs was studied. Exoised glands of treated and untreated tuberculous animals were examined histologically and were cultured.

9541

MORPHOLOGICAL CHANGES IN ANIMALS AT LONG INTERVALS AFTER THE ADMINISTRATION OF CERTAIN RADIOACTIVE SUBSTANCES. A. P. Novikova. p.19-22 of SUMMARIES OF PAPERS PRESENTED AT THE CONFERENCE ON THE REMOTE CONSEQUENCES OF INJURIES CAUSED BY THE ACTION OF IONIZING RADIATION. (1956). (NP-tr-207)

Animals were given uranium fission products in doses ranging from 1-5 and 0.005-0.2 microcurie/g. Animals died. Histological results: increased fat deposits, atrophy of testes and hematopoietic organs, disturbances of thyroid adrenals, alimentary canal, internal parenchymatous organs; damage of bone tissue, disturbances in cardiovascular system, dystrophy and dystrophic regeneration, pneumonia, mycosis, and postnatal complications.

9542

ROENTGEN TREATMENT OF SURGICAL TUBERCULOSIS. Otto Jungling. *Med. cor-bld. d wurt-temb artz. Landesver.* 91, (1922).

Epitheloid cells and bacilli are resistant to x rays. Radiation acts primarily on lymphoid elements and therapeutic results are especially good in tuberculosis of lymph nodes.

From abst. in *Am. J. Roentgenol* 10, ab, 1003(1923)

9543

A SUMMARY: TODAY'S PROBLEMS IN RADIATION HAZARDS AND WHAT IS BEING DONE TO CONTROL THEM. R. H. Chamberlain. *Am. J. Roentgenol Radium Therapy Nuclear Medicine* 78, 1000-2(1957) Dec.

Discussion includes a summary of effects of chronic low level exposures. NSA 12-3518

9544

INJURIES DURING ROENTGEN RADIATION OF MYOMATA AND HEMORRHAGIC MYOPATHIES. Egbert Schwartz. *Strahlentherapie* 15, 398(1923). (In German)

Injurious effects of radiation on the intestines, radiation sickness is described.

9545

ACTION OF RADIUM AND THE X RAYS ON THE BLOOD AND BLOOD-FORMING ORGANS. I. Levin. *Am. J. Roentgenol Radium Therapy* 9, 112(1922).

Frog and rabbit blood reacted identically after irradiation with x rays. Radium implants in frogs produced marked local effect on spleen and marrow. Rabbit implanted with radium 2 or 4 times the amount given to the frog showed no marked change. Radium has a marked local effect with less general disturbance of blood as compared with x rays.

9546

THE EFFECT OF HIGH VOLTAGE ROENTGEN RADIATION (200KV) UPON THE FERTILITY AND MOTILITY

OF THE SPERM OF THE RABBIT. S. A. Asdell and Stafford Warren. *Am. J. Roentgenology* 25, 81-87(1931).

A normal litter of rabbits was produced after insemination with sperm that had been radiated *in vitro* by roentgen rays at 200 kv. No immediate effects are brought about by filtered or unfiltered radiation.

9547

IRRADIATION SICKNESS. Rieder. *Strahlentherapie* 12, 573(1923). (In German).

Author states that radiation sickness can be minimized by ventilating the room during x irradiation. Laudanum-scopolamine is suggested as a good therapeutic measure.

9548

RADIATION POLYCYTHEMIA AND ERYTHROPOIESIS. F. Kromeke. *Dtsch. med Wochschr.* 52, 1127(1926). (In German).

Forty days after an erythema dose of x rays, author found some increase in erythroid cells in marrow and feels that roentgen radiation increases erythroblast production. (rabbits.)

9549

THE CHANGE IN THE BLOOD PICTURE AND ITS VALUE IN THE PROGNOSIS OF THE ROENTGEN TREATMENT OF CANCER. H. Zumpfe. *Strahlentherapie* 12, 696(1923). (In German).

Slight left shift in WBC and leukopenia were observed.

9550

THE DANGEROUS EFFECT OF LARGE DOSES GIVEN IN A SHORT TIME. A. Gunsett. *J. Radiol. et electrol.* 8, 481-508(1924). (In French).

Summarizes effects of large radiation doses including toxins in blood, nervous system effects, biochemical effects on cells, altered endocrine balance, altered liver function, most of these by inference from treated patients. Radiation sickness and radiation leukopenia are described. Other investigators have stated that small doses have a stimulating effect, including an increase in "natural defenses" as observed in mice. The author was unable to confirm the stimulating effect of weak doses on either plants or animals.

9551

EXPERIMENTAL AND HISTOLOGICAL INVESTIGATIONS ON THE EFFECTS OF ROENTGEN RAYS ON THE STAINING PROPERTIES OF TISSUES. Ernest A. Schmidt. *Strahlentherapie* 12, 517(1923). (In German).

Irradiated and unirradiated mice were given intravenous trypan blue injections. Two days after injection they were killed, tissues were examined. Radiated mice had more deeply stained tissues (mostly connective tissue) as a result of altered cell function.

9552

HUMAN CASTRATION BY THE X RAY. H. R. Schinz. *Schweiz. Med. Wchnschr.* 52, 866(1922). (In German).

Physiological effects and physical signs in radiation induced temporary and permanent aspermia and in total castration (destruction of all testicular elements) are described in case presentations.

9553

INJURIES FROM ROENTGEN RAYS IN DEEP THERAPY. Herman Wintz. *Am. J. Roentgenol* 10, 134(1923).

Late ill effects of therapy are described including bladder injury, skin burns and sequelae, and general tendency of previously exposed tissues to be intolerant of additional therapy. "Late radiation sickness" is described; changes in sensitive cell lipoids are discussed. Changes in peripheral blood in chronic occupational exposure include eosinophilia and leukocytosis.

9554

EFFECT OF X RAYS ON BLOOD AND BONE MARROW. Ch. Aubertin and E. Beaujard. *Folia Haemat.* 6, 31 (1908). (In French).

Studies on the marrow of irradiated guinea pigs are reported. Effects on lymphoid tissue are different from those on myeloid tissue, the latter seeming less radio-

sensitive. A dose producing lymphoid necrosis was capable of producing transient myeloid stimulation (several days). Leukopenia is felt not to be due to effects on bone marrow except perhaps in those few cases where severe radiation injury causes total destruction of the myeloid tissue. Reversible radiation leukopenia is attributed to a rate of leukocyte destruction that exceeds the production rate.

9555
NEW INVESTIGATIONS OF THE PROBLEM OF ROENTGEN-RAY DOSAGE. O. Glasser. *Am. J. Roentgenol.* **10**, 1(1923).

Author discusses the importance of the tissue reactions and problems of determining dose.

9556
COMPARATIVE MEASUREMENTS BETWEEN RADIUM AND X RAYS CONCERNING ENERGY ABSORBED AT A DEPTH. Harvey R. Gaylord and K. Wilhelm Stenstroem. *Am. J. Roentgenol.* **10**, 56(1923).

Discusses the importance of the difference in penetrating ability of x and radium rays and the need to consider this in predicting tissue response.

9557
RADIOSENSITIVITY OF THE BAT (*MYOTIS LUCIFUGUS*). D. E. Smith, D. R. Russ and E. M. Jackson. *Fed. Proc.*, **Balt.** **13**, 140(1954).

Bats were subjected to total body irradiation over a wide dosage range. Blood studies indicated that 500-20,000 r did not influence erythrocyte count. Leucocyte counts after exposures were much below those of starved control bats, where there was no effect on circulating blood cells. On basis of postirradiation blood changes the bat had a radiosensitivity similar to the frog. Starvation did not alter the blood counts. Bone marrow and intestinal damage were also seen.

9558
TWO IMPORTANT POINTS FROM THE RADIUM THERAPISTS STANDPOINT REGARDING CANCER IMMUNITY. Carroll Chase. *Am. J. Roentgenol.* **10**, 167(1923).

The author states that since blood loss and exposure to "solvent" anesthetics (chloroform, ether), both associated with surgery, tend to decrease the "immunity" to cancer, radiation therapy is a better form of treatment. It assumes that radiation does not decrease this "immunity".

9559
CELL DIVISION. I. A THEORETICAL APPROACH TO THE PRIMEVAL MECHANISM, THE INITIATION OF CELL DIVISION AND CHROMOSOMAL CONDENSATION. N. G. Anderson. *Quart. Rev. Biol.* **31**, 169-99(1956).

Author reviews effects of radiation on cell division including his hypothesis (and evidence supporting it) of events leading to initiation of cell division.

9560
CALICREIN AND RADIATION IN: BIOLOGICAL EFFECTS OF EXTERNAL RADIATION (NRES VI-2). Kathryn F. Fink. McGraw-Hill, N. Y. (1954) H. A. Blair, ed.

Author conducted studies on similarity of biological response of dogs and rats to large doses of radiation and to callicrein, a hypotension-producing substance present in most mammalian tissues in small concentration.

9561
THE CAUSE OF ROENTGEN RAY DERMATITIS AMONG PHYSICIANS. E. T. Leddy. *Am. J. Roentgenol.* **Radium Therapy** **36**, 310(1936).

This is a review of the first 55 cases studied at the Mayo Clinic.

9562
BIOLOGICAL APPLICATIONS OF TRITIUM. R. C. Thompson. *Nucleonics* **12**(9), 31-5(1954).

A review with 93 references and a section on tritium as a source of ionizing radiation and the radiation damage mechanism in experimental studies of this effect.

9563
REMOTE CONSEQUENCES OF SINGLE AND CHRONIC

INTAKE OF RADIOACTIVE ISOTOPES (Ce^{144} , Ru^{106} , Sr^{89-90}) AND OF A MIXTURE OF BETA EMITTERS THROUGH THE GASTROINTESTINAL TRACT. V. N. Streltsova and Yu. I. Moskalev. p.36-37 of *SUMMARIES OF PAPERS PRESENTED AT THE CONFERENCE ON THE REMOTE CONSEQUENCES OF INJURIES CAUSED BY THE ACTION OF IONIZING RADIATION*. (NP-tr-207)

Both tumorous and non tumorous forms of disease were found after single and chronic administration of the isotopes. The mixture of isotopes causes formation of osteosarcomas and occasional leucoses. Non-tumorous forms of sickness: chronic ulcerative inflammatory processes in the large intestine and chronic inflammatory processes in the buccal cavity.

9564
A COMPARISON OF THE EFFECTIVENESS OF RADIATIONS OF DIFFERENT ENERGIES IN PRODUCING CHROMOSOME BREAKS. T. J. Arnason and Margaret Morrison. *Radiation Research* **2**, 91-5(1955).

Tradescantia buds with microspore nuclei in the resting stage were exposed to x rays of various energies and to γ rays (Co^{60}). Frequency of chromosome breaks was determined by cytological examination of cells at first spore metaphase. The very high energy (betatron), x rays and γ rays produced fewer breaks than did 140-Kev and 200 Kev x rays. Reunion frequencies paralleled break frequencies. NSA 9-2576

9565
CHEMICAL PROTECTION FROM X-RADIATION. Z. M. Bacq and A. Herve. *Bull. Acad. Roy Med. Belg.* (6) **17**, 13(1952).

Cysteine protects pea roots against radiation injury, apparently by removing oxygen from the water around the roots. It is effective at a concentration of 1/5000.

9566
THE EFFECTS OF ROENTGEN RAYS ON BLOOD FORMING ORGANS. Patricelli, Biforaka Medica, (1907). Abstr. in *Brit. J. Radiol* **13**, 318(1908).

Roentgen rays caused anemia and leukopenia in experimentally exposed dogs.

9567
THE ENERGY TRANSFER FROM IONIZING PARTICLES TO AN AQUEOUS MEDIUM AND ITS BEARING ON THE INTERPRETATION OF RADIOCHEMICAL AND RADIOBIOLOGICAL CHANGE. L. H. Gray. *J. Cellular Comp. Physiol.* **39**, Suppl. No. 1, 57-74(1952).

Investigations of the dissipation of energy of ionizing particles in liquids are summarized. Studies of the effects of ionizing radiations on biological systems are reviewed and interpretation of radiobiological data is discussed. (from abstract). NSA 6-4707

9568
STUDIES ON INDUCED MUTATION IN MAIZE. E. J. Dollinger. *Genetics* **39**, 750-66(1954).

Recessive mutations were induced at the Yg locus by x ray treatment of pollen in 14 of the 15 mutants analyzed, mutation was associated with chromosomal alteration resulting in loss of the chromomere containing the Yg locus. Also studied the effect of γ irradiation on induction of the dominant phenotype in cells homozygous recessive for one of the factors whose dominant allele is ordinarily necessary for expression of the dominant phenotype. Attempts were made to induce recessive mutation by γ irradiation of premeiotic cells for the A1, A2, Bt, Pr and R loci.

9569
BIOLOGY OF RADIUM AND URANIUM (MONOGRAPH). J. Stoklasa, J. Penkarn, and Paul Parcey, Berlin(1932). 957pp.

This monograph considers effects of Ra and U on plants and animals including microorganisms, effects of radioactive elements on structure and function of plants,

animals, man; effects on bacterial metabolism, on seed germination; effects on metabolic processes in plant cells; pathological conditions produced by radium. BA 9-18133

9570
THE INFLUENCE OF X-RAY ORGAN STIMULATION ON THE COAGULATION MECHANISM. Clarence C. Saelhof. *Amer. J. Roentgenol.* 8, 179(1921).

Irradiating the splenic area in dogs shortens the blood clotting time. Similar effects were seen after irradiating liver and intestines. Mechanism of altered clotting time varies with the area exposed, spleen irradiation being followed by an increase prothrombin, some increase in antithrombin, a rather delayed increase in fibrinogen, with little alteration of the platelet count.

9571
SELECTIVE ORGAN STIMULATION BY ROENTGEN RAYS; ENZYME MOBILIZATION. W. F. Petersen and C. C. Saelhof. *Am. J. Roentgenol.* 8, 175(1921).

Dogs were irradiated over various organs and blood studied for: serum protein levels, coagulation, serum protease, anti-trypsin, complement. Leukocyte counts and differentials were also included and total nitrogen excretion was determined. Reactions, as determined by the blood studies, varied with the organ irradiated.

9572
DEEP X-RAY THERAPY. A REVIEW OF THE MECHANISM OF ACTION. Reginald Morton. *Am. J. Roentgenol.* 10, 119(1923).

Summarizes effect of radiation on cells (changes seem to be primarily in the nucleus) and states that changes are more readily induced in abnormal cells; especially undifferentiated and dividing cells. Tolerance doses for various tissues are listed.

9573
THE INTESTINAL REACTION TO THE ERYTHEMA DOSE. Charles L. Martin and Fred T. Rogers. *Am. J. Roentgenol.* 10, 11(1923).

Dog skin is more radio-resistant than human skin. An erythema dose (for dog skin) applied directly to the exposed dog intestine produces hyperemia contraction destruction and desquamation of mucosa. Clinical signs in patients suggest that similar reactions occur in man. This is probably the cause of roentgen cachexia.

9574
THE PROBLEM OF RAY DOSAGE. W. Friedrich. *Am. J. Roentgenol.* 10, 6(1923).

This discussion includes an evaluation of the importance of biological variables in estimating doses required and delivered, and distinguishes between "absolute dosage" and "relative dosage."

9575
A STUDY OF CASES OF ACCIDENTAL X RAY BURNS HITHERTO RECORDED. E. A. Codman. *Phil. Med. J.* 9, 438(1902).

Nearly 200 cases of x ray injuries, about 1/3 of them in x ray workers, are reviewed. More than 2/3 occurred in the first 2 years of the use of x-ray. Primary injury is said to be to the trophic nerves of skin. Susceptibility varies widely among individuals. Soft rays are more likely to cause burns.

9576
REVIEWED IN "MEDICAL REVIEW OF REVIEWS" 8, 871(1902) X RAYS IN SARCOMA. A. E. Sterne. *Indiana Medical Journal* Aug.(1902).

A patient received extensive x ray exposure for disseminated sarcomatosis. The sarcoma shrank rapidly but the patient died. Death is attributed to rapid release of toxic products from the irradiated sarcoma cells.

9577
ROENTGEN RAY AND RADIUM IN THE DIAGNOSIS AND

TREATMENT OF CARCINOMA OF THE PROSTATE. H. C. J. Bumpus. *Collected Papers, Mayo Clinic* 13, 380(1921).

The action of radium(needles) is localized to the area immediately around the needles. Histological studies on prostates soon and long after radium Rx are shown.

9578
AMERICAN LITERATURE ON RADIUM AND RADIUM THERAPY PRIOR TO 1906. Carroll Chase. *Am. J. Roentgenol.* 8, 766(1921).

This interesting review includes a suggestion from Alexander Graham Bell to the editor of *American Medicine* that radium be tried for treating deep cancers. Books with sections on radium prior to 1906 and a surprising number of articles are listed. One unintentionally humorous description of the way radium produces its effects is included as an amusing touch.

9579
THE RED CELL BLOOD CONTENT OF THOSE HANDLING RADIUM FOR THERAPEUTIC PURPOSES. J. C. Mottram. *Arch. Radiol. and Electrother* 25, 194(1920).

9580
THE TREATMENT OF PERNICIOUS ANEMIA WITH IRRITANT DOSES OF RADIATION TO THE BONE MARROW. O. Neu. *Munch. med Wochschr.* 68, 1452(1921). (In German).

9581
CLINICAL BLOOD STUDIES IN GYNECOLOGICAL DEEP RADIATION THERAPY. L. Nurnberger. *Dtsch. med. Wochschr.* 41, 700 and 730(1915). (In German).

9582
TREATMENT OF MALIGNANT GRANULOCYTOPENIA. N. G. Nordenson. *Nord. Med.* 8, 1899(1940).

9583
IRRADIATION OF THE ENTIRE HUMAN BODY IN THE TREATMENT OF BLOOD DISEASES. W. Teschendorf. *Fortschr. Geb. Rontgenstr.* (1927) Kongressheft 71. (In German).

9584
EXPERIMENTAL INVESTIGATION OF THE EFFECT OF ROENTGEN RAYS ON THE BLOOD AND BLOOD FORMING ORGANS OF THE WHITE LABORATORY RAT. E. Woenckhaus. *Naunyn-Schmiedeberg's Arch.* 131, 335(1928).

Rats were irradiated with 7-8 H units. There was destruction of myeloid and almost all erythroid marrow elements within a few days. Author attributes first rapid change to redistribution of cells.

9585
ON THE GENERAL EFFECTS OF ROENTGEN RAYS. E. Woenckhaus. *Arch. by Exp. Path. u. Pharmak.*, 150, 182(1930). (In German).

An initial transient decrease, then an increase in the number of circulating leukocytes is followed by a sustained leukopenia (10-12 days) in rats exposed to "moderate" doses of x-ray. The lymphocyte fall is seen immediately after exposure. Permanent leukopenia results from repeated irradiation.

9586
QUANTITATIVE EFFECTS ON HEMATOPOIESIS OF TOTAL IRRADIATION AT VARIOUS DOSES AND DOSE FRACTIONATION SCHEDULES. K. Wolff. *Strahlentherapie* 54, 68(1935). (In German).

Changes observed include thrombopenia and author states that megakaryocytes are highly radiosensitive.

9587
OBSERVATIONS ON THE BEHAVIOR OF WHITE BLOOD CELLS DURING AND AFTER THE FIRST DAY OF TREATMENT WITH ROENTGEN AND RADIUM RAYS. A. Wagner. *Strahlentherapie* 11, 140(1920).

Author describes a transient initial leukocytosis followed by leukopenia.

9588

STUDIES ON THE INFLUENCE OF ROENTGEN AND RADIUM RAYS ON PHAGOCYTOSIS. A. Westman. *Acta. Radiol.*, 2, 57(1923).

By means of a somewhat modified form of Wright's method for opsonic determinations, the author has carried out investigations to determine whether therapeutic roentgen and radium irradiations have any appreciable influence on the phagocytic function of the leukocytes. Phagocytosis has been examined before and after treatment of patients with uterine cancer, which in most of the cases was treated exclusively by radium, and several cases of hidradenitis that were roentgen treated. One case of post-operative prophylactic roentgen treatment was also studied. In all these cases, the radiological treatment had a more or less marked stimulating effect on phagocytosis. This is of special interest in cases with hidradenitis, where radiation had a beneficial influence on inflammatory processes.

9589

CHANGES IN THE BLOOD OF PATIENTS TREATED WITH X-RAYS AND RADIUM. A. Westman. *Acta. Radiol.* 22, 1, 349(1921). (In French).

Initial transient leukocytosis was followed by leukopenia. After small and medium doses, there was a slight increase in rbc and Hb.

9590

VARIATIONS IN BLOOD CELL PRODUCTION IN GYNECOLOGICAL PATIENTS TREATED WITH ROENTGEN, RADIUM AND MESOTHORIUM RADIATION AND THEIR CLINICAL SIGNIFICANCE. P. W. Siegel. *Strahlentherapie*, 11, 64(1920).

Authors observed a transient initial leukocytosis 2-6 days after beginning therapy, followed by leukopenia in irradiated patients. There was a consistent increase in rbc and Hb in gynecologic patients receiving radiation therapy. This is attributed to improved general health.

9591

OUR METHOD OF DEEP ROENTGEN THERAPY AND OUR RESULTS. L. Seitz and H. Wintz. *Strahlentherapie* 5, (1920). (In German).

Authors describe transient leukocytosis in therapeutically irradiated patients and attribute this to marrow stimulation. Slight decrease in rbc and Hb was observed after moderate or small doses, marked decrease after large doses.

9592

THE IMPORTANCE OF INDICATIONS FROM STERNAL PUNCTURE IN ROENTGEN THERAPY. O. Meller, F. Gottlieb and R. Brauner. *Radiology*, 31, 149(1938).

Authors describe early and later changes in the bone marrow picture in 8 patients receiving x-ray therapy. Effects of various doses are compared.

9593

IS A SPECIFIC LEUKOTOXIN PRODUCED IN THE BLOOD SERUM DURING ROENTGEN RAY THERAPY OF LEUKEMIA, PSEUDOLEUKEMIA AND LYMPHOSARCOMAS? C. Kleneberger and H. Zoepfritz. *Munch. med. Wochschr.*, 53, 850 and 911(1906). (In German).

Authors were not able to demonstrate presence of a toxin causing leukopenia.

9594

THE CLINICAL SIGNIFICANCE OF STUDIES BY MEANS OF INTRAVITAL BONE MARROW STAINING. STERNAL PUNCTURE STUDIES. S. J. Leitner. *Folia Haematol.* 65, 1(1941). (In German).

Patient with cancer of the oesophagus treated with x-ray had hypocellular sternal marrow with 2.5% normal-

blasts, a few early myeloid cells many lymphoid cells and reticular phagocytic cells. Mitosis was not seen.

9595

ON THE BIOLOGICAL VARIATION IN RESPONSE OF A GYNECOLOGICAL DISEASE TO WEAK ROENTGEN RAYS. E. Klasten. *Zentr. Chir.* 47, 1171(1923). (In German)

Initial transient leukocytosis was followed by leukopenia. No significant change was observed in rbc, Hb or platelets.

9596

THE DIRECT EFFECT OF RADIUM IRRADIATION ON LEUKOCYTES. R. G. Spurling and J. S. Lawrence. *Am. J. Med. Sci.*, 169, 157(1925).

Blood under stasis in an extremity of dogs and man was irradiated. Radium irradiation of blood retained in an extremity of a dog or man, or in a vein of a dog, produced no demonstrable changes in the percentage of the different types of leukocytes in one and a quarter hours. Likewise the stasis of unirradiated blood in an extremity or vein for a similar period of time was without effect on the leukocytes. The manipulation of dogs' superficial tissues in obtaining blood produces destruction of leukocytes much more readily than similar trauma in man.

9597

SERIAL HISTOLOGICAL MODIFICATIONS OF THE BLOOD FOLLOWING EXPERIMENTAL IRRADIATION. A. Lacassagne and J. Lavedan. *Paris Med.* 51, 97(1924). (In French).

9598

NOTES ON BLOOD PRODUCTION DURING RADIATION THERAPY. E. Hayer. *Strahlentherapie*, 44, 687(1932). (In German).

Author describes changes observed in peripheral blood of patients receiving x-ray therapy. Initial granulocytosis is considered to be a compensatory phenomenon, possibly due to indirect as well as direct effect.

9599

BLOOD STUDIES IN PROTRACTED, FRACTIONATED RADIATION. W. Gloor and A. Zuppinger. *Strahlentherapie*, 40, 488(1931). (In German).

Authors describe their studies on the blood picture in patients receiving radiation therapy. Transient leukocytosis is believed to be due, at least in part, to altered distribution of cells within the circulation. It is suggested that marrow does not need to be irradiated in order to produce the observed effects. Left shift in wbc picture represents response to resorption of products of degenerated cells produced by irradiation.

9600

THE EFFECT ON THE BLOOD OF IRRADIATION, ESPECIALLY SHORT WAVE LENGTH ROENTGEN-RAY THERAPY. G. R. Minot and R. G. Spurling. *Am. J. Med. Sci.* 168, 215(1924).

Authors studied the blood of 42 cases, chiefly of cancer, before and after 56 roentgen ray irradiation treatments. Most common effect was leukopenia and lymphopenia. Particular attention was given to the observations on 22 of the patients given 36 intensive short wave length treatments. Factors influencing the effects of irradiation, e.g. intensity of dose and surface area exposed, are discussed.

9601

THE EFFECTS OF INJECTING BLOOD X-IRRADIATED IN VITRO ON THE BLOOD PICTURE. S. Wermel. *Munch. med Wochschr.* 61, 299(1914). (In German)

Serum x-irradiated *in vitro* and injected into a non-irradiated recipient caused leukopenia.

9602

INFLUENCE OF LOW TEMPERATURE AND PHASE STATES ON X-RAY SENSITIVITY OF YEAST. Thomas H. Wood. *Radiation Research* 1, 234(1954).

In liquid suspensions, haploid *saccharomyces cerevisiae* radiosensitivity was independent of temperature. This was also true of solid suspensions from -30° to -10° but radiosensitivity was half that of the cells in liquid. From -10° to -0.5°, radiosensitivities of solid suspensions increased with temperature up to that of liquid suspensions.

9603

GENETIC AND PHYSIOLOGIC DIFFERENCES IN NEUROSPORA INDUCED BY DIFFERENT PHYSICAL MUTAGENS. Val. W. Woodward. *Radiation Research* 1, 567-568(1954).

Filtration and selective plating technique for isolating biochemical mutants of *Neurospora* was used to study mutation rates and rate of germination after treatment with mutagens. Mutation rates varied, depending on whether conidia were wet or dry. Radiations of different ion densities caused differences in time and rate of conidial germination. There was no correlation between physiologic stimulation and genetic change. (from author's abstract)

9604

CHROMOSOMAL FRAGMENTS IN DIPLOID WHEAT AND THEIR USEFULNESS IN GENETIC STUDIES. Luther Smith. *Genetics*, 32, 105(1947).

Two fragments were produced by an x-ray-induced break of an chromosome at the centromere. Plants with fragments are distinguishable morphologically but are fairly fertile. Of 330 progeny of plants with fragments and heterozygous for a recessive gene for yellowish seedlings, 216 were yellowish.

9605

THE ABSORPTION AND TRANSLOCATION OF SEVERAL FISSION PRODUCTS BY PLANTS. J. H. Rediske and A. A. Selders. Hanford Atomic Products Operation, Biol. Research-HW 28636p 122-127(1953).

Absorption of ruthenium from nutrient solution by red kidney bean was studied as a function of ruthenium concentration and pH. Uptake of ruthenium depends on concentration of ruthenium added to nutrient environment. Ruthenium uptake is not pH sensitive in bean plants. Yttrium is absorbed about 10 times and strontium 10,000 times more efficiently than ruthenium at pH of 6.0.

9606

EXPERIMENTAL STUDIES ON THE EFFECT OF X-RAYS ON THE BONE MARROW. III. A. Casati. *Strahlentherapie* 43, 582(1932). (In German).

Bone marrow goes through two phases after intensive x-radiation, the degenerative and restorative phases. Histological picture of the two phases is described. Studies are based on bone marrow from irradiated hind limbs of rabbits. Dose used: 400 r on each of 2 consecutive days with an identical second course after 2 weeks, and (2) a similar course using an 800 r dose instead of 400 r. Marrow was studied serially up to 50 days after the first exposure. Results: No effect on erythroblasts; disappearance of myeloid cells due to (1) transformation into connective tissue cells and (2) inhibition and abnormality of mitosis in blast cells.

9607

CONTRIBUTION TO THE QUESTION OF THE EFFECT OF X-RAYS ON THE BLOOD. E. Benjamin, A. V. Reuss, E. Sluka, and G. Schwarz. *Wien, klin. Wochschr.* 19, 788(1906). (In German).

Authors believe it is possible to cause radiation leukopenia without exposing the blood forming organs. Their experiments: rabbits ears only were irradiated and leukopenia developed.

9608

THE EFFECT OF ROENTGEN RAYS ON NEPHRECTOMIZED

ANIMALS AND THE QUESTION OF LEUKOTOXINS. J. Schmid and A. Geronne. *Munch. med. Wochschr.* 54, 457(1907). (In German).

Authors believe that radiation produces a circulating leucotoxin which acts on blood forming organs to produce the injury observed there.

9609

EVALUATION OF BONE MARROW FUNCTION THROUGH X-RAY DOSE STIMULATION. G. Bucky and H. Guggenheimer. *Klin. Wochschr.* 1, 11(1922). (In German).

Authors studied changes in the blood picture of patients with blood diseases treated with x-rays. Small x-ray doses appeared to produce a beneficial effect in one case of pernicious anemia. Authors concluded that thrombocytosis could be stimulated by x-rays.

9610

EFFECTS OF ROENTGEN RAYS ON BONE MARROW. H. W. Wunsche. *Naunyn-Schmiedeberg's Arch.* 189, 581(1938). (In German).

Author interprets change in marrow of irradiated lumbar vertebrae of rabbits to be the result of markedly accelerated maturation of cells. Describes course of marrow changes after 200 to 600 r doses repeated up to 6 times at intervals of a few days. Describes cellular abnormalities including giant hypersyncytic granulocytes. Changes were seen within 5 minutes after first dose. Very large doses completely destroyed the marrow. Erythroid series was less readily injured than myeloid series. Author observed immature cells that resembled monocytes and were indistinguishable from them once they reached peripheral blood. Monocytosis is considered characteristic; also increased plasma cells and reticular cells.

9611

FURTHER CONTRIBUTION ON THE BIOLOGICAL EFFECT OF THORIUM X. A. V. Domarus. *Strahlentherapie* 4, 674(1914). (In German).

A group of rabbits received thorium x in various doses subcutaneously. Hemoglobin determinations, red and white blood cell counts and bone marrow examinations were carried out. Some animals died with severe marrow aplasia but other animals showed hyperplasia. Storage of injected material in R-E cells accounted for, in part, for marked effect on bone marrow.

9612

THE X RAY TREATMENT OF BONE SARCOMA AND THE REACTION OF THE BONE TISSUE TO THE X RAY. B. Dahl. *Strahlentherapie* 54, 35(1935). (In German).

Bone sarcoma in man may be radiosensitive as demonstrated by author's cases. Effects of doses as low as 100-150 r and as high as 3000 r to marrow in irradiated area are described. Recovery occurs earlier after lower doses but some recovery is seen even after high doses. Erythroblasts regenerated more rapidly than myeloid series. Degenerative changes in cells and variations in sensitivity among cells are described.

9613

CONCERNING THE EFFECT OF X RAYS ON LEUKOCYTES IN VITRO. A. Neumann. *Strahlentherapie* 18, 74(1924). (In German).

Leukocytes *in vitro* react to x ray as though disintegration were accelerated. Cells finally rupture.

9614

EXPERIMENTAL ASPECTS OF NEW LEUKEMIA THERAPY. A. Pappenheim. *Zschr. exp. Path. u. Ther.* 15, 39(1914). (In German).

Author describes marrow hyperplasia after fatal doses of x rays (rabbits).

9615

THE EFFECT OF ROENTGEN RAYS ON HEMATOPOIESIS IN THE BONE MARROW OF MAN AND THE EFFECT OF VARYING THE INTENSITY OF THERAPEUTIC RAYS.

Englmann. Fortschr. Geb. Röntgenstr Kongressheft, 73, (1935). (In German).

Marrow from irradiated vertebrae and ribs in 46 autopsy cases was studied and compared with marrow from non-irradiated bone. Doses ranged from 100 r to 3800 r; and single dose and fractional-protracted doses are compared. Megakaryocytes were most radiosensitive, degenerating after only 100 r. Myeloid series was next most sensitive; erythroid series last. Author concluded that more mature cells were destroyed before stem cells. Describes degenerative changes in cells. No regeneration was observed after tumor therapeutic doses.

9616

FATAL APLASTIC ANEMIA IN A ROENTGEN RAY SPECIALIST. K. Faber. Acta Radiol. 2, 110(1923). (In French).

9617

SERIOUS INJURY OF THE BLOOD IN CONSEQUENCE OF TELEROENTGENTHERAPY OF THE WHOLE BODY. D. den Hoed, B. Levie and M. Straub. Acta Radiol. 19, 151(1938).

Post mortem findings are reported for 4 patients dying after total body x-irradiation for cancer. Doses ranged from 475 r to 925 r and hematopoietic failure was important contributory cause of death. Bone marrow changes are described. Patients had previously had large doses (up to 10,000 r) of localized therapy. Myeloid tissue was destroyed early. There was extreme splenic sclerosis, the evidence of severe hemolysis. Megakaryocytes had about the same sensitivity as myeloid cells.

9618

EXPERIMENTAL STUDIES ON PERIPHERAL WHITE BLOOD CELLS AFTER X-RADIATION. E. Hayer. Strahlentherapie 50, 193(1934). (In German)

Local and total body irradiation (dogs) are compared with respect to their effect on peripheral blood picture and blood forming organs.

9619

ON THE NATURE OF ROENTGEN-LEUKOTOXINS IN THE BLOOD IN LYMPHOCYTIC LEUKEMIA. H. Cuschmann and O. Gaupp. Munch. med Wochschr. 52, 2409(1905). (In German).

Believe that leukopenia represents direct destruction of circulating leukocytes by the radiation and that the injured cells in turn produce a leukotoxin that destroys additional cells. Injection of serum from irradiated patient or animal causes leukopenia when injected into non-irradiated recipient.

9620

THE RELATION OF RADIOSENSITIVITY TO BUDDING IN *SACCHAROMYCES CEREVISIAE*. Carl Beam, R. Mortimer, R. Wolfe, and C. Tobias. Radiation Research 1, 126(1954).

The X-ray survival curve of haploid *saccharomyces cerevisiae* is the sum of two exponentially decaying functions of dose. When log phase cells are irradiated, 70 to 95% survive and have MLD of 3500 r, those remaining are over 10 times as resistant with MLD of about 50,000 r. Resistant cells are dividing when irradiated. When haploid cells are shaken in a medium containing sugar, but no nitrogen source, the percentage of budding cells is reduced.

9621

THE REACTION OF PLANTS TO THE RADIOACTIVE EFFECT OF P^{32} IN THE FIRST AND FOUR SUBSEQUENT GENERATIONS. A. G. Shestakov, G. F. Ivanova, and N. I. Shmel'kova. Izvest. Timiryazev Sel'skokhoz. Akad. No. 1, 165-178(1955).

Seedlings grown without P were affected by small quantities of P^{32} , but seedlings grown in normal (P

containing) solutions were affected only by high doses of P^{32} . Content of P^{32} in different parts of plants depended on previous P nutrition. CA 49-14113

9622

CONDITIONS WHICH AFFECT THE BIOLOGIC DAMAGE RESULTING FROM EXPOSURE TO IONIZING RADIATION. L. H. Gray. Acta Radiol. 41, 63-83(1954).

Influence of O_2 tension on damage induced by x-ray follows a strikingly similar pattern in the case of 5 different biological responses in plant and insect cells. Influence on α ray and neutron damage is relatively slight. Pre-treatment of Vicia roots with a gaseous atmosphere of air and carbon monoxide caused increased x-ray sensitivity. CA 48-5890

9623

THE QUESTION OF THE GENETIC ACTIVITY OF HETEROCHROMATIN THROUGH STUDIES OF THE X-CHROMOSOMES OF *SPHAEROCARPUS DONNELLI*. E. Knapp. Ber. Deut. Botan. Ges. 53, 751-760(1935).

Most of the heterochromatic x-chromosome in *Sphaerocarpus* must be free of essential genes, since this chromosome is present only in ♀♀ and since plants in which a part of the x-chromosome is deleted (by x-rays) are viable. Author concludes that genes present are not necessary for life but have morphological effect. (from abstract). BA 11-60

9624

STUDIES ON THE MECHANISM OF ACTION OF IONIZING RADIATIONS. XI. INACTIVATION OF YEAST ALCOHOL DEHYDROGENASE BY X IRRADIATION. E. S. Guzman Barron and P. Johnson. Arch. Biochem. Biophys. 48, 149-153(1954).

Dilute solutions of crystalline yeast alcohol dehydrogenase were readily inactivated by x-ray. Degree of inactivation was proportional to x-ray dose. Glutathione completely protected the enzyme against x-ray inactivation but glutamic acid had no effect. H_2O_2 had no effect.

9625

HOW IS CELL GROWTH INFLUENCED BY HORMONES, VITAMINS BY THE D'ARSONVAL CURRENT, SHORT WAVES, AND X-RAYS? EXPERIMENTS ON EMBRYONIC, CULTURED (ANIMAL) AND PLANT CELLS. F. Ludwig and J. V. Ries. Strahlentherapie 67, 507-521(1940).

Influence of various chemical agents (pituitrin, insulin, progynon, dityran, prolan, preloban and vitamin B) on germinating wheat grain was studied. Effects of high-frequency radiations, ultraviolet and red light, and ultrashort waves were investigated.

9626

CYTOLOGICAL STUDIES ON IRRADIATED TISSUES. I. THE INFLUENCE OF RADIUM EMANATION ON THE MICROSPOROGENESIS OF THE LILY. M. Levine. Proc. Intern. Congr. Plant Sci. 1st. Congr., Ithaca 1, 271-297(1929).

Cytoplasmic changes and changes in chromatin material during reduction divisions are described. BA 4-10795

9627

CYTOLOGICAL STUDIES IN *ALLIUM*. I. CHROMOSOME MORPHOLOGICAL CONTRIBUTIONS. Albert Levan. Hereditas 16, 257-294(1932).

Forms with 18 somatic chromosomes may have arisen from those with 16 by fragmentation. Satellites may have arisen in the same way. Fragmentation was observed in three specimens and is described in detail in *A. allegheniense*. In one plant, with 2 fragments, one fragment was attached medially to one large, chromosome, evidently representing a case of translocation. BA 7-2537

9628

INFLUENCE OF RADIUM ON VEGETATION. A. Lepape and R. Trannoy. *Ann. Agron.* **4**, 319-354(1934).

Quantity of Ra measurable in crops varied with amount in soil. Least amount detected in fruits, most in leaves. Small or medium-large doses of Ra added to soil had no apparent effect but large doses were harmful. BA 11-2949

9629

THE SIGNIFICANCE OF SULFHYDRYL COMPOUNDS FOR RADIOBIOLOGY. R. Koch. *Arzneimittel-Forsch.* **5**, 271-275(1955).

Review of cysteine-cysteamine group of compounds as protective agents against radiation damages. CA 49-12565

9630

THE RELATIVE EFFECTS OF X-RAYS, GAMMA RAYS AND BETA RAYS ON CHROMOSOME BREAKAGE IN *TRADESCANTIA*. J. S. Kirby-Smith and D. S. Daniels. *Genetics* **38**, 375-388(1953).

Conclusions: X-rays (60 KeV) are twice as effective as Co^{60} γ or 400 KeV β rays in producing chromosomal aberrations; 1 MeV γ rays and 400 KeV mean energy β rays are closely similar in biological effects on *Tradescantia* dry pollen. Relative magnitude of the two-hit component is greater for γ and high energy β rays than for medium energy x-rays.

9631

THE EFFECTS OF THORIUM AND URANIUM SALT UPON THE CROPS. Z. Kasal. *Kyoto Daigaku Shokuryo Kagaku Kenkyujo Hokoku* **3**, 69-71(1950).

No effects of radioactivity (Th and U nitrates) were seen on wheat, barley, oats, rice, radish and pea crop growth or quality, except where compounds were administered by direct application. Suppressed growth and decrease in yields are attributed to chemical action, not radioactivity. CA 45-4860

9632

THE CHANGES IN THE CHROMOSOMES AND THE FORMATION OF CHROMOSOMAL CHIMAERAS UNDER THE INFLUENCE OF X-RAYS IN *CEPHALARIA SYRIACA* SCHRAD. N. T. Kakhidze. *Trudy Priklad. Botan. Genet. I. Seleksi.* Ser 2, **1**, 177-184(1932).

Seeds were exposed for 14, 18, 24, 30 and 36 min., at 108 Ku., 4 m A. 20-cm. distance, 1/2 mm. aluminum filter. In radicles and apical buds, translocations were observed; both showed chimaera structure in composition of cell nuclei. BA 8-5170

9633

THE PHYSIOLOGICAL EFFECT OF α , β AND γ RAYS OF RADIUM ON THE DYNAMICS AND ENERGETICS OF CARBON DIOXIDE ASSIMILATION. Julius Stoklasa, J. Hruban, and J. Penkava. *Biochem. Z.* **218**, 361-96(1930).

Author concludes that α rays inhibit photosynthesis and increase O_2 consumption of the plants. Respiration is slightly increased by β rays. Combined β and γ rays stimulate photosynthesis. Oxidation by means of absorbed O_2 is promoted by α rays only in absence of β and γ radiation. CA 24-3034

9634

THE USE OF RADIOACTIVE SUBSTANCES AS FERTILIZERS. W. H. Ross. *U. S. Dept. Agr. Bull.* **149**, 1-14(1914).

Radio-elements may be valuable in botanical research greenhouse practice, but have no practical value as fertilizers in general farming. Action of U on plants is due to chemical properties, not to radioactivity. Conflicting results obtained with radioactive fertilizers is explained by presence of U. CA 9-502

9635

THE CAUSE OF THE ACTION OF X RAYS AND GAMMA RAYS OF RADIUM UPON LIVING CELLS. F. Dessauer. *J. Radiol.* **4**, 411-415(1923).

The author proposes a theory called 'point heat', by which heat on a cell could be raised as a result of the release of an electron as a direct result of a radiation hit. Since this electron release could not be directed, it would concentrate in some cells and be absent in others. This might explain the irregular distribution of irradiated cells found following cancer therapy. CA 18-2040

9636

THE GENETIC EFFECT OF CHEMICAL AGENTS ON THE CELL. P. C. Koller. *Proc. Intern. Congr. Genet.* 8th Congr., Stockholm. 1948. p. 320-324(1949).

Ionizing radiation, ultraviolet, and chemicals may be used as mutagenic agents. Certain chemicals act as specific mutagens while others produce toxic effects only. CA 45-6235

9637

EFFECT OF RADIUM AND ULTRAVIOLET LIGHT ON GROWTH AND CITRIC ACID FORMATION IN *ASPERGILLUS NIGER*. E. K. Kresling and E. A. Shtern. *Trudy Nauch-Issledovatel. Inst. Pishchevoi Prom. Narkomish-cheproma SSSR* **3**, 5-24(1935).

Radium and ultra-violet inhibited growth and produced morphological changes in *Aspergillus* cultures on agar. Citric acid production was increased by radon. Radon also changed biological and hereditary properties. CA 30-5256

9638

THE RETENTION OF RADIOACTIVE PHOSPHORUS WHEN ADMINISTERED IN DIFFERENT CHEMICAL FORMS. S. Warren and R. F. Cowing. *Cancer Research* **4**, 113(1944). 113p.

9639

THE RETENTION OF RADIOACTIVE PHOSPHORUS IN LEUKEMIC PATIENTS. S. Warren. *Cancer Research* **3**, 872(1943).

9640

THE DISTRIBUTION OF DOSES OF RADIOACTIVE PHOSPHORUS IN LEUKEMIC PATIENTS. S. Warren. *Cancer Research* **3**, 334(1943).

9641

THE DISTRIBUTION OF DOSES OF RADIOACTIVE PHOSPHORUS IN RODENTS. S. Warren and R. F. Cowing. *Journ. Lab. Clin. Med.* **26**, 1014(1941).

P^{32} injected intravenously or intraperitoneally in mice, rats and rabbits in doses ranging from 5-17.5 μc (mouse), 30-329 μc (rat) and 50-84 μc (rabbit). Spleen, liver, kidney and bone showed high absorption and retention in all species although there were differences among species and among individual animals with respect to distribution to various organs. Urinary excretion of P^{32} was rapid, about 25% of injected dose being excreted within 48 hours.

9642

THE TREATMENT OF LEUKEMIA BY RADIOACTIVE PHOSPHORUS. S. Warren. *New England Journ. Med.* **223**, 751(1940).

9643

BONE MARROW CHANGES FOLLOWING THE ADMINISTRATION OF RADIOACTIVE PHOSPHORUS. S. Warren. *New England Jour. Med.* **228**, 111(1943).

Author describes studies of 8 patients who had come to autopsy following the administration of radioactive phosphorus, either orally or intravenously, as disodium

phosphate. The changes produced in bone marrow did not differ significantly from those produced by other radiation.

9644

USE OF RADIOACTIVE PHOSPHORUS IN TREATMENT OF LEUKEMIA. C. Webster. Texas Rep. Biol. and Med. 2, 83(1944).

9645

X-IRRADIATION AND LIVER REGENERATION IN PARTIALLY HEPATECTOMIZED RATS. L. L. Gershbein. Am. J. Physiol. 185, 245-49(1956).

Rats receiving 20,000 r to the liver immediately after partial hepatectomy showed normal regenerative ability of the liver. (Autopsied 11 days post-exposure).

9646

STUDIES ON NEOPLASMS WITH THE AID OF RADIOACTIVE PHOSPHORUS. THE PHOSPHORUS METABOLISM OF THE NUCLEOPROTEIN, PHOSPHOLIPID, AND ACID SOLUBLE FRACTIONS OF NORMAL AND LEUKEMIC MICE. L. W. Tuttle, L. A. Erf and J. H. Lawrence. Journ. Clin. Invest 20, 57(1941).

9647

THE URINARY EXCRETION AND BIOLOGICAL DECAY PERIODS OF RADIOMERCURY LABELING A MERCURIAL DIURETIC IN NORMAL AND DISEASED MAN. George Bureh, R. Thorpe, S. Threefoot, J. Kelly, and A. Svedberg. J. Clin. Invest., 29, 1131-8(1950). NSA 4-6326

9648

DISCUSSION ON THE CONSTITUTIONAL EFFECTS OF RADIATION WITH SPECIAL REFERENCE TO VOLUME DOSE. D. W. Smithers. Brit. Journ. Rad., 15, 141 (1942).

Author discusses improvements that can be made in radiation therapy technique in order to obtain a more accurate measurement of effective dose received by the patient. Symptoms of radiation sickness are considered probably to be due to histamine and the use of antihistamines in the prevention of x-ray sickness is suggested.

9649

THE CONTROL AND TREATMENT OF RADIATION REACTIONS. D. W. Smithers. Brit. Journ. Rad., 15, 233 (1942)

9650

METABOLIC STUDIES ON LEUKEMIC MICE WITH THE AID OF RADIOACTIVE PHOSPHORUS. K. G. Scott. Cancer Research 5, 365(1945).

9651

NEUTRON CAPTURE THERAPY: SLOW NEUTRON DEPTH DISTRIBUTION MEASUREMENTS IN TISSUE. E. E. Stickley. Am. J. Roentgenol. Radium Therapy, Nuclear Med., 75, 609-18(1956).

9652

RADIOACTIVE PHOSPHORUS AS A THERAPEUTIC AGENT. A REVIEW OF THE LITERATURE AND ANALYSIS OF THE RESULTS OF TREATMENT OF 155 PATIENTS WITH VARIOUS BLOOD DYSCRASIAS, LYMPHOMAS AND OTHER MALIGNANT NEOPLASTIC DISEASES. E. H. Reinhard, C. V. Moore, O. S. Bierbaum and S. Moore. Journ. Lab. and Clin. Med., 31, 107(1946).

9653

RADIOACTIVE PHOSPHORUS IN THERAPY OF LEUKEMIAS. A. Saralegin and A. Pavolovsky. Radiologie, 10, 88(1943).

9654

APPLICATIONS OF ARTIFICIAL RADIOACTIVE ISOTOPES IN THERAPY. I. COBALT 60. W. G. Myers. Amer. J. Roentgenol. Radium Therapy, Nuclear Med. 9, 816-823(1948).

The author presents a summary of physical properties of Co⁶⁰ and discusses his clinical experience using the isotope in radiation therapy.

9655

ENERGY ABSORPTION. W. V. Mayneord. Brit. Journ. Rad., 13, 235(1940).

9656

DISCUSSION ON THE CONSTITUTIONAL EFFECTS OF RADIATION WITH SPECIAL REFERENCE TO VOLUME DOSE. W. V. Mayneord. Brit. Journ. Rad., 15, 100 (1942).

Constitutional effects (radiation sickness) of radiation observed in patients receiving radiation therapy depend upon the total energy absorbed by the body.

9657

ENERGY ABSORPTION. III. THE MATHEMATICAL THEORY OF INTEGRAL DOSE AND ITS APPLICATIONS IN PRACTICE. W. V. Mayneord. Brit. Journ. Rad., 17, 359(1944).

9658

ENERGY ABSORPTION. IV. W. V. Mayneord. Brit. J. Rad., 18, 12(1945).

The mathematical theory of integral dose in radium therapy.

9659

ABSORPTION OF FERROUS AND FERRIC RADIOACTIVE IRON BY HUMAN SUBJECTS AND BY DOGS. C. V. Moore, et al. Journ. Clin. Invest 23, 755(1944).

9660

THE CONCENTRATION OF P³² IN SOME SUPERFICIAL TISSUES OF LIVING PATIENTS. L. D. Marinelli and B. Goldschmidt. Radiology 39, 454(1942).

9661

THE USE OF X-RAYS AND GAMMA RAYS IN MEDICINE. W. V. Mayneord. Report on Progress in Physics 5, 248 (1939).

9662

UPTAKE OF RADIOACTIVE PHOSPHORUS BY NUCLEI OF LIVER AND TUMORS. A. Marshak. Science 92, 460 (1940).

9663

TRANSMISSION OF RADIOACTIVE IRON TO THE HUMAN FETUS. W. T. Pommerenke, P. F. Hahn, W. F. Bale, and W. Balfour. Amer. Journ. Physiol. 137, 164(1942).

9664

RADIOACTIVE PHOSPHORUS AS A THERAPEUTIC AGENT IN MALIGNANT NEOPLASTIC DISEASE. J. M. Kenney. Cancer Research 2, 130(1942).

9665

STUDIES ON NEOPLASMS WITH THE AID OF RADIOACTIVE PHOSPHORUS. TOTAL PHOSPHORUS METABOLISM OF NORMAL AND LEUKEMIC MICE. J. H. Lawrence L. W. Tuttle, K. G. Scott and C. L. Connor. Journ. Clin. Invest., 19, 267(1940).

9666

UPTAKE OF RADIOACTIVE PHOSPHORUS P³² IN RAPIDLY REGENERATING TISSUE, AND IN NORMAL ADULT TISSUE IN HUMAN SUBJECT. L. W. Kinsell. Proc. Amer. Fed. Clin. Res., 1, 51(1944).

9667

RADIOPHOSPHORUS--AN AGENT FOR THE SATISFACTORY TREATMENT OF POLYCYTHEMIA AND ITS ASSOCIATED MANIFESTATIONS, A REPORT OF A CASE OF POLYCYTHEMIA SECONDARY POSSIBLY TO THE BANTIS SYNDROME. L. A. Erf and H. W. Jones. Ann. Int. Med., 29, 587(1943).

9668

CLINICAL STUDIES WITH THE AID OF RADIOPHOSPHORUS. THE RETENTION IN BLOOD, THE EXCRETION AND THE THERAPEUTIC EFFECT OF RADIOPHOSPHORUS IN PATIENTS WITH LEUKEMIA. L. A. Erf and L. W. Tuttle. Ann. Int. Med. XV, 487(1941).

9669

PHOSPHORUS METABOLISM OF BLOOD OF PATIENTS

WITH LEUKEMIA AND POLYCYTHEMIA. L. A. Erf and J. N. Lawrence. *Amer. J. Med. Sci.* 203, 83(1942).

9670
CLINICAL STUDIES WITH THE AID OF RADIOPHOSPHORUS. THE ABSORPTION AND DISTRIBUTION OF RADIOPHOSPHORUS IN THE BLOOD OF, ITS EXCRETION BY AND ITS THERAPEUTIC EFFECT ON PATIENTS WITH POLYCYTHEMIA. L. A. Erf and J. N. Lawrence. *Ann. Int. Med.* 15, 276(1941).

9671
THE TREATMENT OF LYMPHOSARCOMA WITH RADIOACTIVE PHOSPHORUS; A PRELIMINARY REPORT. J. M. Kenney, L. D. Marinelli and L. F. Craver. *Amer. Journ Roentgenol.* 47, 217(1942).

9672
VOLUME DOSAGE IN X RAY THERAPY. PART II. THE CORRELATION OF BIOLOGICAL EFFECTS WITH VOLUME DOSE. F. Ellis. *Brit. Journ. Rad.*, 15, 194 (1942).

9673
VOLUME DOSAGE IN DEEP X RAY THERAPY. PART I. THE ESTIMATION OF VOLUME DOSE IN DEEP X RAY THERAPY FOR CLINICAL PURPOSES. F. Ellis. *Brit. Journ. Rad.*, 15, 174(1942).

9674
PROVISIONAL CALCULATION OF THE TOLERANCE FLUX OF THERMAL NEUTRONS. J. S. Mitchell. *Brit. Journ. Rad.*, 20, 79(1947).

Doses are considered in light of: surface of soft tissues, n- γ reaction in H, total surface dose, bone dose and diffusion-reflection of thermal neutrons at body surface. Based on MPE for x and γ rays (0.1r/day), author estimates MP flux of thermal neutrons to be 1250/cm²/sec for 8 hrs.

9675
PROVISIONAL CALCULATION OF THE TOLERANCE FLUX OF FAST NEUTRONS. J. S. Mitchell. *Brit. Journ. Rad.*, 20, 177-180(1947).

The flux of fast neutrons (2-20MeV) corresponding to the dose 0.1r/day of radium γ rays is estimated to be 85 neutrons/cm²/sec delivered in 8 hrs. Because of uncertainties in the estimate, author recommends that the provisional tolerance flux should not exceed 20 neutrons/cm²/sec.

9676
HISTOCHEMICAL STUDIES OF THE EFFECT OF IRRADIATION OF THE PLACENTA. A. G. Foraker, W. Denham, and D. D. Mitchell. *Arch. Pathol.*, 59, 82-89(1955).

Histological and histochemical changes in locally irradiated uterine horns and placenta in rabbits are described. Five days after 1200 r, changes include: decreased dehydrogenase activity, diffuse granular alkaline phosphatase staining, decreased glycogen (PAS stain), but normal tissue structure with H and E stain. Maximum placental damage is seen at maternal-fetal junction.

9677
DISCUSSION ON THE CONSTITUTIONAL EFFECTS OF RADIATION, WITH SPECIAL REFERENCE TO VOLUME DOSE. F. Ellis. *Brit. Journal. Radiol.*, 15, 143(1942).

Author discusses estimation of volume dose, relationship between symptoms of radiation sickness and total energy absorption and application of the concepts discussed to experimental work.

9678
THE RELATION OF PHOSPHATASE ACTIVITY IN BONE TUMOURS TO THE DEPOSITION OF RADIOACTIVE PHOSPHORUS. H. Q. Woodard and J. M. Kinney. *Amer. Journ. Roentgenol.* 47, 227(1942).

9679
TREATMENT OF LEUKEMIA, BY RADIOACTIVE PHOSPHORUS. L. F. Craver. *Bull. New York Acad. Med.* 18, 259(1942).

9680
ABSORPTION OF RADIOACTIVE IRON BY SCHOOL CHILDREN. W. J. Darby, P. F. Hahn, R. C. Steinkamp and M. N. Kaser. *Fed. Proc.* 5, 231(1946).

9681
RETENTION OF ORALLY ADMINISTERED RADIOPHOSPHORUS BY MICE. L. A. Erf, L. W. Tuttle, and K. G. Scott. *Proc. Soc. Exper. Biol. and Med.* 45, 652 (1940).

9682
CLINICAL STUDIES WITH THE AID OF RADIOACTIVE PHOSPHORUS. THE ABSORPTION AND DISTRIBUTION OF RADIOPHOSPHORUS AND DISTRIBUTION OF RADIOPHOSPHORUS IN THE BLOOD AND ITS EXCRETION BY NORMAL INDIVIDUALS AND PATIENTS WITH LEUKEMIA. L. A. Erf and J. H. Lawrence. *Journ. Clin. Invest.* 20, 567(1941).

9683
CLINICAL EXPERIENCE WITH RADIOPHOSPHORUS IN THE TREATMENT OF CERTAIN BLOOD DISEASES. T. Fitz-Hugh and P. J. Hodes. *Amer. Journ. Med. Sci.* 204, 662(1942).

9684
A STUDY OF THE DISTRIBUTION OF RADIOACTIVE PHOSPHORUS IN THREE CASES OF CANCER. A. Forssberg. *Acta Rad.* 27, 88(1946).

9685
THE ASSIMILATION OF RADIOACTIVE PHOSPHORUS FOLLOWING PHOSPHORUS DEFICIENCY IN RATS. W. E. Gaunt, H. L. Griffith and J. L. Irving. *Jour. Physiol.*, 100, 372(1942).

9686
THE SYNERGISTIC EFFECTS OF ROENTGEN RADIATION AND CORTISONE UPON SUSCEPTIBILITY OF MICE TO PATHOGENIC MICROORGANISMS. J. Friedman, J. T. Syverton, et al. *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 71, 509(1954).

Roentgen radiation and cortisone were administered singly and in combination to mice. The two agents used together had a greater-than-additive effect in reducing innate resistance to the pathogens tested. (x-ray doses 50-500 r).

9687
RADIOACTIVE IRON ABSORPTION BY GASTRO-INTESTINAL TRACT. INFLUENCE OF ANAEMIA, ANOXIA, AND ANTECEDENT FEEDING ON DISTRIBUTION IN GROWING DOGS. P. F. Hahn, W. F. Bale, J. F. Ross, W. M. Balfour, and G. H. Whipple. *Journ. Exper. Med.* 78, 169(1943).

9688
DIRECT INFILTRATION WITH RADIOACTIVE ISOTOPES AS A MEANS OF DELIVERING IONIZING RADIATION TO DISCRETE TISSUES. P. F. Hahn and J. P. B. Goodell, C. W. Sheppard, R. O. Cannon and H. C. Francis. *Jour. Lab. Clin. Med.*, 32, 1442(1947).

9689
THERAPEUTIC USE OF RADIOPHOSPHORUS IN POLYCYTHEMIA VERA, LEUKEMIA AND ALLIED DISEASES. B. E. Hall in SYMPOSIUM ON THE USE OF ISOTOPES IN BIOLOGY AND MEDICINE. Madison, Univ. of Wisconsin Press, 1948.

9690
RADIOACTIVE PHOSPHORUS IN TREATMENT OF POLYCYTHEMIA VERA. RESULTS AND HEMATOLOGICAL COMPLICATIONS. B. E. Hall, C. H. Watkins, M. H. Hargreaves and H. Z. Griffin. *Amer. Journ. Med. Sci.* 209, 712(1945).

9691

HEMATOLOGIC COMPLICATIONS OF THERAPY WITH RADIOACTIVE PHOSPHORUS. L. H. Hempelmann, E. H. Reinhard, C. V. Moore, O. S. Bierbaum, and S. Moore. Jour. Lab. and Clin. Med., 29, 1020(1944).

Authors used radioactive phosphorus as a therapeutic agent in treatment of 100 patients with various hematologic dyscrasias. Conclusion: P^{32} is a valuable therapeutic agent in the treatment of chronic leukemia and polycythemia, but severe leukopenia, thrombocytopenia, anemia and bone marrow aplasia may occur as a complication of therapy.

9692

ENTRANCE OF RADIOACTIVE PHOSPHORUS INTO SPHINGOMYELIN OF VARIOUS TISSUES OF CAT. F. E. Hunter. Proc. Soc. Exp. Biol. and Med. 46, 281(1941).

Greatest incorporation of P^{32} into sphingomyelin was observed in the liver, the lung and the intestinal mucosa. With the exception of the lung, the tissues may be ranked in approximately the same order for sphingomyelin activity as for total phospholipid activity. The lung is relatively higher with respect to sphingomyelin. Radioactivity in sphingomyelin reaches maximum about 2 days after injection in most tissues.

9693

CAUSES AND PREVENTION OF RADIOTHERAPEUTIC OEDEMA OF THE LARYNX. B. Jolles. Brit. J. Radiol. 18, 278(1945).

Movement of water and mineral salts was studied *in vitro* and *in vivo* after x-irradiation of the Larynx. Implications of results with respect to therapy are discussed.

9694

FURTHER EXPERIENCES IN TREATMENT OF LYMPHOSARCOMA WITH RADIOACTIVE PHOSPHORUS. J. M. Kenney and L. F. Craver. Radiology 39, 598(1942).

9695

CYTOLOGICAL ANALYSIS OF THE RESPONSE OF MALIGNANT TUMOURS TO IRRADIATION AS AN APPROACH TO A BIOLOGICAL BASIS FOR DOSAGE IN RADIOTHERAPY. P. C. Koller and D. W. Smathers. Brit. J. Radiol., 19, 89(1946).

Six skin cancer cases received x-ray therapy, surface doses varying from 58 r/min. to 200 r/min. Clinical course was evaluated by cytoanalysis. Total surface dose was 3200-3500 r in 13-23 days. Authors also report on 4 cases of radioresistant tumors receiving doses of 3700-5400 r delivered in 85-94 days. Intracellular and intercellular reactions are compared.

9696

THE THERAPEUTIC USE OF RADIOPHOSPHORUS. J. Warren. Amer. Journ. Med. Sci., 209, 701(1945).

9697

THE CALCULATION OF THE TOLERANCE FLUX OF FAST NEUTRONS. J. H. Tait. A.E.R.E. T/R. 273, February 1949.

9698

RADIOACTIVE SUBSTANCES SPECIFICALLY LOCALIZED IN LIVER SPLEEN OR BONE MARROW. E. Dobson, L. Kelly, H. Jones and J. Gofman. Abst of Communication XVII Intern. Physiolog. Cong. 26, (1947).

9699

PHOSPHORUS METABOLISM OF NEOPLASTIC TISSUES (MAMMARY CARCINOMA, LYMPHOMA, LYMPHOSARCOMA) AS INDICATED BY RADIOACTIVE PHOSPHORUS. H. B. Jones, I. L. Chaikoff, and J. H. Lawrence. Amer. Journ. Cancer, (c) 11, 243(1940).

9700

DEPOSITION OF RADIOPHOSPHORUS IN TISSUE OF GROWING CHICKS. S. F. Cook, K. G. Scott and P. Abelson. Proc. Nat. Acad. Sci., 23, 528(1937).

9701

THE EFFECT OF INSOLUBLE RADIOPHOSPHORUS (CHROMIUM PHOSPHATE) WHEN APPLIED INTERSTITIALLY IN THE TREATMENT OF ADENOCARCINOMA OF THE MAMMA IN MICE. H. Allen, L. H. Hempelmann, and N. A. Novack. Cancer Research 5, 239(1945).

Adenocarcinoma of the breast (mice) can be completely and safely destroyed by interstitial radiation. Where the neoplasms are larger than 1/5 the body weight of the animal, fatal toxemia often results from the absorption of broken-down tumor tissue. Most of the radioactive material apparently remains at the site of injection, although a small portion is carried to the regional lymph nodes, where its action can be noted. No microscopic evidence of distant parenchymatous damage was found.

9702

CLINICAL STUDIES WITH THE AID OF RADIOPHOSPHORUS. THE RETENTION OF RADIOPHOSPHORUS BY TISSUES OF PATIENTS DEAD OF LEUKEMIA. L. A. Erf. Amer. Journ. Med. Sci., 203, 529(1942).

9703

BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL (1950). Austin M. Brues. Editor ANL-4451. Progress Report: A COMPARATIVE STUDY OF THE TIME PATTERNS OF Sr^{89} EXCRETION CHARACTERIZING VARIOUS LABORATORY ANIMALS. S. A. Tyler and Joan Curian. p.16-19 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT FEBRUARY, MARCH, APRIL (1950). Austin M. Brues, ed. Progress Report: (ANL-4451)

9704

INORGANIC FREE RADICALS IN SOLUTION. N. Uri. Chem. Rev., 50, 375(1952).

9705

THE EFFECT OF RADIOACTIVE PHOSPHORUS UPON THE DEVELOPMENT OF THE EMBRYONIC TOOTH AND SUPPORTING STRUCTURES. M. S. Burstone. (Washington U. Sch. Dentistry, St. Louis, Mo.). Jour. Dental Res. 29(5), 662(1950).

9706

LIFE SPAN SHORTENING IN RATS INDUCED BY MULTIPLE DOSES OF POLONIUM-210. J. N. Stannard, H. A. Blair, and R. C. Baxter. Fed. Proc. 14, 144, Part I (1955).

9707

TOXICITY OF I^{131} IN SHEEP. V. GENERAL (LOW-LEVEL CHRONIC EFFECTS). L. K. Bustad, D. E. Warner, H. A. Kornberg. (Hanford Atomic Products Operation, Richland, Wash.). p.136-47.

9708

INHALATION OF RADIOACTIVE AEROSOLS AND ITS PREVENTION. Jech. Cestmir. Acta Radiol. et Cancerol. Bohemosloven. 5, 45-9(1951). (In English).

An α -emitting aerosol of 30 per cent Io (Th^{230}) and 70 per cent Th^{232} suspended in H_2O was inhaled for 3 min. by a rat, which was immediately killed. Nuclear-emulsion radioautographs of lung sections showed the particles to be 1-5 μ in diameter and to be located mainly in the walls of the bronchi, only rarely being found in alveoli. Inhalation of air containing $10^{-12}c$ of Rn and its decay products/cc resulted in 50 per cent retention of the radioactivity, as measured by the expired air (man). These results confirm those of other authors who found substantial retention of aerosols in the respiratory tract. Simple filtration through dry filter paper, cotton or sintered glass removes practically all aerosols from air. NSA 6-4348

9709

CALCULATIONS PERTAINING TO RADIUM PRODUCED IN VIVO FROM A THORIUM PATIENT. pp. 19-25. P. F. Gustafson and L. D. Marinelli. Division Semiannual Report. (January through June, 1956). John E. Rose, Director. (ANL-5596)

9710

A CLINICAL INVESTIGATION OF THE CHRONIC EFFECTS OF RADIUM SALTS ADMINISTERED THERAPEUTICALLY (1915-1931). R. J. Hasterlik, W. B. Looney, A. M. Brues and E. Skirmont. Argonne Cancer Research Hospital ACRH-2, Jacobson, Leon, editor, Semiannual report to AEC (September, 1954).

Authors describe results of clinical, radiographic and hematological studies on 20 persons who had been given radium (internally deposited) as a therapeutic procedure 20-30 years previously and on 6 radium dial pointers. Findings, including tumor incidence, are presented in detail.

9711

THE UPTAKE OF SUBCUTANEOUS AND INTRAMUSCULAR SILVER-COATED RADIOACTIVE GOLD COLLOIDS BY LYMPH NODES IN DOGS. A. H. Jackson, F. E. Staggars, P. F. Hahn. J. Lab. Clin. Med., 42, 739-45 (1953).

Silver-coated radioactive gold colloids administered subcutaneously to dogs were taken up by the regional lymph nodes in significant quantities. Quantitative differences between drainage from superficial and deep breast sites were noted. Some microscopic changes in regional nodes following infiltration of a large single dose of the gold colloid are presented and discussed.

9712

ACTION OF NEUTRONS ON ENZYMATIC ACTIVITY. Kurt Jacobsohn and Mzrieta de Dilveiria. Arch. Portugal Portugaises Sci. Biol. 10, Suppl., 110-11(1950), Reprinted in Trav. Lab. Inst. Rocha Cabral (Lisbon) 19 (1951). (In French). NSA 6-3898

9713

ACTION OF RADIUM AND NEUTRON -SOURCE RADIATION ON ENZYMATIC ACTIVITY. K. Jacobsohn and M. de Silveira. Arch. Portugaises Sci. Biol. 10, Suppl., 105-6(1950), Reprinted in Trav. Lab. Inst. Rocha, Cabral (Lisbon) 19 (1951). (In French) NSA 6-3899

9714

POSTMORTEM FINDINGS AND RADIOACTIVITY DETERMINATIONS FIVE YEARS AFTER INJECTION OF THOROTRAST. L. E. Jacobson and D. Rosenbaum. Radiology, 31, 601-607(1938).

A white female was injected with 75cc of thorotrast intravenously 5 years before her death at age 73. The gross and histological findings in the liver, spleen and lymph nodes are described.

9715

A HIGHER FREQUENCY OF X-RAY-INDUCED CHROMOSOMAL ABERRATIONS IN TRADESCANTIA PLANTS GROWN ON SUBOPTIMAL CALCIUM. D. Steffansen. Radiation Research, 5, 597(1956).

9716

METABOLISM OF FISSION PRODUCTS-RADIO TEL-LURIUM. L. Jacobson, R. Overstreet, I. Chalkoff and Associates, October, 1944 (CH-2258), Add-1, MDDC-1005.

After oral and i. m. administration of two forms of Te^{129} and Te^{127} , uptake, distribution and excretion were measured. Principle organs of deposition are blood, liver, kidney.

9717

VARIATIONS IN THE CATALASE AND LIPASE OF THE BLOOD IN ROENTGEN RAY TREATED PATIENTS. M. J. Goldstein and J. P. Neworoshkin. Strahlentherapie 36, 736-744(1930). (In German).

9718

ANEMIA OF INFECTION. XVII. EFFECTS OF TURPENTINE AND COLLOIDAL THORIUM DIOXIDE ON RAT PLASMA IRON LEVELS. W. N. Jensen, C. J. Gubler, G. E. Cartwright, and M. M. Wintrobe. (U. Utah,

Salt Lake City). Proc. Soc. Exptl. Biol. and Med. 80, (1), 33-36(1952).

Single intravenous injections of colloidal thorium dioxide in the rat produced a marked transient hypoferrremia. A more persistent hypoferrremia resulted from the administration of this substance daily for 3 days both in intact and splenectomized rats. The hypoferrremia-producing effect of turpentine was markedly decreased by prior administration of colloidal thorium dioxide. BA 26-30963

9719

A CONTRIBUTION TO THE STUDY OF THE DISTRIBUTION OF COLLOIDAL RADIOACTIVE GOLD (Au^{198}) IN THE ORGANISM AFTER INTRAPERITONEAL INJECTION. A. Jentzer and P. Wenger. Rev. Med. Liege 5, 425-8(1950) Aug. 1. (In French). NSA 4-5375

9720

A DISSEMINATED, TRANSMISSIBLE RETICULOENDOTHELIAL SARCOMA IN RABBITS PROVOKED BY INTRAVENOUSLY DEPOSITED THORIUM. J. Johansen. Acta. Path. Microb. Scand., Suppl. 105, 92-103(1955).

9721

THE LOCALIZATION OF P^{32} IN THE SUPRANUCLEAR ZONE OF THE COLUMNAR ABSORBING CELL OF THE WHITE RAT. Perry M. Johnston. J. Morph. 95, 77-94 (1954).

Three female white rats were injected intraperitoneally with approximately 1 mc of P^{32} as H_3PO_4 and sacrificed at 1, 3 and 5 days. Adjacent sections of duodenum with pancreas attached were fixed in alcohol-formalin and 2% osmic acid to bring out Golgi apparatus. Autoradiograms were made of sections of duodenum of control and experimental animals (Pelc's stripping film technique). Sections were also placed on NTB₃ and NTB plates. Autoradiograms were stained with Harris' hematoxylin. Grain counts above epithelial cells in a standard area was $100 \mu^2$. There was no marked selectivity for p^{32} .

9722

METABOLISM OF RADIOACTIVE STRONTIUM. D. C. Jones and H. D. Copp. Journ. Biol. Chem. 189, 509-514 (1951).

The comparative study of carrier-free radioactive strontium in adult, young and rachitic rats during the critical (first) 24 hours after intraperitoneal injection. (plasma, bone).

9723

A STUDY OF THE METABOLISM OF RADIOACTIVE STRONTIUM IN ADULT, YOUNG AND RACHITIC RATS. D. C. Jones and D. H. Copp. UCRL-873, Aug. 28, 1950. NSA 4-6305

9724

THE PASSAGE OF STRONTIUM ACROSS THE INTESTINAL WALL OF THE RAT. H. G. Jones and C. R. Coid (Medical Research Council Radiobiol. Research Unit Harwell, Berks, England). Clin. Sci. (London) 15(4), 541-549 (1956).

9725

RETENTION AND EXCRETION OF Sr^{90} BY ADULT RABBITS. J. Jowsey, M. Owen and M. Tutt. British Journal of Experimental Pathology 36, 22-26(1955).

9726

SELECTIVE SENSITIVITY OF THE FORMED ELEMENTS OF THE BLOOD OF THE WHITE RAT AS AFFECTED BY RADIUM CHLORIDE INJECTED INTRAPERITONEALLY. Paul G. Rooft (U. Kansas, Lawrence) Univ. Kansas Sci. Bull. 38(1), 323-330. Illus. (1956).

The total white cell count is lowered appreciably by giving radium chloride (in varying dosages over short period of time) intraperitoneally to young male albino rats. The polymorphonuclear leukocytes are slightly

more sensitive than lymphocytes. Blood platelets react more slowly, but show a pronounced drop. Until more accurate data are available concerning the rate of phagocytosis by liver, spleen, and bone marrow, as well as irradiation effect on phagocytes, quantitative irradiation effects upon formed elements of blood must wait. Also, uniform sampling must be used, for differences exist between various neural regions. For example, the white cell count of blood from the heart may well be different from that of periphery. (from author's discussion.)
BA 31-20357

9727

A STUDY OF THE EFFECTS OF PROTEIN FAST AND INTERNAL IRRADIATION ON THE BONE MARROW OF THE MALE ALBINO RAT. P. G. Rooft and M. Spencer. Univ. Kansas Sci. Bull. 37(1), 31-53(1955).

Two groups of experimental animals were used in the experiment, one subjected to protein fast, the other injected intraperitoneally with radium chloride. Differential counts were made on bone marrow by a random selection procedure. A toluidine blue stain was used to determine the effect on nucleic acid content of tissue. Cellular basophilia and nucleic acid content were not noticeably affected. Total bone marrow basophilia and nucleic acid content are reduced during protein fast, due chiefly to reduction in cellularity. Mitotic activity is decreased by protein fast and irradiation. In the bone marrow, erythropoietic elements are most easily affected by protein fast and internal irradiation, and granulocytopoietic elements are more susceptible than megakaryocytes.
BA 30-12528

9728

THE EFFECTS OF INTERNAL RADIATION FROM THE MOTHER'S MILK UPON THE SPLEEN OF THE YOUNG ALBINO RAT. Paul G. Rooft and Walter W. Harr. Univ. Kansas Sci. Bull. 37(1), 3-29(1955). BA 30-12527

9729

FAST-NEUTRON DOSE IN A LARGE TISSUE-EQUIVALENT PHANTOM. T. A. Barr and G. S. Hurst. Nucleonics 12, (8), 33-35(1954).

9730

THE INTRACAVITARY ADMINISTRATION OF RADIOACTIVE COLLOIDAL GOLD. R. G. Rose, M. P. Osborne, and W. B. Stevens. New England Jour. Med. 247(18), 663-667. Illus. (1952).

Properties and clinical applications of radioactive colloidal gold (Au^{198}) are reviewed with special reference to management of selected cases of recurrent pleural effusion or ascites due to malignant neoplasms. BA 27-8859

9731

THE PROTECTIVE ACTION OF DITHIOCARBAMATES AGAINST THE LETHAL EFFECTS OF X-IRRADIATION IN MICE. D. W. Van Bekkum. Acta Physiol. et Pharmacol. Nerrl., 4, 508-23(1956).

A number of derivatives of dithiocarbamic acid were studied for their possible protective action against the lethal effect of x-radiation in mice. Best results were obtained with ammonium dithiocarbamate, sodium N-dimethyldithiocarbamate and sodium N-diethyldithiocarbamate. Protective effect of optimal doses of ammonium dithiocarbamate and of cysteamine were equal, giving a 40% reduction of LD_{50} .

9732

RADIOACTIVE TRACERS IN RADIOBIOLOGICAL STUDIES. G. Hevesy. Brit. J. Radiol., 29, 465(1956).

9733

TOXICITY OF LOCALLY DEPOSITED YTTRIUM-91 IN MICE. I. EXPERIMENTAL DESIGN AND GROSS PATHOLOGY. M. P. Finkel, H. Lisco, K. A. Lathrop and A. M. Brues. Biol. and Med. Res. Div. Quarterly Rep. 39-46(1956). NSA 11-4781

9734

HISTOLOGY OF THE GONADS OF C_{57} BLACK MICE AFTER TOTAL BODY ROENTGEN IRRADIATION. F. Kroning and J. Haase. Endokrinologie 32, 264-80(1955). (In German).

9735

CHEMICAL OBSERVATIONS IN CONNECTION WITH THE CALCIUM METABOLISM IN THE ORGANISM AND THE TEETH. O. Rygh. Norske Tannlaegefor. Tidende 60(1), 1-19(1950).

The 5 trace elements, Sr, V, Tl, Ba, Zn are involved directly in calcification and decalcification of bones, in cooperation with the living cells of the osseous tissues.
BA 24-23860

9736

THE EXCRETION, RETENTION, DISTRIBUTION, AND CHEMICAL EFFECTS OF STRONTIUM⁸⁹ IN THE DOG. PART II. STATISTICAL ANALYSIS OF EXCRETION AND RETENTION OF STRONTIUM⁸⁹ FOR INDIVIDUAL DOGS. G. Sacher. June, 1946. (CH-3866) NSA 1-607

9737

RADIOACTIVE ISOTOPES AS INDICATORS IN BIOLOGY. J. Sacks. Chem. Rev. 42(2), 411-456(1948). BA 24-11717

9738

REMOVAL OF RADIOACTIVE GOLD COLLOID BY THE PERFUSED MAMMALIAN LIVER. R. C. Little and H. B. Kelly. Am. J. Physiol. 173, 265-9(1953). NSA 7-5265

9739

THE NATURAL PROTECTION OF SHEEP FROM EXTERNAL BETA RADIATION. C. C. Lushbaugh and J. F. Spalding. Am. J. Vet. Res. 18, 345-61(1957)

Studies on sheep exposed to radioactive fallout are reported. The wool provided an efficient means of protection from β radiation skin injury. Histopathology of radiodermatitis due to β rays is described. The downgrowths of epithelium of the "burns" are, in fact, epithelial regeneration in surviving portions of hair follicles deep in the dermis, and form epidermal inclusion cysts
NSA 11-9950

9740

STATISTICAL INVESTIGATION OF THE MORTALITY RATE IN ROENTGEN IRRADIATED RATS AND MICE. A. Catsch, R. Koch, and H. Langendorff. Roentgenstrahl. 84, 462-72(1956). (In German).

9741

SYMPOSIUM ON RADIOIODINE, JULY 28-30, 1948. nd 118p. (AECU-51, BNL-C-S) NSA 2-664

9742

FUNCTIONAL AND HISTOLOGIC EFFECTS OF THERAPEUTIC DOSES OF RADIOACTIVE IODINE ON THE THYROID OF MAN. B. M. Dobyns, A. L. Vickery, F. Maloff, and E. M. Chapman. J. Clin. Endocrinol. Metabol. 13, 548-67(1953).

Authors describe thyroid cells with nuclear changes typical of radiation damage eight years after I^{131} therapy.

9743

URANIUM ABSORBED IN THE HUMAN BODY BY EATING AND DRINKING. J. Hoffman. Translated from Chem. Ztg. 67, 49-52(1943). 20p. (AEC-TR-2663) NSA 11-1759

9744

RADIO ELEMENT METABOLISM AND APPROACHES TO THE TREATMENT OF RADIO ELEMENT POISONING. J. Schubert. nd. 1p. (AECU-641, UAC-170) NSA 4-363

9745

PROGRESS REPORT - RADIO BIOCHEMISTRY. J. Schubert. (Argonne National Lab.), p.171-3 of "Biological and Medical Division Quarterly Report, November, December, January 1949-50." (ANL-4401) NSA 5-2016

9746

HANDBOOK OF RADIOLOGY. R. H. Morgan. Chicago, Ill., The Yearbook Publishers. 1955 518p.

9747

Argonne National Lab., Ill.
THE EFFECT OF ZIRCONIUM AND SODIUM CITRATE ON THE DISTRIBUTION AND EXCRETION OF SIMULTANEOUSLY INJECTED THORIUM AND RADIO STRONTIUM. J. Schubert and H. Wallace, Jr. April 19, 1949. Decl. June 8, 1949. 24p. (AEC-2621) NSA 3-523

9748

STUDIES OF RADIOACTIVE COPPER. M. O. Schultze and S. J. Simmons. J. Appl. Phys. 12, 315(1941).

Authors report studies with radioactive Cu in nutritional anemia of the rat. Cu fed to anemic and Cu-deficient rats produced accelerated cytochrome C oxidase of marrow, reticulocytosis and gradual increase in rbc count and Hb. Absorption and retention of Cu appear to be governed in part by amount of Fe present in tissues. Cu-deficient rats retain more of a single therapeutic dose of Cu than do Fe-deficient rats. Liver shows greatest retention of Cu.

9749

THE DRAINAGE OF RADIOACTIVE SILVER COLLOIDS BY THE LYMPHATICS FOLLOWING INTRAPULMONARY ADMINISTRATION IN DOGS. P. F. Hahn, G. Rouser, M. Brummitt, J. Moorehead and E. L. Carothers. J. Lab. Clin. Med. 39, 624-8(1952). NSA 6-3191

9750

RADIUM. S. B. Schwind and F. E. Croxton. (U. S. Atomic Energy Commission, Division of Technical Information Extension, Oak Ridge, Tenn.). 82p. July 1950. (TID-363).

This is a bibliography of unclassified literature during the period 1898-1950 (745 references).

9751

LYMPHATIC DRAINAGE FOLLOWING INTRABRONCHIAL INSTALLATION OF SILVER-COATED RADIOACTIVE GOLD COLLOIDS IN THERAPEUTIC QUANTITIES. P. F. Hahn and E. L. Carothers. J. Thoracic Surg. 25, 265-79 (1953). NSA 7-3332

9752

MORPHOLOGICAL AND DEGENERATIVE CHANGES IN THE BLOOD OF X-IRRADIATED ANIMALS, STUDIED BY MEANS OF VITAL STAINING. A. Gaviati. Haematologica 1, 273-297(1920). (In Italian).

9753

THE EFFECT OF ADDED CARRIER ON THE DISTRIBUTION AND EXCRETION OF SOLUBLE Be⁷. J. K. Scott, W. F. Neuman and R. Allen. J. Biol. Chem. 182, 291-298(1950). BA 24-29388

9754

RADIATION EFFECTS ON LIVING CELLS IN VITRO. R. Gassul. Klin. Wochensh. 5, 560-561(1926). (In German).

Spleen cells or ciliated epithelium of throat (frog) survive longer in dark than in daylight in vitro. Exposure to x-rays increases rate of cell motion, decreases life span of young ciliated cells and decreases life span of older ciliated cells. Increased rate of motion is associated with increased cellular reducing power. CA 20-1999

9755

THE ELIMINATION OF SOLUBLE RADIUM SALTS TAKEN INTRAVENOUSLY AND PER OS. A. Seil, H. Viol and M. A. Gordon. Radium 5, 40-44(1915).

Following intravenous administration of 0.1 mg Ra to a man, major portion eliminated was eliminated with feces. Excretion via this route was rapid during the first 3 or 4 days, slower for the next 6 or 7 days, then very slow over a period of many months. Orally administered Ra was eliminated twice as fast.

9756

TOXICITY, DISTRIBUTION AND EXCRETION OF THALLIUM. A. Shaw. Proc. Soc. Exptl. Biol. Med. 30, 488-489(1932-33).

9757

AN ANALYSIS OF CERTAIN CHEMICAL CONSTITUENTS OF RABBIT BONE FOLLOWING DEPOSITION OF Sr⁹⁰. J. Sheldon-Peters and J. Vaughan. Brit. J. Exp. Path 37(6), 553-9(1956).

9758

AGE, GROWTH, AND THE LD₅₀ OF X-RAYS. H. I. Kohn and R. F. Kallman. Science 124, 1078(1956).

9759

THE BIOLOGICAL EFFECT OF ROENTGEN RAYS AND THE "TARGET." O. Gans. Arch. Dermat. und Syph. 155, 64-67(1928). (In German).

9760

FATE OF GOLD COLLOIDS INTRODUCED INTO CIRCULATION OF THE MOUSE. C. W. Sheppard, J. Furth and Leon Wish. Fed. Proc. 9(1), 343(1950). BA 25-13870

9761

THE TOLERANCE IN HUMANS OF INTRABRONCHIAL ADMINISTERED RADIOACTIVE SILVER-COATED GOLD COLLOID. P. A. Hahn, G. W. Hilliard, and E. L. Carothers. Brit. J. Radiol. 26, 595-8(1953).

The intrabronchial administration of radioactive gold and silver coated radioactive gold colloids is described. These materials appear to be well tolerated in human in the quantities used. Their use as adjunct therapy with pneumonectomy in treatment of bronchiogenic carcinoma is suggested. NSA 8-709

9762

THE USEFULNESS OF STRONTIUM AS AN ADJUVANT TO CALCIUM IN THE MINERALIZATION OF THE SKELETON IN MAN. E. Shorr and A. C. Carter. Hospital for Joint Diseases 13, 59-66(1952).

9763

Rochester. Univ., New York.
METABOLISM OF RADIUM. I. TRACER STUDIES ON RATS AFTER INTRAVENOUS ADMINISTRATION. H. E. Silberstein and R. M. Fink. (1945). (M-1739)

9764

Argonne National Lab., Ill.
INTAKE AND RETENTION OF RADIUM AT NATURAL LEVELS. A. F. Stehney and H. F. Lucas, Jr. p.8-15 of Report on Biological, Medical and Biophysics Programs. Part I. John E. Rose, Director. 1955. (ANL-5378)

9765

INFLUENCE OF AMINO ACIDS AND OTHER ORGANIC COMPOUNDS ON GASTROINTESTINAL ABSORPTION OF RADIOCALCIUM AND RADIO-STRONTIUM. R. H. Wasserman, C. L. Comar and M. M. Nord. Fed. Proc. 15, 576, abstract 1881(1956).

9766

EFFECTS OF MONOCHROMATIC AND NON-MONOCHROMATIC ROENTGEN RAYS ON SPLEEN METABOLISM IN VITRO. V. Wendrowsky. Arch. Exp. Zellforsch. 14, 412-441(1933). (In German).

9767

EXCRETION OF RADIUM FROM THE MOUSE. J. Weikel and E. Lorenz. (Nat. Cancer Inst., Bethesda, Md.). Radiology 51, 865-870(1948).

Mice of C₃H strain were injected intraperitoneally with 10 γ of radium element as bromide and some of the animals were then treated with BAL. Radium excretion (retention) was measured. BAL treatment did not influence excretion in either the acute or chronic stage of radium poisoning. BA 23-14387

9768

Rochester. Univ., New York.
THE EFFECTS OF EXPOSURE OF RABBITS AND RATS TO INHALATION OF URANIUM DIOXIDE DUST AT 80 mg/m³ CONCENTRATION AND 2 μ MASS MEDIA PARTICLE SIZE. H. B. Wilson and G. Sylvester. nd. 22p. (AECU-670). NSA 4-1352

9769

EXPERIMENTAL STUDIES OF THE DIRECT AND INDIRECT EFFECTS OF RADIATION. F. Devik. Nord. Med. 50, 964-66(1953).

Skin flaps of hairless mice were irradiated with doses of 2800 r or greater. During acute reaction, marked hyperplasia of irradiated epithelial cells was noted. Cells at center of irradiated area received same dose, showed severe damage. This difference indicates that fate of irradiated cells also depends on surroundings, or the milieu of cell after irradiation. The difference between central and peripheral cells of irradiated area does not seem to be caused by difference in blood supply

9770

THE METABOLISM OF F^{18} IN NORMAL AND CHRONICALLY FLUOROSSED RATS (THESIS). P. C. Wallace. (Radiation Lab., Univ. of Calif., Berkeley). April 30, 1953. 119p. (UCRL-2196). NSA 7-4319

9771

FURTHER STUDIES ON THE GASTROINTESTINAL ABSORPTION OF PLUTONIUM. M. H. Weeks, J. Katz, W. D. Oakley, J. E. Ballou, L. A. George, L. K. Bustad, R. C. Thompson, and H. A. Kornberg. Radiation Research 4, 339-47(1956).

In chronic feeding experiments the concentration of plutonium in the solution fed had no effect on fraction absorbed from GI tract of rats over range 10^{-5} μ g 1 mL. Average absorption from a pH 2 Pu (IV) nitrate solution was 0.0028%. In single feeding experiments, absorption of plutonium (pH 2 Pu (IV) nitrate solution) from GI tract of 3 pigs was 0.0022%. Plutonium in mono acidic solutions and Pu(VI) were absorbed to a considerably greater extent. Excretion of plutonium in urine of rats during first 9 days after intragastric administration amounted to about 20% of total plutonium absorbed. Less than 1% of plutonium fed to rats remained in GI tract 2 days after feeding. (from authors' summary)
NSA 10-7458

9772

GASTRO-INTESTINAL ABSORPTION OF PLUTONIUM. III. COMPARISON BETWEEN RAT AND PIG. M. H. Weeks, L. A. George, W. D. Oakley, L. K. Bustad, and R. C. Thompson. (Hanford Works). Nov. 15, 1954. 14p. Contract W-31-109-Eng-52. (HW-33744)

In single feeding experiments, absorption of plutonium from GI tract of 3 pigs averaged 0.0022% with 95% confidence limits of ± 0.0013 . Plutonium absorbed and excreted in urine of rats amounted to less than 20% of total plutonium absorbed. Less than 1% of plutonium fed to rats remained in the animals 2 days after feeding.
NSA 9-1703

9773

INFLUENCE OF PLUTONIUM CONCENTRATION ON EFFECTIVENESS OF THERAPEUTIC AGENTS. M. H. Weeks, W. D. Oakley and R. C. Thompson. (Hanford Works). Aug. 1, 1954. 9p. Contract W-31-109-Eng-52. (HW-32399)

Retention of plutonium in bone and soft tissues (including pelt and GI tract) of rats was not significantly different in animals receiving plutonium in amounts varying by a factor of 10^5 . Effects of zirconium citrate and Ca EDTA in preventing retention of plutonium were not significantly influenced by plutonium concentration. Radiation: rats were injected intraperitoneally with 1 mL solution containing 1.4×10^{-8} g Pu(IV) as the citrate, pH6.

9774

EFFECTS OF VARIOUS DOSES OF RADIOACTIVE PHOSPHORUS ON THE PROTEIN METABOLISM. I. V. Savitskii and A. F. Leshchinskii (Odessa Pharmaceutical Inst.) Med. Radiol. 1, No. 6, 82-90(1956). (In Russian).

Authors studied action of tracer and therapeutic doses of P^{32} on protein metabolism in rabbits subjected to loss of blood. Total serum nitrogen, serum proteins (albumins, globulins, and fibrinogen), residual nitrogen, urea and concentration of amino-acids in blood and plasma were determined, as well as hematocrits. Conclusion: tracer doses of P^{32} can, under certain conditions stimulate protein metabolism whereas doses approaching those used clinically in therapy can delay healing processes. NSA 11-3664

9775

INFLUENCE OF TEMPERATURE STRESS ON UPTAKE OF P^{32} IN THE RAT. John A. Sealander, Jr. (Univ. of Arkansas, Fayetteville). Am. J. Physiol. 186, 227-30(1956). NSA 11-70

9776

ORGANIC AND INORGANIC IODINE LEVELS IN SERUM OF SHEEP RECEIVING DAILY ORAL DOSES OF I^{131} . M. H. Weeks, J. Katz, and N. G. Farnham. Endocrinology 50, 511-20(1952). NSA 6-5276

9777

MORPHOLOGIC CHANGES IN THE THYROID GLAND FOLLOWING RADIOIODINE THERAPY. M. R. Shapiro. Ann. Western Med. Surg. 4, 274-5(1950). NSA 4-4472

9778

EFFECTS OF THYROXINE AND KSCN ON CAPACITY OF RAT THYROID GLAND TO ACCUMULATE ASTATINE²¹¹. C. J. Shellaburger, P. W. Durbin, M. W. Parrott, and J. G. Hamilton. (Univ. of Calif., Berkeley and San Francisco). Proc. Soc. Exptl. Biol. Med. 87, 626-9 (1934). NSA 9-1709

9779

CONCERNING ROENTGEN SICKNESS AND ROENTGEN CACHEXIA. Herni Hirsch. Deutsch. med. Wochenschr. 8, 1646(1922).

9780

THE RATIONALE OF RADIUM THERAPY IN CANCER. Isaac Levin. Am. J. Roentgenol. 7, 552(1920).

Differences among cells and tissues with respect to radiosensitivity and differences in biological effectiveness of x-rays, radium rays and γ rays are reviewed. Radiation treatment of a plant tumor is described and illustrated (including histological changes in irradiated plant tissue). Other studies utilized cancer-bearing rats. Experimental observations are compared with observations on malignant tumors treated with radiation (in man).

9781

THE PATHOGENESIS AND TREATMENT OF LYMPHOSARCOMA AND HODGKINS GRANULOMA. I. Levin. Ann. Surg. 70, 561(1919).

The sensitivity of lymphoid tissue is described and documented. Experimental studies were carried out using turtles because of their high lymphocyte count. After total body x irradiation, turtle develops marked lymphopenia (95% lymphocytes decreasing to 16%). Effect was less if another turtle or a layer of meat was interposed between animal and the source.

9782

FORECARE AND AFTERCARE IN ROENTGEN RAY THERAPY. H. Wintz. Radiol. 1, 74(1923). (In German).

The many variables in patient care that may influence response to therapy are reviewed. Iodine and mercury-containing preparations used on the skin before therapy decreased the tolerance of skin to radiation.

9783

THE INFLUENCE OF ROENTGEN RAYS ON ENDOCELLULAR AND METABOLIC PROCESSES. O. Strauss. Fortschr. Gebiete Rontgenstrahl. 31, 80(1923). (In German).

Cholesterol and surface tension of plasma are decreased. Osmotic pressure and hydrogen ion concentration are increased, mineral metabolism is altered after irradiation. These changes reflect the effect of x-rays on the "lipoid mixture", thereby causing the observed effect on cells.

9784

CONCERNING THE ANOMALIES IN SEXUALITY IN THE YEAST *NADSONIA FULVESCENS* PRODUCED BY X RAYS. G. A. Nadson and G. S. Filippov. *Compt. rend. soc. biol.* 95, 433-4(1926).

9785

THE EFFECT OF X-RAY TREATMENT ON BLOOD PRESSURE. Levy-Dorn and Weinstein. *Fortschr. Gebiete Roentgenstrahl.* 28, 175(1923). (In German).

Radiation causes an increase in blood pressure, especially when radiation is delivered over the 11th thoracic vertebral area and over the adrenals. (Observations on patients).

9786

LESIONS PRODUCED IN THE HUMAN EYE BY ROENTGEN RAYS. G. V. A. Birch-Hirschfeld. *Ztschr. Augenheilkunde* 45, 199-206(1921).

Two case presentations.

9787

THE INFLUENCE OF X RAY THERAPY IN BENIGN AND MALIGNANT GROWTHS IS DEPENDENT UPON AN APPARENT VALID DISTINCTION BETWEEN THEM. Gattwald Schwarz. *Am. J. Roentgenol.* 10, 622(1923).

9788

EXPERIMENTAL ALTERATIONS OF CELL SIZE AND MITOTIC ACTIVITY IN THE OUTER ORBITAL GLAND OF THE WHITE RAT. VI INFLUENCE OF SINGLE DOSE ROENTGEN IRRADIATION. H. Teir. *Acta Pathol. Microbiol. Scand.* 32, 337-47(1953).

Through single dose roentgen irradiation of outer orbital gland of 2 week old rats, higher nuclear classes than normal were obtained with doses of 600, 1000, 1500 and 3000 r in the organ exposed. X rays caused a delay in growth of organ as a whole. Deviating mitoses can, at least in part, explain the occurrence of higher nuclear classes. The cells were sensitive to colchicine 6 weeks after dose of 1000 r. Author suggest that the system which under normal conditions controls growth of cells and their number is influenced by irradiation.

9789

AUTORADIOGRAPHIC LOCALIZATION OF IODINE-131 IN THE SALIVARY GLANDS OF THE HAMSTER. G. Cohen, J. H. Logothetopoulos and N. B. Myant. *Nature Lond.* 176, (4496) 1268-9(1955). *CLML* 30-30218

9790

SOME EFFECTS OF ACCELERATED ELECTRONS OR CATHODE RAYS ON CERTAIN INSECTS AND ON THE WHEAT AND FLOUR WHICH THEY INFEST. V. H. Baker, O. Taboada, and D. E. Wiant. *Michigan State Coll. Agric. Expt. Sta. Quart. Bull.* 36, (1), 94-106 (1953).

Granary weavils and flour beetles were exposed to radiation from Van de Graaff 2-million-volt electron accelerator. After 1000 rep, 30% of flour beetle eggs hatched. Dose of 5×10^5 rep was lethal to all flour beetles, 2.5×10^5 rep lethal to 100% of granary weevils, 2.5×10^5 rep lethal to 92% flour beetles 1 wk after treatment, 1×10^5 lethal to 82% granary weevils 1 wk after treatment. (from authors summary).

9791

ENZYME FORMATION IN NON-VIABLE CELLS. L. S. Baron, S. Spiegelman, and H. Quastler. *J. Gen. Physiol.* 36, 631-641(1952-1953).

The only lethal agent yielding complete dissociation of viability from capacity to synthesize enzymes in yeast

cell was x ray. Dosage causing 99.9% lethality (and greater) did not inhibit capacity of treated suspensions to synthesize maltozymase and galactozymase. Suspensions retained ability to utilize externally supplied nitrogen from enzyme synthesis. (from author's summary).

9792

THE MECHANISM OF THE CATALYSIS OF CELL RESPIRATION AND THE INFLUENCE OF ROENTGEN RAYS. P. Ellinger and M. Landsberger. *Klin. Wochensch.* 2, 966-969(1923).

9793

ABNORMAL PLANT GROWTH. R. Bloch. *Brookhaven Symposia in Biol.* 6, 41-54(1954).

Three sections: I. Amorphous changes of histological nature, involving temporary or permanent loss of typical organization, II. Abnormal growth on an organ level, involving distortion of developmental patterns due to different etiological factors, III. Formed changes, involving harmonious alterations of histological organization and pattern. (from abstract). *BA* 28-29592

9794

NUTRITIVE VALUE OF PROTEIN AND ENERGY OF FOOD. B. C. Johnson and V. C. Motta. *Federation Proc.* 15, 907(1956).

Irradiation sterilization of beef, beans, peas, and milk has not been found to cause greater losses in the nutritive value of the protein of these foods than are caused by other food processing methods.

9795

SPONTANEOUS CHROMOSOME ABERRATIONS IN *TRADESCANTIA*. Norman H. Giles. *Genetics* 25, 69-87 (1940).

Types, frequency, and loci of spontaneous structural chromosome aberrations in a number of pure species and in F₂ generation of a natural species hybrid of *Tradescantia* were studied at the first post-meiotic mitosis. Aberrations are similar to chromosome alterations induced by low dosage x-rays in the developing microspore. (from author's summary).

9796

THE RELATION BETWEEN X-RAY INTENSITY AND THE FREQUENCY OF DEFICIENCY IN THE MAIZE ENDOSPERM. S. F. Goodsell. *Anat. Record* 47, 381-382(1930).

Effect of x-ray on frequency of deficiency in heterozygous maize endosperms was determined by irradiating young ears 48 to 54 hours after pollination with seven graded doses up to 1000 r and 10, 175 deficient areas were classified. Each locus frequency of deficiency is proportional to intensity of dose (from author's abstract).

9797

EFFECT OF VARIOUS RADIATIONS ON SURFACE FILMS OF PROTEINS. A. Dognon and C. Piffault. *Compt. Rend.* 208, 907-8(1939).

Measurements of surface tension show that films of serum albumin or hemoglobin are destroyed on exposure to x ray or to U-V light, the surface tension of H₂O covered with a film of either steadily rising on such exposure compared with that of pure H₂O.

9798

SUMMARIES OF PAPERS PRESENTED AT THE CONFERENCE ON THE REMOTE CONSEQUENCES OF INJURIES CAUSED BY THE ACTION OF IONIZING RADIATION. F. G. Krotkov, A. V. Lobedinsky, A. I. Ignatyev, eds. 1956. 74p. (NP-tr-207)

Papers are abstracted separately.

9799

INTRACELLULAR LOCALIZATION OF THE TRYPTOPHAN-LAA ENZYME SYSTEM. Solon A. Gordon. *Radiation Research* 3, 229(1955).

The enzyme system catalyzing the conversion of tryptophan to phytohormone, indoleacetic acid, is sensitive

in vivo to x rays. Irradiation of mung bean plant with 10 r decreases activity of one conversion stage by 20%. Damage is not mediated through nuclear or cell division but occurs in cytoplasm of meristematic or embryonic cells. (from author's abstract.)

9800

CHANGES IN THE BLOOD PICTURE IN ANIMALS AT LONG INTERVALS AFTER THE INTRODUCTION OF RADIOACTIVE SUBSTANCES INTO THE ORGANISM.

I. K. Petrovich. p. 9-11. "Summaries of Papers Presented at the Conference on the Remote Consequences of Injuries Caused by the Action of Ionizing Radiation." F. G. Krotkov, A. V. Lebedinskiy and A. S. Ignatyev, Eds. Translated from a publication of the State Medical Literature Press, Moscow, 1956. (NP-tr-207).

Mixed uranium fission products, a mixture of isotopes and uranium nitrate, given to dogs over more than a year did not cause acute radiation sickness but dogs developed leukocytosis, leukopenia and thrombosis. Uranium nitrate and Sr⁸⁹ altered white and red blood cell counts, Po²¹⁰ increased monocytes and decreased hemoglobin and lymphocytes.

9801

ENZYMATIC RADIOSENSITIVITY OF AUXIN BIOSYNTHESIS.

Solon A. Gordon and Robert P. Weber. *Radiation Research* 1, 218(1954).

Although auxin is not unduly radiosensitive, low doses of ionizing radiation cause immediate depression of free auxin levels. Depression occurs through radiosensitivity of auxin biosynthesis. Enzyme system in biosynthesis is readily inhibited by low dose irradiation. Radiosensitive locus appears to be the terminal aldehyde oxidation which gives rise to indoleacetic acid. Enzymatic inhibition can be integrated with changes in free auxin levels and their sequelae. (from author's abstract.)

9802

REMOTE CONSEQUENCES OF INJURIES CAUSED BY IONIZING RADIATION. D. I. Zakutinsky. p.1-4 of Summaries of Papers Presented at the Conference on the Remote Consequences of Injuries Caused by the Action of Ionizing Radiation. F. G. Krotkov, A. V. Lebedinskiy, and A. S. Ignatyev, eds. Translated from a publication of the State Medical Literature Press, Moscow, 1956. 74p. (NP-tr-207)

Internally deposited radioactive substances are continuous sources of radiation and in many cases cause malignant tumors. Late effects of exposure observed in atomic bomb victims include blood disturbances, sterility and defects in children. Late effects observed in experimentally irradiated animals include increased sensitivity to drugs such as caffeine, and bromine. Changes in the permeability of blood vessels were found. Inhibition of spermatogenesis is especially likely to occur following exposure to fast neutrons.

9803

QUANTITATIVE COMPARISON OF THE BIOLOGICAL EFFECTS OF NEUTRONS AND OTHER IONIZING RADIATIONS. L. H. Gray and J. Read. *Nature* 144, 509(1939).

With Li-D neutrons, the ratio of gamma-ray to neutron energy necessary to produce the same increase in mutation rate in *Drosophila* sperm is $\gamma/N = 0.7$, whereas for the lethal effect $\gamma/N = 11$. Explanation of the greatly increased sensitivity of certain tissues to neutron compared with x-ray energy, must be sought in terms of specific relationships between the distribution of ionization and biological structure.

9804

CLINICAL AND PATHOMORPHOLOGICAL INVESTIGATIONS OF THE PROGENY OF DOGS SUBJECTED TO THE ACTION OF URANIUM FISSION PRODUCTS. S. P.

Voskresensky and A. P. Novkova. p.54-56. "Summaries of Papers Presented at the Conference on the Remote Consequences of Injuries Caused by the Action of Ionizing Radiation." F. G. Krotkov, A. V. Lebedinskiy and A. S. Ignatyev. Eds. Translated from a publication of the State Medical Literature Press, Moscow, 1956. 74p. (NP-tr-207).

Uranium fission products affect sexual function.

Pregnancy and parturition were grossly normal, progeny decreased. Mammary glands were disturbed. In progeny, no changes in organs, atelectase and lipophages in lungs, lipemia, deviations in parenchymatous organs, earlier involution of Hassall's bodies in thymus, prolonged spermatogenesis and atypical mitotic forms in seminal epithelium.

9805

COMPARISON OF THE LETHAL EFFECT OF FAST NEUTRONS AND GAMMA-RAYS ON THE GROWING TIPS OF BROAD BEAN ROOTS. L. H. Gray, J. Read, and J. C. Mottram. *Nature* 144, 478-479(1939).

Growing tips of broad bean roots were irradiated by fast neutrons (~ 2.9 Mev). Results: 63 ± 6 energy units of neutrons or 690 ± 35 r of γ rays cause 50% mortality. Neutron energy appears to be ten times as efficient as gamma-ray energy in its lethal effect on bean roots.

9806

SOME CLINICAL AND BIOCHEMICAL INDICATIONS OF THE STATE OF THE ANIMAL ORGANISM AT LONG INTERVALS AFTER INJECTIONS OF RADIOTHORIUM. S. M. Mikhailovich. p.15-18. "Summaries of Papers Presented at the Conference on the Remote Consequences of Injuries Caused by the Action of Ionizing Radiation." F. G. Krotkov, A. V. Lebedinskiy and A. S. Ignatyev, Eds. Translated from a publication of the State Medical Literature Press, Moscow, 1956. 74p. (NP-tr-207).

Study of activity measured by γ radiation. Small doses of radiothorium proved lethal to dogs. Symptoms and signs: lassitude, immobility, anorexia, diarrhea, hemorrhages, weight loss, decrease of hemoglobin content and erythrocyte count, protein in blood and urine. Cholesterol ester of serum fell. Neoplasms formed. Hematopoiesis, liver, and kidney changes were also observed.

9807

THE SENSITIVITY OF SIX MICROORGANISMS TO X-RAYS. Shirley E. Gunter and Henry I. Kohn. *Radiation Research* 1, 498(1954).

Cells from young cultures, washed and resuspended in pH 7 phosphate buffer supplemented with magnesium sulfate, were irradiated at 25 to 27°C. Initial viable count of suspension was 20,000 cells/ml. The range of survival (visible colony formation) after incubation at 30°C. was 5 to 90%. (from author's abstract).

9808

DYNAMICS OF THE FORMATION AND DEVELOPMENT OF BONE SARCOMAS AFTER DAMAGE BY RADIOACTIVE STRONTIUM AND YTTRIUM. N. N. Litvinov. p.47-50. "Summaries of Papers Presented at the Conference on the Remote Consequences of Injuries Caused by the Action of Ionizing Radiation." F. G. Krotkov, A. V. Lebedinskiy and A. S. Ignatyev, Eds. Translated from a publication of the State Medical Literature Press, Moscow, 1956. 74p. (NP-tr-207)

Rats received radioactive Sr 90 intraperitoneally in doses of 0.4 microcurie per gm and radioactive Y 91 in doses of 0.6 microcurie per gm. Greatest damage is found in the metaphyses of the long tubular bones. Several initial tumor nodes develop in the same metaphysis of a given bone. The tumors are osteoblastic. The

tumors metaphysis most frequently into the lungs and mediastinum.

9809

INDUCED MUTATIONS AND THE VIABILITY PROBLEM. In: AGRICULTURAL GENETICS. CONFERENCE AT RIETL. A. Gustafsson. *Nature* 166, 292-294(1950).

Reports on: mutants obtained by x-ray irradiation of barley and the potentiality of irradiation as a tool in plant-breeding, artificial induction of mutations and polyploids; study of caryological interrelationships of species in wheat and other plants, significance of polysomics, oil plants, fruit breeding problems, and potentialities of special techniques such as artificial inductions of mutations and polyploidy for growing wheat.

9810

THE EFFECT OF IONIZING RADIATION ON INVERTASE IN CELLS. Franklin Hutchinson and Angela Preston. *Radiation Research* 3, 236(1955).

Dry and wet starved yeast cells were irradiated. Activity of irradiated invertase was determined as a function of dose. Rate of inactivation of invertase in dried yeast cells is the same as in dried purified preparations. Radiation sensitivity in wet cells is almost twice that in dried cells. In wet cells direct and indirect effect of ionizing radiation are equally important. (from author's abstract).

9811

REMOTE CONSEQUENCES OF PLUTONIUM DAMAGE. Z. M. Bukhtoyarova and V. K. Lemberg. p.38-9 of "Summaries of Papers Presented at the Conference on the Remote Consequences of Injuries Caused by the Action of Ionizing Radiation." F. G. Krotkov, A. V. Lebedinskiy, and A. S. Ignatyev, eds. Translated from a publication of the State Medical Literature Press, Moscow. 1956. 74p. (NP-tr-207)

Report describes damage after single intraperitoneal administration of plutonium nitrate to rats. Use of 6.3-10.3 and 1.89-10.3 microcuries g decreases leukocytes and shortens life. Osteosarcomas and tumors of soft tissues were produced. Greatest numbers of tumors were observed with doses of 1.89-10.3 microcurie/g, 6.3×10^3 and 1.89×10^3 microcurie/g resulted in earliest development of osteosarcomas.

9812

DEUTERON CROSS SECTION OF AMYLASE IN VITRO AND IN VIVO. John Jagger and Dwight Wilson. *Radiation Research* 1, 500(1954).

Malt β -amylase was bombarded in dry state by 3.7. Mev deuterons. Radiation sensitivity of amylase is the same in living barley seed and in a semipurified condition. Data indicate that radiation sensitivity is not changed by purification, studies on semi-purified enzymes provide accurate information regarding the state of these enzymes in living systems. (from author's abstract).

9813

HUMORAL FACTOR IN IRRADIATION PROTECTION; MODIFICATION OF LETHAL IRRADIATION INJURY IN MICE BY INJECTION OF RAT BONE MARROW. C. C. Congdon and E. Lorenz. *Am. J. Physiol.* 176, 297-300 (1954).

Recovery of irradiated mice after receiving heterologous marrow appears to be due to humoral factor from temporarily surviving intraabdominally transplanted cells.

9814

INFLUENCE OF THE SALTS OF URANIUM ON ALCOHOLIC FERMENTS. E. Kayser. *Compt. Rend* 155, 246-248(1913).

The salts of U behave toward the sugar as toward the yeast, and their toxicity is lessened by the presence of

large masses of yeast. Small doses of the salts stimulate alcoholic fermentation. (from abstract). CA 7-615

9815

DYNAMICS OF THE FORMATION AND DEVELOPMENT OF EXPERIMENTAL OSTEOGENIC SARCOMAS. R. I. Makarycheva. p. 45-46. "Summaries of Papers Presented at the Conference on the Remote Consequences of Injuries Caused by the Action of Ionizing Radiation." F. G. Krotkov, A. V. Lebedinskiy and A. S. Ignatyev, Eds. Translated from a publication of the State Medical Literature Press, Moscow. 1956. 74p. (NP-tr-207).

White rats received Sr90 intraperitoneally in doses of 0.4 microcurie/g. Osteogenic sarcomas developed in 84.5% of the animals. Multiple tumors were present in 73.5% of the animals. Tumors were most common in the distal metaphysis of the femur and at the proximal end of the tibia. Development of bone tumors was preceded by prolonged reconstruction of the bone tissue of the metaphyses.

9816

CHANGES IN THE GLIA IN DOG BRAINS AT LONG INTERVALS AFTER ACUTE RADIATION SICKNESS. L. L. Vannikov. p. 23-24. "Summaries of Papers Presented at the Conference on the Remote Consequences of Injuries Caused by the Action of Ionizing Radiation." F. G. Krotkov, A. V. Lebedinskiy and A. S. Ignatyev, Eds. Translated from a publication of the State Medical Literature Press, Moscow. 1956. 74p. (NP-tr-207).

Brains of 22 dogs received 400-600r doses of x rays. The dogs survived. White substance of the cortex and other regions showed increased numbers of astrocytes, with hypertrophy and thickening of bodies and processes. Hypertrophic diffuse gliosis of dystrophic origin was seen. The astrocytic glia system is damaged first, and then the neuron system.

9817

DEVELOPMENT OF TUMORS AT THE PLACE OF INTRODUCTION OF RADIOACTIVE SUBSTANCE. L. L. Khamaide. p. 40-44. "Summaries of Papers Presented at the Conference on the Remote Consequences of Injuries Caused by the Action of Ionizing Radiation." F. G. Krotkov, A. V. Lebedinskiy and A. S. Ignatyev, Eds. Translated from a publication of the State Medical Literature Press, Moscow. 1956. 74p. (NP-tr-207)

Radioactive preparations can produce malignant tumors at the site of introduction. Uranium fission products were given to male rabbits. Hyperemia, edema of the skin, purulent infiltration and necrosis resulted. The effects of various doses is discussed. Malignant neoplasms also occurred; the optimum dose for this was 0.1 microcurie/g.

9818

CHANGES IN LOOSE CONNECTIVE TISSUE IN CHRONIC RADIATION SICKNESS. V. V. Shikhodyrov. p. 25-28. "Summaries of Papers Presented at the Conference on the Remote Consequences of Injuries Caused by the Action of Ionizing Radiation." F. G. Krotkov, A. V. Lebedinskiy and A. S. Ignatyev, Eds. Translated from a publication of the State Medical Literature Press, Moscow. 1956. 74p. (NP-tr-207)

At the height of acute radiation sickness, the numbers of cellular elements decrease. Also noted; swelling and dissolution of collagen fibers, disintegration of argyrophilic structures, and an increase in chromotrophic substance.

9819

CHEMICAL ACTIONS OF IONIZING RADIATIONS ON AQUEOUS SOLUTIONS. PART I. INTRODUCTORY REMARKS AND DESCRIPTION OF IRRADIATION

ARRANGEMENTS. F. T. Farmer, Gabriel Stein and Joseph Weiss. J. Chem Soc., 3241-5(1949).

Free radical reactions studied in solutions in absence of interfering reagents are similar to reactions obtained in biological systems, containing the same molecules (x-rays, neutrons and α rays).

9820

RECENT STUDIES ON THE ETIOLOGY AND NATURE OF LEUKEMIA. J. Furth. Blood 6, 964(1951).

Author discusses induction of leukemia by ionizing radiation and suggests that virus-like agents, may cause leukemia in mammals as well as in fowls. NSA 6-20

9821

PROTECTIVE ACTION OF KCN AGAINST MORTALITY IN MICE IRRADIATED WITH VARIOUS DOSES OF X RAYS. H. Betz and A. Herve. Compt. rend. soc. biol. 144, 1015 (1950).

KCN administered intraperitoneally to mice before x irradiation gave some protection against a dose of 700 r, not 1200 or 1800 r. Mechanism of protective effect is discussed. NSA 5-1174

9822

EFFECT OF MENADIOL DIPHOSPHATE (SYNKAVITE) ON THE SENSITIVITY OF E. COLI AND S. CEREVISIAE TO X-RAYS. Henry I. Kohn and Shirley E. Gunter. Radiation Research 2, 351-353(1955).

Possible inhibitory effect of MDP on mitosis in microorganisms was studied using resting cell suspensions of Escherichia coli and Saccharomyces cerevisiae. LD₅₀ of both microorganisms was ~ 2000 r. At that dose MDP was without effect. After 10,000 r approximately 5% of cells survived. In the case of E. coli, MDP may have increased the killing, but increase was small.

9823

X-RAY MUTATIONS IN RICE. N. Parthasarathy. Nature 143, 340(1939).

Seeds of a pure line of rice were exposed to x rays under different conditions for 1-3 hours and various types of mutations appeared. A semi-sterile mutant gave in the F₃ generation normal fertile plants, semi-sterile and dwarfs in the ratio 1:2:1. The semi-sterility was found to be due to the association of four chromosomes in meiosis.

9824

THE GENE. L. J. Stadler. Science 120, 811-19(1954)

The author discusses the properties of the gene and reviews research for determining the characteristics of the gene including the work of such men as H. J. Muller and P. W. Bridgman. Studies on the mutation of specific genes and detection of spurious gene mutations are described.

9825

RADIATION DOSIMETRY. G. J. Hine and G. L. Brownell. New York Academic Press. 1956. 932p.

9826

DIFFERENTIAL SENSITIVITY OF SOAKED BARLEY SEEDS TO X-RAYS AND THERMAL NEUTRONS. Calvin F. Konzak. Radiation Research 1, 220(1954).

Seeds of Himalaya barley were on wet blotters for 0, 8, 16, and 24 hours before irradiation. Seeds were exposed to x ray doses of 0, 2, 4, 8, 16 x 10³r. Growth of seedlings from exposed seeds was reduced. Seedlings from soaked seeds showed more radiation damage than seedlings from dry seeds. (from author's abstract).

9827

PHYSICAL AND CHEMICAL ASPECTS OF SUPER VOLTAGE ROTATIONAL THERAPY. Hugh F. Hare, S. W. Lippincott, Jr., D. Sawyer, J. G. Trump, E. W. Webster, K. A. Wright, W. W. Evans, and R. C. Granke. Radiology 57, 157-68(1951).

This paper considers the physical and chemical aspects of 2 million volt x ray therapy combined with rotational administration, with particular reference to treatment of tumors. Treatment of the pituitary, larynx, head and neck is discussed. Supervoltage radiation of malignant disease depends on (1) type and extent of malignant lesions, (2) location, (3) ability of tumor to respond to any type of radiation, (4) amount of radiation given, and (5) time interval used in its administration.

9828

THE INFLUENCE OF OXYGEN TENSION ON THE GENETIC EFFECTS OF X-RAYS. C. F. Konzak. Radiation Research 1, 501-502(1954).

Maize endosperm mutations at al and sh 2 loci and pr locus were induced by irradiation of pollen. Irradiation in pure oxygen (compared with air) caused no change in mutation frequency, nitrogen produced a 62% reduction. Reduction by nitrogen attributed to removal of oxygen, which has direct action in production of chromosome breaks by x-rays. (from author's abstract).

9829

NUCLEIC ACID CHANGES IN RAT SPLEEN AFTER LOCALIZED X IRRADIATION. M. Bererbom. (Univ. of Kansas Medical Center, Kansas City). Radiation Research 5, 650-6(1956).

Effect of 400 r localized x radiation to the splenic area of rats on histological appearance of spleen, its weight, nucleic acid content and nucleic acid-base composition, for 7 days after irradiation is described. Effects of histological appearance, weight and nucleic acid content of the spleen were smaller than after the same dose of x rays given to the whole body. No changes in purine-pyrimidine composition of spleen, RNA or DNA were observed. (from authors summary).

NSA 11-2791

9830

THE EFFECT OF X RAYS ON CHROMOSOMES IN DIFFERENT STAGES OF MEIOSIS. A. Marshak. J. Gen. Physiol. 19, 179-98(1935).

Pollen mother cells exposed to low dosages of x rays at various stages show different frequencies of chromosome abnormalities in the first meiotic anaphase. Maximum frequencies of abnormalities were obtained in buds irradiated in the pachytene stage of the meiotic prophase and in the preceding mitosis. These results are taken to indicate that the x ray sensitive portions of the chromonemata are closely approximated in pairs in pachytene and in the early mitotic prophase. (from author's summary).

9831

ABNORMAL AND PATHOLOGICAL PLANT GROWTH. Brookhaven National Lab. Report of Symposium held August 3 to 5, 1953. Brookhaven Symposia in Biology No. 6, 310p. (BNL-258)

Topics included: use of in vitro cultures in investigating growth and differentiation in vascular plants, abnormal plant growth, genetic tumors in Nicotiana hybrids, nutrition and diseased plant growths, origin of crown-gall tumor cells, experimentally inhibited, plant tumor growth, size and shape of wound-tumor virus, virus induced abnormalities, nutritional aspects of virus-tumor growth, growth and regeneration in gametophytes and sporophytes of Gymnosperms, and aberrant growth in plants induced by ionizing radiation. (from abstract).

NSA 8-5464

9832

THE RESPONSE OF TRADESCANTIA POLLEN GRAINS TO RADIATION AT DIFFERENT DOSAGE RATES. P. C. Koller. Brit. J. Radiol. 19, 393-404(1946).

Irradiation was at 50, 5, 0.5 and 0.25 r/min. with x ray at 5, 0.5, 0.25, and 0.1 1-/min with γ rays.

Total dose was 200 r. The average number of breaks with both x rays and γ rays was less in samples fixed 72 hours after irradiation at 0.5 r/min. and for those fixed 48 and 72 hrs. after irradiation at 0.25 r/min. No evidence was found of any difference in breakage frequency of cells after x and γ radiation at the same dosage rate. (from author's summary).

9833

AGENTS MODIFYING CELLULAR METABOLISM. I. ACTION OF NEUTRONS, TRYPAFLAVINE, AND VEGETABLE EXTRACTS ON MITOSIS OF VEGETATIVE ROOT TIPS. Flavio Resende. Biol. Soc. Portuguesa Cienc. Nat. Ser 2.3, 182-211(1951). (In Portuguese, with English Summary).

Physiological and structural changes brought about by neutron radiations, tryptaflavine, and by three different plant extracts when applied to mitotic root tips cells of *Allium cepa* or of *Aloe Mitrifomis* var. *eommelinu*, are analyzed in light of their relationship to changes induced by the same agents in cancer therapy. NSA 7-1886

9834

CHROMOSOME BREAKAGE EXPERIMENTS WITH ENDOSPERM; SUB-CHROMATID BREAKAGE. L. F. La Cour and A. Rutishauser. Nature 172, 501-502 (1953).

Errors in chromosome separation at anaphase appear after x rays. Tissues were fixed at 1/2 hr. intervals after a dose of 54 r. A 6 1/4 hr. fixation in endosperm undergoing mitosis showed metaphases with chromatid breakage and anaphases with adhesions. Associations at non-homologous loci classified as intrachromatid and interchromatid. Conclusion; sub-chromatid breaks are induced by treatment during prophase but not during resting stage and metaphase.

9835

EFFECT OF OXYGEN ON THE RADIOSENSITIVITY OF GROWING BONE AND A POSSIBLE DANGER IN THE USE OF OXYGEN DURING RADIOTHERAPY. P. Howard-Flanders and E. A. Wright. Nature 175, 428(1955).

9836

ACTINOMYCOSIS OF THE FACE AND NECK TREATED WITH RADIUM. S. A. Heyderdahl. Brit. J. Radiol. 31, 1-14(1926).

Actinomycosis of face and neck were cured by gamma rays of radium. (from abstract). BA 1-744

9837

THE ARTIFICIAL INDUCTION OF MUTATIONS AND ITS THEORETICAL AND PRACTICAL RESULTS. P. Hertwig. Z. Induktive Abstammungs- u. Vererbungslehre 61, 1-35(1932).

Newer results of mutation research are discussed with special regard to chemical experiments on *Antirrhinum*, irradiation work on *Drosophila* and *Habrobracon*, and temperature work of Goldschmidt and Jollos. (from abstract). BA 7-20273

9838

MUTATIONS PRODUCED BY X-RAYS IN *PELLIA NEESIANA*. E. Heitz. Verhandl. Schweiz. Naturforsch. Ges. 1940, 170-171(1940).

For analysis of heterochromatin, thalli of a clone of *P. neesiana* were x irradiated. Among 1300 regenerates 160 had transpositions (in one experiment, up to 30%). Many transpositions are associated with physiological and morphological alterations. Irradiated individuals contain fractures in heterochromosome parts more frequently than in euchromosome regions. (from abstract). BA 19-20945

9839

DISTRIBUTION OF POLONIUM SUBCUTANEOUSLY INJECTED, THROUGHOUT THE TISSUES OF RATS

BEARING IMPLANTED CANCEROUS TISSUES. Antoine Lacassagne and Jeanne Lattes. Compt. rend. Soc. de biol. 90, 352-3(1924). (In French).

Largest amount of polonium became fixed in the spleen, while tumor tissues had less than other organs. Results indicate that cancerous tissue is not particularly susceptible to polonium.

9840

LOCALIZATION OF GLUTATHIONE RADIOPROTECTIVE MECHANISM IN TOTAL BODY IRRADIATION. F. L. Jennings and C. F. Tessmer. Radiation Research 5, 606(1956).

Results suggest that the primary radioprotective effect of glutathione in total-body irradiation can be localized in the spleen.

9841

THE IRRADIATION OF MEIOSIS IN *TRADESCANTIA*. A. Hague. Heredity 6, (suppl), 57-75(1953).

Three diploid specimens of *Tradescantia* were given x ray doses during meiosis and pollen-grain resting stage. Pollen mother cells were 20 times more sensitive than pollen grains. Spiralized chromosomes were 3 times more sensitive than unspiralized or diffuse chromosomes. High breakage is followed by high re-union. (from abstract) BA 27-15120

9842

THE FRACTIONATION EFFECT IN *TRADESCANTIA*. A. Hague. Heredity 6, (suppl), 35-40(1953).

T. paludosa anthers were given an x ray dose of 360 r. Chromosome breakage observed at 1st pollen-grain mitosis is reduced by fractionation with 4-hr interval but is restored to continuous dose level by 8- and 12 hr interval. Reduced breakage is outcome of physiological effect of first dose on later breakability, which disappears after 8 hrs. or more. (from abstract). BA 27-15119

9843

SOME OBSERVATIONS ON THE EFFECT OF GAMMA IRRADIATION ON THE BIOCHEMISTRY OF RABBIT BONE MARROW. J. F. Thomson, W. W. Tourtelotte, M. S. Cartarr, J. B. Storer. Arch. Biochem., Biophys. 42, 185(1953).

Effects of localized exposures of 310 r of γ rays Co^{60} on nucleic acid concentration in bone marrow are due to alterations in bone marrow cell population. There is selective elimination of cell types having a high concentration of cytoplasmic RNA.

9844

THE BIOLOGICAL ACTION OF THE BETA RAYS OF RADIUM. Isaac Levin. Proc. Soc. Exptl. Biol. Med. 21, 462-5(1924).

Capillary glass tubes, containing Ra, were inserted into normal and neoplastic tissues of plants and animals. Necrosis occurred in tissue immediately surrounding capillary, while second zone showed characteristic gamma radiation effects. In human tissues above conditions exist 1-2 weeks post-exposure but after 6-8 weeks recovery is almost complete. Action of β and γ rays is qualitatively similar, but quantitatively ratio of β to γ rays from a unit of Ra is approx 100 to 1.

9845

BIOLOGICAL EFFECTS OF IONIZING RADIATIONS FROM RADIUM AND POLONIUM ON CERTAIN FUNGI. S. Berk. Mycologia 4, 587-598(1952).

The effects on certain fungi of ionizing radiations from radium and polonium plated on metallic foils indicated that α particles were responsible for the biological effects. (from abstract). BA 27-7710

9846

THE DETECTION AND NATURE OF DOMINANT LETHALS IN *LILIU*. I. EFFECTS OF X RAYS ON THE HERI-

TABLE COMPONENT AND FUNCTIONAL ABILITY OF THE POLLEN GRAIN. S. W. Brown and M. S. Cave. *Am. J. Botany* **41**, 455-469(1954).

Dominant lethality, rather than injury to the functional ability of the pollen grain, is the result of 4000 r x ray dose delivered to pollen of *L. formosanum*, as demonstrated pollen grains. (from abstract). BA 29-2622

9847

THE STIMULATING ACTION OF ROENTGEN RAYS UPON EMBRYONIC DEVELOPMENT. P. Ancel and P. Vintemberger. *Compt. rend. soc. biol.* **91**, 606-9(1924). (In French).

Irradiation of hen eggs produced variable results. There was no developmental change in some cases, in others rapid or delayed development. Irradiation of 590 artificially inseminated *Rana fusca* eggs in various developmental stages for variable lengths of time did not accelerate development.

9848

THE DETECTION AND NATURE OF DOMINANT LETHALS IN LILIU. II. CYTOLOGICAL ABNORMALITIES IN OVULES AFTER POLLEN IRRADIATION. S. W. Brown and M. S. Cave. *Am. J. Botany* **41**, 469-483(1954).

Pollen of *L. formosanum* was exposed to an x ray dosage of 4000 r and placed on the stigma immediately. Fertilization occurred in nearly 100% of ovules. Cytological abnormalities in the developing embryo and endosperm consisted of large, irregularly lobed nuclei and micronuclei from fragmented chromosomes and a few bridges. (from abstract). BA 29-2623

9849

THE EFFECT OF X RADIATION ON GENIC MATERIAL. R. S. Caldecott. *Northwest Sci.* **27**, 25-32(1953).

Seedling mutation occurred in 6% of the x2 of barley seeds exposed to 15,000 r x ray dose. X ray induced fragments in root tips usually occurred in pairs at anaphase. No injury was seen in seedlings from dormant seeds exposed to 4000 r or less. Above this, progressive injury resulted. Persistent reciprocal translocations were the most common aberration. (from abstract). BA 27-18804

9850

THE CYTOLOGICAL EFFECTS OF IRRADIATION AT LOW INTENSITIES. P. C. Koller. *Heredity* **6** (suppl.) 5-22(1953).

Pollen grains of *Tradescantia bracteata* were irradiated by x and gamma rays at dosage rates 50, 5, 0.5, 0.25, and 0.1 r per min. Effects: stickiness of chromosomes, centric breakage errors of spindle formation, errors of spiralization (spurious breakage), chromatid and chromosome breaks, formation of micronuclei. Duration of irradiation was more important than dose in producing these effects. (from abstract). BA 27-15124

9851

THE LUZULA SYSTEM ANALYSED BY X RAYS. L. F. La Cour. *Heredity* **6** (suppl.), 77-81(1953).

Interchanges deriving from treatment of meiosis with x rays provide proof of an inverted meiosis in *L. purpurea* (2n=6). First division of meiosis is equational instead of reductional. Induced changes, such as a ring of four, appear at the 2nd division as a half-ring of four. Similar results are seen at meiosis in a tetraploid seedling derived from x ray treatment. (from abstract)

BA 27-15125

9852

THE PHYSIOLOGY OF CHROMOSOME BREAKAGE AND REUNION IN HYACINTHUS. L. F. LaCour. *Heredity* **6** (Suppl.), 163-179(1953).

Breakage and reunion in initial x ray broken cells (x1) and in X2 cells derived from them were studied in

roots of diploid garden hyacinths. Chromosome reunion occurs at X1 together with sister and chromatid reunion. At X2, chromosome reunion, arising mostly at telophase, is found. (from abstract). BA 27-24105

9853

INTERPRETATION IN X RAY CHROMOSOME BREAKAGE EXPERIMENTS. G. R. Lane. *Heredity* **6** (Suppl.), 23-24 (1953).

Physical and biological approaches to design and interpretation of quantitative experiments with ionizing radiation on biological material, particularly in relation to experiments on x ray chromosome breakage in *Tradescantia* pollen. (from abstract). BA 27-15126

9854

EFFECT OF RADIATION ON PROTOPLASM AND BIOCOLLOIDS. E. Bersa. *Protoplasma* **19**, 136-145 (1933). (In German).

A bibliography. BA 9-6735

9855

THE MECHANISM OF DELAYED KILLING OF MAIZE SEEDS WITH X-RADIATION. Louis R. Maxwell. *Proc. Natl. Acad. Sci. U.S.* **24**, 377-84(1938).

Killing comes at a particular stage in growth of seedlings as a result of irradiation of dry seeds with dosages of 50,000 to 100,000 r. One week after emergence of the plumule, elongation ceases and usually a thick crumpled first leaf will show. Seedling remains green for another week before dying. Experimental survival ratio-dosage relationships are given.

9856

THE EFFECT OF X-RAYS ON CHROMOSOMES IN MITOSIS. Alfred Marshak. *Proc. Natl. Acad. Sci. U. S.* **23**, 362-9(1937).

In mitosis, chromosomes are most sensitive to x rays at the onset of prophase, when division of chromonemata occurs. Separation of strands formed by this division occurs at the succeeding anaphase. In different species of plants and animals, the frequency of x ray induced chromosome abnormalities is independent of wave-length and varies directly as the total length of the chromonemata of the somatic chromosome complement. Other results are included. (from author's summary).

9857

GENETIC EFFECTS OF ULTRA-VIOLET RADIATION IN MAIZE. III. EFFECTS OF NEARLY MONOCHROMATIC 2537, AND COMPARISON OF EFFECTS OF X RAY AND ULTRA-VIOLET TREATMENT. L. J. Stadler and G. F. Sprague. *Proc. Natl. Acad. Sci. U. S.* **22**, 584-91(1936).

The proportion of fractionals is higher with U-V than with x rays. The proportion of germless seeds produced by U-V treated pollen is much lower than that produced by x rayed pollen. Proportion of haploviaible deficiencies may be higher with U-V than with x ray.

9858

THE LOCATION OF A GENE FOR DISEASE RESISTANCE IN MAIZE. Virginia H. Rhoades. *Proc. Natl. Acad. Sci. U. S.* **21**, 243-6(1950).

Cytological studies of x ray induced deficiencies and genetical studies of trisomic ratios indicate that the factor for resistance to physiologic form 3 of *Puccinia sorghi* is located in the short arm of the tenth and shortest chromosome of the haploid maize complement. (from author's summary).

9859

SOME EFFECTS OF HIGH TEMPERATURE ON POLY-PLOIDY AND OTHER VARIATIONS IN MAIZE. L. F. Randolph. *Proc. Natl. Acad. Sci. U. S.* **18**, 222-9(1932).

Effects of heat treatments (applied separately and in combination with x rays at the time of syngamy) on fertilization were studied.

9860

THE OCCURRENCE OF A NICOTIANA GLUTINOSA HAPLONT. Thomas H. Goodspeed and Priscilla Avery. Proc. Natl. Acad. Sci. U. S. 15, 502-4(1929).

Glutinosa haplont was one of 24 plants which grew from seedlings subjected to x rays 5 weeks after germination. Effect on external morphology was mostly ephemeral, when put into the field all except two were normal in appearance. One being the haplont. This plant was a replica of its diploid parent.

9861

GENETIC EFFECTS OF X-RAYS IN MAIZE. L. J. Stadler. Proc. Natl. Acad. Sci. U. S. 14, 69-75(1928).

Plants of three families heterozygous for C-Sh-Wx were treated by X raying young tassels at the time of maturation divisions. Treatments killed much of the pollen. Crossover percentage in male gametes in treated and untreated tassels are tabulated. When plants recessive for an endosperm character are pollinated by dominant heterozygous seeds produced include occasional mosaic individuals, in which a portion of endosperm shows recessive character. Effect of x rays discussed.

9862

STUDIES ON FACTORS AFFECTING THE SENSITIVITY OF BACTERIA TO HIGH VELOCITY ELECTRONS.

W. D. Bellamy and E. J. Lawton. Annals of the N. Y. Acad. of Sciences 59, 595(1955).

There is a great species difference in radiation sensitivity. Those organisms more resistant to heat are also more resistant to irradiation. Growth conditions greatly affect the sensitivity of most microorganisms. One of many factors involved is oxidation-reduction potential of cells. Reduced systems are much less sensitive in the presence of O₂ than oxidized systems. Evidence is presented showing difficulty in extrapolating from radiation effects on an isolated enzyme system to an intact cell.

9863

THE INFLUENCE OF NEAR INFRARED RADIATION ON THE PRODUCTION BY NITROGEN MUSTARD OF CHROMOSOMAL REARRANGEMENTS IN DROSOPHILA.

B. P. Kaufmann, H. Gay, and H. Rothberg, Jr. J. Exptl. Zool. 111, 415-436(1949).

In spermatozoa of irradiated Drosophila, chromosome breaks induced either by x rays or nitrogen mustard were distributed at random along chromosomes irrespective of division into euchromatic and heterochromatic regions. Frequency of rearrangements was increased (both x ray and nitrogen mustard) if males were first exposed to near infrared radiation.

9864

CYTOCHEMICAL STUDIES OF CHANGES INDUCED IN CELLULAR MATERIALS BY IONIZING RADIATIONS.

Berwind P. Kaufman, Margaret R. McDonald, and Maurice H. Bernstein. Ann. N. Y. Acad. Sciences 59, 533(1955).

Salivary gland cells of D. melanogaster and growing onion root tips were x irradiated. Structural nucleoproteins were partially degraded by x rays as shown by altered swelling of salivary gland cells under fast conditions and by altered staining reactions of onion cells. Effect of x rays on onion root tip cells are compared with effects of ribonuclease with respect to chromosome aberrations.

9865

IRRADIATION OF PARTS OF INDIVIDUAL CELLS. III. EFFECTS OF CHROMOSOMAL AND EXTRA CHROMOSOMAL IRRADIATION ON CHROMOSOME MOVEMENTS.

William Bloom, Raymond E. Zirkle, and Robert B. Uretz. Ann. N. Y. Acad. Sciences 59, 503(1955).

Cultures of cells from newt (Triturus viridescens)

were heart studied to determine effect of radiating specific portions of cells in vitro with a microbeam of (1) protons and (2) ultraviolet light.

9866

RADIATION STUDIES OF PROTEINS AND ENZYMES.

Richard Setlow. Ann. N. Y. Acad. Sciences, 59, 471(1955).

In the average, direct action of fast charged particle on large molecules is such that one primary ionization inactivates the specific function of one molecule. Some molecules required more than one ionization for inactivation, some are inactivated by a primary ionization in a neighboring molecule.

9867

VIOLET RAYS AND RADIO-ACTIVE MATERIAL FOR HASTENING PLANT GROWTH. Anonymous. Brit. J. Radiol. 18, 317(1914).

Both light from mercury vapor lamp and radioactive material in soil increase plant growth. Seeds germinated more rapidly in soil containing 1 mg of Ra salt/ 20 tons of soil and after U-V irradiation.

9868

INFLUENCE OF X-RAYS ON GERMINATION. G. Promsy and P. Dreyon. Rev. gen. bot. 24, 177-97.

Irradiated seeds had longer radicles, earlier gemmules, greater height, cells of epidermis lengthened radially, and pith cells were twice as large, when compared to control seeds. Lupin beans were soaked for 2 hours without removing shells and irradiated for 1 hour. Cellular activities as well as rate of growth increased. CA 7-3606

9869

IONIZING RADIATION METHODS FOR DETERMINING BIOLOGICAL STRUCTURE. Ernest Pollard Ann. N. Y. Acad. Sciences 59, 469(1955).

Inactivation of a large variety of biologically active molecules by x ray has permitted identification of the number and size of functional "sites" on the molecule. Similar studies on the inactivation of viruses, bacteria, etc., by means of radiations of varying penetration (β rays, slow, medium and fast deuterons, alpha particles and various velocities) permit similar "dissection" of these structures for identification of functionally important parts.

9870

USE OF CHARGED PARTICLES TO MEASURE SKIN THICKNESS AND OTHER SURFACE PROPERTIES.

Franklin Hutchinson. Ann. N. Y. Acad. Sciences 59, 494(1955).

Charged particles (electrons and protons) have a finite range in tissue, the range depending on the energy of the charged particle. If the energy is made sufficiently low, irradiation of an organism will be confined completely to the surface. Increasing the energy enables the charged particles to penetrate more deeply. It is by this method, that it is possible to measure the thickness of a surrounding layer or skin. E. coli and B. subtilis spores were used in the experiments described.

9871

RADIOACTIVE PLANT GROWTH STIMULANT. R. R. Adams. U. S. Patent 1,461,340(1923).

Spray for plants is prepared using a radioactive substance, e. g., Ra-bearing Ba salts, together with glue, casein or other adhesive. Pb arsenate or other insecticides or fungicides may be added to the mix. (from author's abstract). CA 17-2933

9872

HOMOLOGY PATTERNS OF X RAY INDUCED LETHAL MUTATIONS IN NEUROSPORA. K. C. Atwood and Frank Mukai. Radiation Research 1, 125(1954).

Nuclei of *Neurospora* in which recessive lethal mutations have been induced can be propagated under heterokaryotic symbiosis with the same mutation. Most large chromosomal deficiencies have an autonomous nuclear lethal effect that may account for much of the nuclear lethal effect of x rays.

9873

X-RAY INDUCED MUTATIONS IN GROWING MYCELIUM OF *NEUROSPORA*. K. C. Atwood and Thad Pittenger. *Radiation Research* 3, 212(1955).

When recessive mutations are induced by x rays in nuclei of actively growing *Neurospora* mycelium, progeny of mutant nuclei are carried forward and may be recovered in conidia formed at a great distance from point of induction. Doses up to 50,000 r have no permanent effect on mycelial growth rate. Induced mutation rate in growing cultures remains lower than in conidia.

9874

RADIUM EXPERIMENTS WITH *DATURA*. IV. VISIBLE GENE MUTATIONS IN RADIUM-TREATED AND CONTROL MATERIAL. A. G. Avery and A. F. Blakeslee. *Anat. Record* 41, 99(1928-1929).

Two recessive genes obtained from 18 F₁'s tested from a capsule treated with radium emanation, one recessive from 50 F₁'s from treated pollen. Haploidy induces gene mutations, out of 316 F₁'s from a haploid, 7, or 2.2%, were heterozygous for new genes. Except for one plant no new genes have been discovered in unirradiated plants. (from author's abstract).

9875

PROTECTIVE EFFECT OF SODIUM CYANIDE ON X-IRRADIATED PEA ROOTS. Z. M. Bacq and A. Herve. *Arch. Intern. Physiol.* 59, 348-356(1951).

The effect of x radiation on the roots of pea seedlings is diminished if the plants are treated with a 1:4000 solution of sodium cyanide 4 hours before irradiation. *CA* 47-5971

9876

ROLE OF ELECTROLYTES AND STARVATION IN ALTERING APPARENT RADIOSENSITIVITY OF BAKER'S YEAST. William J. Bair and J. N. Stannard. *J. Gen. Physiol.* 38, 493-504(1954) and (1955).

Effects of 90,000 r of 250 kv. x rays on respiration and fermentation of yeast depended on K⁺ and H⁺ of suspending medium. At pH 4.5, stimulatory effects were observed in KH₂PO₄ buffer and inhibition in K-free (T-S-T) buffer. At pH 6.5, situation was reserved. Starving increases radiosensitivity of respiration and fermentation. (from author's summary).

9877

AN IRRADIATION EFFECT ON ONION ROOTS. Matts Helde. *Acta Radiol. Suppl.* 116, 684(1954).

Influence of Ra γ irradiation on a spontaneous, rhythmic potential difference between root tip and any reference point on the root was studied in onions. Normal shape of this potential difference as a function of time is a sine-like wave with a characteristic voltage amplitude of 1-20 mV and a period of 10-30 min. The wave seems to be due to growth processes of the tip. When root tips are irradiated (dose 2r) in water saturated with oxygen an immediate check of the potential is observed

9878

THE EFFECT OF ROENTGEN RAYS UPON CELLS. DIMINUTION IN THE REACTIVITY OF A SENSITIVE ORGAN BY LIGATION OF THE AFFERENT ARTERIES. J. Jolly. *Compt. rend. soc. biol.* 91, 532-34(1924). (In French).

Rabbits, in which one iliac artery had been ligated were irradiated with roentgen rays and then killed.

Histologic changes in popliteal ganglia showed more serious lesions in unligated leg. Author concludes that normally functioning cells are more radiosensitive.

9879

COMPARATIVE SENSITIVITY OF DIFFERENT LYMPHOID ORGANS TO ROENTGEN RAYS. J. Jolly. *Compt. rend. Soc. biol.* 91, 354-6(1924). (In French).

Rabbits were irradiated for variable lengths of time. Differential results; lesions appeared in popliteal ganglion 2-6 hrs post exposure, 12 hrs post-exposure in femoral marrow. Recovery is complete in ganglion by 8th day, but may continue to 21st day in marrow.

9880

THE EFFECT OF ROENTGEN RAYS UPON CELLS. MODIFICATIONS ON THE RADIOSENSITIVITY BY LIGATION OF THE VASCULAR CONNECTIONS. J. Jolly. *Compt. rend. Soc. biol.* 91, 351-4(1924). (In French).

One lobe of guinea pigs thymus gland isolated from circulation by ligation. Neck region irradiated, animal killed 2-3 hrs afterwards. Ligated lobe had no lesions, while other lobe was extensively damaged. Results are attributable to reduced vitality of cell caused by lack of circulation. Concludes that normally functioning cells are more radiosensitive.

9881

THE PRODUCTION OF VARIATION IN *NICOTIANA* SPECIES BY X RAY TREATMENT OF SEX CELLS. T. H. Goodspeed and A. R. Olson. *Proc. Natl. Acad. Sci. U. S.* 14, 66-9(1928).

Authors attempted to produce heritable variations in *Nicotiana* by x irradiating sex cells at various stages of maturity. Over 1000 plants from the first x raying came to maturity. Over 20% of variant plants appeared. Variants showed striking alteration of some one, or all external morphological characters which distinguish *tabacum* var. *purpurea*.

9882

EXPERIMENTS ON THE RESPIRATION OF X-IRRADIATED BARLEY SEED. K. Mikaelson and H. Halvorsen. *Physiol. Plantarum* 6, 873-9(1953).

Germination was not affected in dry seeds of barleys jotun and maja treated with heavy doses of x rays. Doses of 5000-15,000 r had no influence upon the initial rate of respiration, but after 4-5 days of germination at 20°C. respiration was markedly reduced in irradiated seeds. The nature of the x ray effect on respiration is discussed in relation to observations on cytology and growth. (from abstract). *BA* 24-1094

9883

RESPIRATION OF PLANT TISSUE CULTURES AS A FUNCTION OF X-RAY DOSE. Mark W. Jones. *Phys. Rev.* 89, 899(1953).

Tissue cultures of corn root tips, grown in White's culture medium augmented by 10-5 mg IAA per liter nutrient were subjected to x ray doses of 100, 200, 400, 800, and 1400 r. Mean oxygen uptake decreased with increasing dose. Concomitant observations of dry weights indicate that their use for arbitrary correction of respiration rates of different weight cultures is not completely justified by the analysis of covariance between different series of observations. (from abstract).

9884

EFFECTS OF DELAYING OF GERMINATION OF SEEDS SUBJECTED TO RADIATION. June G. Jones and D. Pomeroy. *Phys. Rev.* 87, 179(1952).

When dry seeds are irradiated, subsequent development is affected. Extent of damage is influenced by delaying the germination of dry seeds, previously exposed to x rays. Radiation injury was measured by comparing the length of coleoptiles of control and irradiated seedlings four days after germination. (from abstract).

9885

THE INDUCTION OF VARIATIONS IN PENICILLIUM NOTATUM BY THE BOMBARDMENT OF SPORES WITH NEUTRONS. H. J. Hanson. Ohio State Univ., Columbus, Doctoral Dissertation 54, 149-54(1948).

Over 150 variations involving color, texture, rate and quantity of vegetative growth sporulation, color and amt. of transpired fluid were noted after exposure to slow neutrons for 1 hr. through 134 days. (from abstract). BA 23-28109

9886

ASSIMILATION OF RADIOACTIVE ELEMENTS BY PLANTS. V. I. Baranov. Compt. Rend. Acad. Sci. USSR 24, 951-954(1939).

U, Ra, Rd-Th, and Ac were placed in the nutrient medium for the following plants: Pisum sativum, Lactuca sativa, Cucumis sativus, Linum usitatissimum, and Avena sativa. Uptake of isotopes resulted in higher concentrations in leaves and stems than in the roots. CA 34-4108

9887

HISTOLOGICAL EFFECTS OF ABSORBED RADIO-ISOTOPES UPON THE CALLUS OF SEQUOIA SEMPERVIRENS. Ernest Ball. Bota. Gaz. 114(4), 353-363(1953).

Callus cultures of S. sempervirens grown 85 days on agar media containing P32, S35, and C14. Thickening resulted from formation of new cells at right angles to surface. Internal parenchyma was largely disintegrated. Marginal meristems underwent hypertrophy and ceased to form new cells. (from author's summary). BA 28-14639

9888

SOME EFFECTS OF RADIOISOTOPES ON THE CALLUS CULTURE OF SEQUOIA SEMPERVIRENS. Ernest Ball. Anat. Record 121, 466(1955).

Radioisotopes P32 and S35, accumulated in meristematic cells. Parenchymatous cells showed lower accumulation. Sublethal amounts of P32 and S35 destroyed parenchymatous cells of callus and marginal meristems. No permanent changes were noted after calluses were exposed to internal radiations from C14. Radioactive carbon compounds moved from the inoculum into new tissues produced by growth. (from author's abstract).

9889

ACTIVATION OF THE BACTERIAL OXIDATION PROCESSES BY URANIUM SALTS. H. Agulhon and R. Sazerac. Compt. Rend. 155, 1186-1188(1913).

Solution of U salts (1/1000) stimulate vinegar fermentation by Mycoderma aceti. U acetate was used because it is much less antiseptic than nitrate. Similar results were obtained with sorbase bacterium in its action on glycerol. (from abstract). CA 7-809

9890

SPONTANEOUS AND INDUCED CELL RESTORATIONS AFTER TREATMENTS WITH IONIZING AND NON-IONIZING RADIATIONS. R. Latarjet. Acta Radiol. 41, 84-100(1954).

Restoration phenomena in irradiated cells may depend on several different processes. Distinctions are made between 3 general processes: (1) restoration by reversion, (2) restoration by recovery, and (3) restoration by superimposed injury. (from abstract). Studies utilized E. coli and diploid yeast. BA 28-25502

9891

THE RADIATION RISKS OF THE ROENTGENOLOGIST. A. Barclay and S. Cox. Am. J. Roentgenol. Radium Therapy 19, 551-61(1928).

Measurements were made of the amount of radiation received by workers. It was concluded that a daily exposure of 0.00028 of a skin unit dose was a safe limit. CA 22-3421

9892

INFLUENCE OF X RAYS ON THE BLOOD. RESUME OF WORK DONE ON SUBJECT SINCE 1904. E. Dernerville. Revere Scrisse, The (1914). From abst. in Brit. J. radiol. 19, 152(1914).

9893

THE EFFECT OF X AND RADIUM RAYS ON PLANTS. M. Koernicke. Himmel und Erde 17, 1 and Nature 71, 373(1904).

The exposure of seedlings to Roentgen and radium rays caused retardation and eventually cessation of growth of stem and root, in some cases growth was resumed after an interval, in others the plants never recovered. The first effect of the rays on dry bean and turnip seeds was to accelerate germination, but while the beans ceased to develop after a time, the turnips did not even show signs of retardation.

9894

A CLINICAL STUDY OF THE EFFECT OF RADIATION ON BLOOD CHOLESTEROL IN MALIGNANT DISEASE. W. L. Mattick, et al. J. Cancer Res. 11, 86-100(1927).

9895

MUTATIONS IN ASPERGILLUS NIGER BOMBARDED BY LOW VOLTAGE CATHODE RAYS. R. M. Whelden. Mycologia 32, 630-44(1940).

The several variant strains of fungus produced differed markedly from the parent, most commonly in the color of the fruiting mycelium. One showed increase in size. They have been continued through several asexual generations without showing any appreciable change. At the voltage used (about 12 KEV) the electrons penetrate spores far enough to release most of their energy in the zone in which the nucleus is located. (from abstract).

9896

COBALT-60 FIELD IRRADIATION MACHINE. Otto A. Kohl, W. R. Singleton and B. Manowitz. Nucleonics 13, (7) 42(1955).

In the Brookhaven Laboratory Co 60 radiation field, utilizing a 1600 curie source, abundant endosperm mutations were produced in growing corn plants. A dose-response curve for such mutations was calculated. With a radiation dose of 1300 r., one-day exposures produced maize endosperm mutations at the rate of about 3% per gene if given at the most sensitive period, i.e., about a week prior to pollen shedding. A description of the machine is given. NSA 9-7571

9897

BEER PASTEURIZATION. Anonymous. Nucleonics 13(1), 71(1955).

Irradiation of packaged beer with 50,000 rep of Co 60 gamma rays inactivates yeast cells, resulting in complete biological stability. Because glass bottles darken and enamel inside steel cans is adversely affected, aluminum cans would be most suitable for beer irradiation. This was part of a report by Neil F. Ritchey, atomic energy advisor to the Reynolds Metal Company.

9898

ELECTRON BOMBARDMENT OF BIOLOGICAL MATERIALS II. THE RATE OF DEATH OF FUNGUS SPORES BOMBARDED IN VACUUM WITH CATHODE BEAMS FROM 4 Kv-15Kv. R. M. Whelden, C. E. Buchwald, F. S. Cooper and C. P. Haskins. J. Gen. Physiol. 23, 391-400(1940).

Effects: shortening of germination time was observed at very low voltage, germination became very irregular at voltages from 11-15 Kv and cultures from these spores showed several mutations, marked retardation of growth, and complete inactivation. The last is reported in detail. (from abstract). BA 15-2925

9899

X-RAY INDUCED MUTATIONS IN BARLEY. Nishimura, Yonehachi, N. Hirowo, and S. Takeo. Japanese J. Breeding 1, 210-14(1952). (In Japanese with English Summary).

Investigation of the X1 and X2 generations of x-rayed barley seeds revealed a difference of fertility among spikes of an individual plant in X1 generation. Progenies of spikes with normal fertility in X1 generation often segregate in the X2 into fertile and partially sterile plants, while partially sterile spikes often produce fertile plants only. The possibility of applying Burnham's multiple translocation method to barley is discussed. (from abstract). BA 27-8479

9900

ACTION OF X RAYS ON AMPHIBIAN EGG DEVELOPMENT. II. THE EFFECT OF OXYGEN ON THE RELATIVE SENSITIVITY AT VARIOUS STAGES DURING THE FIRST CLEAVAGE IN THE TOAD EGG. Y. Nakao. in: Progress in Radiobiology. C. C. Thomas Publishers, Ill. 1956. 557p.

9901

A PRELIMINARY REPORT ON SOME CHROMOSOME ALTERATIONS BY X RAYS IN CREPIS. M. Navashin. Am. Naturalist 65, 243-52(1931).

Chromosome alterations; addition or subtraction of entire haploid chromosome sets or individual chromosomes; rearrangement of chromosome material without any alterations in the total mass of the nucleus, alteration of the morphological characters of the chromosomes invariably connected with a change of the total mass of the nucleus, although often affecting different chromosomes independently, and appearance of new large "V-shaped" chromosome structures.

9902

THE TOLERANCE OF GOSSYPIUM HIRSUTUM FOR DEFICIENCIES AND DUPLICATIONS. Margaret Y. Menzel and Meta S. Brown. Am. Naturalist 88, 407-18(1954).

Exposure of germinating seeds of *G. hirsutum* to 1200r of x rays was effective in producing chromosome aberrations. Ten lines having 12 different translocation complexes were recovered, involving a minimum of 29 breaks and rearrangements. At least ten, and probably all twelve, of these complexes gave one or more viable and fertility-deficiency duplication genotypes when out-crossed. (author's summary)

9903

RADIOACTIVITY OF THE ERUPTION OF VESUVIUS AND OF THE COMPANION SOLFATARIA, AND THEIR INFLUENCE ON THE DEVELOPMENT OF BACTERIA AND HIGHER PLANTS. J. Stoklasa and J. Penkava. Compt. Rend. 179, 819-22(1924).

A considerably greater electrical condition was found in the air near the crater of Vesuvius, at the top of the Eifel Tower, and in Alsatian potash deposits, by comparison with the air at the base of each of these structures. These conditions are exceeded by the condition of gases at Pozzuoli. These conditions are attributed to Rn and K and are believed to favor photosynthesis. (from abstract). CA 19-602

9904

THE IMPORTANCE OF POTASSIUM FOR THE BUILDING UP OF NEW MATERIAL IN LIVING PLANTS. Julius Stoklasa. Ernähr. Pflanze 30, 299-307(1934).

Seeds of barley, wheat, oats, clover, peas, and the broad-bean exposed to both gamma and beta radiation from K metal and KCl showed an increased germination over the controls. Rays from other K salts such as KOH, K₂CO₃, KCl, and K₂SO₄ also improved germination. Plants showed high yields when treated with a residue from a Ra extraction process. CA 28-7294

9905

SOME ASPECTS OF THE CHEMICAL PROTECTION AGAINST RADIATION DAMAGE TO VICIA FABA CHROMOSOMES. Sheldon Wolff. Genetics 39, 356-64 (1954).

Seeds of *Vicia faba* were treated with 2×10^{-3} M solns. of BAL, sodium hydrosulphite, cysteine, glutathione, or sodium ascorbate, and were then given 500 r of x rays. BAL gave good protection against radiation-induced chromosomal aberrations. Sodium hydrosulfite gave some protection but less than BAL. The other chemicals did not enhance radioresistance. (from abstract). BA 28-27877

9906

THE EFFECT OF THERMAL NEUTRON RADIATION ON THE CHROMOSOMES OF DATURA. Henry T. Yost, Jr., W. R. Singleton, and A. F. Blakeslee. Proc. Natl. Acad. Sci. U. S. 39, 292-7(1953).

Seeds of *D. stramonium*, line 1, were exposed to radiation for 2 hrs. at a flux of approx. 4.6×10^8 thermal neutrons cm²/sec. Seeds were germinated and transplanted. Pollen was classified according to chromosomal type and gene type. Chromosomal aberrations were correlated with translocations and gene aberrations with 12 bivalents. (from abstract). BA 28-17609

9907

STUDIES ON X RAY INDUCED RECIPROCAL TRANSLOCATIONS IN EINKORN WHEAT. I. ANALYSIS OF SOME NEW RT TYPES. K. Yamashita. Seiken Zihō (Rept. Kihara Inst. Biol. Research) 4, 102-10(1950). (In Japanese with English Summary).

Studies deal with analysis of some new types of reciprocal translocations (RT types) in *Triticum aegilopoides* and *T. monococcum*. The chromosome constutions of 10 new RT types were established, based on the data of the crossing experiments with 6 standard Rt types. Attempts to combine RT sets of chromosomes were successful. (from abstract). BA 27-104

9908

STUDIES ON X-RAY INDUCED RECIPROCAL TRANSLOCATIONS IN EINKORN WHEATS II. Kosuke Yamashita. Seiken Zihō. (Rept. Kihara Inst. Biol. Research) 5, 1-41(1952).

The work deals with x ray induced reciprocal translocations (RT's) in *Triticum aegilopoides* and *T. monococcum*. General characteristics of the chromosome configurations in pollen mother cells of each type of RT-heterozygote are illustrated crosses were made among the RT-types and the behavior of chromosomes in metaphase I in PMC's of hybrids was analyzed. (from abstract). BA 27-26735

9909

GENETICS AND CYTOLOGY OF A MUTANT DWARF-SPORED GLOMERELLA. H. E. Wheeler. Am. J. Botany 40(9), 694-702(1953).

A variant of *Glomerella cingulata*, obtained from a culture grown on a medium containing radiocarbon, produced ascospores approximately 1/3 normal size and which lacked the curvature characteristics of the ascospores of this sp. The results of a genetic and cytological study indicated that the dwarf-spored character was controlled by a mutant designated dw 1 (dwarf). (from abstract). BA 23-12723

9910

EFFECT OF ROENTGEN RAYS UPON THE OXIDATION VELOCITY OF CELLS. P. Weis. (Pflugers) Arch. ges. Physiol. 203, 262-73(1924).

After exposure to x-rays for several hours, no change in oxidation velocity of cells observed in avian erythrocytes, frog muscle cells, yeast cells and

Staph. aureus. Staph. aureus showed inhibition of reproductive rate. Author concludes that growth inhibition and oxidation rate are not related.

9911

THE ACTION OF X RAYS IN THE FORMATION OF BONE CALLUS. F. P. Sgobbo. Riforma Med. Napoli **34**, 282-88 (1918). (In Italian).

Experiments with dogs showed that bone callus formation and fracture consolidation are retarded by strong x irradiation before and after fracture. Retardation, development limitation, or absence of callus resulted according to dosage used.

9912

ACTION OF ROENTGEN RAYS UPON THE COAGULATION OF THE BLOOD. P. Pagniez, A. Ravina and I. Solomon. Jour. Radiol Electrol **7**, 153-7(1923). (In French).

X ray radiation caused a decrease in coagulation rate of blood. Observations were made 1 hr. post-exposure, but in some cases effect was noted 5 min post exposure. Effect lasted 4-7 days.

9913

THE EFFECT OF X RAYS ON THE SKIN OF VITALLY STAINED WHITE MICE. Gerty T. Cori. J. Exptl. Med. **39**, 639-43(1924).

Mice, subcutaneously injected with trypan blue, were irradiated with a Kelly-Koett apparatus, Coolidge tube (4 ma, 95 kv., 2.5 mm, Al, 22 cm dist) on the left hind part of the back. Epilation occurred in a shorter time than in control mice who did not receive an injection of vital stain.

9914

CONDITIONS FOR THE BIOLOGICAL EFFECT OF X RAYS. III. EFFECT OF THE OXIDIZING SUBSTANCE ON SENSITIVITY. E. Petry. Biochem. Z. **135**, 353-383 (1923).

Oxidizing agents did not alter effect of x rays on development of seedlings. Previous treatment with H₂O₂ increased sensitivity to radiation, exposure to CO₂ had opposite effect. (from abstract) CA 17-3357

9915

OXYGEN CONSUMPTION DURING LATENT PERIOD OF X RAY INJURY. E. Petry. Wien. Klin. Wochschr. **36**, 51-52(1923). (In German).

Author believes that the primary effect is on ferments and cellular metabolic processes.

9916

THE IMMEDIATE CHANGES OBSERVED IN TISSUE CELLS AFTER EXPOSURE TO SOFT X RAYS WHILE GROWING IN VITRO. T. S. P. Strangeways and H. E. H. Oakley. Proc. Roy. Soc. (London) **95**, 373-81(1922-3).

Irradiation of choroids of 6 day old chick embryos resulted in (1) stoppage of cell division after 5 min exposure except in cells already in mitosis, (2) almost complete cessation of mitosis after 20 minute exposure. If cultures were replaced in incubator, mitosis occurred again. Changes in chromosomes and cell structure alterations are discussed.

9917

THE INFLUENCE OF X RAYS ON THE SEEDS OF VICIA FABA AS SHOWN IN THE DEVELOPMENT OF THE PLANTS. Th. Pfeiffer and W. Simmermacher. Landwirtsch. Vers.-Sta. **86**, 35-43(1915).

Germination is hastened by short exposure to x rays and checked by long exposure. Growth of plant above ground was somewhat increased by short exposure. Results were variable but indicated increase in total dry matter of plants from seeds exposed for a short time. (from abstract). CA 9-2925

9918

A NEW METHOD OF SYNTHESIZING PURE-BREEDING

TYPES WITH EXTRA CHROMOSOMAL MATERIAL IN DATURA. A. F. Blakeslee, A. D. Bergner and A. V. Avery. Am. Naturalist **70**, 255-7(1936).

Chromosomes used by the authors were a large "1" chromosome 5.6 and a small median "m" chromosome 19.20. By the action of x rays, segments of these two chromosomes were interchanged so that a prime type 3 race (PT39) was formed which had an m sized 5.20 and an l sized 6.19 chromosome. Through radium treatment, another prime type (PT53) was obtained which had breaks in the 5.6 and 19.20 chromosomes at different loci.

9919

IRRADIATION EXPERIMENTS WITH ULTRAVIOLET LIGHT, X RAYS, AND RADIUM IN THE CONTROL OF PLANT DISEASES. F. Pichler and A. Wober. Centr. Bakteriolog. Parasitenk **57**, 319-327(1922). (In German).

Acid sprays that contain free O or form O enhance action of X rays and ultra-violet in treating plant disease. X rays was more efficient than ultra-violet, Ra had no effect. (from abstract) CA 17-1270

9920

EFFECT OF RADIUM ON PLANTS IN WATER CULTURES. F. Pilz. Z. Landwirtsch. Versuchsw. Deut. Oesterr. **19**, 399-410. Biedermanns Zentr. **46**, 412-414. J. Chem. Soc. **112**, (pt I) 718-719(1916). (In German).

Dry matter of peas receiving 0.000116 mg of Ra was increased 28%, pods 43%. Dry matter of maize increased 15% yield of grain decreased 47%. Ra retards ripening. Percentage of N, P₂O₅ and Ca was lower in Ra treated plants than in controls. (from abstract). CA 12-1562

9921

EXPERIMENTAL STUDY OF MITOSIS AS A RADIO-SENSITIVITY FACTOR. P. Vintemberger. Arch. Anat. Hist., Embryology **12**, 229-464(1930-31). (In French).

9922

A POSITION EFFECT IN OENOTHERA. D. G. Catcheside. J. Genet. **38**, 345-352(1939).

In one of 3 x ray induced translocations in O. blanda, capacity of gene Ps to pigment flower buds is reduced. A single crossover plant was obtained in which PS was separated from translocation and restored to normal h blanda complement, whereupon it acted with normal force. (from abstract). BA 14-71

9923

MUTATION RATE INCREASED BY AGING SEEDS AS SHOWN BY POLLEN ABORTION. J. L. Cartledge and A. F. Blakeslee. Proc. Natl. Acad. Sci. U. S. **20**, 103-110(1934).

Storing dry seeds up to 10 yrs increased rate of pollen abortion mutations about a proportion to age of seeds. Most mutations occurred in sectors of plants as did mutations induced by radiation treatment of dry seeds. (from abstract). BA 9-4364

9924

THE EFFECT OF RADIUM ON THE GROWTH OF PLANTS. E. J. Russell. Nature **96**, 147-8(1915).

Action of radium through the soil: germination and growth were accelerated. The plants farthest away were stimulated most. Different plants and even different organs of the same plant, were differently affected, the root system responding more markedly than the aerial parts.

9925

EFFECT OF X RAYS ON MEIOTIC CHROMOSOMES OF VICIA FABA L. A. Camara. Boll. Soc. Broteriana Ser. **2**, 13, 187-209(1939).

Flower buds were subjected to x ray doses (64 KV. 5mA at 30 cm without filter) for 15-20 min. After 24 hrs many cells showed chromosome alterations, including

fragmentations, translocations, segmental interchanges and polyploidy. No evidence was found for increased chiasma frequency. (from abstract). BA 15-21

9926

INDUCED DOMINANT LETHALITY IN LILIU. S. W. Brown and M. S. Cave. Proc. Natl. Acad. Sci. U. S. 39, 97-102(1953).

Massive pollination with pollen of L. formosanum treated with x rays (2000-4000 r) gives little or no seed set. Treated grains functioned in fertilization at same rate as untreated. Various doses of x rays resulted in some germless seeds. Occurrence of occasional low seed sets is attributed to pseudogamous development. (from abstract). BA 28-12704

9927

ORIGIN OF SPONTANEOUS MUTATIONS. M. Navashin. Nature 131, 436(1933).

The author tested the effect of prolonged dormancy of seeds upon the rate of chromosomal mutations. After completing experiments with Crepis tectorum Navashin, he concluded that selective mortality had nothing to do with the enormous increase in the rate of mutation discovered and that increase in the mutation rate cannot be attributed to accumulation of the direct effects of some external agency like radiation.

9928

NATURAL IONIZING RADIATION AND RATE OF MUTATION. E. B. Babcock and J. L. Collins. Nature 124, 227-8 (1929).

An experiment was planned for the purpose of comparing the rates of occurrence of sex-linked lethal mutations in Drosophila melanogaster, following method already devised by Muller (Genetics 13, 279-357(1928)), and using a balanced lethal strain synthesized by him. As a result of the experiment, it was concluded that the natural ionizing radiation of the earth is a very important factor controlling the rate of which new inherited characters originate in animals and plants.

9929

THE ACTION OF THE ROENTGEN RAYS ON THE BLOOD FORMING ORGANS. Patricelli. Riforma Medica (1907). From abst. in Brit. J. Radiol. 13, 318(1908).

In experiments on healthy dogs, x rays caused depression of number of leucocytes and erythrocytes.

9930

ROOT PRODUCTION IN PLANTS FOLLOWING LOCALIZED STEM IRRADIATION. Eric Christensen. Science 119, 127-128(1954).

Seedling plants were exposed to 250 KVP, 30 ma x ray with 1 mm Al filtration. Xanthium shows chlorosis in 2 wks, at 3 wks the irradiated area is narrower than zones around it. In 4 wks. small papules which develop into normal roots result. Explanation: a phloem block impairs downward transport. An accumulation of organic materials explains the swelling. Irradiation did not interfere with height.

9931

ABSORPTION OF STRONTIUM INTO PLANTS FROM FIELD PLOTS. J. F. Cline. p.47-49 of BIOLOGY RESEARCH - ANNUAL REPORT 1954. Jan. 3, 1955. (HW-35917)

Plots containing barley were contaminated with one millicurie of Sr^{90} per plot. No significant difference occurred in the uptake of strontium by barley grown in the surface as compared to sub-surface irrigated plots. There was no effect of Sr^{90} on viability of seed. Uptake of Sr^{90} by barley was about 0.03% of the total amount applied to the soil.

9932

STUDIES ON X RAY EFFECTS. Herbert Taylor, W. Witherbee, J. B. Murphy. J. Exptl. Medicine 29, 53-73 (1919).

Various animals show an immediate decrease in circulating lymphocytes, followed by a rise to normal following x irradiation. Polymorphonuclear neutrophilic leucocytes, when affected, increase in number immediately after the administration of the x rays and then tend to decrease below their normal level. A return to normal precedes lymphocyte recovery.

9933

CEREAL PLANTS. J. F. Cline and J. H. Rediske. p.36-39 of BIOLOGY RESEARCH - ANNUAL REPORT 1953. Jan. 4, 1954. (HW-30437)

Millacre plots planted to barley were irrigated with reactor effluent water. Effluent water has an effect on seed nitrogen content, nitrogen concentration is greater in controls. This indicates impairment of protein synthesis. Spectrochemical analysis showed aluminum, calcium, chromium, iron, magnesium, sodium and zinc present in concentrations exceeding that considered desirable in good irrigation water.

9934

THE IMMEDIATE EFFECTS OF X RAYS ON THE BLOOD LYMPHOCYTES. S. Russ. Arch. Radiol. and Electrother. 26, 146(1921).

Rats irradiated for 2 minutes had 50% reduction in lymphocytes with recovery phase from 1-3 days. Simulated x ray with no radiation had no effect on rate before or after simulated test.

9935

CHRONIC EFFECTS OF PILE EFFLUENT WATER ON CEREAL PLANTS. J. F. Cline, A. A. Selders, and J. H. Rediske. p.39-42 of BIOLOGY RESEARCH - ANNUAL REPORT 1952. July 7, 1953. (HW-28636)

Millacre plots were planted to barley and irrigated with: 100% reactor effluent 5% reactor effluent and control well water. Results: no difference between control and 5% effluent-watered plots in size of plant, yield, or total nitrogen, activity densities of seed and vegetative parts for all three types did not vary significantly. Barley from 100% effluent water showed decrease in seed yield, vegetative parts and nitrogen.

9936

CHRONIC EFFECTS OF REACTOR EFFLUENT WATER ON CEREAL PLANTS. J. F. Cline, A. A. Selders, and J. H. Rediske. p.28-31 of BIOLOGY RESEARCH - ANNUAL REPORT 1954. Jan. 3, 1955. (HW-33917)

Effects on barley of irrigation with various dilutions of reactor effluent are described. Seed yield is significantly decreased by watering with 100% effluent. No significant effects resulted from watering with 5% effluent.

9937

EFFECT OF GAMMA IRRADIATION ON THE ASCORBIC ACID CONTENT OF GREEN PLANTS. Anson R. Cooke. Science 117, 588-589(1953).

Plants were constantly exposed to gamma rays. There was a rise in ascorbic acid before visible damage, followed a few days later by a rise in ascorbate level, followed by a second decrease. It is suggested that there is correlation between normal ascorbic acid content and sensitivity of a plant to irradiation. Ascorbic acid may offer a protecting action against irradiation in plants.

9938

CHROMOSOME CHEMISTRY AND GENE ACTION. C. D. Darlington. Nature 149, 66-69(1942).

The author discusses chromosomes, nucleic acids, mitosis and bridges between plants and animals, and super-charging of chromosomes produced by unflavorable conditions or by an x ray dose of 100 r. X rays act on the cell primarily by their effect on spindle fibre formation. Dose of 50 r will upset spindle development but germination of ripe pollen grains is not disturbed by 80,000 r.

9939

THE EFFECT OF CATHODE RAYS ON THE PROTEINS OF SERUM. L. E. Baker and R. B. Corey. J. Exptl. Med. **50**, 439-44(1929).

Chicken fibroblasts underwent change when cultivated in serum which was irradiated with cathode rays. Cells resembled those of colonies cultivated in proteoses or peptones. Cytoplasm was completely filled with granulations but maintained long, sharp, active pseudopods. Cells multiplied slightly more rapidly than control tissues that had not been irradiated. Phenomena indicate that cathode rays had produced certain chemical changes in serum. Chief effect of cathode rays on proteins is similar to that of ultraviolet light observed by Harris and of sunlight by Young. The most prominent effect of cathode ray exposure on proteins was denaturation. In pure protein solutions there was a small increase in non-protein nitrogen. Irradiation of solutions of pure protein showed that changes observed reflected properties of proteins and were not dependent on presence of other constituents of serum. CA 23-5479⁶

9940

THE EFFECT OF RADIATION DOSE FRACTIONATION ON CHROMOSOME ABERRATION FREQUENCIES IN TRADESCANTIA MICROSPORES. I. STUDIES WITH X-RAYS. F. J. DeSerres and N. H. Giles. Radiation Research **1**, 129(1954).

Tradescantia microspores were exposed to high and low radiation intensities to fractionated doses of x rays. Results do not support the theory of an inhibition-recovery sequence in production of chromosome aberrations with fractionated doses. Results support conclusions that reduction in chromosome aberration frequency with rest periods of 4, 8 or 12 hours does not exceed twice the aberration frequency induced by a single half-dose. (from author's abstract).

9941

RELATIVE BIOLOGICAL EFFECTIVENESS OF IONIZING RADIATIONS BY MICROBIOLOGICAL METHODS. H. J. Dishburger, M. P. Fujihara, F. P. Hungate, and H. A. Kornberg. p.167-72 of BIOLOGY RESEARCH - ANNUAL REPORT 1954, Jan. 3, 1955. (HW-35917)

The microbiological method for measuring the RBE on bacteria has been extended to yeast. Radiation was delivered to Saccharomyces cerevisiae and Lactobacillus casei. Growth-time curves; values for RBE of tritium as compared to P³² were 2.0 with L. casei and 1.8 and 2.3 with diploid and haploid strains of S. cerevisiae.

9942

RADIOPHOTOGRAPHIC DETERMINATION OF NATURAL AND ARTIFICIAL RADIOACTIVE ELEMENTS IN PLANTS. A. A. Drobkov. Doklady Akad. Nauk S.S.S.R. **68**, 177-180(1949).

Plant growth is improved by small amounts of uranium or radium. The determination of radioisotopes can be made from radiophotographs of leaves and stems. CA 44-710

9943

PROGRESS IN RADIOBIOLOGY. M. Ebert and A. Howard. Nature **176**, 683-684(1955).

Biological lesions due to ionizing radiations must originate in the absorption of primary energy. A number of metabolic steps occur between the initial chemical disturbance and damage. Genetic effects of radiation, factor influencing radiosensitivity of biological systems and the effects of oxygen on radiosensitivity are discussed. Carcinogenic effect of whole body x ray is discussed.

9944

ABNORMAL ELASTIC FIBERS. T. Gillman, J. Penn, D. Bronks and M. Roux. Arch. Pathol. **59**, 733-49(1955).

9945

VARIATION OF RADIOSENSITIVITY AND RELATIVE

EFFECTIVENESS OF HAPLOID YEAST. Mortimer M. Elkind and Carl A. Beam. Radiation Research **1**, 493 (1954).

Radiosensitivity of haploid Saccharomyces cerevisiae, SC-7, has been studied in the region of exponential survival with 50-KV x rays and Po 210 α particles. Cultures were grown on YED agar for 18 hours at 30°C. Survival studies with fresh cells and cells starved up to 9 days showed a change in x ray LD 50 from about 1.5 krep to 3.7 krep, respectively, and in α ray LD 50 from about 2.6 krep to 1.9 krep, respectively. (from author's abstract).

9946

VARIATION OF THE BIOLOGICAL EFFECTIVENESS OF X-RAYS AND α PARTICLES ON HAPLOID SACCHAROMYCES CEREVISIAE. Mortimer M. Elkind and Carl A. Beam. Radiation Research **3**, 88-104(1955).

A 1.5-fold decrease in x ray sensitivity of SC-7 occurred as a function of culture age. Yeast cells from a 2-day PD agar surface in M/15 KH₂PO₄ for 48 hours without dextrose had unaltered sensitivity to 250-KV x rays. Changes in sensitivity results from changes in target size. Radiosensitivity of Haploid Saccharomyces cerevisiae: (1) for interdivisional cells radiosensitivity depends on metabolic state, (2) budding cells are more radioresistant than interdivisional cells and more sensitive to α particles.

9947

CHANGES PRODUCED IN YEAST CELLS BY ROENTGEN RAYS AND CHEMICAL SUBSTANCES I AND II. H. V. Euler, L. Ahlstrom and B. Hogberg. Z. Physiol. Chem. **227**, 1-17, 18-25(1942).

Yeast cells surviving exposure to 5000 r and 50,000 r x rays, showed reduced rate of multiplication. Up to 40% showed an increase in size. Nucleic acid content was reduced about 20%. Under colchicine cells enlarge 20 to 50%. Doses of 15,000 r have no influence on fermenting power of yeast. This is not altered by pretreatment with colchicine. (from abstract). CA 37-5426I, CA 37-5426II

9948

CHROMOSOME BREAKAGE BY X RAYS AT VERY LOW TEMPERATURES. A. C. Faberge. Radiation Research **1**, 130(1954).

To get same number of chromosome breaks, pollen at 192° C requires twice the x ray dose needed at +25°C. Irradiation in nitrogen depresses number of breaks. Freezing per se was compensated by increasing dose, these values of isolated chromatid breaks resulted: 300 r at 25°C., in air = 190, in nitrogen = 87; 600 r at -192°C. in air = 180, in nitrogen, - 88. (from author's abstract)

9949

EXPERIMENTAL STUDY ON THE GENESIS OF THE HEMOCLASTIC CRISIS IN INTENSIVE IRRADIATION. M. G. Giraud and L. Pares. Presse med. **30**, 885-887 (1922). (In French).

9950

THE EFFECTS OF THE SHORTER WAVE-LENGTH ROENTGEN RAY ON THE GASTRIC SECRETION OF DOGS. Sidney Portis and Robert Ahrens. Am. J. Roentgenol **11**, 272-80(1924).

Gastric secretions were collected for one hour before a standard meal and hourly for four hours after the meal. The chest and abdomen were radiated for one hour on each of three days. Chest radiation has little or no effect, abdominal irradiation lowers gastric secretion and acidity.

9951

ON THE POSSIBILITY OF DISENTANGLING BY SPECTROLOGICAL MEANS THE COMPLEX OF GENETIC EFFECTS INDUCED BY RADIATIONS. L. J. Stadler. Genetics **23**, 170-1(1938).

Genetic alterations induced by penetrating radiations include translocations, deficiencies, and point mutations. In maize, "germless seeds" are produced, resulting from alterations which prevent normal embryo development. Comparison of x ray and U-V effects in maize indicates at least three of four are spectrologically separable. (from abstract).

9952

ROENTGEN THERAPY IN EXPERIMENTAL AND HUMAN TUBERCULOSIS OF THE LUNGS. O. De La Camp. *Strahlentherapie* 3, 546-50(1913).

Rabbits were injected with a culture of tubercle bacilli pathogenic for man. Four weeks later, the non-irradiated controls showed numerous small tubercles with typical macro- and microscopic characteristics. Irradiated rabbits had no macroscopically visible tubercles, but did have microscopic foci smaller than those in controls and lacking many characteristics of typical tubercle histologically. Author believes hard x rays early in disease may be beneficial clinically.

9953

MODIFICATION OF RADIATION RESPONSE. A. Hollaender. *Bull. Atomic Scientists* 12, 76(1956).

Author discusses the protective effect of cysteamine. Bacteria grown on a glucose-salt medium before irradiation did not need special nutrients to demonstrate protective effects of cysteamine after exposure, since they apparently could synthesize all metabolites without having to have specific factors (e.g. glutamine, uracil, guanine) added.

9954

OBSERVATIONS ON THE EFFECTS OF ROENTGEN IRRADIATION UPON NORMAL AND CARCINOMATOUS MICE. Friedrich Kok. *Strahlentherapie* 17, 327-30 (1924). (In German).

Various experiments on mice indicate that toxic effects of roentgen rays are neutralized to some extent by carcinoma. The criterion of effect was the number of days the animals lived after exposure.

9955

FURTHER OBSERVATIONS OF THE EFFECTS OF X RAYS UPON LYMPHOCYTES. S. Russ, H. Chambers and Gladys Scott. *Brit. J. Radiol.* 25, 377-80(1920).

Rats were given one 12 second exposure (x rays) or repeated exposures. One exposure reduced lymphocyte count 50%, repeated doses had little effect. Authors believe that recovery processes are active in spite of repeated doses. Authors further suggest that 2 types of lymphocytes, one resistant and one sensitive to radiation, are present in equal numbers in the blood.

9956

SOMATIC SEGREGATION AND ITS RELATION TO ATYPICAL GROWTH. Donald F. Jones. *Genetics* 22, 484-522(1937).

Seeds x irradiated shortly after fertilization show a marked increase of inter-chromosomal mosaics in adjacent areas. Time of treatment and length of exposure made no significant difference in frequency of mosaics.

9957

INHERITANCE IN *NICOTIANA TABACUM* XIII. THE CYTOGENETICS OF "DEFORMED", AN X-RAY DERIVATIVE. Thomas H. Goodspeed and Priscilla Avery. *Genetics* 18, 487-521(1933).

"Deformed" is characterized by: (1) abnormally shaped leaves, (2) narrower and sometimes shorter than normal flowers flecked with white. Some viable pollen is produced. Other results are also reported. (from abstract). BA 9-4374

9958

BIOLOGICAL REACTION OF X RAYS: THE INFLUENCE

OF X RAY TREATMENT ON THE COMPLEMENT CONTENT OF THE BLOOD OF CANCER PATIENTS. C. F. Cori. *Am. J. Roentgenol.* 10, 830-34(1923).

The increase or decrease in complement after x ray treatment varies more with the individual than with the dose. Complement values return to normal after treatment is concluded. Radiation of blood or serum in vitro uniformly decreased complement.

9959

STUDIES ON THE BIOLOGICAL EFFECTS OF X RAYS. J. W. Mavor. *Am. J. Roentgenol.* 10, 968-94(1923).

Effects of x rays on chromosomes are classified as (1) irregular distribution of chromosomes at cell division, a hereditary effect, (2) interchange of hereditary determiners between chromosomes. A given dose does not necessarily produce same effect on the various chromosome pairs or on various parts of any pair. (Studies on *Drosophila melanogaster*).

9960

CHROMOSOME BREAKAGE. L. F. La Cour. p.18-20 of Forty-Fourth Annual Report on the John Innes Horticultural Institution for 1953. (1954).

Point errors at anaphase are induced only in x irradiated scilla sibirica endosperm. Errors appear as chiasma-like structures and are attributed to breakage and reunion of subchromatids. Spontaneous chromosome breakage in endosperm of a *Lilium* hybrid and experiments on chemically induced localized breakage in *Vicia Faba* are discussed. (from abstract). PBA 24-2735

9961

THE EFFECT OF X-RAYS ON BONE MARROW. Ernest Falconer, Morris Laird and H. Ruggles. *Am. J. Roentgenol.* 11, 342-51(1924).

It was found that local irradiation (long bones) had little or no effect on bone marrow of long bones of old male dogs, and one anemic female dog. Experiments were performed on bone marrow that was in a normal state of balance. It was concluded that leucemia could not be treated by this method.

9962

CHROMOSOME BREAKAGE IN *ALLIUM* BY 8-ETHOXYCAFFEINE AND X-RAYS. B. Kihlman. *Exptl. Cell Research* 8, 345-68(1955).

Comparison of the effects of EOC and 75 and 100 r of x rays on root tip chromosome of *Allium cepa* showed that interphase sensitivity to breakage by the two agents was similar. Relative frequencies of chromatid and isolocus breaks at different times after treatment were also similar. Effect of oxygen tension on the radio-mimetic effect of EOC investigated. (from author's summary).

9963

EFFECTS OF POST TEMPERATURE TREATMENTS UPON THE X-RAY INDUCED CHROMOSOMAL ABERRATIONS. M. Kurabayashi. *Cytologia (Tokyo)* 18, 253-65(1953).

Post irradiation temperature of 0°C. caused delay in mitotic cycle of young ovular tissue of *Paris tetraphylla*, thus delaying appearance of chromosomal aberrations compared with that seen at 20°C. A pronounced increase in translocation frequency was seen at 0°. (from abstract). PBA 24-2660

9964

CHARACTERISTICS OF CHROMOSOME BREAKAGE BY DIFFERENT AGENTS. L. H. Gray. *Heredity* 6, (Suppl.). 331-315(1953).

Evidence points to different forms of primary damage leading to production of chromosome aberrations. The primary cause of chromosome breaks and translocations that follow is a physical or chemical change induced by a single ionizing particle. Various ionizing agencies dif-

fer with respect to production of chromosome breaks and dependence on molecular oxygen. (from abstract).

BA 27-15109

9965

INVESTIGATION INTO THE BIOLOGICAL ACTION OF ROENTGEN RAYS. W. Johanssen. Acta Radiol. 3, 251-2 (1924).

Victoria pea root tips were exposed to roentgen rays and measured after irradiation. Upon the completion of 70,000 measurements it was found that aluminum filtered roentgen rays were less powerful than copper filtered rays in inhibiting growth.

9966

THE RELATION OF TEMPERATURE CHANGE TO ROENTGEN RAY SKIN REACTION. Charles Martin and George Caldwell. Am. J. Roentgenol. 9, 152-61 (1922).

Rabbits (and other species) were subjected to altered temperature, ointment and adhesive applications during and after irradiation. Removal of adhesive after exposure appeared to accentuate reaction to radiation as did the ointments and application of an ice bag for several days after exposure.

9967

ROENTGEN RAY CACHEXIA Charles Martin and Fred Rogers. Amer. J. Roentgenol. 11, 280-286 (1924).

Each of six dogs received x irradiation (75 m a min.) to an isolated loop of bowel, the rest of the body being shielded by lead. Two dogs died within a week (peritonitis and infection) others remained well for various periods, eventually succumbing to slowly developing cachexia. Effects of irradiating a loop of bowel or the entire abdomen are compared. Large doses caused decreased fat absorption.

9968

OBSERVATION OF THE EFFECT OF X-RAYS AND RADIUM UPON THE MALARIAL PARASITE IN VITRO. Leon J. Menville. Radiology. 3, 399-401 (1924).

Plasmodium malariae cultures in glucose-blood medium were exposed to x ray and Ra. No direct killing effect was exerted by either type of radiation. Results obtained in vitro may not apply in vivo. It might be quite possible to produce enzyme or lysin production that might affect parasites if spleen were radiated in vivo.

9969

INFLUENCE OF INDIVIDUAL VARIATIONS OF SENSITIVITY TO ROENTGEN RAYS. H. Holthusen. Fortschr. Gebiete. Roentgenstrahlen 29, 777-805 (1922).

Radiosensitivity of *Ascaris megalocephala* varied with developmental stage, was increased when temperature was raised to 37° C. Author also describes studies on hemolysis of x rayed erythrocytes in various salt solutions. Concludes that x rays may cause formation of methemoglobin from hemolyzed blood depending on nature of salt solution in which it is suspended.

9970

STUDIES IN X RAY EFFECTS. Waro Nakahara. J. Exptl. Med. 38, 309-14 (1923).

Mice were radiated through an opening in a lead plate. After a period of 7 days, protected area as well as roentgen-rayed area was inoculated with cancer. In three weeks vigorous tumors appeared in the protected area. Only one tumor in six inoculations was observed in roentgen rayed area.

9971

RADIO DERMATITIS AND ITS EXPERIMENTAL PRODUCTION IN ANIMALS. Cecil Rowntree. Brit. J. Radiology, 14 (1909).

Rat tails were x-rayed with rest of body shielded by lead cage. Histological changes are reported. Rabbit ears were x rayed with rest of body shielded and histological and morphological changes noted. Ears received 18 days

of constant exposure. Marked changes in the skin of both irradiated species were studied and are described in detail. Author feels small doses are more harmful, causing severe hypertrophy and hyperplasia of skin.

9972

LETHAL DOSE OF ROENTGEN RAYS FOR CANCER CELLS. Francis Wood and Fredrick Prime. Jour. Amer. Med. Assoc. 74, 308-313 (1920).

Sarcoma and carcinoma cells were x irradiated with various doses *in vitro* and *in vivo* (in mouse). Sarcoma cells were killed by 6 erythema doses (ED) *in vitro*; by 5 ED *in vitro*. Carcinoma cells were killed by 6 ED *in vivo* by 4 ED *in vitro*. Concludes that 5-7 ED would be required to kill all cells of rapidly growing, highly cellular and highly malignant sarcoma and carcinoma in man when tumor is at the surface of the body.

9973

THE EFFECT OF X RAYS UPON TUMOR GROWTH IN MICE. K. C. A. Valken. Acta. Radiol. 3, 451-2 (1924).

Irradiation of mice (5 sec., 3 times a week, for 3-4 wks) produced an immunity against sarcoma inoculation in most cases. If mice were inoculated with sarcoma first and then irradiated, some immunity was produced. A second sarcoma inoculation resulted in absolute immunity. The mice were also immune to carcinoma.

9974

THE EFFECT OF DIRECT RADIATION OVER THE PRECORDIUM ON THE HEART SIZE, THE HEART MECHANISM AND THE MYOCARDIUM OF RABBITS. Gordon Burgess, G. F. Strong and E. S. Emery. Am. J. Roentgenol. 11, 328-30 (1924).

Post mortem examinations proved almost entirely negative except for clumps of fibrin in pericardium of one rabbit. There was moderate necrosis in the heart muscle, but not enough to bring about any special degenerative myocardial change. Authors concluded that there were no definite changes in heart size.

9975

ROENTGEN RAY INTOXICATION. S. L. Warren and G. H. Whipple. Am. J. Roentgenol. 98, 11 (1924); J. Am. Med. Assoc. 81, 1673 (1923) Nov.

Evidence from animal experiments and clinical observations indicates that human intestinal mucosa is peculiarly sensitive to hard, short wave length roentgen rays.

9976

EXPERIMENTAL STUDIES ON THE EFFECT OF IRRADIATED SERUM ON THE BLOOD. J. Glaubermann. Munch. med. Wochschr. 61, 1867 (1914). (In German).

Rabbits were injected subcutaneously with x irradiated (*in vitro*) or normal serum and serial studies of peripheral blood leukocyte and differential leukocyte counts were carried out during post injection period. Irradiated serum was observed to produced leukopenia in the non-irradiated recipient following a transient initial leukocytosis. Both granulocytes and lymphocytes were depressed but blood picture returned to normal in 24 hours. Author believed that cells defrayed in blood of irradiated animals produced a toxin causing effect in the recipient.

9977

PATHOLOGICAL TISSUE CHANGES AFTER RADIATION OF THE LIVER WITH ROENTGEN RAYS. R. Tsukamoto. Strahlentherapie 18, 320 (1924). (In German).

Increased blood amino acids were observed following irradiation. Also, plasma proteins were studied after irradiation.

9978

VERTEBRATE RADIOBIOLOGY; EMBRYOLOGY. John P. O'Brien, Marquette Univ., Milwaukee, Wis. Ann. Rev. Nucl. Sci. 6, 423-51 (1956).

The subject is reviewed under the following categories:

(1) Radiobiological Mechanisms. The primary aim is elucidating processes stemming from the first impact of radiation on the developing system to the earliest and later responses, (2) Morphogenetic Mechanisms- Mechanism and principles of vertebrate development, (3) Clinical Embryology - Clinical observations are included. (from abstract). NSA 11-5145

9979

CHANGES IN THE BLOOD OF PATIENTS TREATED WITH X RAYS AND RADIUM. Axel Westman. Acta Radiol, 1, 349-57(1921-22). (In French).

Relatively small doses of x-ray caused a slight increase in RBC and hemoglobin and also caused leukopenia

9980

HISTOLOGICAL CHANGES IN THE BONE MARROW OF RATS EXPOSED TO THE GAMMA RADIATIONS FROM RADIUM. J. C. Mottram. Arch. Radiol. and Electrother. 25, 197(1920).

Twenty three rats were exposed 12-460 hrs to varnished Ra applicators each containing 80 mgr. radium bromide. Bone marrow was less affected by x rays than was lymphoid tissue. Longer exposures caused a granulocytopenia and aplastic anemia, indicating interference with output of blood cells from bone marrow.

9981

BLOOD CHANGE DUE TO X RAYS AND SENSITIZATION TO X RAY EFFECT. H. Holthusen. Strahlentherapie 14, 561(1923). (In German).

Various types of radiation including ultraviolet and fluorescent wave lengths were studied with respect to their influence on response of peripheral blood erythrocytes pictured to x irradiation.

9982

PATHOLOGICAL EFFECTS OF ROENTGEN RAYS ON ANIMAL TISSUES. Harvey. Dublin Jour. of Med. Science Feb. (1907); Arch. Roentgen Ray 2, 145(1908).

9983

SULFUR-35 AS A MUTAGENIC AGENT IN NEUROSPORA. F. P. Hungate and T. Mannell. Genetics 37, 709-719 (1952).

Mutagenic effects of metabolized S^{35} were tested so that effect of transmutation of S^{35} into Cl^{35} could be quantitatively distinguished from radiation effect of β particle. Mutation frequency varied with specific activity of S^{35} . Variation in mutation rate could not be explained by radiation, appeared to be due to varying probability of S^{35} - Cl^{35} transmutation. (from abstract). BA 27-11814

9984

THE INFLUENCE OF β RAYS ON THE PERMEABILITY OF CELLS. J. Petrova. Botan. Cetr., Beih. Abt. A, 54, 369-428(1936).

Weak doses of beta radiation did not change cell permeability of the thread-like algae *Zygnema* over that of the controls. Strong doses inhibited cell division and caused diminished cell permeability especially in $Ca(NO_3)_2$. CA 30-4193.

9985

BIORADIOACTIVITY OF PLANTS AND THE EXISTENCE OF RADIUM ELEMENTS IN THEM. E. Burkser, I. Brun and K. Bronstein. Biochem. Z. 181, 145-148(1927).

Fresh and withered plant tissue showed radioactivity which was not due to moisture content. Emanation measurements showed that plants contain very little Ra. (from abstract). BA 4-591

9986

THE ROLE OF NATURAL RADIOACTIVE ELEMENTS IN THE LIFE OF PLANTS. A. A. Drobkov. Sovet. Agron 7, no. 9, 75-79(1949).

Cultures with sunflower, alfalfa, cotton, and cucumbers grown on purified salts without Ra, Th, or V lagged in development. When all β rays were supplied by small quantities of uranium X, sugar beets and their sugar content exhibited increases. Radioactivity concentrates in young growth. Intake of V increases during blooming and maturation. Plants utilize more radioactive elements when supplied in low concentration. (from abstract). CA 44-708

9987

ASSIMILATION AND DISTRIBUTION OF RADIOACTIVE ELEMENTS IN GRAFTED PLANTS AND THEIR EFFECT ON DEVELOPMENT OF TOMATOES. I. E. Glushchenko and A. A. Drobkov. Izvest. Akad. Nauk S.S.S.R., Ser, Biol., 6, 62-6(1952).

P32 distributes itself unevenly in graft combinations of tomatoes and nightshade. P and Ra are poorly retained by tomato tissues. Nightshade seems to retain these elements near the site of administration. Injection of radioactive causes their transport both up and down, but their distribution is uneven. Low doses of Ra stimulate early stages of growth of tomato plants. (from abstract).

9988

THE CHONDRIOME IS THE PART OF THE CELL MOST SENSITIVE TO X-RAYS. G. A. Nadson and E. I. Rochline. Gleichgewicht Compt. Rend. Soc. Biol. 95, 378-380(1926). CA 22-92

9989

EFFECT OF X RAY IRRADIATION ON SESAMUM SEEDS. C. V. Ramakrishnan and K. T. Jacob. J. Am. Oil Chemists' Soc. 31, 270(1954).

A reduction of seed lipase activity but an increased esterase activity resulted from seed irradiation. Other results included early flowering of plant and a larger fruit yield. CA 48-8885

9990

OXIDATION AND THE MECHANISM OF ACTION OF MUTAGENIC FACTORS. I. R. Rapoport. Zhur. Obshchei Biol. 4, 65-72(1943). (Russian with English Summary).

Chromosome breakage by short-wave energy is compared with rupture of ozonides at the points of unsaturation. Synapsis and crossing-over are explained as labile polymerization and depolymerization with regrouping of the unsat. points in chromosomes. The author concludes that ozone is the chemical mediator of the action of x rays as a result of using x rays together with heavy metals. CA 38-758

9991

THE ACTION OF METALS AT A DISTANCE. V. Rivera. Atti. Pontif. Accad. Sci., Nuovi Lincei 86, 184-188 Rev. Appl. Mycol. 13, 178(1933).

Petri dishes with spores of penicillium sown on meat broth agar were placed in Zn, Fe and Pb containers. Conidia were produced only in culture with Pb. In lower and higher plants, Pb also stimulated cellular multiplication. Effect is attributed to "secondary radiation." (from abstract) CA 28-4441

9992

THE EFFECT OF RADIATION-DOSE FRACTIONATION ON CHROMOSOME ABERRATION FREQUENCIES IN TRADESANTIA MICROSPORES. II. STUDIES WITH FAST NEUTRONS. Norman H. Giles, Frederick J. De Serres, and Alvin V. Beatty. Radiation Research 1, 131(1954).

A single dose of 25 N was given without fractionation, and in two equal fractions with intervals of 1, 2, 4, 8, and 12 hours. No effect of fractionation was found. Aberration frequencies from a dose of 12.5 N were half those of 25 N. Results do not indicate an inhibition-recovery sequence

in production of chromosome breakage by radiation.
(from author's abstract).

9993

CHAPTER TITLE: EFFECT OF URANIUM ON THE METABOLISM OF YEAST AND BACTERIA. J. A. Muntz, T. P. Singer, and E. S. C. Barron. Book: Toxicology Of Uranium (NNEs, IV-23) New York, McGraw-Hill p 246-261 A. E. Tannenbaum, ed. (1951).

Uranium has an inhibitory effect on utilization of glucose by yeast. This effect may be reversed by phosphates and NaHCO_3 . There was also an inhibitory effect on enzymes in cell-free yeast extract. Bacterial cells of different kinds were sensitive to uranium in varying degrees. CA 45-7190

9994

RADIUM RACES OF YEAST AND THEIR PRACTICAL SIGNIFICANCE. G. A. Nadson and E. Ya Pokhlina. Vestnik Rentgenol. 1. Radiol. 11, 239-254(1932).

New forms with distinct morphological and physiological properties are obtained from *Saccharomyces cerevisiae* XII subjected to Rn. New characteristics are hereditary. Type "A" is usually spherical, forms conglomerate masses. Type "B" cells are long, have one or several vacuoles. Cells reproduce at poles. In a fermenting mass, "B" type settles rapidly. Yeast yield of "B" exceeds yield from original form. (from abstract). CA 28-7293

9995

PROTEOLYTIC ENZYME STUDIES IN IRRADIATED RABBITS. N. K. M. De Leeuw, C. S. Wright and J. L. Morton. J. Lab. Clin. Med. 42, 592-597(1953).

Serum profibrinolysin and antitrypsin increased after total body irradiation. Spontaneous rapid lysis of clots was not observed. Thus, in irradiated rabbits a rise in serum profibrinolysin and antitrypsin may occur in the absence of spontaneous hemorrhage or spontaneous lysis. (author's summary).

9996

HANDBUCH DER RADIUM-BIOLOGIE UND THERAPIE. Paul Lazarus and J. F. Bergmann Wiesbaden. Reference from Brit. J. Radiol. 18(157), 117(1914).

9997

QUANTITATIVE EXAMINATION OF BONE MARROW IN GUINEA PIGS AFTER GAMMA IRRADIATION. P. F. Harris. Brit. Med. J., 2, 1032(1956).

Quantitative examinations of bone marrow in 400g male guinea pig have been made at varying intervals up to 5 weeks after total body irradiation. Results confirm that the lymphocyte is very sensitive to radiation but also indicate that there is a marked accumulation of these cells in bone marrow between 10 and 18 days after irradiation. During marrow regeneration, erythropoiesis seems to reach a peak at 20th day and myelopoiesis between 22 and 24 days. Evidence suggests that time taken for immature neutrophil to mature in guinea-pig bone marrow in recovery from irradiation is approximately 2-4 days.

9998

THE EFFECT OF BLACK OXIDE OF URANIUM IN THE COMMERCIAL CULTURE OF MUSHROOMS. D. Montet. Compt. rend. soc. biol. 111, 20-22(1932).

A 20-30 per cent increase in yields of mushrooms occurred following the addition of U_3O_8 to the usual manure fertilizer. The author attributes this increase to radioactivity. CA 27-119

9999

THE BEHAVIOR OF THE HEART UPON THE INTRODUCTION OF RADIOACTIVE SUBSTANCES INTO THE ORGANISM. A. Krebs. Ztschr. f. Kreislaufforsch 28, 701-710 (1936). (In German).

10000

EFFECT OF RADIUM ON CITRIC ACID FORMATION

BY *ASPERGILLUS NIGER*. E. K. Kresling. Trudy Nauch-Issledovatel. Inst. Pishchevoi Prom. Narkomisphepoma SSSR 3, 49-64(1936).

Citric acid production was not increased when radon was added at the time of inoculation. Some increase was observed when radon was added 2 days after inoculation. Acid production was not increased by adding radioactive ores of BaSO_4 . CA 30-5258

10001

EFFECTS OF X RADIATION ON FLOW OF PERFUSION FLUID THROUGH ISOLATED RABBIT'S EAR. H. B. Gerstner and P. M. Brooks. Fed. Proc., Balt. 14, 56(1955).

After 2000r dose of 260 Kv X ray, rate of flow of perfusion fluid first decreased then returned to normal in isolated rabbit ear.

10002

MICROBIOLOGICAL STUDIES OF STREPTOMYCIN-PRODUCING FUNGI. II. IMPROVEMENT OF STREPTOMYCIN-PRODUCING STRAINS BY ULTRAVIOLET AND X RAYS. H. Nakayama, Y. Ikeda, K. Kajikawa, M. Kawasaki, and Y. Serizawa. Kagaku Kenkyusho Hokoku 28, 395-404(1952).

Actinomyces strains KU and K-1 were exposed to ultraviolet and x rays. A mutant developed in strain KU which produced about twice as much streptomycin. A nonchromogenic mutant developed in strain K-1, but this did not produce more streptomycin. CA 47-8833

10003

DIFFERENT EFFECTS OF α RAYS ON NUCLEUS AND CYTOPLASM OF THE CELL. J. Petrova. Botan. Centr., Beih. Abt. A., 61, 399-431. Chem Zentr. 1943, 1, 1376-1377(1942). (In German).

When entire cell of alga *zygnema* was irradiated with Po α rays, injurious effects were same as after B- and γ -radiation. If only cytoplasm was irradiated, usual dose had no effect, while several hundred times this amount caused cell death within 24 hours. Cell nucleus is 700 times more sensitive than cytoplasm to radiation (from abstract) CA 38-4651

10004

CONDITION FOR THE BIOLOGICAL ACTION OF X RAYS I. E. Petry. Biochem. Z. 119, 23-44(1921). (In German).

Radiation of germinated seedling cooled to 4° or poisoned by KCN or AgNO_3 effectually retarded further root development. Toxic effect of x ray is independent of processes usually associated with metabolism and respiration of such organs. Presence of O_2 is not essential for harmful effect of x rays. (from abstract). CA 15-3302

10005

EXPERIMENTAL STUDY OF THE BIOLOGICAL EFFECTS OF POLONIUM INTRODUCED INTO THE ORGANISM. A. Lacassagne, J. Lattes and J. Lavedan. J. radiol. et electrol. Jan. 9, 1-14(1925). (In French).

After receiving 10-40 electrostatic units by injection, rabbits showed initial leukocytosis followed by severe leucopenia. The intensity of leucopenia was severe, with leucocytes dropping from 9200 to 10 in less than 8 days time. The animals all died.

10006

THE EFFECTS OF IONIZING RADIATIONS FROM POLONIUM ON THE SPORES OF *ASPERGILLUS NIGER*. S. Berk. Mycologia 45, 488-506(1953).

Dry conidial spores of *A. niger* FA300 irradiated with varying doses of alpha particles showed; interference with the production of conidial heads; inhibition of sporulation and cell division or the development of an extensive mycelium, slight inhibition of vegetative growth, inhibition of germination or production of germ tube. (from abstract). BA 28-4399

10007

THE PHYSIOLOGICAL ACTION OF THE ROENTGEN RAYS. Richter and Gerhartz. *Berliner klin. Wochenschr.* (1908). From abst. in *Brit. J. Radiol.* **13**, 78(1908).

Adrenalin exposed to x rays has decreased physiological activity with respect to elevating blood pressure and blood sugar. The properties of yeast, pepsin and pancreatin were not altered by x irradiation.

10008

CELLULAR DESTRUCTION AND PROTEIN DEGRADATION INDUCED BY EXPOSURE TO X-RAYS. K. I. Altman, G. L. Haberland, K. Schreier, and L. H. Hempelmann. *Radiation Research* **5**, 466(1956).

By means of C^{14} label, the fate of dietary glycine in x-irradiated CLD_{50} animals was studied. Irradiation caused a 10-fold increase in protein breakdown, the tracer studies suggesting that labeled glycine is transported to the liver from radiosensitive tissues. Glycine synthesis by liver is inhibited.

10009

RADIOACTIVE FERTILIZERS AND PLANT GROWTH. B. C. Aston. *New Zealand J. Agr.* **20**, 172-3(1920).

A brief review of work in England and America.

10010

RADIOACTIVITY AND NITROGEN FIXERS. E. Kayser and H. Delaval. *Compt. Rend.* **179**, 110-112(1924). (In French).

Presence of U material from Belgian Congo, (60 parts U3 O8 per 100) increased the amount of fixed N2 in three N-fixing microorganisms. This increase varied from 35 to 100%. (from abstract). CA 18-3001

10011

PLANT STUDIES - EFFECT OF RADIOACTIVITY IN PLANT PHYSIOLOGY. D. Montet. *Compt. Rend.* **195**, 582-84(1932). (In French).

The effects of uranium, thorium, radium and radon on the germination and development of plants have been studied. Plants studied include wheat, barley, balsam, hyacinth, tulip, *Clarkia* and *Pelargonium*. The effects of radioactivity can be shown by a smooth curve indicating effects similar to those on animal physiology. It appears that radiation acts on the surface of the grains since there is a considerable difference between small and large grained plants. Techniques are described for studying catalytic and radioactive effects of the isotopes. With weak doses of radiation a favorable influence on pigmentation is reported. CA 27-1380

10012

EFFECT OF X RAYS ON PLANTS. E. Miede and H. Coupe. *Compt. Rend.* **159**, 338-340(1914). (In French).

X rays exert very favorable action on growth of *Raphanus Sativus* and *Lepidium Sativum* as shown by an increase of 45% in the weight of the leaves and 59% for the whole plant. (from abstract). CA 9-3809

10013

DIFFERENTIAL RESPONSE TO X RAYS OF DIPLOID AND TETRAPLOID BARLEY. A. Muntzing. *Nature* **148**, 319(1941).

Tetraploid barley produced by temperature shocks on diploid Opal B variety has low fertility. Response of tetraploids to X-rays was less than that of diploids. A gene hit at one locus in a tetraploid is protected by three genes; there is only one gene for protection in a diploid (from abstract).

10014

EFFECT OF γ -RAYS ON THE SEROLOGICAL PROPERTIES OF OVALBUMIN. H. Fricke, C. A. Leone, and W. Landman. *Radiation Research* **6**, 478(1956). (Abstract).

10015

SECONDARY ELECTRON EMISSION FROM METAL FOILS AND ANIMAL TISSUES. W. V. Mayneord. *Proc. Roy. Soc. Lond.* **A130**, 63(1930). CA 25-871

10016

STUDIES ON THE EFFECT OF X RAYS ON PLANTS.

G. Tolomei. *Nature* **57**, 323-324(1898).

Action of x-rays on vegetable life is identical with that of light (sunshine, electric, or magnesium light). *Elodea canadensis*, immersed in carbonic anhydride-charged water, was exposed to x-rays. Result was an evolution of bubbles, as in the presence of light. Other vegetable forms showed similar results.

10017

EFFECT OF X RAYS UPON AGRICULTURAL SEEDS.

A. Gustafsson. *Nature* **158**, 488(1946).

Effects of treating dormant seeds of various crops with X-rays are discussed. Critical dosage above which great lethality occurs varies among species. Peas require about 7,500 r; but *Brassica napus* and *Linum* are highly resistant at more than 50,000 r. Resistance is probably due to the oily or fatty nature of the cell contents. (from abstract).

10018

RADIUM AND PLANTS. H. H. Dixon. *Nature* **69**, 5(1903).

Seeds distributed over moist sand were exposed to radium bromide in the dark. Seedlings immediately under the radium tube were retarded in development; growth of other seedlings was nearly uniform. No other noxious effects appeared. Motile organisms showed little sensitivity to radiations. (*Volvox globator*).

10019

SUCCESSFUL SKIN HOMOGRAFTS AFTER THE ADMINISTRATION OF HIGH DOSAGE X RADIATION AND HOMOLOGOUS BONE MARROW. Joan Michel Main and Richmond T. Prehn. *J. Natl. Cancer Inst.* **15**, 1023-9 (1955).

Mice were irradiated (200 kv. 15 Ma, 54 cm. dist., 0.25 mm Cu and 0.55 mm Al) and treated in one of 3 ways: (1) 350 r; (2) 750-800 r, then injected intravenously with bone marrow homologous to skin grafts, (3) 750-800 r, injected with hybrid bone marrow homologous to recipient but containing antigenic components identical with skin graft antigens. Skin grafts from different strain were made 24-30 days after irradiation. Only grafts made on Group III took. NSA 9-2560

10020

RADIATION INDUCED INSTABILITIES IN STREPTOMYCES.

H. B. Newcombe. *J. Gen. Microbiol.* **9**, 30-36(1953).

Heritable changes affecting colony color and morphology were produced by γ - or u-v irradiation of spores of *Streptomyces* sp. The two types of radiation were equally effective. Gene mutations occurred frequently; initial changes may be chromosomal rearrangements. BA 28-17617

10021

AN ABSOLUTE TISSUE DOSIMETER FOR FAST NEUTRONS.

G. S. Hurst. *Brit. J. Radiol.* **27**, 353-57(1954).

10022

EFFECT OF RADIATION LETHALITY OF VARIOUS AGENTS RELEVANT TO THE H_2O_2 CATALASE HYPOTHESIS.

R. N. Feinstein, G. J. Cotter and M. M. Hampton. *Am. J. Physiol.* **177**, 156(1954).

10023

STUDIES ON THE MECHANISM OF ACTION OF IONIZING RADIATIONS IN PLANT SEEDS. Lars Ehrenberg. *Svensk Kem. Tidskr.* **67**, 207-224 (1955).

In case of irradiated resting barley seeds, it was found that readily titratable sulfhydryl, β -amylase, reducing sugars and bound auxin were independent of the water content at the time of radiation. However, irradiation of resting seeds was found to affect the α -amylase and auxin formation during the early germination stage. CA 50-8806

10024

THE EFFECT OF CHEMICALS AND RADIATIONS ON MITOSIS. J. Chury, V. Hudecek, M. Skalka and V. Slouka. Scripta Med. Fac. Med. Univ. Masarykianae et Palackyanae 23, 147-158(1949).

Influence of sulfanilamide, $K_2Cr_2O_7$ in certain dilutions, vapor of Br, and 80-KV x-ray on root cells of Allium cepa was judged mainly by breaking and swelling of chromosomes. The similarity of effects of the various agents indicates that a toxic substance formed in plasma on nucleus. (from abstract). CA 6-11341

10025

THE BIOLOGICAL ACTION OF RADIATIONS. FACTORS OF SELECTIVITY. I. THE TIME FACTOR. J. Palacios and H. Tellez-Plasencia. Anales Soc. Espan. Fis. Y. Quim 32, 677-681(1934).

In this theoretical study most of the work is devoted to the time when the action of x-rays is greatest, i.e. in the labile phase. Two possible simultaneous different equations are presented which represents the number of cells produced as a function of the time. CA 28-6448

10026

ABNORMAL PLANT GROWTH UNDER THE INFLUENCE OF VITAMINS, HORMONES, AND RADIATIONS. J. V. Ries and F. Ludwig. Rept. Proc. Intern. Congr. Microbiol., 3rd Congr., New York, 1939. 33, 552-553(1940).

The growth of germinating wheat grains is strongly stimulated by irradiation with 6 m. shortwaves for 2-5 mins., markedly inhibited by an irradiation for 10 mins. The embryonic development of frog spawn or frog tadpoles is inhibited by an irradiation for 5 mins., while a single or repeated irradiation for 10 mins. has an accelerating effect on the development. CA 35-1461

10027

SHORTENING THE REST PERIOD OF SEEDS OF AESCULUS HIPPOCASTANUM L. WITH URANYL NITRATE. R. Retovsky. Ber. Deut. Botan. Ges. 60, 355-366(1942).

When resting seeds are soaked in a solution of uranyl nitrate for 24 hours, the speed of germination is increased. With less dormant seeds small concentrations of the chemical give best results while higher concentrations may delay germination. CA 37-6707

10028

BIOCHEMICAL MUTATIONS IN NEUROSPORA. D. Bonner. Cold Spring Harbor Symposia Quant. Biol. II, 14-24 (1946).

Biosynthesis of vital substances by mutant strains of Neurospora appears to occur as a chain of reactions each yielding characteristic end products. The mechanism of genetic blocking of these reaction chains is discussed. (from abstract). BA 22-19745

10029

THE BIOLOGICAL ACTION OF X RAYS AS A FUNCTION OF INTENSITY. A. A. Bless. Phys. Rev 65, 356(1944)

Various x ray intensities (from 25 r/min to 5000 r/min) produced no significant differences in length of stems of Big Club Variety wheat sprouts from irradiated seeds when the dosage was constant. (from abstract). BA 9-15229

10030

EFFECT OF X RAYS ON THE PRODUCTION OF INDOPHENOL-BLUE FORMATION (NADI-REACTION) IN YEAST CELLS. E. Bautz. Naturwissenschaften 41, 375-376(1954).

An x ray dose of 50000 r causes 55 per cent of Rhodotorula rubra cells to die. There is an increase to 70 per cent of nadi-negative cells. The number of nadi-positive

cells determines the extent of the x ray effect. The nadi-negative cells recover more rapidly in new than in old nutrient media. CA 49-9734

10031

THE INFLUENCE OF URANIUM SALTS ON SOIL MICRO-ORGANISMS AND ON THEIR FUNCTION. G. Luchetti. Boll. Inst. Agrar., Pisa 8, 571-591(1932).

Soil microorganisms are enhanced by uranyl nitrate and uranyl acetate at low concentrations while at higher concentrations there is an inhibitory effect. The author states that the salts in low concentration apparently enhances nitrogen fixation in the soil while affecting ammonification. CA 27-3549

10032

POTASSIUM AS AN ANTAGONIST OF X RAYS AND RADIUM. G. A. Nadson and A. Zholkevich. Vestnik Rentenol, i Radiol. 3, 85-106(1924).

Seeds of Sinapis Alba were exposed to ultra-violet dipped into solutions of various salts or exposed to Ra rays, and the germination rate and number of germinating seeds determined. Seeds treated with KI and exposed to Ra grew better than those directly exposed to radium. Na salts showed no such action. (from abstract). CA 20-1649

10033

ELECTRONIC PRESERVATION OF FOOD. Wolfgang Huber. Electronics 21, 74-9(1948).

Foods and drugs can be preserved for long periods by exposure in sealed containers to ultra-short-time pulsed cathode rays from a capacitron. Energy from a capacitron is cold energy of considerable intensity, making it possible to treat products at temperatures below freezing in any physical state.

10034

EFFECT OF IRRADIATION ON FERMENTATIVE MICRO-ORGANISM I. MORPHOLOGICAL AND BIOCHEMICAL CHARACTERISTICS OF RACES OF ASPERGILLUS NIGER PRODUCTS BY RADIUM TREATMENT. R. Nakazawa and M. Simo. J. Agr. Chem. Soc. Japan 14, 895-910 (1938). (Nippon Nogei-Kagaku Kaishi).

RaBr was used to treat Aspergillus niger for varying lengths of time. This resulted in five races showing morphological and biochemical changes. CA 34-3308

10035

THE ACTION OF RADIUM AND X RAYS ON MICRO-ORGANISMS. II. THE PRODUCTION OF ACIDS BY RADIUM-IRRADIATED ASPERGILLUS NIGER. Ryozi Nakazawa and Mituo Simo. J. Agr. Chem. Soc. Japan 15, 547-552 (1939). (Nippon Nogei-Kagaku Kaishi).

After treatment with radium, some varieties of Aspergillus showed increased acid formation. Citric acid fermentation was increased in one and oxalic acid fermentation in another. CA 34-3308

10036

THE EFFECT OF X RAYS ON FERMENTS IN BARLEY SEEDS AND SPROUTS. V. P. Nilova. Trudy Priklad. Botan Genet. 1. Seleksi 14, 109-115(1936).

Barley seeds treated with x rays exhibited decreased catalase activity. X rays did not affect peroxidase of seeds or seedlings. Methylene blue was decolorized more slowly by extracts of irradiated seeds than by those of normal seeds. X rays did not affect amylase of seeds or seedlings. Irradiation increased proteolytic activity. CA 31-5840

10037

EXAMINATION OF THE POSSIBILITY OF THERAPY OF PLANT DISEASE WITH IONIZING RADIATION. P. E. Waggoner and A. E. Dimond. Phytopathology 42, 599-602(1952).

Therapy of Fusarium wilt of tomato by external sources of gamma or X-radiation were unsuccessful.

ful because hosts were injured at 10^5 roentgen (r) of gamma at 25 r/hr. or X-radiation at 20000 r/hr., while doses greater than 10^6 r are required to eliminate spores or vegetative cells of *Fusarium oxysporum* f. *lycopersici*. Radioisotopes could possibly be accumulated in diseased tissue as a result of metabolic accumulation or mechanical stoppage of trans-locative processes. Because of such effects, therapy might have been possible when a radioisotope was used which was accumulated in diseased tissues to such a degree that death of the parasite was favored while injury to the host was minimized. The amount of P^{32} arriving at the growing point following soil application was only slightly less in diseased than in healthy plants. Therefore, therapy of *Fusarium* wilt of tomato by internal sources of radiation seems unlikely. CA 47-2278

10038

RADIATION-INDUCED NUTRITIONAL AND MORPHOLOGICAL MUTANTS OF *GLOMERELLA*. Clement L. Markert. Genetics 37, 339-352(1952).

Of 10,839 colonies grown from irradiated spores, 2620 were mutant. No qualitative differences in mutagenic effect were found to be associated with any particular quantity of any of the three radiations used. Kinds or proportions of mutants did not change with dose or type of radiation. (from abstract). BA 27-3100

10039

EFFECT OF STARVING AND DOWEX 50 TREATMENT ON GROWTH OF NORMAL AND X-IRRADIATED YEAST. William J. Bair and J. N. Stannard. J. Gen Physiol. 38, 505-513(1954-1955).

Effects of starvation or treatment with dowex 50 resin on respiration and fermentation parallel effects of 90,000 r of 250 Kv. x-rays. Starvation increased radiosensitivity of cell division processes. Neither starvation nor resin altered growth of non-irradiated yeast. Two effects of radiation: (1) permanent inhibition of growth, (2) temporary inhibition of the remaining cells resulting in delay of growth. (from authors' summary).

10040

ANTIBIOTICS PRODUCED BY ACTINOMYCETES. II. X-RAY INDUCED MUTATION OF *STREPTOMYCES VINACEUS*. K. Minoura. Hakko Kogaku Zasshi 27, 100-103(1949).

Mutants of *Streptomyces vinaceus* were produced as a result of irradiation of the conidia. The mutants showed loss of antibiotic action against *Escherichia coli*. CA 47-11329

10041

THE ASSOCIATION OF DIFFERENT ALTERATIONS IN SELF-FERTILE X RAYED DERIVATIVE OF *NEUROSPORA TOTRA-SPERMA*. W. S. Malloch. Mycologia 33, 540-554(1942).

Cultures were grown from ascospores exposed to hard x rays and Grenz radiation. Frequency distributions for ascospore production, color of substratum, conidiospore production and perithecia development in the hard x ray and Grenz radiation, are presented. (from abstract). BA 16-5061

10042

GIANT PLASTIDS IN FERNS PRODUCED FROM X-RAYED SPORES. Lewis Knudson. Am. J. Botany 21, 712-13(1934).

In prothallia from x-irradiated *Polypodium aureum* spores large amoeboid-like plastids were observed. In older cells of prothallium in the region of rhizoids, plastids were more uniformly circular in cross section. In peripheral cells, amoeboid-shaped plastids were of various grotesque forms. Photographic and other

evidence indicates that giant amoeboid-like plastids are formed by the union of smaller plastids.

10043

FURTHER NOTES ON THE BIOLOGICAL ACTION OF METALS AT A DISTANCE. V. Rivera. Atti. Pontif. Accad. Sci. Nuovi Lincei 86, 240-242(1933).

Growth of organisms placed a few cm from metals of high atomic weight is stimulated presumably by radiations from the metal. Whether effect is stimulating or depressive depends on dosage, distance of metal or secondary source of radiation. (Reference found in Mycol. 13, 178(1933)). CA 28-4441

10044

STIMULATION OF GROWTH IN *ASPERGILLUS NIGER* UNDER EXPOSURE TO LOW VELOCITY CATHODE RAYS. C. E. Buchwald and R. M. Whelden. Am. J. Botany 26, 778-84(1939).

When irradiated with cathode rays of certain energies and densities and subsequently cultured on potato-maltose agar, spores of the Ascomycete fungus *Aspergillus niger* are definitely stimulated in growth. Earlier, more rapid swelling and germ tube production by a larger percentage of cells were found in the irradiated samples, as compared with controls.

10045

A RECIPROCAL TRANSLOCATION IN *SORGHUM VERSICOLOR* ANDERSS. E. D. Garber. Am. J. Botany 35, 295-7(1948).

In an X-ray induced reciprocal translocation in *S. versicolor* involving the nucleolus chromosome and one of the other chromosomes in the complement, semisterile plants had 50.6%, normal plants less than 5% aborted pollen grains. Normal plants had 85.5% fertile florets while semisterile plants had 34.2%. A study of quartets indicated 50% zigzag of one type of open ring configuration, and 26.8% of a second type.

10046

INTERMEDIATES IN CHLOROPHYLL SYNTHESIS USING *CHLORELLA* MUTANTS. S. Granick. Am. J. Botany 36, 825(1949).

By X-irradiation of *Chlorella*, mutants with altered chloroplast pigments have been obtained. Several key intermediates have been identified which permit a reasonable interpretation of the pathway of chlorophyll synthesis. Steps leading to chlorophyll synthesis are summarized. (from author's summary).

10047

IMMEDIATE EFFECTS OF 200 r AND 400 r OF X-RADIATION ON THE MICROSPORES OF *TRADESCANTIA PALUDOSA*. A. V. Beatty and J. W. Beatty. Am. J. Botany 41, 242-50(1954).

Tradescantia microspores were exposed to either 200 r or 400 r of x rays at 30°C. After both doses, chromosomes irradiated in the earlier part of midprophase reverted to an earlier stage, those irradiated in the latter part of midprophase showed clumping at metaphase and anaphase. (from abstract).

10048

CHROMOSOME TRANSLOCATIONS INDUCED IN *TRITICUM X AGROPYRON* HYBRIDS BY X RAYS, PHOSPHORUS³², AND SULFUR³⁵. Thomas S. Osborne and Fred C. Elliott. Am. J. Botany 42, 646-9(1955).

X-raying dormant grains with 12,000 to 20,000 r increased PMC interchange two to three times above controls, while imbibition of aqueous P^{32} or S^{35} in sublethal to lethal amounts produced little or no effect on interchange frequency. Dormant grains exposed to 12,000 to 14,000 r yielded 0.40 interchanges per PMC, storing dormant grains in oxygen these exposures yielded an average frequency of 0.61 interchanges. (from authors' summary).

10049

OBSERVATIONS ON THE ACTION OF X RAYS ON PLANT CELLS. Maud Williams. Ann. Botany (London) 37, 217-24(1923).

Strips of tissue from the upper surface of the petiole of *Saxifraga umbrosa* showed depressed circulation after x irradiation, and recovery in 24 hours. Viscosity of the protoplasm is lowered in the early stages of radiation. There is no direct influence of the rays upon the anthocyanin or chlorophyll. Solutes diffuse from the vacuole into the protoplasm which appears to coagulate. (from author's summary).

10050

RADIOISOTOPES IN SOILS RESEARCH AND PLANT NUTRITION. S. B. Hendricks and L. A. Dean. Ann. Rev. Nuclear Sci. 1, 597-610(1952).

Field and greenhouse experiments with P^{32} as well as other applications of radioisotopes to soils research and plant nutrition are reviewed. NSA 6-5726

10051

THE INACTIVATION OF DRY PENICILLIN BY DEUTERON BOMBARDMENT. Marquerite Davis and Ernest Pollard. Arch. Biochem. Biophys. 37, 112-16(1952).

Assuming that the random arrival of one primary ionization inactivates the molecule an inactivation volume of $700 \text{ \AA}^3$ is found for dry penicillin bombarded with deuterons. Actual molecular volume is $400 \text{ \AA}^3$. Inactivation volume is thought to be too large because of action of the various forms of energy in a primary ionization on more than one molecule. (from abstract). NSA 6-6263

10052

EFFECT OF HIGH VOLTAGE CATHODE RAYS ON RICKETS AND ON THE ACTIVATION OF CHOLESTEROL. D. Knudson and W. D. Coolidge. Proc. Soc. Exptl. Biol. Med. 24, 366-9(1927).

Because of damage to skin by rays, it is not possible to give dose necessary to activate enough cholesterol of skin to cure rickets. CA 22-2770

10053

INTRATHORACIC CHANGES FOLLOWING X RAY TREATMENTS, CLINICAL AND EXPERIMENTAL STUDY. K. S. Davis. Radiology 3, 301-322(1924).

Irradiation of the thorax of rabbits and dogs produced pulmonary and pleural lesions. Clinical observations are also discussed.

10054

EFFECTS OF FOOD IRRADIATED WITH X RAYS UPON MICE. J. K. Narat. Radiology 8, 41-3(1927).

Mice fed with x irradiated food show diminished activity, sluggish motions, retardation of growth (1/3 cases) weight loss in a few cases and increased mortality and morbidity.

10055

SPECULATIONS ON HAZARDS OF EXPOSURE TO RADIATIONS. John Keosian. Science 122, 586-7(1955).

Author speculates on mutations caused by increasing background radiation. (No experimental data). NSA 9-7248

10056

PRECONCEPTION OVARIAN IRRADIATION; ITS INFLUENCE UPON THE DESCENDANTS OF THE ALBINO RAT (*MUS NORVEGICUS*). D. P. Murphy. Surg. Gynecol. Obstet. 50, 588-593(1930).

Litter size of female rats whose ovaries were exposed to Radon before mating with non-irradiated male was decreased. First generation offspring showed delayed growth and fertility, probably attributable to effect of radiation on mother's health. No developmental defects were found in second generation, produced by mating with brothers or other males from irradiated mothers.

10057

ON THE OCCURRENCE OF THE OESTROUS CYCLE AFTER X RAY STERILISATION. PART IV. IRRADIATION OF THE ADULT DURING PREGNANCY AND LACTATION, AND GENERAL SUMMARY. A. S. Parkes. Proc. Roy. Soc. (London) B102, 51-62(1927).

Irradiation of mice with sterilizing dose of x rays during pregnancy resulted in abortions. Oestrus reappeared after irradiation. Mice were also sterilized during lactation, and after prolonged lactation oestrus reappeared. Irradiation did not affect corpora lutea of lactation and they became histologically "permanent." Duration of lactation is not affected by sterilization. CA 21-3660

10058

EFFECT OF METALS AT A DISTANCE ON GERMINATING SEEDS. G. A. Nadson and C. Shtern. Compt. Rend. 201, 159-161(1935).

Action of Al, Fe, Cu, Sn, Pt, Au, Pb on growth of germinating white mustard seeds is presented. Biological action of metal depends on thickness and dimensions of their surface. Action is due to emission of secondary rays, principally electrons, from the metals under the influence of radioactivity of the circumambient medium. (from abstract). BA 11-15720

10059

RADIOACTIVITY OF THE ROCKS IN THE FAR EAST AND ITS INFLUENCE ON FORESTS. L. L. Lagunov. Bull. Far East. Branch Acad. Sci. USSR no. 9, 105-109 (1934).

Ra is present in the igneous and sedimentary rocks of eastern Siberia as well as in small amounts in the soil. Tests showed that with an increase in radioactivity, there was a corresponding increase in self seeding with many more trees in a given area. However, with larger Ra concentrations, there was a marked decrease in the number of broad-leaved trees. CA 29-3910

10060

FIXATION BY PLANTS OF RADIUM AVAILABLE IN THE SOIL. A. Lepape and R. Trannoy. Compt. Rend. 199, 803-805(1934).

Plants tend to pick up Ra when present in soil either naturally or added as a fertilizer. This may result in the collecting of Ra in an animal body as a result of consumption of these plants. CA 29-870

10061

DISTRIBUTION OF RADIUM AND URANIUM IN PLANTS RAISED ON MEDIA WITH DIFFERENT CONCENTRATIONS OF THESE ELEMENTS. K. G. Kunasheva. Trav. Lab. Biogeochem. Acad. Sci. URSS 5, 197-200(1939).

Ra and U were added to Helriegel's solution in which *Pisum sativum* was grown. Ra was absorbed by all parts of the plant, while U was absorbed by the roots only. CA 34-4113

10062

COUPLED OXIDATION-REDUCTION INDUCED BY IONIZING RADIATIONS. E. S. G. Barron and P. Talmadge. Radiation Research 5, 468(1956). (Abstract).

10063

EFFECT OF X-IRRADIATION ON POTASSIUM EXCHANGE IN YEAST. A. K. Bruce and J. N. Stannard. Radiation Research 5, 471(1956). (Abstract).

10064

ENZYME ALTERATION BY IONIZING RADIATION. D. L. Aronson, M. J. Fraser and C. L. Smith. Radiation Research 5, 225(1956).

10065

EFFECT OF X RAYS ON MEIOTIC AND MITOTIC CELL DIVISION IN *TRITICUM VULGARE*. R. Imbert and J. Courtine. Ann. Univ. Montpellier, Suppl. Sci. Ser. Botan. 4, 30-42(1949).

Plants receiving an x ray dose of 2000 V on the 20th day showed greater development than controls and up to 30% more fertile flowers per head. Plants irradiated for 6 periods of 3.5 min. with intervals of 1 hr., developed slowly. Plants irradiated for 3 periods of 7 min. at intervals of 2 hrs 30 min were more retarded.

10066

INFLUENCE OF RADIUM ON THE DEVELOPMENT AND GROWTH OF THE LOWER FUNGI. J. Dauphin. *Nature* 69, 311(1904).

Radium rays arrest growth of the mycelium of *Mortierella*, but spores and mycelium are not killed. When returned to normal growing conditions, they can germinate and continue to grow. (from abstract).

10067

EFFECT OF PROCESSING CONDITIONS ON ORGANOLEPTIC CHANGES IN FOODSTUFFS STERILIZED WITH HIGH INTENSITY ELECTRONS. W. Huber, A. Brasch, and A. Waly. *Food Technol.* 7, 109-115(1953).

Since penetrating ionizing radiation may adversely affect food flavor and texture, commercial radiation sterilization will require development of technics to avoid such changes without increasing markedly the energy required for sterilization. Several such technics, both physical and chemical, are found in irradiation in the frozen state, irradiation in the absence of oxygen, and irradiation in the presence of radical acceptors. Oxygen is one of the principal factors. Since in many instances the oxygen threshold values were as low as 1 per cent of saturation, methods for oxygen removal were developed, including counter-current stripping with inert gases, and pre-storage in closed containers at controlled temps. Radical interceptors of chemical nature include spices and press juices of organs such as liver, brain and spleen. Tocopherol, esters of gallic acid and certain other polyphenols may be combined with synergists such as ascorbic acid and citric acid to enhance protective action for protection of flavor and color in foodstuffs. CA 47-12668

10068

BIOLOGICAL EFFECT OF THE PENETRATING RAYS OF THE ELEMENTS. XI. DETERMINATION OF THE PROPERTIES OF LEAD RADIATIONS AFTER THEIR PARTIAL ABSORPTION BY LEAD. P. Gyurko. *Erdeszeti Kiserletek* 49, 183-188(1949).

The tropism of germinating plants was used in determining the biological effect of penetrating rays from lead plates. CA 46-1055

10069

THE BIOLOGICAL EFFECT OF THE PENETRATING RAYS OF ELEMENTS. D. Feher. *Erdeszeti Kiserletek* 47, 212-221(1947).

The biological effect of penetrating rays of 72 elements (68 of which were not radioactive) and their salts was studied with peas. The following elements gave the most intense biological effect: He, Er, Yb, Na, Be, Kr and Ar. CA 45-1630

10070

INFLUENCE OF RADIOACTIVE MINERALS ON WHEAT. A. J. Ewart, Jr. Dept. of Agr. Victoria, Australia 9, 155-157(1910).

When radioactive rock containing 0.218% P_2O_5 , 0.740% K_2O , 0.400% CaO , 2.14% MgO was used as fertilizer, inconsistent results were obtained. (from abstract). CA 5-2508

10071

GROWTH ERGONES AND ANTIERGONES. H. von Euler. *Svensk Kem. Tidskr.* 58, 180-187(1946).

Proteus vulgaris showed increased growth in ribonuclein, diminished growth in colchicine, and no effect in DNA. *Streptococcus hemolyticus* also had a diminished growth in colchicine. Growth inhibiting actions of x rays applied to washed and germinating barley seeds were more acute than when seeds were unwashed. CA 41-3841

10072

INFLUENCE OF ROENTGEN RAYS ON YEAST CELLS. H. von Euler. *Svenska Bryggare foren. Manadsblad* (Stockholm) 57, 141-146(1942).

A 40 per cent increase in respiration, as measured by oxygen uptake, occurred in yeast cells treated with x rays. The respiration was not influenced by aniline; Na_2HAsO_3 influenced the cells to return to the normal rate of respiration. CA 37-5107

10073

THE EFFECT OF IONIZING RADIATIONS ON THE BROAD BEAN ROOT. PART IV. THE LETHAL EFFECT OF ALPHA RADIATIONS. L. H. Gray and John Read. *Brit. J. Radiol.* 15, 320-36(1942).

Bean roots were exposed to a known dose of α radiation by immersing the tissue in water containing dissolved radon. Compared on basis of ionization per unit volume of tissue, α radiation is about equal in efficiency to neutron radiation, and 9 times as efficient as γ radiation in killing bean roots. (from authors' summary)

10074

CHEMICAL STUDIES ON DIPLOID AND TRIPLOID ASPENS FROM NORMAL AND X-RAYED POLLEN. H. von Euler. *Arkiv. Kemi, Mineral, Geol.* 26A(30), 19p. (1942).

Crosses were made between tetraploid and diploid aspens with and without irradiated pollen. Leaves of triploid plants contained about 2.5 times as much ribonucleic acid and more chlorophyll than those of diploid plants. The amounts of ascorbic acid, catalase, and dehydrogenases for succinic and citric acids were the same in triploid and diploid leaves. CA 43-5831

10075

MECHANISMS INVOLVED IN THE ACTION OF RADIATIONS ON THE CELL NUCLEUS. M. Errera. *Ann. Soc. Roy. Sci. Med. Et. Nat. Bruxelles* 5, 65-176(1952).

Subjects reviewed include: blockage of mitosis, changes in cytology, x ray effects on virus and bacteriophages, genetic effects on nucleus, especially in salivary glands of drosophila. Direct chemical action of radiation is discussed in explaining biological effects. Author also compares effects of ionizing and U. V. radiation. (from abstract). CA 46-10230

10076

INVESTIGATION OF THE PACHYTENE OF NORMAL AND X-RAYED POLLEN MOTHER CELLS OF *SOLANUM LYCOPERSICUM*. Verner Gottschalk. *Chromosoma* 4, 298-341(1951).

Each inflorescence of Sieger tomatoes was exposed to an x ray dose of 300-1000 r, with a dose interval of 100 r. Pollen mother cells of Sieger tomatoes were studied in acetocarmine smear preparations. The 12 pairs of chromosomes were individually identified by length, symmetry, location of the centromere, the number of macrochromomers in the heterochromatin, and nature of telomere. X-radiation induced all types of aberrations. (from abstract). BA 26-10374

10077

THE STABILITY OF BROKEN ENDS OF CHROMOSOMES IN *ZEA MAYS*. Barbara McClintock. *Genetics* 26, 234-282(1941).

Using structural modifications of chromosome 9, dicentric chromatids were produced at meiosis following crossing-over. Many chromatids with broken end but

with complete complement of genes were produced. Fusion at the position of breakage between sister halves results in an anaphase bridge configuration. When a chromosome with a newly broken end is introduced, broken end heals. (from abstract). BA 15-14129

10078

A CORRELATION OF RING-SHAPED CHROMOSOMES WITH VARIATION IN ZEA MAYS. Barbara McClintock. Proc. Natl. Acad. Sci. U. S. 18, 677-681(1932).

Pollen carrying dominant allelomorphs of genes affecting pigmentation was x-rayed and placed on silks of recessive plants. Variegation, composed of dominant and recessive color types was found in F. plants possessing a ring-shaped chromosome. (from abstract). BA 8-5179

10079

COMPARISON OF X-RAY AND CHEMICALLY-INDUCED CHROMOSOME MUTATIONS IN THE PACHYTENE OF SOLANUM LYCOPERSICUM. Werner Gottschalk. Chromosoma 4, 342-58(1951).

Plants were treated with M/20 ethyl urethane in combination with M/200 KCl, or AlCl₃ in concentrations of M/50 and M/1000, for 24 hrs., then left in running water for 48 hrs. before fixing. On acetocarmine smears with all agents tested, majority of breaks occurred at insertion region. Effects of chemicals and x-radiation are broadly comparable. (from abstract). BA 26-10875

10080

THE INDUCTION OF PARTHENO-CARPY IN PETUNIA. Henry A. McQuade. Ann. Missouri Botan. Garden 39, 97-112(1952).

Parthenocarpic fruits were produced in Petunia with 2, 4-D x-rayed pollen, and x-rayed ovaries. Lethal doses for various tissues are discussed. BA 27-99

10081

STUDIES ON THE BIOLOGICAL EFFECT OF RADIATION. H. Holthusen. Pfluger's Arch. Ges. Physiol. 187, 1-24 (1921). (In German).

10082

CHROMOSOME BREAKAGE INDUCED BY ABSORBED RADIOACTIVE PHOSPHORUS. T. J. Arnason. Cold Spring Harbor Symposia Quant. Biol. 13, 1-5(1948).

The use of radioisotopes to induce mutations is discussed and experiments on cytological effects of radioactive phosphorus upon germinating seed and seedlings of Triticum vulgare, T. durum, T. monococcum and Hordeum distichum are described. (from abstract).

10083

EFFECT OF INDOLEACETIC ACID ON ROOT GROWTH OF X-IRRADIATED PEAS. E. S. Mika. Botan. Gaz. 113, 285-293(1952).

Idaho White peas treated with different dosages of x-ray were observed for growth inhibiting effect. Irrespective of irradiation, development of axillary bud in decapitated seedlings was promoted in absence and inhibited in presence of IAA. Initiation and development of lateral roots in intact and decapitated plants were accelerated when IAA was present. (from abstract). BA 26-22583

10084

THE INFLUENCE OF THE ANTIQUITY OF THE CELL UPON CELL RESISTANCE TO RADIUM AND X-RAYS. R. H. Millwee. Radiology 22, 74-76(1934).

Cells of algae, molds, ferns, and others of this type have probably existed in the earth and have remained unchanged for long periods of time in spite of being irradiated by continuous exposure to natural radiation and cosmic radiation. The author speculates that this fact may be due to an acquired resistance by these cells. CA 28-2021

10085

MULTI-OVARY IN BARLEY. A MUTANT INDUCED BY

ATOMIC BOMB IRRADIATION. C. C. Moh and R. A. Nilan. J. Heredity 44, 183-184(1953).

Characteristic of mutant is its floral structures. Young florets have normal organs. During later development, anthers produce stigmata and stamens eventually become ovaries. Mutant behaves as simple recessive. (from abstract). BA 28-12716

10086

INDUCED MUTATIONS AND PLANT BREEDING. P. Jacquard. Compt. rend. Congr. Cinquantenaire. Ec. Colon. Agr. (Tunis) 1, 1-18(1950).

Methods, including irradiation, and results obtained in various countries by use of induced mutations in plant breeding are reviewed.

10087

THE ACTION OF X-RAYS ON THE RYE. III. X-RADIATION OF SEEDS. L. P. Breslavetz and A. S. Afanassieva. Cytologia 8, 110-27(1937).

X-ray doses of 250 r to 8000 r stimulate growth, development, and yield of plants. The dose 750r produced the greatest increase in number of seeds and weight and also increased fertility.

10088

A STUDY OF X-RAY INDUCED CHROMOSOMAL ABERRATIONS IN BARLEY. Richard S. Caldecott and Luther Smith. Cytologia (Tokyo) 17, 224-42(1952).

Chromosomes in resting embryo responded to x-irradiation (applied at 34 KVP and 27 doses ranging from 0 to 32,000 r) as though they were monopartite. Single bridges at anaphase in somatic cells were rare. Observations suggest acentric fragments may undergo one division, but do not persist beyond subsequent resting stage. Ordinarily, broken ends of chromosomes unite shortly after breakage but delayed attachments do occur. (from authors' summary).

10089

THE PROBLEM OF RADIATION DAMAGE IN FERTILIZER STUDIES WITH LABELLED PHOSPHATE. R. S. Russell, R. P. Martin and S. N. Adams. Trans. Intern. Congr. Soil Sci., 4th Congr., Amsterdam 2, 138-141(1950).

When young barley plants were treated with P^{32} , the rate of growth of roots and absorption of phosphates were significantly reduced. Winter wheat in soil culture pots containing P^{32} showed decreased phosphate absorption. CA 46-4612

10090

ACTION OF URANIUM NITRATE AND MANGANESE SULFATE WHEN ADDED TO GROWTH FACTORS, ON GERMINATION AND PRODUCTIVITY OF PISUM SATIVUM. Paul Becquerel and Jacqueline Rousseau. Compt. Rend. Acta. Sci. (Paris) 224(11), 773-775(1947). (In French).

Pea seeds were put to germinate after soaking in uranium nitrate, manganese sulfate, phenylacetic acid, β -indoleacetic acid, or a mixture of these. Uranium nitrate and $MnSO_4$ increase inhibition exercised on germination by phenyl- and indoleacetic acids. Mixture of Phenylacetic acid (10^{-5}) and $MnSO_4$ (10^{-4}) had favorable effect on yield of seeds. (from author's summary). BA 22-19247

10091

BIOLOGICAL ACTION OF RADIOACTIVE SUBSTANCES. II. ACTION OF COLLOIDAL THORIUM OXIDE ON GERMINATION OF SEEDS. V. Bevilotti. Boll. Soc. Ital. Biol. Sper. 19, 283-285(1944). (In Italian).

Dilute solutions of colloidal ThO_2 accelerated wheat and corn germination while higher concentrations inhibited this action. If sprouting occurred, there was no difference in treated or untreated seeds following the first 10 days of growth. CA 41-1734

10092

F₁'s FROM RADIUM-TREATED POLLEN. A. F. Blakeslee, S. Satina, A. D. Bergner, J. S. Potter, and A. G. Avery. *Anat. Record* **47**, 383(1930).

Of 400 F₁ individuals from pollen treated with radium, nearly half were abnormal. Chromosomal abnormalities include segmental interchanges causing closed circles of four to six members, simple translocations causing chains of four or more members; deficiencies for a whole or part of a chromosome, additions of a chromosome or fragment. No gamete lethals exist. Individuals with circles are normal, those with chains are abnormal. (from authors' abstract).

10093

SYMPOSIUM ON PHYSIOLOGICAL EFFECTS OF RADIATION AT THE CELLULAR LEVEL. EFFECTS OF RADIATION ON MARINE ALGAE. L. R. Blinks. *J. Cellular Comp. Physiol. (Suppl. 2)* **39**, 11-18 (1952).

The marine algae surviving at the most radioactive spot accessible on the Bikini Island reefs, 1 yr. after the atom bomb explosions, were abundant, and like those of other, normal, regions nearby, both in appearance and in a variety of functions (pigment content, photosynthetic rate, respiratory rate, calcification, K content, permeability, bio-electric potential, and oxidase activity). Only in 1 function investigated, did algae from radioactive regions differ; their catalase activities were markedly enhanced, possibly in response to H₂O₂ produced by radiation. This suggests an adaptive enzyme effect. If injurious genetic effects had occurred, they were still recessive, or perhaps were missed in the rapid sampling carried on. CA 47-6464

10094

VARIATIONS IN THE EVENING PRIMROSE INDUCED BY RADIUM. W. H. Brittingham. *Science* **74**, 463-464 (1931).

After treatment with radon, evening primrose were self-pollinated. Effects: a necrotic area, abscission of buds, and necrosis of buds in meiosis or younger. Sowings were made of seed from treated buds. Unclassifiable leaf shapes, sizes and other peculiarities existed. The majority of atypical forms did not survive. Those that bloomed had abnormal characteristics, e. g. flowering tip was smaller bore fewer flowers, and had many buds drop before blooming.

10095

POLLEN-TUBE GROWTH AND SEED PRODUCTION AFTER RADIUM TREATMENT. J. T. Buchholz. *Anat. Record* **47**, 382(1930).

Describes; relation between dosage and physiological effect on pollen-tube growth, relation between dosage and proportion of seeds obtained when pollen is used in pollinations of untreated females, genes with no visible effects on heterozygous sporophytes, many of them transmitted through female gametophyte generation in 1:1 ratio and eliminated by gametophytic selection in male gametophyte. (from authors' abstract).

10096

RADIUM EXPERIMENTS WITH DATURA. I. THE IDENTIFICATION AND TRANSMISSION OF LETHALS OF POLLEN-TUBE GROWTH IN F₁'s FROM RADIUM-TREATED PARENTS. J. T. Buchholz and A. F. Blakeslee. *Anat. Record* **41**, 98(1928-1929).

An F₁ from treated pollen produced pollen in which half the pollen grains remained ungerminated on the stigma. F₂ progeny appeared normal. Many F₁ plants from radium-treated parents were heterozygous for lethal genes affecting pollen germination or growth. F₁

plants negative for pollen-tube lethal genes gave rise to F₂ progenies, free from lethals. (from authors' abstract).

10097

RADIUM EXPERIMENTS WITH DATURA. V. EFFECTS OF RADIUM ON POLLEN-TUBE GROWTH RATE, AND THE SEED OUTPUT FOLLOWING TREATMENT. J. T. Buchholz and A. F. Blakeslee. *Anat. Record* **41**, 101-102 (1928-1929).

Pollen from 2n plants of *Datura stramonium* were treated with radium-emanation tubes. Growth rate decreased in proportion to dosage. Seed capsules from treated pollen were aborted without enlargement and aborted after enlargement as dosage decreased. Differences in seed output per capsule occurred with dosage steps of 0.16 millicurie hour. (from authors' abstract).

10098

THE ROLE OF ATOMIC ENERGY IN AGRICULTURAL RESEARCH. J. C. Burgher. *Proc. Ann. Oak Ridge Summer Symposium*, 4th Ann. Symposium, Oak Ridge, Tenn., TID-5115, p. 11-23(1953). AGRICULTURAL RADIO-BIOLOGY AND THE NATIONAL WELFARE.

Future of agricultural research, especially as related to radiobiology. Advances include improved fundamental food plants (increased yield and disease-resistancy).

10099

CYTOGENIC EFFECTS OF X-RAY AND THERMAL-NEUTRON IRRADIATION ON DORMANT SEEDS OF BARLEY. Richard S. Caldecott. *Genetics* **39**, 240-259 (1954) also, *Radiation Research* **1**, 127(1954).

Different lots of dormant seeds of barley were subjected to doses of 5, 10, 15, 20, and 25 (X10³) r of x-ray and to 15 doses of thermal-neutron irradiation. Survival to maturity in X-rayed material decreased as dosage increased. Frequencies of interchanges and mutations were directly proportional to dosage. (from author's summary).

10100

RADIUM EXPERIMENTS WITH DATURA. II. POLLEN ABORTION IN F₁'s FROM RADIUM-TREATED PARENTS. J. Lincoln Cartledge and A. F. Blakeslee. *Anat. Record* **41**, 98(1928-1929).

Among offspring of radium-treated daturas, two were new chromosomal types with + 50 and + 75% aborted pollen. Eleven other had + 50% abortion, one had + 85% abortion, three had half smaller sized or aborted pollen and half lighter-colored pollen. Two had + 25% of pollen aborted. Three with + 50% abnormal grains and one with + 25% abortion produced progenies with normal and abnormal pollen. (from author's abstract).

10101

EFFECTS OF IONIZING RADIATIONS ON SEEDS OF BARLEY. Richard S. Caldecott. *Radiation Research* **2**, 339-350(1955).

Experiments testing whether increased radio-sensitivity of seeds with high water content results from nature and frequency of radical species formed along tracks of ionizing electrons indicate that water content can be increased to 15% to 20% with no increase in sensitivity to X-rays (there is an inverse relationship) when seeds are soaked in H₂O at 3°C. There is no 1:1 relationship between sensitivity to X-rays and water content.

10102

THE QUESTION OF FUNDAMENTAL BIOLOGICAL ACTION OF RADIATION. F. Dessauer. *Radiology* **14**, 1 (1930).

Author describes coagulation of protein solutions (aqueous) by heat and ultraviolet and outlines non-specific "heat" effect of x rays. CA 24-1398

10103

THE EFFECT OF ROENTGEN AND RADIUM RAYS ON

CELL DIVISION. G. Perthes. Dtsch. med. Wschr. 30, 632(1904). (In German).

A fundamental effect of irradiation is the production of abnormal mitoses. In this paper, describing changes in normal and neoplastic cells, author confirms earlier findings on *Ascaris ova*. Nuclei in active mitosis show increased radiosensitivity.

10104

IONIZING RADIATION AND THE SOCIALLY HANDICAPPED. T. C. Carter (Medical Research Council's Radiobiological Research Unit, Harwell, Berkshire, Eng.). Brit. J. Radiol. 30, 641-47(1957) Dec. NSA 12-2648

10105

Naval Radiological Defense Lab., San Francisco
THE RELATIONSHIP OF TIME OF PEAK ACTIVITY FROM FALLOUT TO TIME OF ARRIVAL. P. D. LaRiviere. Feb. 28, 1957. 15p. NSA 12-13686

A mathematical formula is presented for use in establishing the relationship between the time of arrival, time of peak intensity, and time of cessation of fall-out. A simple relationship was found between these parameters over a wide variety of conditions. NSA 12-13686

10106

EFFECT OF LOCAL IRRADIATION WITH 15 KV X-RAYS ON THE MAST CELLS OF THE WHITE MOUSE. L. Avery, J. A. Boiffard, and M. Gabe. Compt. rend. soc. biol., 148, 1189-91(1954). (In French).

10107

Division of Reactor Development AEC and Harvard Univ., Boston. School of Public Health.
FIFTH ATOMIC ENERGY COMMISSION AIR CLEANING CONFERENCE HELD AT HARVARD AIR CLEANING LABORATORY, BOSTON, JUNE 24-27, 1957. 163p.

Separate abstracts of each of the papers presented have been prepared. NSA 12-12147

10108

Argonne National Lab., Lemont, Ill.
PARTICULATE AIRBORNE CONTAMINATION AT START-UP OF THE EBWR. J. J. Hartig and J. A. Pagliaro. p. 1-4 [of] FIFTH ATOMIC ENERGY COMMISSION AIR CLEANING CONFERENCE HELD AT HARVARD AIR CLEANING LABORATORY, JUNE 24-27, 1957. 4p.

High levels (up to 5×10^{-7} $\mu\text{c/cc}$) of radioactivity from airborne particulate matter were discovered at the initial full power operations of the Experimental Boiling Water Reactor. How the isotopic composition and the source of the activity were determined is described. The level was reduced by using a Vapor Recovery System on the air ejector which consisted of an $\text{H}_2\text{-O}_2$ recombiner, Freon condenser, an alumina bed and a charcoal trap. NSA 12-12148

10109

SERUM GLUTAMIC OXALACETIC TRANSAMINASE ACTIVITY IN IRRADIATED ANIMALS. D. F. Petersen, C. C. Lushbaugh, and P. Lee. Fed. Proc. 16, 327(1957).

10110

Oak Ridge National Lab., Tenn.
NUCLEAR ACCIDENTS. A. D. Callihan Pt. J "Studies in Nuclear Safety" Lectures Presented at the Nuclear Safety Training School Conducted by Union Carbide Nuclear Company, June 3-14, 1957. 2p. Contract W-7405-eng-26

Nuclear accidents at Los Alamos, Argonne, and Oak Ridge are briefly discussed. NSA 12-15280

10111

HYGIENIC EVALUATION OF RADIOACTIVE STRONTIUM AS A FACTOR IN THE CONTAMINATION OF THE EXTERNAL ENVIRONMENT. A. N. Marey. p. 108-15 "Various Studies on the Use of Radioactive Substances in Medicine." Translated from Med. Radiol. 2, No. 5, 89-95 (1957). 8p.

Hazards for present and future generations from environmental strontium-90 are discussed. (C. H.)

NSA 12-15231

10112

ON THE METHODS OF FINDING CHANGES ARISING IN THE ORGANISM UNDER THE INFLUENCE OF SMALL DOSES OF IONIZING RADIATION. Draft Translation of U.S.S.R. Report. (1956?). 10p. (AEC-tr-3046). NSA 12-19

10113

THE DISTRIBUTION OF ALPHA-RADIOACTIVITY IN NATIVE VEGETATION. J. T. Curtis and Ralph Dix (Univ. of Wisconsin, Madison). Botan. Gaz. 117, No. 3, 233-8(1956) Mar.

Analysis of the soil and of the plants in a variety of plant communities for alpha-emitting substances showed that a considerable concentration occurred in the A_0 soil layer. This concentration was greatest in coniferous forests growing on loess-free, igneous soils in cool climates. The humus beneath hemlock trees showed the greatest alpha radioactivity. A number of rare elements were found to be similarly concentrated in the humus of coniferous forests, including Cu, Ga, Pb, and Zr. The high concentration reached by these elements indicate that immediate soil environment of tree seedlings may be very different from that expected in ordinary soil analyses in the region. (auth) NSA 12-13654

10114

A SURVEY OF RADIATION EXPOSURE IN PEDIATRIC PRACTICE. Mitchell R. Zavon and Peter J. Valaer (U. S. Public Health Service, Cincinnati). Pediatrics 20, 941-6(1957) Nov.

The work habits and equipment of 44 pediatricians who use fluoroscopes in office practice were studied to determine radiation exposure. Most of the pediatricians surveyed had exposures that were low by comparison with present maximal permissible limits. The low exposures were, however, not due to intrinsic protection nor necessarily to good technique, but to infrequent use of the equipment. Recommendations are included for increasing protection. NSA 12-11268

10115

CAN RADIATION CAUSE THYROID CANCER? B. J. Duffy, Jr. (Georgetown Univ. Hospital, Washington). J. Clin. Endocrinol. and Metabolism 17, 1383-8(1957) Nov. NSA 12-2661

10116

ANALYSIS OF RADIATION DAMAGE TO THE EYE CORNEA. T. V. Krestinskaya (Pavlov First Leningrad Medical Inst.). Doklady Akad. Nauk S.S.S.R. 116, 52-5 (1957) Sept. 1. (In Russian). NSA 12-2653

10117

CHEMICAL EFFECTS OF IONIZING RADIATIONS. G. Stein and J. Weiss. Nature 161, 650(1948).

Irradiated: simple dilute aqueous solutions of benzene and benzoic acid.

Irradiation: (1) x rays, (2) neutron and γ rays (Ra-Be source).

Studied: Reaction products formed, including phenol and biphenyl from benzene, catechol products originating from an opening of benzene ring, yields of reaction products was dependent on pH of the solutions. Possible reactions are suggested. CA 42-5346

10118

THE CYTOLOGY OF THE IRRADIATED OVARY OF *DROSOPHILA MELANOGASTER*. R. C. King (Northwestern Univ., Evanston, Ill.). Exptl. Cell Research 13, 545-52(1957) Dec. NSA 12-4047

10119

ON HEALING PROCESSES IN TISSUES DAMAGED BY X

RADIATION. I. V. Shiffer (Central Research Roentgen-Radiological Inst. of Ministry of Health, U. S. S. R.). Med. Radiol. 2, No. 4, 38-43 (1957) July-Aug. (In Russian). NSA 12-48

10120

CONDITIONING OF THE MOUSE FETUS AGAINST X-IRRADIATION DEATH. Roberts Rugh and Joan Wolff (Columbia Univ., New York). Proc. Soc. Exptl. Biol. Med. 96, 178-9 (1957) Oct. NSA 12-2668

10121

EXCRETION OF YTTRIUM AND LANTHANUM CHELATES OF CYCLOHEXANE 1, 2-TRANS DIAMINE TETRAACETIC ACID AND DIETHYLENTRIAMINE PENTAACETIC ACID IN MAN. Harry Kroll, Samuel Korman, Elsie Siegel, Hiram E. Hart, Betty Rosoff, Herta Spencer, and Daniel Laszlo (Montefiore Hospital, New York). Nature 180, 919-20 (1957) Nov. 2. NSA 12-1204

10122

ENZYME DAMAGE CAUSED BY X-RAYS. Hedi Fritz-Niggli. Translated by R. Towndrow from Radiol. Clin. 25, 358-70 (1956). 13p.

The irradiation of isolated mitochondria of rat livers with small doses of x rays showed a great reduction in the activity of those enzymes responsible for the oxidation of pyruvate, α -ketoglutarate, fumarate, and citrate (the citric acid cycle). The oxidation of citrate is impaired by the 0.1 r irradiation of mitochondria in 2.88% mannitol solution. However, the oxidation of succinate is unaffected by doses of 1000 r. Hesperidin, rutin, and mannose lessened the radiation damage. NSA 12-5153

10123

ON THE ROLE OF MATERNAL ORGANISM IN THE INJURY OF THE MOUSE FETUS BY IONIZING RADIATION. A. A. Neifakh (Severtsov Inst. of Animal Morphology). Doklady Akad. Nauk S.S.S.R. 116, 952-5 (1957) Oct. 21. (In Russian). NSA 12-5160

10124

EFFECT OF SALTS OF HEAVY METALS ON THE RADIO-SENSITIVITY OF TRANSPLANTABLE TUMOURS. I. V. Veselaja and V. I. Gorodyskii (Kiev Radiological and Oncological Research Inst.). Problems Oncology 3, 303-5 (1957). NSA 12-5828

10125

Food and Drug Administration, Washington, D. C. and Federal Civil Defense Administration, Battle Creek, Mich. EFFECTS OF NUCLEAR EXPLOSIONS ON BULK FOOD STAPLES. Sumner C. Rowe. Mar. 1956. 38p. (WT-1163)

Twenty-eight different selected packaged foods representing those of greatest volume in the American diet were exposed to nuclear detonations at the Nevada Test Site during the spring of 1955. The foods were divided into three groups: retail size packages, replicas of bulk packages, and bulk sizes (50 to 100 lb). The different packages were so placed that some were exposed to strong neutron and gamma flux, others to gamma radiation and blast effects, and still others to only blast effects. The foods were recovered as soon after exposure as feasible and were studied periodically for induced radioactivity, physical and chemical changes, organoleptic variations, nutritional adequacy, and toxicity. These studies showed that most foods were suitable for emergency feeding at presently suggested AEC tolerance within 15 days after exposure. The initial predominant radioactivity, in most cases, was demonstrated as resulting from sodium or potassium or both, the intermediate studies suggested phosphorus as the substance contributing the major portion of the radioactivity, and, in the final phase of the study, possibly the radiation effects on chlorine and trace elements predominated. Calculations were made of the levels of radioactivity and the half lives of the radio-

active elements predominating in the foods. The organoleptic evaluations demonstrated an accelerated deterioration in the quality of the dairy products and an off-color development in the table salt. There was an indication of a change in the baking characteristics of the exposed flour and corn meal. Flying glass created a hazard in that some of the foods contained glass particles resulting from broken windows produced by the blast effect. There were no significant losses of vitamin content or change in protein quality of the foods exposed. Furthermore, there was no indication that the rate of deterioration of vitamins during storage was affected by exposure to radiation. The pharmacological tests have not been completed as yet, although apparently a synthetic diet consisting of the exposed and control foods did not affect growth after a 36-week study of rats. Nineteen elements that may occur in foods were exposed in the form of their chemically pure salts with the area of strong neutron flux to determine whether, and to what degree, the elements would become radioactive. The samples were examined for induced radioactivity over a period of three months. Tin, zinc, cobalt, silver, chlorine, phosphorus, and sulfur were found to be the elements of greatest significance since residual radioactivity could be demonstrated after considerable time. NSA 12-7094

10126

Rochester, N. Y. Univ. Atomic Energy Project. RADON SOLUBILITY IN BODY TISSUES AND IN FATTY ACIDS. Elmer Nussbaum. June 17, 1957. 169p. Contract W-7401-eng-49. (UR-503)

Data are given for the distribution coefficient of radon ($\mu\mu\text{c}/\text{ml}$ in gas divided by $\mu\mu\text{c}/\text{ml}$ in specimen at equilibrium) in fatty acids, olive oil, extracted animal fats, and samples of tissue from rat and man. The gamma activity of the 1 ml samples was determined by means of a well-type NaI crystal scintillation counter after radon and RaC had attained radioactive equilibrium. Fatty acids having 1 to 13 carbon atoms per molecule were equilibrated with radon at 50 and 37°C the distribution coefficient in formic acid was 0.96. Solubility increased with increasing number of carbon atoms per molecule of fatty acid, reaching a broad plateau in the region of heptanoic acid. In oleic and linoleic acids the distribution coefficient was 6.7 and 6.3, respectively. In olive oil and in extracted animal fats it ranged between 5.5 and 6.5. Selected rat tissues were dissected after *in vivo* equilibration with approximately 1 μc of radon per liter of air for periods of 30 minutes to 48 hours. At equilibrium the distribution coefficient had the following mean values; omental fat, 4.8, brain, 0.31; liver slices, 0.30, kidney, 0.28, heart, 0.22; skeletal muscle, 0.15, and venous blood, 0.40. Radon in omental fat attained a half-equilibrium value in about 30 minutes and 95 per cent of equilibrium in 6 hours. In-vitro equilibration of human blood and extracted fat yielded mean values for the distribution coefficient of 0.43 and 6.33, respectively. NSA 12-5139

10127

California. Univ., Berkeley. Radiation Lab. HUMAN AND CATTLE THYROID RADIOACTIVITY ASSOCIATED WITH FALLOUT: OCTOBER 1955 TO OCTOBER 1956. Margaret R. White. Mar. 1, 1957. 15p. Contract W-7405-eng-48. (UCRL-3703)

Thyroids from humans, obtained at autopsy, were followed for radioactivity from January 1956 to October 1956. There is less than one chance in one thousand that human thyroid tissue could have been irradiated to the extent of 0.001 rep from ^{131}I fallout. The probable value is no more than 0.00016 rep during this period. Thyroids from cattle slaughtered in the San Francisco Bay Area were followed for radioactivity from October 1955 to

October 1956. Two periods of increase in radioactivity, possibly due to small-yield detonations in Nevada, were seen in December 1955 and January 1956. A period of high activity in cattle thyroid, probably due to a Russian detonation, began in March, and radioactivity from this delivered a maximum of 0.2 rep. Another period of high activity, presumably due to the Bikini tests, began in May 1956 and was continuing at the time this report ended. It delivered (up to October 11, 1956) a maximum of approximately 1.3 rep to cattle thyroid tissue. This level of radiation exposure would produce no change in physiological function of the thyroid and would not be detrimental to cattle. NSA 12-4673

10128

THE EFFECTS OF ATOMIC RADIATION ON OCEANOGRAPHY AND FISHERIES. Publication No. 551. Washington, National Academy of Sciences - National Research Council, 1957. 142p.

General Considerations Concerning The Ocean As A Receptacle for Artificially Radioactive Materials. An attempt was made to summarize both the present knowledge and the areas of ignorance concerning the oceans that must be taken into account in considering the biological effects of radiation. Physical and Chemical Properties of Wastes Produced by Atomic Power Industry. The range of physical and radiochemical characteristics that may be anticipated in concentrated fuel reprocessing wastes and approximate quantities of wastes produced are indicated. Comparison of Some Natural Radiations Received by Selected Organisms. The accumulation of natural radiations from various sources for man and fish for different levels in both air and water is described. Disposal of Radioactive Wastes in the Ocean: The Fission Product Spectrum in the Sea as a Function of Time and Mixing Characteristics. An attempt was made to construct a detailed quantitative picture of the fission product spectrum in the ocean, in steady state with a given fission rate. Transport and Dispersal of Radioactive Elements in the Sea. The physical processes whereby radioactive elements in true solution are diluted by mixing and are carried from one part of the ocean to another are described. The Effects of the Ecological System on the Transport of Radioactive Elements in the Sea. The processes which must be considered in order to evaluate biological effects on the ultimate distribution of radioisotope wastes or contaminants in the sea are described. Precipitation of Fission Product Elements on the Ocean Bottom by Physical, Chemical and Biological Processes. An attempt is made to define the processes by which materials may be carried to the bottom, to note the conditions under which these several processes can be expected to operate, and to assess the extent to which the processes have been responsible for the removal of activity to the bottom in cases where bottom accumulation has been measured. Ecological Factors Involved in the Uptake, Accumulation, and Loss of Radionuclides by Aquatic Organisms. Some experiments are described on the uptake, accumulation, and loss of radionuclides by various marine organisms. Accumulation and Retention of Radioactivity from Fission Products and Other Radiomaterials by Fresh-Water Organisms. These organisms include many biological forms such as vascular plants, algae and phytoplankton, protozoans, zooplankton and other invertebrate forms, and representatives of each of the five vertebrate classes. Effects of Radiation on Aquatic Organisms. The relative sensitivity of different groups of aquatic organisms to the effects of radiation is discussed. Isotopic Tracer Techniques for Measurement of Physical Processes in the Sea and the Atmosphere. The present status of our knowledge of the distribution and properties of various naturally occurring isotopes which are useful for studies

of atmospheric and oceanic transfer phenomena are discussed. On the Tagging of Water Masses for the Study of Physical Processes in the Oceans. Consideration has been given some of the problems involved in tagging water masses in the open ocean. Large-Scale Biological Experiments Using Radioactive Tracers. NSA 12-5848

10129

A DEFINITION OF "SIGNIFICANT AMOUNT" TO BE APPLIED TO RADIOISOTOPE WORK. R. J. Magill (Univ. of California, Berkeley). Proc. Health Phys. Soc. 192-4 (1957).

Although most legislative acts and authoritative sources of information concerning safe practices in working with radioactive materials suggest certain health protective measures for persons working with a "significant amount" of radioactivity, the amount considered significant is usually left undefined. It is suggested that the meaning for the term "significant amount" be that amount of material which in the case of a total accident would involve as much irradiation to a critical organ over a finite period of time, say one month, as a permissible body burden. NSA 12-8245

10130

CURRENT SAFETY PROBLEMS AT THE COSMOTRON. M. R. Beebe. (Brookhaven National Lab., Upton, N. Y.). Proc. Health Phys. Soc. 217-26 (1957).

A survey of the radiation from the Cosmotron has shown that the shielding is inadequate from a safety standpoint. At present local shieldings are piled up where necessary. As present plans call for an increase in the beam intensity, either the control rooms and experimental areas will have to be moved to a remote location or an effective shielding arrangement will have to be made. NSA 12-8276

10131

Knolls Atomic Power Lab., Schenectady, N. Y. HEALTH PROBLEMS ASSOCIATED WITH THE CIVILIAN REACTOR PROGRAM. J. J. Fitzgerald and J. L. Flynn. Apr. 30, 1957. 35p. Contract W-31-109-Eng-52.(KAPL-1804)

The radiation protection records achieved in the operation of AEC-owned reactors and nuclear facilities clearly demonstrate that the nuclear industry is one of the safest industries in which one may work. There is no reason to believe that there will be any unsolvable health problems associated with the civilian power reactor program. The increased levels of operation will be offset by the industrial utilization of the unique radiation protection techniques, procedures, and standards that were developed and perfected under the sponsorship of the AEC. NSA 12-8241

10132

CORRELATION BETWEEN URANIUM AIR DUST SURVEYS AND URANIUM URINE DATA. R. L. Hoover (National Lead Co., Cincinnati, Ohio) Proc. Health Phys. Soc. 49-52 (1957).

In assessing air dust problems associated with the handling of uranium, a good correlation was found between air dust levels and uranium urine data. Two typical cases of incident exposures are presented as examples. NSA 12-8286

10133

INHALATION FROM URANIUM CONTAMINATED CLOTHING. J. C. Bailey, A. F. Becher, and H. F. Henry (Oak Ridge Gaseous Diffusion Plant, Tenn.). Proc. Health Phys. Soc. 188-91 (1957).

In order to determine realistic uranium contamination limits for clothing, an extensive series of tests was performed to evaluate the actual inhalation hazard associated with uranium contaminated clothing. It was determined that if protective clothing is necessary, respiratory protection is much more important. NSA 12-8291

10134

TRAINING OF DOCTORS IN RADIATION PROTECTION METHODS BY THE GERMAN RED CROSS. Hanns Langendorff (Univ. of Freiburg i. Br.). Roentgen Bl. 10, No. 11, 345-50(1957) Nov. (In German).

A comprehensive survey is given of the training schedule available for radiologically trained physicians, who by the initiative of the German Red Cross and with the aid of that institution, receive supplementary training in the protection against the effect of x rays in all-day courses lasting 4 months. Participants in the course are simultaneously orientated about the necessary precautions in the application of radioactive substances. NSA 12-8279

10135

INVESTIGATION OF RADIATION DOSE IN THE LUNGS CAUSED BY RADON BEARING ATMOSPHERE. Karl Aurand, Ulrich Feine, Wolfgang Jacobi, and Alfred Schraub (Max Planck-Institut für Biophysik, Frankfurt am Main). Strahlentherapie 104, 345-54(1957). (In German).

The authors report on a method for appraising the tissue dose in the respiratory tract by decay products of radon. This appraisal is of importance with a view to the questions of the natural radiation exposure as well as to questions concerning the protection against irradiation in uranium mining. By aid of experiments with Th-B-marked aerosols, the question of resorption and of dispersion in the lungs is reported on. With autoradiographs of sections from the lungs of rats, the microscopic dispersion of Th-B-marked room-aerosols is shown.

NSA 12-7693

10136

THE EXPERIMENTAL BASE AND SIGNIFICANCE OF THE MAXIMUM ADMISSIBLE RADIATION DOSE. G. Joyet (l'Université, Zurich). Z. Med. Isotopenforsch. 1, No. 2, 135-60(1957) Nov. (In French).

A summary was made of the experimental basis and significance of the maximum permissible radiation dose. It was shown that significance may be properly attached to a maximum dose of 0.3 r per week, not because of the radiation effects on the recipient but because of the genetic effects. The genetic effects caused by modern sources of radiation- x-ray diagnosis, luminous watch dials, radiological aids to shoe fitting, and nuclear weapon tests- were calculated for the population as a whole. The special case of persons occupationally exposed to radiation was also considered. NSA 12-6414

10137

NUCLEAR AND ELECTRON PARAMAGNETIC RESONANCE AND ITS APPLICATION TO BIOLOGY. Power B. Sogo and Bert M. Tolbert (Univ. of California, Berkeley). Advances in Biol. and Med. Phys. 5, 1-35 (1957).

Electron spin resonance and nuclear magnetic resonance both involve the absorption of electromagnetic radiation in the radio-frequency range. They may be considered as extensions of ultraviolet, visible, and infrared spectroscopy. They comprise a unique branch of spectroscopy in that one can vary the absorption energy levels at will, instead of having to use the energy levels nature has given. This advantage arises from the fact that one can vary the strength of the applied magnetic field and thus vary the spacing of the electronic and nuclear magnetic energy levels. No fundamental new truths have been demonstrated in biology by the use of nuclear magnetic resonance. Electron spin resonance measurements are beginning to give information from which one can construct a detailed picture of the nature of some biochemical reactions, such as reactions involving one-electron oxidation-reduction reactions or the so-called free radical

reactions. The discovery by electron spin resonance of these free radicals in living material, and their correlation with biological activity, helps confirm what previously was only a hypothesis on certain types of enzymatic reactions. Studies to date employing electron spin resonance or nuclear magnetic resonance are reviewed. (91 references.)

NSA 12-8920

10138

CRITICAL OBSERVATIONS ON CONTACT THERAPY WITH Co⁶⁰ IN PARANASAL REGION. Kurt Ernst Scheer, Werner Schwab, and Werner Ey (Universität Heidelberg and Universitäts-Hals-Nasen-Ohrenklinik Heidelberg). Strahlentherapie 104, 398-404(1957). (In German).

Cobalt⁶⁰ contact therapy within a combined surgical-radiotherapeutic treatment is definitely indicated in the case of malignant tumors of the paranasal sinus, of the epipharynx, of the inner parts of the nose; malignant tumors of the tonsil, the floor of the mouth, the petrosal portion of the temporal bone, and the oesophagus. The advantages and limits of the Co⁶⁰ therapy are critically examined, the energy absorption displayed by the tissues being given particular consideration.

NSA 12-7698

10139

SOME PHYSICAL ASPECTS OF RELATIVE BIOLOGICAL EFFICIENCY. P. R. J. Burch (Univ. of Leeds). Brit. J. Radiol. 30, 524-9(1957) Oct.

After surveying the broad nature of the problem of relative biological efficiency, an account is given to methods which have been used to characterize the quality of ionizing radiations. These former methods have ignored the phenomenon of secondary or δ -track formation and reference is made to treatments which take this factor into account. The concept of local energy losses is defined, and tables are given for various radiations, showing the amounts of local energy dissipated in water with respect to particle kinetic energy range. The radiations considered are 1 Mev and Po²¹⁰ α particles, tritium β particles, 1 and 2 Mev monochromatic electrons, 25 Mvp, 220 and 100 kyp x rays and Co⁶⁰ γ rays. The special problem of the LET of electrons of less than 2 kev is considered and new values are derived from recently published experimental results. A mean LET is defined and calculated, its limitations are emphasized. NSA 12-20

10140

Army Medical Nutrition Lab., Denver. ACCEPTABILITY OF IRRADIATED FOOD CONSUMED BY HUMAN SUBJECTS. Report 200. Virginia E. McGary, Margaret E. Shipman, Lester M. Levy, and Lionel M. Bernstein. Mar. 15, 1957. 23p. Project 6-60-11-020. (AD-125592)

Irradiated foods were fed to nine or ten human test subjects in four separate studies. In the first study irradiated foods provided approximately 35% of the total calorie intake, in the second, 61%, in the third, 80%, and in the fourth study, 100%. Acceptability data were obtained by use of questionnaires with an arbitrary hedonic scale, and by personal interviews with the individual subjects. Statistical analysis of the acceptability data showed significant differences between irradiated and control food in only 10 out of 42 items. Control foods were preferred to irradiated foods in nine of the 10 cases. NSA 12-34

10141

WHOLE BODY X-IRRADIATION OF EXPERIMENTAL ANIMALS. M. J. Corp (Atomic Energy Research Establishment, Harwell, Berks, Eng.). Phys. Med. Biol. 1, 370-79(1957) Apr.

The use of conventional x-ray therapy machines for whole-body irradiation of experimental animals is de-

scribed. It is shown that irradiation from one side only gives what is probably a sufficiently uniform dose distribution in mice. In the case of rats and larger animals non-uniformity of dose distribution due to absorption is considerable although the average dose is seen to be very close to the dose measured in the absence of the animal but at the position its center would occupy. Bilateral techniques are therefore recommended if dose distributions uniform to 5% are desired. There is some evidence that dose distributions may be estimated fairly closely from standard depth dose tables for semi-infinite phantoms. NSA 12-9606

10142

THORIUM MAXIMUM PERMISSIBLE AIR CONCENTRATIONS AND AIR SAMPLING PROBLEMS. J. W. Healy (General Electric Co., Richland, Wash.). *Proc. Health Phys. Soc.* 177-87(1957).

A review of some of the possible radiological problems involved in the handling of thorium was made. The maximum permissible body burden and the MPC in water and in air are given. The uncertainties in the calculation are discussed. The problems of air sampling are discussed in detail. It is evident that unless the concentration of the daughter elements are low, counting measurements are of limited application to the measurement of thorium.

NSA 12-8290

10143

Laboratory of Vitamin Technology, Inc., Chicago.
THE USE OF ADDITIVES IN ELIMINATING THE UNDESIRABLE EFFECTS OF IONIZING RADIATIONS. Report No. 7 (Final) for July 1, 1955-October 31, 1956. Lawrence Rosner. 49p. Project No. 7-84-01-002. Contract DA-19-129-qm-389. (AD-125505)

The use of additives in eliminating the undesirable effects of ionizing radiation in the sterilization of boneless ground chuck is presented. Several classes of chemicals were considered for investigation: antioxidants, free radical acceptors, organic radical transfer agents, sequestering agents, seasoning, sulfhydryl compounds, natural materials, solvents, and vitamins, singly and in combination. NSA 12-5143

10144

Knolls Atomic Power Lab., Schenectady, N. Y.
RADIOLOGICAL DEVELOPMENT ACTIVITIES IN HEALTH PHYSICS. Semiannual Progress Report [for] July-December 1956. L. J. Cherubin and J. J. Fitzgerald. 54p. Contract W-31-109-Eng-52. (KAPL-1887)

The efficiencies of respirator filter media (American Optical Type R-57 and MSA Type H Comfo Ultra Filter) were found relatively high under test conditions. Three reports on air sampling and collection efficiency studies were prepared for publication in technical journals. Several types of beta pocket dosimeters were constructed, tested, and evaluated. Correction factors for mixed radiation fields and beta energies were established. A fast-neutron pocket dosimeter was designed and constructed. Theoretical considerations concerning the selection of chamber gases are discussed with respect to the response to fast-neutron fluxes. Modifications in the foil badge neutron dosimeter system were introduced to facilitate the use and increase the effective sensitivity of the dosimeter. A method for calibrating and evaluating beta hand counters is discussed with reference to the use of single and multiple sources, and the use of uranium and mixed fission-product sources. Modifications in the methods of collecting fish and plankton were introduced to provide an improved and more representative sampling program. No significant accumulation of radioactive materials in plankton was detected during this period. Analyses of fish tissues indicate an apparent decrease in radioactive material concentrations in 14% of the specimens

analyzed, an increase in 48% of the analyzed specimens, and no increase or decrease in 38% of the analyzed specimens. Criteria are set forth to aid in the rapid and essentially complete evaluation of critical assembly environmental hazards. The probability, consequences, and ranges of hazards associated with a nuclear incident are discussed. A brief description of exclusion area, containment, shielding, plant layout, emergency planning, and evaluation procedure consideration is presented to aid in the development of adequate radiation protection measures. (For preceding period see KAPL-1615).

NSA 12-10322

10145

THE STATUS OF BIOASSAY TECHNIQUES FOR EVALUATION OF INTERNAL EXPOSURES FROM RADIOACTIVE ISOTOPES. J. W. Healy (General Electric Co., Richland, Wash.). *Proc. Health Phys. Soc.* 21-32(1957).

The interpretation of bioassay data in terms of the quantity of radioisotopes in the body is dependent upon the knowledge of the excretion rate of the substance by the human following acute administration. Other cases including chronic uptake and lung deposition may be evaluated from the acute case if other physical parameters are known. At the present time, one function of the bioassay laboratory should be the accumulation of data from any accidental exposures so that values for the parameters involved may be obtained for the human. NSA 12-8284

10146

RADIATION CATARACT. W. T. Ham, Jr. *Arch. Ophthalmol.* 50, 618-43(1953).

10147

STUDIES ON MUTATIONS IN BARLEY. I. SUPERDOMINANT FACTORS FOR INTERNODE LENGTH. N. Nybom. *Hereditas* 36, 321-8(1950).

Three allelic mutations induced by x-ray treatment reduced the length of culm and head. When the mutants were crossed with each other or with the mother line, (variety Bonus) F₁ plants were produced with longer culms and heads than either parent. (from abstract).

10148

INVESTIGATION OF GENES CONTROLLING KNOWN SYNTHESIS IN THE ASCOMYCETE NEUROSPORA. G. W. Beadle. *Yearbook Am. Phil. Soc.* p. 143-5(1943).

By treating *Neurospora* with x-radiation and ultraviolet light, it has been possible to obtain mutants unable to synthesize thiamine, thiazole, pyridoxine, nicotinic acid, pantothenic acid, p-amino-benzoic acid, chlorine, adenine, uracil, arginine, leucine, lysine, methionine, proline, tryptophane and valine. (from abstract).

10149

SEGMENTAL EXCHANGE IN SOMATIC CELLS OF MAIZE. D. F. Jones. *Proc. Intern. Congr. Genet.* 7th Congr., Edinburgh, 1939. p. 170(1941).

Number and ratio of mosaics involving one and two chromosome markers in untreated controls and in x-rayed material are given. (from abstract).

10150

Brookhaven National Lab.
STUDIES ON THE THYROIDAL UPTAKE OF ASTATINE IN THE RAT. C. J. Shellabarger and John T. Godwin. (1954), 27p. (BNL-1924)

Astatine has been found to be selectively concentrated by the rat thyroid gland. When the thyroidal uptake of astatine was compared to the thyroidal uptake of I¹³¹, more of the latter was taken up by the rat thyroid, although this advantage in favor of I¹³¹ was less apparent when the period between isotope administration and sacrifice was shortened. When rats were treated with thiouracil, the thyroidal uptake of astatine was enhanced, and only in thiouracil treated thyroid glands were clusters of alpha

tracts found, and these were thought to represent aggregates of astatine atoms. NSA 8-6396

10151

IODINE: RADIOACTIVE AND STABLE IN NORMAL AND CANCEROUS TISSUES. Wm. T. Salter and MacAllister W. Johnston. Trans. Assoc. Am. Physicians 61, 210-35 (1948).

After the administration of I^{131} the concentrations of this isotope and of stable I were determined in various healthy and diseased tissues. The absorption depended on the natural avidity of the tissue for I, the stage of disease or age of the tissue, and the rate of metabolic turnover of the I in the tissue. The normal thyroid was found to store a large quantity of administered I^{131} . NSA 4-2603

10152

THE METABOLISM OF IODINE COMPOUNDS. William T. Salter, Gopal Karandikar, and Paul Block. J. Am. Pharm. Assoc., Sci. Ed. 38, 626-41 (1949) Dec.

The fates of iodine and iodine compounds within the human body were studied with the aid of radioactive iodine, I^{131} . From the numerous and detailed observations, it was concluded that whenever an organic compound is administered to a mammal, varying amounts of iodide are liberated by decomposition, drugs like thyroxine are completely degraded down to the iodide ion alone. The organic iodine compounds are resolved into two great classes for discussion: those connected with the internal economy of the thyroid, and, those which are more strictly pharmaceutical in nature. In the first group, along with iodide, the chief compounds considered are diiodotyrosine and thyroxine, the latter group is extensive and is distinguishable by the tendency to concentrate in the liver and kidneys, creating a radio-opaque effect as an aid to diagnosis and to the identification of areas and organs. Careful and extensive studies on the pharmaceutical effects of iodine incorporation into organic molecules are indicated. 44 references. NSA 4-1666

10153

AN INTRODUCTION TO THE NONCLASSIFIED LITERATURE DEALING WITH BIOCHEMICAL STUDIES OF EXPERIMENTAL URANIUM POISONING. Samuel Schwartz and Elaine J. Katz. "Toxicology of Uranium, Survey and Collected Papers." Albert Tannenbaum, ed. New York, McGraw-Hill Book Company, Inc., 1951. (NNS Div. IV, Vol. 23, Paper 13, p. 262-73).

The nonclassified literature dealing with the biochemical effects of uranium poisoning has been reviewed. Representative studies of various tests have been noted with special reference to the literature of the past two decades. Most of these tests are based on alterations in kidney function. Chief emphasis has been given to nitrogen retention, acidosis, albuminuria, and abnormalities in special renal-clearance tests. Although the latter appear to be sensitive and reliable indices of kidney dysfunction, several authors have pointed out that the classical interpretation of these tests does not hold in uranium poisoning, inulin clearance, for example, may be markedly diminished even when the glomeruli appear essentially normal histologically. This is believed to be due to increased back-diffusion of inulin through the damaged tubules. Nearly all the studies that have been reported are based on dog and rabbit experiments. 61 references. (auth) NSA 5-321

10154

Rochester, Univ., New York.
A SECOND-YEAR INHALATION TOXICITY STUDY OF ANIMALS EMPLOYING URANYL NITRATE HEXAHYDRATE AT 4 MG/M³. G. F. Sprague, Jr., A. Pettengill, B. Brown, and H. E. Stokinger. Dec. 19, 1948. Decl. Jan. 1949. 56p. (AEC-2442); (UR-51) For publication in NNS.

The chronic toxicity of uranyl nitrate hexahydrate has been studied for a second year in 23 dogs and 70 rats. The exposure conditions and toxicologic procedures resembled closely those of the previous year, but considerably more study was given to the determination of particle size of the nitrate dust. As a result of the exposure to uranyl nitrate hexahydrate dust at 4 mg/m³ daily for a second year, the following observations are made. The mortality among dogs and rats that could probably be attributed to uranium exposure was confined to 2 dogs previously exposed to uranium dioxide and one rat exposed to the nitrate, although the overall mortality amounted to 65 per cent of all animals dying or sacrificed because of advanced age or disease. Little change occurred in weight response in any of the animal groups with the exception of the dogs exposed previously to uranium dioxide and tetrafluoride. Dogs exposed previously to UF₆ showed greatest weight gain at the end of the second year; rats previously exposed to this compound were the only ones to lose weight. A greater number of abnormal values among biochemical constituents both in blood and urine appeared in the animals during the second year than during the first year. The greatest number and degree of changes occurred among those animals exposed to uranium compounds that produced the least effect during the first year, namely UO₂ and UCl₄. Animals previously exposed to the same level of the nitrate as in the current study showed fewest changes. Renal injury was found in all animals exposed, characterized respectively by necrosis, cellular desquamation and regeneration or tubular atrophy. The hematologic finding of anemia among both dogs and rats was noteworthy. Again this anemia was most marked in animals whose prior exposure had been to UO₂, UF₄, and UCl₄. The anemias observed were confined to decreases in red blood cell count and hemoglobin content, and were not associated with a rise in the percentage of reticulocytes. One of the more important observations from the second year study was the deposition of uranium in the tissues. Among the important depots of uranium storage were the bones and teeth. NSA 2-898

10155

DISTRIBUTION OF THE RADIOACTIVE SUBSTANCE FOLLOWING INTRAVENOUS INJECTION OF PETEOSTHOR. I. THE THORIUM X AND THORIUM B CONTENT IN THE ORGANS OF THE RAT. Kurt Ernst Scheer. Arztl. Forach. 4, 1/161-1/164 (1950) Mar. 25. (In German).

Two groups of 8 rats each received intravenous injections of pure thorium or peteosthor. About 24 hr later the animals were sacrificed, and their tissues were examined for radioactivity, the content of Th X and Th B were computed. It was found that there was a clear distinction in the content of Th X and Th B in those organs which received thorium from those which received the peteosthor, but the livers of the animals treated with the latter substance contained about twice as much Th B. The testicles of all animals showed a low activity. The author concludes that the possible use of pure thorium as a clinical tool ought to be investigated. NSA 4-3352

10156

CIBA FOUNDATION SYMPOSIUM ON IONIZING RADIATIONS AND CELL METABOLISM. D. W. van Bekkum. London, England. J. A. Churchill, Ltd. 1956. 318p.

Studies on spleen and thymus from irradiated rats demonstrated a biochemical defect as early as 30 min. after exposure. Similar results were found when the

spleen was exteriorized and irradiated with the rest of the body shielded. These effects were not reproducible *in vitro*. Specific activity of ATP and the relative specific activity of its labile phosphate groups were depressed in parallel with oxidative phosphorylation. Evidence is presented to show that a relative cytochrome c deficiency develops in spleen mitochondria shortly after irradiation. Possible relationship between the cytochrome c effect and the oxygen effect is considered.

10157

ABSORPTION AND DISTRIBUTION OF THORIUM NITRATE IN THE RAT. Paul R. Salerno and Paul A. Mattis. Paper presented at the American Society for Pharmacology and Experimental Therapeutics Fall Meeting, Boston, Nov 13-15, 1950.

An abstract of this paper has appeared in *J. Pharmacol. Exptl. Therap.* 101, 31-2(1951) Jan. and is reproduced here in its entirety.

$\text{Th}(\text{NO}_3)_4$ was administered to adult male rats by several routes, and the tissue distribution was studied by means of UX_1 (Th^{234}) as a radioactive indicator. Studies on rats given 30 mg/kg by stomach tube revealed that maximal absorption had occurred within 4 days and that more than 90% of the absorbed dose was deposited in the skeleton. After 32 days, 100% of the retained Th, which represented 0.06% of the administered dose, was found in the skeleton. When larger doses of Th (700 to 800 mg/kg) were administered by oral intubation, no absorption could be measured, which indicates that less than 0.001% is absorbed at this dosage level. Absorption following subcutaneous administration was found to be progressive in that 0.03 and 0.07% of the injected dose was found in the skeleton at 16 and 30 days, respectively. Following the intraperitoneal injection of 60 mg/kg of Th, 1% of the dose was deposited in the skeleton after 30 days. $\text{Th}(\text{NO}_3)_4$ administered intravascularly by intracardiac injection was retained to the extent of 95, 89, and 83% at 3, 8, and 14 days, respectively. Tissue distribution in terms of per cent of injected dose was 16% to the skeleton, 55% to the liver, and 5% to the spleen after 14 days. Two hours after intracardiac injection, 50% of the Th is removed from the blood, and 7.6% is found in the skeleton. Less than 1% is found in the blood after 18 hr. Most of the Th which is excreted is found in the feces and apparently is transported from the liver via the bile. NSA 5-2093

10158

LOBAR DEPOSITION AND RETENTION OF INHALED INSOLUBLE PARTICULATES. H. E. Stokinger, L. T. Steadman, H. B. Wilson, G. L. Sylvester, S. Dziuba and C. W. LaBelle. *Arch. Ind. Hyg. Occupational Med.* 4, 346-53(1951) Oct.

The rates of alveolar deposition and elimination of insoluble particulates were determined for each of the lobes of the rat lung following inhalation of uranium oxides of different mass-median particle sizes. NSA 6-1089

10159

THE RELATION BETWEEN MEAN PARTICLE-SIZE AND THE TOXICITY OF PARTICULATE URANIUM DIOXIDE. H. E. Stokinger. nd. Decl. Dec. 22, 1949 (Proposed for publication in NNES, Div VI, Vol 1, Chap 21, Sec F.). 81p. (AECD-2782)

Particulate uranium dioxide was separated into seven fractions differing in particle size over the range 11 to 0.35 μ . Equal weights of these fractions were administered to white rats by intratracheal injection, and the magnitude of the ensuing response was estimated by measurement (a) of weight change, (b) of accumulation of non-protein nitrogen in the blood, and (c) of the ability of the kidney to excrete phenolsulphonphthalein. The quantity of uranium in the lungs, kidneys, and femurs was de-

termined analytically. The following conclusions are reported: (1) administration of uranium dioxide in the lungs of rats leads to a typical response originating primarily in the damage which is produced in the kidney; (2) the intensity of this response is a function of the particle-size of the uranium dioxide such that the greater response is associated with the smaller particles and the lesser response with the larger particles; (3) particles smaller than 1 μ are relatively more active in causing damage than are particles greater than 1 μ , and there is no indication that a limit had been reached at 0.35 μ which was the smallest size tested; (4) the intensity of the reaction in the kidney is proportional to the quantity of uranium present in the kidney; (5) the variation of toxicity which is associated with variation in particle size reflects a corresponding variation in the quantity of uranium which gains access to the systemic circulation; (6) the quantity of uranium entering the systemic circulation cannot be measured by following the changes in the uranium content of the lung; (7) appreciable fractions of an administered dose of uranium dioxide are removed by some route which does not involve the circulating blood; (8) the amount of uranium removed by this route is a function of particle-size such that the efficiency is greater for larger particles and lesser for smaller particles; (9) the rate of solution of uranium dioxide in the lung could not be shown to be proportional to the amount of surface available, since large increases in surface led to relatively small increases in the amount of systemic uranium recovered; (10) a concept is offered for the distinction between deposition as an entity differing from retention in the lung. 48 references. (auth.) NSA 4-1922

10160

INTRODUCTION (CHRONIC ONE-YEAR-URANIUM COMPOUNDS INHALATION STUDIES). H. E. Stokinger. (nd). Decl. Dec. 22, 1949. 9p. (AECD-2779).

In this chapter introduction, the previous 30-day exposure studies are briefly reviewed and the purpose and method of attack for one and two-year chronic exposure studies are discussed. NSA 4-1917

10161

TRACER STUDIES ON THE DISTRIBUTION AND EXCRETION OF URANIUM IN MICE, RATS, AND DOGS. Albert Tannenbaum, Herbert Silverstone, and Janet Koziol. October 31, 1946, decl. July 14, 1948. For publication in NNES. 72p. (AECD-2167, CH-3659)

The excretion of uranium and distribution of uranium in tissues following injection of uranyl nitrate was studied in mice, rats, and dogs. Highly radioactive isotopes of uranium were used either as tracers or alone, radioautographs as well as analytical data were obtained. The conclusions of the studies are summarized as follows:

(1) A high portion of the uranium is excreted in the urine within 24 hours after injection. Much smaller proportions are excreted during this period when the dosages are toxic. (2) Initially fecal excretion of uranium is relatively low, but as the urinary excretion rapidly decreases, the fecal uranium may assume significant proportions. (3) Less than 10% of the injected uranium remains in the body after one month following injection of non-toxic dosages of uranyl nitrate. When the injected dose is toxic as much as 40% may be retained. (4) The kidneys and bones are the principal sites of accumulation (retention) of the injected uranium. A greater proportion is retained in the kidneys with toxic dosages as compared with non-toxic dosages. Other tissues contain much smaller concentrations of uranium. (5) Radioautographs indicate that uranium accumulates in bone almost entirely in the cancellous portion (trabeculae) and endosteum. (6) Similar radioautographic studies on kidney reveal that the cortex is the essential site of accumulation with some

tendency for concentration at the cortico-medullary junction. (7) When the uranium at the site of injection has been depleted (or removed entirely) the daily rate of excretion of uranium from the body is of the order of 0.5 to 1.0 per cent of that present in the body. NSA 1-750

10162

Radiation Lab., Univ. of California.

THE DEPOSITION OF CARRIER-FREE RADIO-VANADIUM IN THE RAT FOLLOWING INTRAVENOUS ADMINISTRATION. Kenneth G. Scott, Joseph G. Hamilton, and Patricia C. Wallace. May 18, 1951. 10p. (UCRL-1318)

Tracer studies in the rat have been conducted employing carrier-free radiovanadium (V^{48}). There is an initial relatively rapid excretion by way of the kidneys and digestive tract, following intramuscular administration of carrier-free pentavalent V^{48} in isotonic saline solution at pH 5 to 6. Four groups of three rats each were employed, and the groups were sacrificed at 1, 4, 15, and 64 days. At the 64-day interval approximately 10% of the V^{48} is retained in the body. Principal organs of retention at this interval are the skeleton, muscle, liver, testes, and kidney. The highest concentration per gram of wet tissue was observed in the skeleton, testes, kidney, and liver. Intragastric administration was performed on one group of three rats, and it would appear that approximately 0.5% was absorbed from the digestive tract. (auth) NSA 5-4363

10163

INVESTIGATIONS ON METABOLISM OF FLUORIDE. III. EFFECT OF ACUTE RENAL TUBULAR INJURY ON URINARY EXCRETION OF FLUORIDE BY THE RABBIT. Frank A. Smith, Dwight E. Gardner, and Harold C. Hodge (Univ. of Rochester School of Medicine and Dentistry, N. Y.). Arch. Ind. Health 11, 2-10(1955) Jan.

Acute renal tubular injury was produced in rabbits by the subcutaneous administration of uranyl nitrate hexahydrate. Development of the acute uranium nephritis and recovery therefrom were followed by measuring urinary protein and chloride concentrations by determining urine volumes, and by renal histological examinations. The uranium-poisoned rabbit that has sustained an acute, high-grade tubular injury maintained a normal fluoride balance, i. e., neither retained nor excreted abnormal proportions of ingested fluoride. The calculated resorption of fluoride in the renal tubule was much less than that of chloride. The fluoride content in soft tissues, viz., blood, thyroid, heart, pancreas, liver, and kidneys, is normally low and is increased very little by doubling the fluoride intake, uranium injury to the kidney did not alter this tendency. Calculations based on the balance data are presented to show that the retained fluoride is deposited in the skeleton of the animal. (auth) NSA 9-1730

10164

THE METABOLISM OF AMERICIUM IN THE RAT.

Kenneth G. Scott, D. Harold Copp, Dorothy J. Axelrod, and Joseph G. Hamilton. Journal of Biological Chemistry 175, 691-703(1948) Sept. (See also AECD-1785)

An investigation of the metabolism of americium in the rat has been conducted, following its administration by intramuscular injection and by stomach tube. No appreciable absorption took place from the digestive tract. Within 24 hours after parenteral administration, 55% of the total amount of americium absorbed from the site of injection was deposited in the liver and 20% accumulated by the skeleton. Excretion occurred primarily by way of the digestive tract and most of the americium eliminated appeared to come from the liver. There was no significant change in the content of americium in the skeleton throughout the interval of the experiment. The distribution of americium in bone was studied by the radioautographic

technique with thin, undecalcified sections of the femur. Americium was heavily deposited in the region of trabecular bone below the epiphysis, at the endosteal and periosteal surfaces of the shaft, and throughout the cortical bone in the region of small blood vessels. 2 tables, 3 graphs, and 2 plates (radioautographs). 7 references. NSA 1-1389

10165

HISTOLOGICAL CHANGES IN HUMAN SKIN DUE TO THE EFFECT OF FAST ELECTRONS. F. Nodl. Arch. Dermatol. u Syphilol. 200, 136-37(1955). (In German).

10166

CONGENITAL MALFORMATIONS DUE TO THE EFFECT OF RADIUM ON CHICKEN EGGS. J. Tur. Compt. Rend. Soc. Biol. (Paris) 56, 236-238(1904).

Chicken eggs were incubated in the presence of radiation from Ra Cl for 24-70 hrs. All exposed embryos showed the same type of teratogenic development, the sensitive portion of the embryos being the central portion. Peripheral portions were less extensively altered. Results of histological studies are reported. Ectoderm was reduced in amount and showed no tendency to differentiate into specific tissues. Endoderm of vitellin showed prolific mitosis (increased over what would be expected in unirradiated preparations.)

10167

RADIOSENSITIVITY OF NERVE TISSUE. A. Zimmern and J. A. Chavany. Strahlentherapie 41, 482-495(1931). (In German).

10168

RADIOBIOLOGY OF THE ORAL TISSUES. M. S. Burstone. J. Am. Dental Assoc. 47, 630-36(1953).

10169

Atomic Energy Project, Univ. of Rochester
THE EFFECTS OF A MAINTAINED BODY BURDEN OF POLONIUM IN THE RAT. 2. PLAN OF LONG TERM EXPERIMENT, DISTRIBUTION, EXCRETION AND RETENTION DATA. J. Newell Stannard and Robert C. Baxter. Nov. 22, 1954. 33p. Contract W-7401-eng-49. (UR-376).

Detailed plans are given for a three year, life span experiment to determine the effects of a maintained body burden of Po^{210} in the rat. Four dosage levels were chosen to cover a range between one expected to produce little or no biological change to one expected to result in considerable radiation damage. They are nominally 0.023, 0.1, 0.3, and 1.5 μc per kilogram per month given intravenously as neutralized solutions. The basis for choice of animals, route of administration, and the experimental design is discussed. The mean body contents at equilibrium were found to be approximately twice the monthly dose. Earlier assumptions predicted that it should be between 1.25 and 1.5 times the monthly dose. This difference is most readily accounted for by the presence of a longer effective half life than the assumed value (40 days rather than 30 days) and may represent in part less rapid excretion of the polonium than expected from single dose experiments. Actual measurements of excretion rates were performed as a "spot check" at the two lower dosage levels and found to be slightly lower than the rates predicted from conservative criteria. Some very high retentions were seen which may indicate delayed excretion resulting from tissue damage. Tissue contents of polonium were maintained throughout the experiment in a pattern similar to that seen in the first month after a single intravenous dose. The redistribution with time seen after a single dose does not occur. Spleen, liver, and kidney remained high throughout the exposure period, predicting greater damage per μc of polonium disintegrating in the body than after a single dose. (For preceding report in series see UR-329.) NSA 9-1705

10170

IRON METABOLISM. HEME SYNTHESIS IN VITRO BY IMMATURE ERYTHROCYTES. R. J. Walsh, E. D. Thomas, S. K. Chow, R. G. Fluharty, and C. A. Finch. *Science* 110, 396-8(1949) Oct. 14.

The results of studies on heme synthesis in vitro investigated with the Fe^{55} and Fe^{59} are presented. Blood samples from anemic and iron deficient patients and the bone marrow of rats and humans were used. It was determined that while blood containing less than 1% reticulocytes took up on measurable quantity of radioiron, the reverse was true with blood of high reticulocyte content; the radioactivity was localized in the immature cell population. The results also indicate that the physiological process of iron assimilation by the developing red cells is, first, the attachment of the iron to acceptors in the red cell stroma capable of removing iron from the serum and second, the synthesis of heme. It is also indicated that the reticulocytes are still capable of completing the process of hemoglobinization in the peripheral blood, in keeping with observations that tagged reticulocytes live a normal life span. The uptake of iron by normoblasts is much greater than with the reticulocytes; radioactive heme could also be demonstrated after incubation of radioiron with the marrow cells. It is concluded that the uptake of radioiron by reticulocytes may be used as an indicator of hemoglobin synthesis. NSA 4-8

10171

Atomic Energy Project, Univ. of Rochester. THE EFFECTS OF A MAINTAINED BODY BURDEN OF POLONIUM IN RATS. [PART] 1. PILOT DISTRIBUTION AND EXCRETION EXPERIMENT. J. N. Stannard. Apr. 27, 1954. 21p. Contract W-7401-eng-49. (UR-329).

The kinetics of excretion and total retention of Po^{210} by rats following five small weekly doses are substantially the same over a period of 49 days as when a comparable total amount is administered in a single dose. The excretion half life is 50 to 55 days and the effective half life is 37 to 39 days. This is slightly longer than previously reported values of 30 to 35 days in the rat and 30 days for the mouse, but is not considered significantly different. Tissue distribution is not altered by dividing the dose with the possible exception of red blood cells which showed a lower relative concentration. The doses given would not produce observable radiation damage in 49 days. These data are to be used for a large multiple dose experiment to be reported subsequently. (auth). NSA 8-3968

10172

Rochester, N. Y. Univ. Atomic Energy Project. THE LONG TERM RETENTION AND DISTRIBUTION OF POLONIUM²¹⁰ IN THE RAT. J. N. Stannard. Apr. 30, 1955. 31p. Contract W-7401-eng-49. (UR-393)

Retention and tissue distribution data are presented. from 76 rats receiving single intravenous doses of polonium chloride and maintained from 1 to 445 days after injection. (auth) NSA 9-5583

10173

STUDIES ON THE BIOLOGICAL EFFECT OF ROENTGEN AND γ RADIATION IN PHYCOMYCES BLAKESLEEANUS. A. Forssberg. *Acta Radiol., Suppl.* 49, P. E. Norstedt and Sons, Stockholm, Sweden. 1943. 143p. (In German).

10174

THE HISTOLOGIC STRUCTURES OF SOME HUMAN LUNG CANCERS AND THE POSSIBLE IMPLICATIONS FOR RADIOTHERAPY. R. H. Thomlinson and L. H. Gray. *Brit. J. Cancer*, 9, 539(1955).

10175

ACUTE TOXICITY OF CARNOTITE ORE DUST. Herbert B. Wilson, H. E. Stokinger, and George E. Sylvester.

Arch. Ind. Hyg. and Occupational Med. 7, 301-9(1953). April.

Carnotite ore dust inhaled by animals under experimental conditions was found to be highly toxic to the rabbit, moderately toxic to the rat, and slightly toxic to the goat. The toxicity was characteristic of U poisoning and, in degree, closely resembled that of UO_2 . (auth) NSA 7-4030

10176

Atomic Energy Project, Univ. of Rochester. THE RELATION OF PARTICLE SIZE OF URANIUM DIOXIDE DUST TO TOXICITY FOLLOWING INHALATION BY ANIMALS-II. Herbert B. Wilson, George E. Sylvester, Sidney Laskin, Charles W. LaBelle, James K. Scott and H. E. Stokinger. June 6, 1952. 25p. (UR-197)

In two separate experiments, rabbits and rats were exposed to inhalation of UO_2 at a concentration of 80 mg/ m^3 , 7 hours daily, 5 or 6 days weekly for 37 calendar days. In the first, the mass median diameter (MMD) of the chamber dust particles was 2.3 μ ; in the second 0.5 μ . The dusts were produced by "atomizing" water suspensions of the particles, and precautions were taken to reduce, to negligible proportions, "fines" in the 2.3- μ study and hexavalent U in the 0.5- μ study. Greater toxicity of the 0.5- μ MMD particles was evidenced in the rabbit by slight retardation of growth, highly incidence of urinary protein, elevation of urinary amino acid N-creatinine ratios and of blood N. P. N. and by greater renal damage, in the rat by greater renal damage, retardation of growth, increase in lung weight and in apparent gross lung damage. Uranium in all tissues (lung, femur and kidney) of terminally sacrificed animals was greater following inhalation of the 0.5- μ MMD dust than of the 2.3- μ dust. An unusual granulomatous reaction was observed in the lungs of two terminally sacrificed rabbits of the 0.5- μ study. These results are compared with those of two preliminary experiments, conditions of which differed from those of the current studies in only two important respects: in the earlier studies (a) the MMDs of the particles of the "above 1 μ " study were smaller (b) significant percentages of hexavalent U were present in the 0.5- μ dust. (auth) NSA 6-4715

10177

THE EFFECT OF EXPOSURE OF RABBITS AND RATS TO INHALATION OF URANIUM DIOXIDE DUST AT 22 Mg/ M^3 CONCENTRATION AND 0.5 μ PARTICLE SIZE. Herbert B. Wilson and George Sylvester. (nd). Dec. Dec. 22, 1949. 15p. (AECD-2781)

Rats and rabbits were exposed to UO_2 of mass median particle size of approximately 0.5 μ and at a concentration of 22 mg/ m^3 for a total of 140 hr during a 28-day period. No evidence of toxicity was found in the rat. Slight toxic effects were noted in the rabbit. Five of 16 showed very mild renal injury on micropathological examination. Five rabbits revealed a slight tendency to proteinuria; whereas, possible significant elevation of amino acid N-creatinine ratios was observed in 2 cases. Weight response was normal for both species. Deposits of uranium in the tissues of rabbits subjected to the full 140 hr of exposure were found to average 8, 1.0, and 1.8 $\mu\text{g/g}$ of tissue for lung, kidney, and femur respectively; 30, 2.0, and 1.2 were the corresponding values for the rats. NSA 4-1921

10178

Argonne National Lab. AN INVESTIGATION OF RADIUM DEPOSITION IN THE HUMAN SKELETON BY GROSS AND DETAILED AUTORADIOGRAPHY. W. B. Looney and Lois A. Woodruff. June 1952. 34p. (AECU-2174, UAC-598)

A comprehensive picture of Ra deposition throughout the human skeleton is presented. Data are based on a

series of gross and detailed autoradiographs of deposition in compact and trabecular bone. Photographs and detailed discussions of a number of autoradiographs are included. NSA 6-5555

10179

Atomic Energy Project, Univ. of Calif., Los Angeles
GASTROINTESTINAL ABSORPTION OF IONS; I. AGENTS DIMINISHING ABSORPTION OF STRONTIUM. Norman S. MacDonald, Ralph E. Nusbaum, Florita Ezmirlan, Richard Barbera, G. V. Alexander, Patricia Spain, and Donald E. Rounds. Nov. 13, 1951. 13p. (UCLA-169).

Thirty-two chemical agents, readily available in tonnage quantities, were screened for their ability to diminish the skeletal deposition of ingested Sr by gastrointestinal absorption. Aqueous SrCl_2 solution was administered to fasted rats by stomach tube, and followed immediately by an aqueous solution or suspension of the agent under study. After 24 hr. the Sr content of the femurs was determined by an emission spectrographic technique. The materials which definitely decreased skeletal accumulation of Sr^{++} are listed in order of decreasing efficacy: MgSO_4 , Na_2SO_4 , the ammonium salt of an amido-polysphosphate, two carboxylic type cation exchange resins, a colloidal phosphorylated glucoside, calcium phytate, pectin, bran cereal, castor oil and a hydrophilic laxative derived from plantago. None of the following materials significantly altered the amount of deposition, bentonite, kaolin, hydrated alumina, soluble starch, methyl cellulose, carboxy methyl cellulose, agar, gum acacia, crude lignified cellulose, gelatin, fresh egg white, oatmeal, phenolphthalein, mineral oil and the disodium salt of ethylene diamine tetra acetic acid. Powdered milk, tannic acid, inulin, sodium alginate and a carboxylic and sulfuric acid substituted starch, all increased the skeletal accumulation of ingested Sr. (auth) NSA 6-69

10180

ROENTGEN IRRADIATION OF THE SPLENIC AREA AND CALCIUM LEVELS. E. Benassi. Riv. Radiol. e Fis. Med. 2, 311-328(1930).

10181

IMMEDIATE EFFECT OF X-RAYS ON GRANULE-BOUND DNA IN THE SPLEEN OF THE RATS. M. Goutier-Pirotte and A. Thonnard. Biochim. et Biophys. Acta, 22, 396(1956). (In French).

The authors determined the amount of DNase in the spleen of female rats before and 24 hrs. after whole body exposure to 850 r X-ray dose (LD_{100}). DNase was determined in veronal-acetate and citrate buffer extracts of spleens; aqueous homogenates of spleens were the controls. Optimum pH for the enzyme varied with radiation dose, being displaced towards acid side after irradiation; towards alkaline side in irradiated rats that had been pretreated with cysteamine or β mercaptoethylamine. Effects of irradiation and irradiation plus protective agents were also studied in vitro.

10182

Argonne National Lab.
SPECIAL PROBLEMS AND EXPERIMENTAL CYTOLOGY. S. Phyllis Stearner, E. J. B. Christian, Howard S. Ducoff, B. Vincent Hall, J. V. Passonneau, Austin M. Brues, Katherine A. Hamilton, Walter E. Kisielecki, L. Seki, Agnes N. Stroud, R. B. Balder, Jr., C. P. Stroud, and J. M. Gurian. p.26-40 "Quarterly Report [for] August, September, and October 1952, Division of Biological and Medical Research." Austin M. Brues, ed. 15p. (ANL-4932)

Data on the effect of partial-body shielding on radiation-induced hypotension in young chicks are presented in tabular form. Paramecium transferred to previously irradiated medium showed a 2-hr growth delay, irradiated cells in fresh medium showed a 10-hr delay and irradiated cells

in irradiated medium were delayed about 12 hr. Possible explanations for the growth delay are discussed. Structural features of the glomerulus are described as observed in ultrathin sections of rat kidney under the electron microscope. Rats were exposed to β rays of $\text{Sr}^{90}\text{-Y}^{90}$ over a 35-cm² area using 1500 μc diffusely distributed or in the form of 10, 20, or 50 point sources. Following the death of the last rat 741 days after exposure it was determined that survival was significantly less in all of the irradiated groups than in controls at all times after 350 days. Malignant tumors were not seen in the 60 controls, while 71 skin carcinomas, 73 sarcomas, and 15 adenocarcinomas of mammary origin appeared in the 405 experimental rats. Fractions of human plasma administered intravenously in saline to mice 6 min before exposure to 800-r x radiation gave protection to 80% of the group when doses of 23 mg were used, while only 1% of the controls survived. Data are presented which indicate that diethylstilbestrol, when administered for a sufficient period, acts as a cocarcinogen in mice, accelerating the induction of uterine tumors by 20-methylcholanthrene and perhaps stimulating their growth. Preliminary data are presented for a study of the effect of weekly doses of x radiation on the organ weights of growing mice. (C. H.) NSA 7-2727

10183

PARTITION OF ORALLY ADMINISTERED RADIOACTIVE PHOSPHORUS IN THE BLOOD AND MILK OF THE DAIRY COW. P. Saarinen, C. L. Comar, S. P. Marshall, and George K. Davis. J. Dairy Sci. 33, 878-84(1950) Dec. NSA 5-2678

10184

NEW RESULTS OF EXPERIMENTS WITH THORIUM X ON HUMAN TISSUES. E. Schoen and Heribert Moser. Munch. med. Wochschr. 93, 862-3(1951) Apr. 27. (In German).

While pointing out the possibility of the use of P^{32} in the diagnosis of tumors in certain organs, Cramer (Med. Monatsschr. 5, 118(1951)) excluded the liver and the spleen, because in these organs the radioactivity obtained is the same in healthy and altered tissues. Experiments are reported here showing that the necessary selectivity is observed also in these organs when ThX (Ra^{224}) is used. After an intravenous injection, measurements are made of the rate of the γ -activity decrease. Whereas in a tumorous liver the activity belongs mainly to Ra^{224} , in a nontumorous one it is determined chiefly by Pb^{212} (10.6-hr), a decay product of Ra^{224} . NSA 5-5547

10185

EFFECTS OF GAMMA-RAYS ON SOLUTIONS OF SODIUM DEOXYRIBONUCLEATE. R. A. Cox, W. G. Overand, A. R. Peacocke, and S. Wilson. Nature 176, 919(1955).

10186

ORIGIN OF MALIGNANT TUMOR CELLS. P. C. Koller. Nature 151, 244(1943).

Cytological analysis of tumor cells shows that all chromosome abnormalities and the increased rate of division itself can be explained by assuming that there is a quantitative change in the nucleic acid synthesis due to alteration in the heterochromatic region of the chromosomes.

10187

PRINCIPLES OF BIOLOGICAL ACTION OF RADIOACTIVE RADIATION. B. N. Tarasov. Translated from p. 3-138 of Osnovy Biologicheskogo Deystviya Radioaktivnykh Izucheny. Moscow, 1954. 115p. (PB-11230)

A review is presented of recent studies on the biological action of ionizing radiations. The nature of the interaction of radiation with matter is discussed. Other topics discussed include the magnitude of absorbed energy at which biological effects are produced; the mechanism of the primary action of radioactive radiation;

the indirect action of radiation; secondary reactions to radioinduced damage; the effects of biological action on the penetration of radioactive substances into the organism; and the distribution within the organism and the action of biologically active radioisotopes. 120 references. (C. H.) NSA 13-14992

10188

RADIOIRON IN DUCKS AND CANARIES AND ITS EFFECTS ON THEIR INITIAL MALARIAL INFECTIONS. Paul E. Thompson, D. A. McGinty, D. L. Bush, and Mary L. Wilson. *Journal of Infectious Diseases* **83**, 23-32(1948) July-Aug.

Radioactive colloidal iron mixtures (Fe^{55} and 59) were administered parenterally in single and multiple doses to ducklings and canaries. These studies reveal the following: Radioactivity is evident in red cells 18 hours following single intravenous administration, during the next 70 hours, increasing amounts of radioactivity are found in blood cells with negligible amounts in plasma. Radioiron is utilized more rapidly by blood cells following intravenous injection than following intraperitoneal administration. Radioactivity of perfused tissues of ducklings receiving multiple doses of maximally tolerated amounts of radioiron over a period of 23 days was greatest in liver, bone marrow and spleen, lesser amounts occurred in other tissue studies. There was no evidence of intolerance to radioiron of specific activity of one millicurie per gram apart from the toxicity of iron itself. The in vivo effects of radioiron on two species of malarial parasites were studied. *Plasmodium cathemerium* infections were established in canaries having 0.12 microcuries per ml blood. *Plasmodium lophurae* infections were initiated in ducklings having 0.10 microcurie per ml blood. There was no evidence of radiation damage to the plasmodia on the basis of their morphology and ability to produce an acute parasitemia. 19 references. NSA 1-1057

10189

RELATION OF PARTICLE SIZE OF U_3O_8 DUST TO TOXICITY FOLLOWING INHALATION BY ANIMALS. Herbert B. Wilson and George E. Sylvester (Univ. of Rochester School of Medicine, N. Y.), Sidney Laskin (Institute of Industrial Medicine, New York), Charles W. La Belle (Jefferson Medical Coll., Philadelphia, Penn.), James K. Scott (Univ. of Rochester Atomic Energy Project, N. Y.) and H. E. Stokinger (Occupational Health Program, Cincinnati, Ohio). *Arch. Ind. Health* **11**, 11-16(1955) Jan.

U_3O_8 dust at a concentration of approximately 80 mg per cubic meter with a mass-median particle diameter of 0.5μ has been shown to be much more toxic than the same concentration with an average mass-median diameter of 2.5μ . This was evidenced in the rabbit by higher mean urinary protein values, by retardation of growth, and by significantly greater renal damage, as shown by histopathological examination of tissues; in the rat it was evidenced by retardation of growth, by renal damage shown histopathologically, and in serially killed rats by gross lung damage and increase in lung weight and by gross, probably secondary, weight abnormalities in other organs. In all tissues analyzed deposition of uranium was greater following inhalation of particles of 0.5μ MMD. The lungs showed the greatest differences. The results of this study have been compared with those of a corresponding UO_2 study. The quantitative toxic differences related to particle size were very much alike, whether the oxide was UO_2 or U_3O_8 , and, when adjusted for the difference in exposure hours, the amounts of uranium in the tissues of terminally killed animals were nearly identical. Some qualitative differences between the results of the UO_2 and U_3O_8 0.5μ MMD studies have been noted. (auth) NSA 9-1731

10190

ROLE OF BROMINE IN ANIMAL BODY. I. DISTRIBUTION OF BROMIDES IN THE BODY OF RATS, DETERMINED WITH THE AID OF RADIOBROMINE. I. N. Verkhovskaya. *Izvest. Akad. Nauk S. S. R., Ser. biolog.*, 114-27(1950) Jan.-Feb. (In Russian).

The distribution of bromides in the body of the rat was studied with the aid of Br^{82} . The highest relative radioactivities were observed in blood, urine, the medullary portion of the kidneys, the thyroid, and the hypophysis; in the latter the activity was sometimes very high. Medium values of the relative activity were shown by the lungs, liver, spleen, adrenals, salivary and lymphatic glands, and testes and ovaries. Very low values were obtained from various parts of the brain. (auth) NSA 5-38

10191

EFFECTS OF ROENTGEN RADIATION ON VITAL STAINING OF TISSUES. C. Holtermann. *Strahlentherapie* **17**, 158-174(1924). (In German). CA 20-1248

10192

EFFECTS OF X-RAY EXPOSURE ON TISSUE DEOXY-RIBONUCLEASE II. E. P. Gordon, S. Okada, and L. H. Hempelmann. *Radiation Research*, **5**, 479(1956).

Effects of whole-body x-irradiation on DNase II activity, DNA content, and acid soluble phosphorus fractions of the spleen, thymus, liver, and kidney were studied in normal rats. The DNase II and DNA levels in these tissues were also affected by adrenalectomy, cortisone and partial shielding of the body during irradiation.

10193

Hanford Atomic Products Operation, Richland, Wash. PHYSIOLOGICAL PARAMETERS FOR ASSESSING THE HAZARD OF EXPOSURE TO RUTHENIUM RADIOISOTOPES. R. C. Thompson, M. H. Weeks, O. L. Hollis, J. E. Ballou, and Willa D. Oakley. Mar. 1, 1956. 59p. Contract W-31-109-Eng-52. (HW-41422)

Results are reported from a variety of studies on the absorption by various routes, the distribution, the excretion, and the long term retention of Ru^{104} in various tissues of the rat. Gastrointestinal absorption of Ru is much greater than previously assumed; the maximum permissible concentration of Ru^{106} in drinking water should be $4 \times 10^{-3} \mu\text{c/ml}$. (auth) NSA 10-9994

10194

General Electric Co. Hanford Atomic Products Operation, Richland, Wash. EVALUATION OF BIOLOGICAL HAZARDS FROM RUTHENIUM PARTICULATES. I. STUDIES OF PERCUTANEOUS ABSORPTION, GASTROINTESTINAL ABSORPTION, AND GASTROINTESTINAL HOLDUP. R. C. Thompson, O. L. Hollis, and W. D. Oakley. Mar. 1, 1956. Decl. Mar. 29, 1957. 25p. Contract W-31-109-Eng-52. (HW-41519)

Studies are described of the percutaneous absorption and gastrointestinal absorption in the rat of Ru administered in the form of insoluble particulates. Results are also reported on the gastrointestinal holdup of these particulates. All results are characterized by extreme variability, due, no doubt, to variation in the chemical and physical nature of the particles employed. On the average, absorption of Ru in this form is 100-fold less than the absorption of Ru administered in solution. There was no tendency for prolonged holdup of particles in the gastrointestinal tract. (auth). NSA 11-13572

10195

THE DISTRIBUTION OF RADIOACTIVE IODINE IN HUMAN TISSUES; NECROPSY STUDY IN NINE PATIENTS. J. B. Trunnell, B. J. Duffy, Jr., John T. Goodwin, Wendell Peacock, Lorraine Kirschner, and Ruth Hill. *J. Clin. Endocrinol.* **10**, 1007-21(1950) Sept.

Nine patients dying after (although with one exception not because of) radioactive iodine administration have been studied with respect to their tissue iodine distribution. Both direct gamma-ray measurements and radioautographic procedures were employed. Data obtained have been presented in tabular form and have been used as a basis for estimating quantities of radiation which may be delivered to various tissues as a result of therapy with I^{131} . Only the *corpora amylacea* of the prostate of one patient showed iodine collection radioautographically in nonthyroid or nonthyroid-cancer tissue. Reasons for inability to regard this group of patients as representative of normal are set forth. (auth) NSA 4-6518

10196

Rochester, N. Y. Univ. Atomic Energy Project. INFLUENCE OF INJECTION SOLUTION TREATMENT ON BLOOD DISAPPEARANCE RATES AND TISSUE DISTRIBUTION OF POLONIUM²¹⁰. Robert G. Thomas and J. N. Stannard. Dec. 14, 1955. 19p. Contract W-7401-eng-49. (UR-421)

Factors influencing the kinetics of blood disappearance and tissue distribution of Po^{210} following injection into rats are discussed. Necessity for the careful control of injection solutions is emphasized. (C. H.) NSA 10-3099

10197

PATHOGENESIS OF INTESTINAL ULCERS FOLLOWING IRRADIATION. N. B. Friedman. Arch. Pathol., 59, 2-4 (1955).

Adhesions do not favor the localization of irradiation ulcers in fixed intestinal loops. Colostomy protects irradiated intestinal mucosa from the development of ulcers. Ulceration following irradiation results from the action of secondary factors on a damaged intestinal mucous membrane. The reaction pattern of damaged intestine is determined more by the structure and function of the bowel than by the nature of the injury.

10198

EFFECT OF WHOLE-BODY IRRADIATION ON EXCRETION OF SODIUM AND POTASSIUM IN THE RAT. J. L. Glenn and W. R. F. Boss. Federation Proc. 15, 75(1956).

Authors describe results of their studies on the effects of sublethal, midlethal, and lethal doses of x-irradiation on the excretion of Na and K in the rat.

10199

THE DISTRIBUTION OF P^{32} IN THE MONONUCLEOTIDES OF NORMAL AND REGENERATING LIVER RIBONUCLEIC ACIDS. Elliot Volkin and Charles E. Carter. Feb. 14, 1950. 13p. (ORNL-585)

This paper deals with the P^{32} turnover in liver ribonucleic acid purified by the guanidine salt method. The specific activities of the component monoribonucleotides were determined following mild alkaline degradation of the parent nucleic acid and separation of the mononucleotides on the anion-exchange resin, Dowex-1. One hour after injection of inorganic P^{32} into the rat, the adenylic acid moiety of the ribonucleic acid had about 50% higher specific activity than the other mononucleotides, the specific activities of the latter being comparable. The isomeric adenylic acids were equally labeled. The mononucleotide composition and specific activity of regenerating rat liver ribonucleic acid followed the same pattern as the normal, although specific activities of the mononucleotides were about 3 times higher than their normal counterparts. 13 references NSA 4-2214

10200

CHEMICAL AND HISTOCHEMICAL CHANGES IN THE LIVER AFTER IRRADIATION WITH LARGE X-RAY DOSES. P. Lelievre, H. Betz, and J. Jehotte. Compt. rend. soc. biol., 149, 1077-79(1955). (In French).

10201

A RADIOAUTOGRAPHIC STUDY OF THE LOCALIZATION

OF RADIOACTIVE EUROPIUM IN SOFT TISSUE OF THE RAT. C. D. Van Cleve. nd. 1p. (AECU-218).

This document is in abstract form, it is reproduced below in its entirety. Radioautographs of liver, kidney and spleen were investigated following the intravenous and intramuscular administration of radioactive europium (Eu^{154}). Following intravenous administration radioactive europium apparently was deposited primarily in the reticulo-endothelial system of the liver and spleen. The uptake following intramuscular administration was not sufficiently high to permit any detailed evaluation of the areas of localization of this radioactive substance. NSA 2-2081

10202

ON THE ROLE OF RADIOTHORIUM (Th^{228}) IN RADIUM POISONING. M. A. Van Dilla and B. J. Stover (Univ. of Utah Coll. of Medicine, Salt Lake City). Radiology 66, 400-2(1956) Mar. NSA 10-6514

10203

METABOLISM OF I^{131} IN SEVERE ANOXIC ANOXIA. L. Van Middlesworth. Science 110, 120-1(1949) July 29.

The results of an investigation to determine whether there are any significant alterations in the metabolism of radioactive I in relatively acute exposures to severe anoxic anoxia are presented. Eighteen rats were fed a low I diet for eight weeks, after which one-half were exposed to 268 mm Hg air pressure at 15-20°C for 12 hr, returned to normal pressure and injected with I^{131} . They were then re-exposed to the low pressure for an additional 24 hr and sacrificed. All injections of I^{131} consisted of 10 μ c in 0.5 cc of physiological saline solution administered intraperitoneally, and each rat the total I^{131} was determined in the thyroid gland and in a sample of plasma. The anoxic rats demonstrated a pronounced reduction in protein bound I^{131} in plasma, the influences of anoxia upon the I^{131} in unfractionated plasma, in the thyroid, and in the urine were less pronounced. NSA 3-1191

10204

UPTAKE OF RADIOACTIVE PHOSPHORUS IN EXPERIMENTAL TUMORS. I. COMPARISON OF RADIOACTIVITY IN NEOPLASTIC AND NORMAL OCULAR TISSUE. Charles I. Thomas, Mary Sue Bovington, and Jack S. Krohmer (Western Reserve Univ. School of Medicine, Cleveland, Ohio). Cancer Research 16, 796-803(1956). Sept. NSA 10-11679

10205

STUDIES OF PHOSPHORUS METABOLISM IN MAN; II. A STUDY OF THE PERMEABILITY OF THE HUMAN ERYTHROCYTE TO INORGANIC PHOSPHATE IN VITRO BY THE USE OF RADIOACTIVE PHOSPHATE (P^{32}). F. H. L. Taylor, S. M. Levenson, and M. A. Adams. Blood 3, 1472-1477(1948) Dec.

The phosphate exchange in red cells and plasma was studied in vitro using P^{32} in the form of sodium phosphate as a tracer. No phosphate was added other than the isotopic preparation of high specific activity. The inorganic phosphate exchanged freely between the plasma and the erythrocytes at 37.5°C in a period of four hours. The minimal transfer occurred at 7°C. Most of the added P^{32} which passed into the erythrocytes during this time remained in the inorganic fraction, less than 15% was found in the organic acid soluble fraction. The specific activity of the inorganic phosphate of the erythrocytes was equal to or greater than that obtained for the inorganic phosphate of the plasma at the end of the four-hour incubation period at 37.5°C. 8 references. 2 tables. NSA 2-673

10206

Technical Information Service, AEC UNCLASSIFIED BIBLIOGRAPHIES OF INTEREST TO THE ATOMIC ENERGY COMMISSION. SUPPLEMENT 1. Hugh E. Voress. comp. July 20, 1954. 23p. (TID-3043(suppl. 1))

This compilation contains additional annotated references to bibliographies considered pertinent to the AEC program. Reports available at the Technical Information Service as of July 20, 1954, were included. The bibliographies are arranged by subject, and multiple listings are made for those which cover more than one subject. A table of contents lists the subjects covered, and author and report number indexes are included. (auth)

NSA 8-6607

10207

RADIOACTIVE ISOTOPES IN THE STUDY OF IRON METABOLISM AND IN HUMAN THERAPY. Alfredo Vannotti. *Rend. 1st. super. sanita* 12, 595-607(1949).

One and a half hours after intravenous injection into rabbits of Fe^{59} ferrous lactate the activity is distributed as follows: Blood 26% (mostly in the plasma), liver 41%, spleen 0.6%, kidney 4%, intestines 7%, muscle 7%, bone 4%, skin 9%. After several days the activity of the blood is found mostly in the red corpuscles (hematin), while the activity of the skin, muscle kidney, and intestines becomes insignificant. The distribution of ferric lactate is initially slightly differed but it subsequently becomes equal to that of Fe^{++} . In rabbits with chronic anemia the percentage distribution after 1.5 hr is as follows for Fe^{++} and Fe^{+++} , respectively: Blood 37 and 41, liver 25 and 21, spleen 0.19 and 0.16, kidney 1.4 and 8, intestines 6 and 0.7, muscle 9 and 1.5, bones 19 and 24, and skin 1 and 1. In a healthy rabbit at an O_2 pressure corresponding to 7000 m altitude the Fe distribution in the organs cited in the same order as before is: 31, 23.5, 0.34, 2, 5, 14, 12, and 9%, respectively. In Pb-intoxicated rabbits the Fe circulating in the blood is distinctly lower while a concentration occurs in the bone marrow. Apparently the Fe cannot be used for the hemoglobin synthesis in this case. The Fe in erythroblasts is found in the cytoplasm rather than the nucleus. The synthesis of hemoglobin probably occurs in the cytoplasm. The synthesis of hemoglobin is more rapid than that of cytochrome c and that of myoglobin. Normally there is no renal elimination of Fe except in cases of excessive Fe in circulation. Some of the therapeutic applications of radio-P and radio-I are reviewed. NSA 4-4212

10208

NEW ACHIEVEMENTS IN THE FIELD OF THE METABOLISM OF IRON BY USING A RADIOACTIVE ISOTOPE. A. Vannotti, M. Closuit, and A. Jaccottet. *Bull. Schweiz. Akad. Med. Wiss.* 5, 427-47(1949) Dec. (In French).

Studies were made on iron metabolism in rabbits in both normal and pathological conditions using Fe^{59} as a tracer. In chronic anemia, there is strong fixation of iron in the bone-marrow to the prejudice of deposit organs. In hypoxia (6000 m altitude) iron is also accumulated in the bone-marrow depending upon the degree of erythropoieses. Likewise, in hyperthyroidism, bone-marrow activity is important, but an augmentation of iron in the myocardium (only muscle in activity during the tests) was also found. Finally, in acute inflammatory conditions, a considerable drop of circulating iron and a strong fixation of this metal in bone-marrow and musculature are noted. Physico-chemical alterations of proteins are at the origin of these modifications. The spleen is of but secondary importance in the fixation of iron during hemolysis, while the liver remains the regulating organ of the intermediate iron metabolism, which is chiefly governed by the hematopoiesis needs, and but secondarily by the metabolic necessities of other tissues. These functional differences in the repartition of iron during the synthesis of hemoglobin and the other cellular hemes are also apparent in the variation of the rapidity with which iron-based pigments are formed. If hemoglobin formation can proceed very rapidly cellular heme compounds syntheses,

especially that of cytochrome c, are much slower. 24 references. (auth) NSA 4-4526

10209

MODIFICATION OF STRIATED FIBERS UNDER THE INFLUENCE OF PROLONGED IRRADIATION BY MEANS OF RADIUM PLACED IN THE MUSCLES. N. Dobrovolskaia-Zavadskaia. *Jour. Radiol. et Electrol.* 8, 49-61(1924). (In French).

10210

POLYCYTHEMIA TREATED BY RADIOACTIVE PHOSPHORUS. B. D. Vaughan. *Med. J. Australia* 2 (37th year), 623(1950) Oct. 21.

A case of polycythemia is described in which phenylhydrazine proved unreliable and P^{32} lost its effect after three administrations had caused temporary remission and improvements of the blood picture. NSA 5-1769

10211

WHAT IS THE RECOVERY FACTOR IN SPLEEN?

D. H. W. Barnes and J. F. Loutit. *Nucleonics* 12(5), 58-70(1954).

The "factor" in homogenates or suspensions of spleen and marrow that induces recovery in animals exposed to an otherwise lethal radiation dose may consist of viable cells that repopulate the animal's depleted hematopoietic tissues.

10212

DAMAGE TO THE GERM PLASM THROUGH ROENTGEN IRRADIATION. L. F. Driessen. *Strahlentherapie* 16, 656-689(1924) (In German)

10213

THE METABOLISM OF NICKEL. I. SPATIAL AND TEMPORAL DISTRIBUTION OF Ni^{63} IN THE MOUSE. Arthur W. Wase, Donald M. Goss, and M. John Boyd (Hahnemann Medical Coll., Philadelphia). *Arch. Biochem. and Biophys.* 51, 1-4(1954) July.

Administered Ni^{63+++} is widely distributed throughout the tissues and organs of the mouse. It is rapidly metabolized by the principal tissues with the exception of the lung and brain. It is eliminated via the feces and urine shortly after administration. (auth) NSA 8-5793

10214

UPTAKE OF CALCIUM-45 AND STRONTIUM-90 FROM WATER BY FRESH-WATER FISHES. Harold L. Rosenthal. (Rochester General Hospital, N. Y.). *Science* 126, 699-700 (1957) Oct. 11. NSA 12-2728

10215

New York Operations Office. Health and Safety Lab. AEC. SUMMARY OF ANALYTICAL RESULTS FROM THE HASL STRONTIUM PROGRAM, JULY THROUGH DECEMBER 1956. John H. Harley, Edward P. Hardy, Jr., Ira B. Whitney, and Merrill Eisenbud. *Mar. 15, 1957*. 44p. (NYO-4862)

A network of stations was established in 1951 throughout the United States and extended to many parts of the world in 1952 for the purpose of sampling fall-out from nuclear explosions. Gummed films representing a 24 hour collection of fall-out are ashed and counted for β activity which is then extrapolated to Sr^{90} content. Samples of rain water, tap water, vegetation, bone, milk, urine, fish, and soil collected at various places were also assayed for Sr^{90} content. Analytical results on samples collected from Sept. 1955 through Sept. 1956 are summarized. A fall-out collector is described in which fall-out material collects in a plastic funnel and is passed through a filter and ion exchange column to collect the activity. (For preceding period see NYO-4751.) NSA 12-2205

10216

DISTRIBUTION OF STRONTIUM-90 IN POND WEED AND FISH. K. W. E. Bidwell and Eileen E. Foreman (United Kingdom Atomic Energy Authority, Windscale Works,

Sellafield, Cumberland). *Nature* 180, 1195-6(1957) Nov. 30. NSA 12-3537

10217

RADIO-CAESIUM IN DRIED MILK. D. V. Booker (A. E. R. E. Harwell). *Phys. in Med. and Biol.* 2, 29-35(1957) July.

A gamma scintillation spectrometer method for measuring the radio-caesium and potassium content of dried milk is described. The changes with time of the Cs^{137} activity in dried milk from Frome, Somerset are presented. Levels of Cs^{137} activity in full cream dried milk collected from October to December 1956 from five different areas were measured. (auth) NSA 12-2726

10218

Argonne National Lab., Ill.

ACUTE RADIOTOXICITY OF INJECTED P^{32} IN MICE. PART I. METABOLISM AND SURVIVAL. D. S. Anthony and R. H. Snyder. Feb. 11, 1947. 17p. (MDDC-881; C-3772)

The results of pilot experiments on the metabolism and radiotoxicity of radioactive phosphorus are reported in the paper. Data were obtained on the toxicity of well-known radioactive element in the same strains of animals and under the same experimental conditions as data obtained with less familiar radioactive elements. Determinations of the relative radiotoxicity of different isotopes could therefore be made without reference to work done under different conditions. Since the effects of radioactive phosphorus on man had been studied, comparison of these effects with those on laboratory animals provided a basis for extrapolation with other radioactive elements. The experiments with radioactive phosphorus greatly facilitated planning and interpretation of later experiments on the toxicity of other heretofore rare radioactive elements.

10219

Washington. Univ., Seattle. Applied Fisheries Lab. SURVEY OF RADIOACTIVITY IN THE SEA AND IN PELAGIC MARINE LIFE WEST OF THE MARSHALL ISLANDS, SEPTEMBER 1-20, 1956. Allyn H. Seymour, Edward E. Held, Frank G. Lowman, John R. Donaldson, and Dorothy J. South. Mar. 15, 1957. 63p. Contract AT(45-1)-540. (UWFL-47)

A survey of the radioactivity in the sea in the region of the North Equatorial Current from the Marshall Islands to the Marianas Islands was made in September 1956. Plankton samples were taken by oblique tows from 200 meters and water samples were taken from the surface, 25, 50, 100, and 150 meters at 74 stations. The general pattern of distribution of radioactivity shows a sharp decrease east of Bikini and a gradual but irregular decrease west of Eniwetok. A slight degree of contamination is indicated as far to the west as Guam, the western extremity of the survey. Non-fission products account for a large proportion of the radioactivity in plankton and fish samples. (auth) NSA 12-41

10220

ON TRANSMISSION OF RADIOSTRONTIUM BY NUTRITIONAL CHAIN FROM THE OPENED WATER RESERVOIRS INTO THE HUMAN ORGANISM. A. N. Marei, M. M. Saurov, and G. D. Lebedeva. *Med. Radiol.* 3, No. 1, 69-76(1958) Jan.-Feb. (In Russian).

Water-living organisms (plankton, water plants, molluscs, fish) as well as domestic ducks concentrate a significant amount of isotopes in their tissues due to inhabiting water containing radiostrontium. Fish and ducks, which are the main links in the biological food-chain, transmit radiostrontium from the water reservoir into the human organism. The most significant is pollution of bone tissue, where most of the isotope is accumulated. It is passed into the broth in cooking fish and poultry. The

possibility of intake of radiostrontium not only with water, but with food products in amounts which are over the permissible levels, requires revision of standards of permissible concentrations for opened water reservoirs. (tr-auth) NSA12-9631

10221

REPORT OF THE COMMITTEE APPOINTED BY THE PRIME MINISTER TO EXAMINE THE ORGANISATION FOR CONTROL OF HEALTH AND SAFETY IN THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY. Alexander Fleck. London, Her Majesty's Stationery Office, 1957. 27p.

Recommendations are presented for additional control of health and safety in the atomic energy field in the United Kingdom. NSA 12-10335

10222

Division of Organization and Personnel. Safety and Fire Protection Branch, AEC.

A SUMMARY OF INCIDENTS INVOLVING RADIOACTIVE MATERIAL IN ATOMIC ENERGY ACTIVITIES, JANUARY-DECEMBER 1956. Daniel F. Hayes. Aug. 1957. 28p. (TID-5360)(Suppl.)

Pertinent details of the incidents are given. Some are illustrated with photographs or diagrams. NSA 12-7093

10223

General Electric Co. Hanford Atomic Products Operation, Richland, Washington.

ABSORPTION OF PLUTONIUM THROUGH THE SKIN OF THE RAT, OF PENETRATION AND METHODS FOR SKIN DECONTAMINATION. M. H. Weeks, W. D. Oakley, J. Katz and R. C. Thompson. 20p. 1953. (HW-30232)

10224

California. Univ., Livermore. Radiation Lab. THE SAFETY PROGRAM OF THE UNIVERSITY OF CALIFORNIA RADIATION LABORATORY AT LIVERMORE, CALIFORNIA. Russell Gardner Herron. Apr. 14, 1958. 28p. Contract (W-7405-eng-48). (UCRL-5185)

The safety program of the University of California Radiation Laboratory at Livermore, California, is discussed in terms of the functions of the six independent safety groups that comprise the laboratory's primary safety organization, namely, Industrial Safety, Medical Safety, Fire Prevention and First Aid, Health Chemistry, Health Physics, and High-Explosives Safety Groups. The conclusion reached is that the safety program of a large modern research laboratory is one of wide scope and complexity. It appears that the University of California Radiation Laboratory at Livermore is actively working towards the goal of maximum safety for its personnel and equipment. (auth) NSA 12-8918

10225

THE RADIATION DOSES OF GONADS DURING DIAGNOSTIC AND THERAPEUTIC APPLICATION OF IONIZING RAYS. Hanns-Joachim Lossel. *Strahlentherapie* 103, 614-19(1957). (In German). NSA 12-3527

10226

HAZARDS OF RADIOACTIVITY, THE FIFTH NATIONAL CONFERENCE ON PERSONNEL PROTECTION IN GOTTWALDOV. J. Fуска. *Jaderna Energie* 4, No. 1, 27 (1958) Jan. (In Czech.) NSA 12-7102

10227

SAFETY AND PROTECTIVE PROBLEMS IN REACTOR DESIGN AND WORK WITH RADIOISOTOPES. E. Heinz Graul. *Atompraxis* 3, 468-76(1957) Dec. (In German).

A survey was made of the safety and protective problems connected with reactor projects and work with radioisotopes. (J.S.R.) NSA 12-5178

10228

GONAD DOSES RECEIVED DURING THE MEDICAL AP-

PLICATION OF ROENTGEN RADIATION. Kristian Koren and Sem Maudal. *Acta Radiol.* 48, 273-9(1957) Oct.

The gonad doses received by male and female patients during the medical application of roentgen rays have been measured systematically on a dummy. Their relationship to the skin and volume doses are shown. (auth) NSA 12-3511

10229

RADIATION HYGIENE ABOARD NUCLEAR SUBMARINES. John H. Ebersole. *Am. Ind. Hyg. Assoc. Quart.* 18, 305-11(1957) Dec. NSA 12-5851

10230

RADIATION HAZARDS IN THE FIELD OF PEDIATRICS. Meinhard Robinow (Yellow Springs Clinic, Ohio) and Frederic N. Silverman (Univ. of Cincinnati Coll. of Medicine). *Pediatrics* 20, No. 5, 921-40(1957) Nov. NSA 12-5827

10231

THE ATOMIC RESEARCH CENTER-KARLSRUHE. Institute for Radiation Protection and Radiation Biology. K. G. Zimmer. *Atomwirtschaft.* 2, 434-5(1957) Dec. (In German). NSA 12-5179

10232

THE PROBLEM OF RADIOACTIVITY AND LEGISLATION ON THE DISCHARGE OF RADIOACTIVE WASTE SUBSTANCES IN WATER. F. Devlamink. Translated by J. Cooke from Centre belge etude et document. eaux, *Bull. mens.* No. 65, 204-9, 212-13(1956). 10p. (IGRL-T/W-37)

Water pollution problems resulting from atomic explosions or nuclear reactors are surveyed. Various methods of treatment of residuary radioactive water surveyed include: hold-up lagoons, filtration, absorption by certain earths, ion exchange, flocculation, adsorption by powdered metals, biological processes, evaporation and crystallization. The Royal Decree fixing the concentration limit of radioactive substances is given. (L. M. T.) NSA 12-5177

10233

HISTORICAL PROGRESS OF THE ISOTOPIC METHODOLOGY AND ITS INFLUENCES ON THE BIOLOGICAL SCIENCES. G. Hevesy. *Minerva Nucleare* 1, 189-200 (1957) Oct. NSA 12-5867

10234

INDUSTRIAL HEALTH IN THE ATOMIC ENERGY INDUSTRY. James H. Sterner (Eastman Kodak Co., Rochester, N. Y.). *Minerva Nucleare* 1, 213-16(1957) Oct. NSA 12-5860

10235

Westinghouse Electric Corp. Bettis Power Plant, Pittsburgh.

HAZARDS OF THE AREA SURROUNDING PWR DUE TO ATMOSPHERIC DIFFUSION OF RADIOACTIVITY R. F. Valentine. Sept. 1957. 85p. Contract AT-11-1-GEN-14. (WAPD-SC-548) Supplemental to WAPD-SC-541.

Results are presented of dosage calculations resulting from dissemination of radioactive contaminants to the atmosphere from the Shippingport reactor following a postulated loss-of-coolant accident. An evaluation is made of the hazards from gamma and beta radiation sustained directly from the passing cloud and from fallout and rain-out and the hazard resulting from inhalation of radioactive materials. Accumulated ground concentrations are calculated. The evaluation is made basically for four types of accidents, release to the atmosphere of primary coolant containing only corrosion products; release to the atmosphere of primary coolant containing fission products of the blanket UO_2 , release of the primary coolant followed by core meltdown and release of the liberated core fission products to the atmosphere through a breached or open plant container, and release of the primary coolant followed by core meltdown and seepage of fission products from an intact plant container. In each case the quantity of fission products assumed to be in-

involved is that amount present after 3,000 hours of operation at a power of 270,000 kw. Any accident which occurs earlier than this would result in a smaller degree of hazard because of the smaller quantity of fission products generated. (auth) NSA 12-2206

10236

DOSES OF RADIATION FROM NATURAL AND ARTIFICIAL RADIOACTIVE SOURCES. L. F. Franzen, G. Myszynski, and G. Wiesenack. *Atomwirtschaft.* 2, 362-6(1957) Nov. (In German).

Only since quite recently has man been subjected to irradiation which, as the result of medical and industrial development has been added to the radiation from natural sources. According to the investigations quoted artificial radiation accounts for 20 to 25% of the total radiation level. Atomic test explosions have so far only made an insignificant contribution. The same can still be said of the industrial application of nuclear energy which is still in its infancy. It has been estimated that people living in Europe will over a period of 30 years be subjected to a total dose of radiation from 2,500 to 4,000 mr. Of this total dose received in 30 years about 750 to 850 mr will be contributed by medical and industrial apertenances, the overwhelming share of 600 to 700 mr being the result of medical x-ray diagnosis. The atmospheric radioactivity has been estimated (incl. rainfall etc.) at 20 to 30 mr over a period of 30 years and will therefore not represent any hazards as far as external, direct radiation is concerned. The possible absorption by an accumulation of radiating substances in the body must, however, be carefully studied and special consideration must be given to fission products with a long half-life. Regarding the accumulation of certain substances in plants and animals it is still not possible to make a generally valid statement though a great number of facts have been collected. The present internationally agreed permissible dose rates are used as a criterion specially for the maximum permissible concentrations of radioisotopes, isotope mixtures, short-term absorption, catastrophes, and also include soil contamination. (tr-auth) NSA 12-3520

10237

RADIATION HAZARDS ASSOCIATED WITH USE OF THE STRONTIUM 90 BETA APPLICATOR. W. A. Gore, M. A. Greenfield, C. T. McGraw, J. R. McProuty, and M. Rowen (Veterans Administration Center and Univ. of California at Los Angeles, Calif.). *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 79, 54-6(1958) Jan. NSA 12-3519

10238

BONE, SKIN AND GONADAL DOSES IN ROUTINE DIAGNOSTIC PROCEDURES. J. S. Laughlin, I. Pullman, M. L. Meurk and R. S. Sherman. *Am. J. Roentgenol. Radium Therapy Nuclear Medicine* 78, 961-82(1957).

10239

NEUTRON ACTIVATION ANALYSIS FOR MEDICAL ISOTOPE DOSIMETRY WITH SPECIAL CONSIDERATION OF COLLOIDAL Au^{198} . Presented at the International Conference on Radioisotopes in Scientific Research, Sept. 9-20, 1957 at Paris. No. UNESCO/NS/RIC/205. J. H. Muller. London, Pergamon Press, Ltd., 1957. 11p. NSA 12-1157

10240

PROBLEMS OF RADIATION PROTECTION IN THE PEACEFUL APPLICATION OF ATOMIC ENERGY. Robert G. Jaeger. *Z. angew. Phys.* 9, 467-79(1957) Sept. (In German). NSA 12-46

10241

MEASUREMENT OF RADIOACTIVITY IN HUMAN BREATH. A. H. Ward. *Nature* 167, 600(1951) Apr. 14. (Letter to the editor).

Alpha activity in the breath from patients with Ra or Th in their bodies has been measured by two methods. The first uses the α radiation breath-monitor, type A. E. R. E. 1056A, which is designed primarily for radon measurements and is not so suitable for quickly decaying activities. The second method permits continuous-flow measurements and has been developed at Harwell. Details of the continuous-flow counter are given. Results obtained indicate that patients having Th in their bodies have concentrations in the breath of about 100 to 300 $\mu\text{c}/\text{liter}$. The corresponding Th burden is 2 to 10g, initially equivalent to 0.2 to 1.0 μc . At most, 1% of the produced Th(Rn^{220}) escapes in the breath. The Ra-Rn tolerance figures are as follows: 40% of the total emanation produced from 0.1 μg Ra fixed in the body escapes in the breath giving the accepted tolerance dose 1 $\mu\text{c}/\text{liter}$ of breath.

10242

Naval Radiological Defense Lab.

A QUANTITATIVE STUDY OF PERCUTANEOUS ABSORPTION. I. ABSORPTION OF RADIOSTRONTIUM CHLORIDE IN MINUTE QUANTITIES THROUGH INTACT AND MECHANICALLY DAMAGED RAT SKIN. R. K. Loeffler and V. Thomas. 1950. 25p. (AD-225(B)).

NSA 5-323

10243

Naval Radiological Defense Lab.

A QUANTITATIVE STUDY OF PERCUTANEOUS ABSORPTION. V. TREATMENT OF CONTAMINATED SKIN AND WOUNDS TO PREVENT ABSORPTION OF RADIOACTIVE SALTS. (Technical Objective AW-6). R. Kenneth Loeffler and John W. Herron. Apr. 2, 1951. 21p. (AD-309(B))

Experimental data from previous reports (AD-225(B), 254(B), 290(B), 308(B)) on bodily absorption of $\text{Sr}^{89}\text{Cl}_2$ and $\text{Sr}^{89}\text{SO}_4$ through intact, mechanically-damaged, and thermally-burned skin were used as a basis for the testing of several methods and agents for treating contaminated skin and wounds. Pretreatment of skin, care of rats, preparation of contaminating material, and general analytical procedures are explained. It was found that neither arterial nor venous tourniquets prevent absorption of radiostrontium chloride through either intact or abraded rat skin. However, a tourniquet exerting pressure greater than normal venous pressure will lessen absorption into the system. An arterial tourniquet will prevent absorption of material into the system. A variety of cleansing agents were tested alone and in combination. Some of them were tap water, tincture of green soap, Ivory soap, TiO_2 slurry, the disodium salt of ethylene diamine tetraacetic acid (EDTA), and tannic acid. Tide alone and with Epinephrine gave the best results as decontaminants. Epinephrine effectively hinders absorption, especially from abraded skin, during the first hour after contamination. Included is a discussion of possible practical applications of results. NSA 5-4996

10244

SAFE AND BENEFICIAL UTILIZATION OF NUCLEAR ENERGY. A. H. Dowdy. Am. J. Pub. Health 37, 1291-9 (1947). NSA 5-5240

10245

BASIC HEALTH PHYSICS. I. D. E. Barnes (AWRE, Aldermaston). Nuclear Power 2, 250-3 (1957) June.

This first article of a series includes general information on the four main types of ionizing radiations, the measurement units of radiation and radioactivity, the biological effects of radiation, natural exposure to radiation, and permissible doses. (M. H. R.) NSA 11-8801

10246

CURRENT STATUS OF INSECT CONTROL BY RADIATION. Charles C. Hassett (Army Chemical Center, Md.). Science 124, 1011-12 (1956) Nov. 23.

Radiation exposure is considered as a safe, nondestructive means of ridding many stored products of insect pests. Radiation sources and the cost of controlling insect pests by exposure to radiation are discussed. (C. H.)

NSA 11-873

10247

SOME HEALTH CONSIDERATIONS IN THE HANDLING OF TRITIUM. W. H. Kingsley and F. G. Hirsch, (Sandia Corp., Albuquerque, N. Mex.). June 6, 1956. 5p. (AECU-3394). NSA 11-3668

10248

NECESSITY OF INDOLEACETIC ACID FOR THE DUPLICATION OF CROWN-GALL TUMOR CELLS. Richard M. Klein and Howard H. Vogel, Jr. (New York Botanical Garden, N. Y. and Argonne National Lab., Lemont, Ill.). Plant Physiol. 31, 17-22 (1956) Jan.

The reduction of the endogenous or biologically effective level of IAA in crown-gall tumor tissues was accomplished in vivo and in vitro by the use of ionizing radiations (x-rays, gamma rays, and fast neutrons) and by the use of a specific anti-auxin. In all cases, the primary effects were a reduction in the growth of the tissues. These inhibitions of growth could be reversed wholly or in part by supplying the tumor cells with appropriate concentrations of IAA. These results give presumptive evidence that IAA may be specifically required for the duplication of crown-gall tumor cells which presumably synthesize optimal amounts of auxin. (auth) NSA 10-9937

10249

RADIATION EFFECTS -- POINTS OF HEAT AND NECROTIC TISSUE HORMONES. F. Dessauer and W. Caspari. Acta Radiol. 6, 241-271 (1926). (In German).

10250

Wright Air Development Center. Aero Medical Lab., Wright-Patterson AFB, Ohio. HEALTH-PHYSICS PROCEDURES FOR AN AEROMEDICAL RADIOISOTOPES LABORATORY. Thomas J. McGuire. Mar. 29, 1957. 34p. Project title: HIGH ALTITUDE PHYSIOLOGICAL. Task Title: PHYSIOLOGICAL MEASUREMENTS AND SERVICES. (WADC-TR-57-142; AD-118113)

Radioisotopes will be utilized in tracer work involving studies on the effect of simulated altitude on laboratory animals. Iodine¹³¹, Na²⁴, and Cr⁵¹ are the isotopes to be handled. Recommendations are presented which are applicable to the installations setup, equipment selection, health monitoring, isotopes handling, personnel protection, waste disposal, and decontamination. (auth) NSA 12-3509

10251

Convair, Fort Worth, Tex. HEALTH PHYSICS ACTIVITIES [FOR] OCTOBER 1, 1955 TO SEPTEMBER 30, 1956. R. F. Shockley, W. R. Miller, and W. F. Cockrell, comps. and eds. Apr. 2, 1957. 135p. Projects 6-(1-9964). Contract AF33(600)-32054. (NARF-65472; 3-R-81)

Health physics activities for the period are summarized. Data are presented from the following: a continuous evaluation of the levels of radioactivity in the environs, routine and special physical examinations of all employees normally exposed to radiation, routine and special measurements of the levels of radioactivity in controlled and uncontrolled areas, and routine and special monitoring of personnel working in controlled areas. (For preceding period see NARF-56-4T) (C. H.) NSA 11-6614

10252

National Research Council. Committee on the Handbook of Biological Data. HANDBOOK OF BIOLOGICAL DATA. William S. Spector,

ed. Oct. 1956. 620p. Project 7158. Contract AF33(038) - 2174. (WADC-TR-56-273; AD-110501) NSA 11-4222

10253

RADIATION HAZARDS IN INDUSTRY. Charles R. Williams. *Journal of Industrial Hygiene and Toxicology* 30, 294-299 (1948) Sept.

Although radiation problems are not new, their importance as industrial hazards has awakened widespread interest with the advent of nuclear energy and the increasing production of radioisotopes for research and industrial applications. The sources of these hazards are discussed here, and it is pointed out that with most radioactive materials, difficulties arise not from their use, but from their misuse. 9 references. NSA 1-1824

10254

RADIATION AND HEALTH. A. S. McFarland. *Nature* 162, 480-481 (1948) Sept. 25.

This is a short report on some of the material presented in a symposium on the therapeutic applications of radioactive isotopes held by the Radiology Section of the British Medical Association at Cambridge. This material included the various nuclear reactions which led to the production of radioisotopes, a review of recent tracer applications, and a review covering all isotopes used therapeutically whether by internal or external administration. Health hazards involved in the use of radioisotopes are briefly discussed. NSA 1-1495

10255

A STUDY OF THE TREATMENT OF PLUTONIUM AND RADIOYTTTRIUM POISONING BY ZIRCONIUM CITRATE. Jack Schubert. September 1, 1948, decl. October 22, 1948. 23p. (AEC-2358; ANL-HDY-592)

A study was made of the effect of a single dose of zirconium citrate on the excretion and distribution of plutonium and radioyttrium in rats and a growing dog. It was found that the administration of zirconium citrate to rats increased the excretion of Pu from 1 per cent to 50 per cent and that of Y from 25 per cent to 60 per cent of the injected dose during a 24-hour period. The amount of Pu and Y deposited in the skeleton was reduced by factors of 6 and 2.6 respectively. No significant changes in the Pu or Y contents of the feces, liver, spleen or kidneys were found. The administration of zirconium citrate to a dog 5 months after exposure to Pu was followed by a sustained increase in the urinary excretion of Pu. The extent of the increase was proportional to the dose of zirconium citrate. Two and one-half years after exposure to Pu the infection of a small amount of zirconium citrate was followed by a twofold increase in the urinary excretion of Pu. A discussion is given of the chemical concepts involved in applying metal displacement principles to the removal of radioactive metals from the body. NSA 1-1534

10256

PROBLEMS OF RADIOACTIVE WASTE DISPOSAL.

Forrest Western. *Nucleonics* 3, No. 2, p. 43-49, August 1948.

The nature of the waste disposal problem as well as the general principles by which the problem may eventually be solved are mentioned. The possibilities of disposal are: (1) Dilution, where care must be taken that the radioactive chemicals do not become concentrated by absorption or adsorption. (2) Dilution by mixing with one or more stable isotopes of the same chemical element. (3) Storage to allow decay to stable isotopes. (4) Concentration of radioactive materials by removal from process fluids by ion exchange, adsorption, precipitation, sedimentation, extraction, and evaporation. (5) Placing in containers and disposal of materials in the ocean. Tables are given of tolerance concentrations of various radioisotopes in drinking water, decay time of some fission

products, and activities of certain long-life fission products in place after 100 days. NSA 1-945

10257

ROENTGEN RADIATION AND INFLAMMATION. L. Heidenham and C. Fried. *Klin. Wochenschr.* 3, 1121-1122. (1924). (In German).

10258

PUBLIC HEALTH ASPECTS OF ATOMIC ENERGY (CONCLUDED). Roy J. Morton. *Mississippi Doctor* 28, 31-4 (1950) June.

The problems of radioactive waste disposal with a minimum objective of insuring that the radioactive isotopes released into drainage systems, atmosphere, or soil must be incapable of sufficient concentration to be harmful to plant or animal life, are discussed, and some of the measures taken by the Atomic Energy Commission to insure this are presented. Air contamination measurements, dust filter systems, decontamination, and reclamation of some products and storage of decaying materials beyond a danger time are discussed. A short history of the waste disposal unit which was set up to evaluate hazards, to study the factors that influence the extent and significance of the hazards, and to aid in the development of effective and economical measures for prevention and control of hazards is given, the study program is described in more detail comprising three main branches: survey studies consisting of field sampling and evaluation, process studies consisting of laboratory and pilot plant studies on wastes; corollary studies consisting of the improvement of instrumentation and laboratory techniques as well as cooperating efforts with geological, meteorological, and ecological study programs. NSA 4-4147

10259

THE MEDICAL PROGRAM OF THE ATOMIC ENERGY COMMISSION. Shields Warren. *Bulletin of the Atomic Scientists* 4, 233-234 (1948) Aug.

The medical program of the Atomic Energy Commission may be divided into four parts. First, the maintenance of health of the workers of the Commission and its contractors. Second, the protection of environmental health, this involves such problems as waste disposal, possible contamination of surrounding areas and the like. Third, the development of basic research in those problems peculiarly related to atomic energy, of which the effect of ionizing radiation on the plant, animal and human cell, both isolated and aggregated into organisms, must be determined. Such problems as permissible dose levels of ionizing radiation, metabolism of new or rare elements, the mechanism of radiation injury, the development of therapy for such injury, the character and mode of development of hereditary changes due to ionizing radiation are among those of basic importance. Fourth, the exploration of what, if any, values the new sources of energy available at the installation of the Atomic Energy Commission themselves and the value that very shortlived radioactive isotopes may have in cancer research and cancer therapy. The aims of the training program administered by the National Research Council for the AEC are summarized. NSA 1-857

10260

Argonne National Lab., Ill.
POTENTIAL HAZARDS AND PATHOLOGICAL ASPECTS OF RADIOACTIVE ISOTOPEs. Hermann Lisco. nd. 7p. (AECU-521, UAC-86)

It is pointed out that health and safety programs have made it possible for people to handle kilograms of radioactive materials and to deal with sources of high energy radiations of various types without harm, in the vast majority of cases. Unknown factors still to be dealt with are mentioned as the nature and the mechanisms of the biological action of radiations in general and of radio-

isotopes in particular. Criteria that are being used to formulate and establish the laws and principles of toxicology as applied to radioactive isotopes are indicated. Some common pathological denominators are noted as for instance: the incidence of blood dyscrasias, abnormalities of the liver, neoplasms of bone, lung, and skin, and graying and loss of hair. The isotopes that have been studied have generally shown a distribution that included the skeletal system, the liver, and the blood-forming organs. Two aspects of potential hazards are given: proper handling of radioactive isotopes and care and judgment in applying radioactive isotopes in the diagnosis and treatment of disease. NSA 3-1834

10261

ARTIFICIAL RADIOACTIVITY. J. W. T. Spinks. Can. Med. Assoc. J. 62, 120-2(1950). NSA 4-1941

10262

INSURABILITY OF ATOMIC ENERGY WORKERS. H. M. Parker. General Electric Co., 1948. 18p.

The purpose of this pamphlet is to describe the facts concerning life expectancy of Atomic Energy Workers in the light of the best present knowledge, to discuss the estimated validity of such knowledge, to remove hysteria on the one hand, and to suggest legitimate areas of safeguards for insurance writers on the other. The damaging effects of ionizing radiation are stated in the subdivisions on acute exposure and chronic exposure, with special reference to possible effects on the life span of the individual. Estimates of the shortening of life are applied to the Hanford Works operating experience. The known operating risks for the future are indicated. Compensating increase of life span, compared with such occupations as normal chemical manufacture or radiation therapy, is expected to arise from the extensive medical and industrial safety controls applied in the field of atomic energy. The validity of present day permissible exposure limits is discussed. Legitimate safeguards for those proposing to write insurance without extra premium are proposed. NSA 3-1837

10263

Rochester. Univ., New York.
THE RETENTION OF URANIUM DIOXIDE IN RABBITS. C. LaBelle, C. Booth, and R. Barrett. April 19, 1948. Decl. June 3, 1948. 32p. (AECD-2028; UR-24)

An apparatus, fitted with a system of electronic controls, has been constructed in which a rabbit breathes dusty air in a face-piece. The valves are operated in such a way that the exhaled air is drawn off through a filter paper sampler at a regulated rate to maintain the air pressure within the face-piece essentially equal to that of the atmosphere. A duplicate line continuously samples the same volume as the atmosphere is being inhaled, permitting calculation of the quantity of dust retained by the rabbit. When the retention in micrograms per minute per kilogram of body weight is plotted against dust concentration in micrograms per liter on a log-log plot, a straight line is obtained with a slope of $3/2$ over the concentration range from 10 to 250 milligrams per cubic meter. No significant differences could be shown between the retention of dust particles one micron and those one-half micron in diameter. The quantity of dust retained was directly proportional to the volume of air breathed, and was independent of the rate of breathing. Individual animals show a two to three-fold variation from the mean probably as a result of anatomical variation in the respiratory tract. NSA 1-41

10264

PROTECTION AGAINST RADIATION HAZARDS. Shields

Warren and Austin M. Brues. *Nucleonics* 7, No. 4, 70-6 (1950) Oct.

The status of our present knowledge of the effects of ionizing radiations on humans and animals is summarized. Problems of protection, the maximum permissible dose, the hazards of isotope utilization, and the dangers from radioactive wastes are discussed. NSA 4-6271

10265

HEALTH PHYSICS. R. E. Lapp and H. L. Andrews. *Nucleonics* 3, No. 3, p. 60-67, September 1948.

This is a brief summary of the principal phases of radiation health protection, dealing principally with the biological effects of radioactivity. The discussion embraces a consideration of permissible levels of radiation exposure and the role of the health physicist. Other topics covered radiation hazards, absorption of radiation by tissue, radiation units and dosages, and waste disposal. 29 references. NSA 1-1268

10266

RADIOACTIVE PHOSPHORUS (P^{32}) THERAPY IN BLOOD DYSCRASIAS. Bruce R. Brown. Bulletin of the New England Medical Center 10, 185-190(1948) Aug.

This paper points out that radioactive phosphorus has a rather limited application in the treatment of blood dyscrasias. It has no useful effect in Hodgkin's disease, multiple myeloma, lymphomas, and acute leukemias. It is useful in the treatment of polycythemia vera, chronic myelogenous leukemia, and chronic lymphatic leukemia, but it is in no way curative. It has not radically changed the treatment of blood dyscrasias although preliminary investigations had given rise to much optimism as to its clinical use. 7 references. NSA 1-1197

10267

THE BIOLOGICAL SIGNIFICANCE OF RADIOGALLIUM (Ga^{72}). Horace C. Dudley. Naval Medical Research Institute Report No. NM-011-013-Report 6. May 12, 1949. 17p.

Details of preparation of the radioactive sample, shielding and safety precautions, preliminary toxicity data, results of radioautographic studies of skeletal tissues, and a discussion of the biological significance of Ga^{72} are reported. Radioautographic studies have been made showing that this element is deposited throughout all skeletal tissues and especially in those areas of greatest osteogenic activity. Toxicity studies of Ga^{72} indicated that in rabbits the dosage level of 2 millicuries Ga^{72} per kilogram approaches the acute atoxic level. Mice and rats were found to be more resistant to the effects of both radiation and the carrier Ga. On the basis of this work studies have been initiated on the effects of Ga^{72} on osteogenic neoplasms. NSA 3-1177

10268

USE OF ISOTOPES IN MAN. Austin M. Brues. Chicago Med. Soc. Bull. 51, 954-7(1949) May 28.

A general discussion of the uses of radioisotopes for experimentation and therapy is presented. Among the newer methods of treating patients, P^{32} is mentioned as a valuable agent for the treatment of diseases of the blood-forming organs. The effects of radioarsenic, As-76 in certain blood dyscrasias and in Hodgkin's disease are pointed out. The role of I^{131} in thyroid metabolism and treatment and the future of such tracer elements as C^{14} are discussed. It is noted that the use of these isotopes is being given as much encouragement as possible. NSA 3-264

10269

THE RADIATION HAZARDS OF RADIOTHERAPEUTIC STAFF. John R. Nuttall. Brit. J. Radiology 23, 35-40 (1950) Jan.

The subject of protection from ionizing radiations is discussed from the point of view of the radiologist. The

three main causes of skin damage from radiation are: repeated exposure of the hands to a beam of x-rays, such as that encountered in removing foreign bodies or setting fractures under a fluorescent screen, handling radium containers, and contamination from radon. The changes in the skin are described and consist of erythema around the nail beds, followed by hardening and cracking of the nails and the skin, and necrotization, the production of cancer usually occurs in the region of the most severe radiation damage, but the author has seen multiple lesions of the face of workers with serious hand damages. The hematopoietic effects and the radiation effects on the reproductive organs are outlined and presented. The author concludes that the hematopoietic changes remain the major danger to the radiological workers, the observed higher incidence of leukemia in radiologists indicating this, reduction of the dosage to the gonads is also concluded to be one of the major objects of radiation protection. The actual danger to the operator should be weighed against the usefulness of the form of treatment proposed. NSA 4-1856

10270

CLINICAL RADIATION DOSAGE. III. A BIOLOGICAL FACTOR IN RADON AND ISOTOPE DOSAGE. Lionel Cohen. *Brit. J. Radiology* **23**, 25-7(1950) Jan.

It has been shown that when relatively short-lived radioactive sources are used in therapy, there is a critical interval of time during which the biological efficacy is approaching a maximum; clinical dosage prescriptions must be calculated for this critical interval, doses based on longer or shorter time intervals are considered likely to prove excessive. A formula is given whereby the critical biological interval can be determined for isotopes having various half-lives, a nomogram relates tissue tolerance and cancer lethal doses to the half-life of the γ ray source used. It is suggested that permanent implants of moderately long-lived sources may have certain clinical advantages. NSA 4-1865

10271

RADIATION EXPOSURE OF PERSONNEL HANDLING THE MONEL METAL NASOPHARYNGEAL RADIUM APPLICATOR. Henry J. Rubin, Barney M. Kully, and Raymond D. Finkle. *Ann. Otol., Rhinol. and Laryngol.* **59**, 90-101 (1950) Mar.

In a carefully monitored series of treatments with the 50-mg Monel metals nasopharyngeal radium applicator, total-body irradiation did not exceed 6 mr/treatment for the physician and assistant, the tolerance dose for the whole body is 300 mr/week. The average exposure of the entire length of both index fingers of the physician was 26 mr, and of several finger tips 50 mr/treatment, 600 mr/week has been tentatively adopted as the permissible exposure for hands and fingers. The maximum number of treatments which one physician may administer weekly by the technique described is 12. The results suggest that generally accepted recommendations as to the number of treatments physicians may administer without endangering themselves are too high for safety, lead shields or other accessories for the radium applicator or modifications in its construction might reduce the dose delivered to the physician's finger tips and thereby permit a larger number of treatments. The authors conclude that if the technique of any physician differs appreciably from the one described, it should be monitored to ascertain the number of treatments he may administer by his method without exceeding tolerance. 18 references. (auth) NSA 4-3298

10272

Los Alamos Scientific Lab.
EXHAUST VENTILATION ON MACHINE TOOLS USED ON MATERIALS OF HIGH TOXICITY. H. F. Schulte,

E. C. Hyatt, and F. S. Smith, Jr. [nd] Decl. Oct. 5, 1951. 9p. (AEC-3253, LADC-1040)

The following approximate concentrations ($\mu\text{g}/\text{m}^3$ of air) are the maximum permitted in Los Alamos machining operations; natural U, 50 ($3 \times 10^{-3} \mu\text{g}/\text{m}^3$), enriched U, 0.2 to 1.0 ($3 \times 10^{-5} \mu\text{g}/\text{m}^3$), Th, 100 ($3 \times 10^{-5} \mu\text{g}/\text{m}^3$), Be, 2, Tl, 150; Pb, 150. In addition to toxicity, conditions which must be considered in designing ventilating hoods are recoverability of material, pyrophoric danger, physical properties of metals and oxides, nature of operations, and ease of decontamination. Hoods for an enriched-U lathe, milling machine, index mill, shaper, power hack saw, handwork, break press, Be lathe, and Be grinder are illustrated. Data on ventilation and air concentrations are tabulated. NSA 5-6740

10273

HISTORICAL SKETCH OF RADIATION PROTECTION EXPERIENCE AND INCREASING SCOPE OF RADIATION PROTECTION PROBLEMS. K. Z. Morgan. *Ind. Med. Surg.* **20**, 148-56(1951) Apr.

The need for a science of health physics and the duties of health physicians are outlined in a nontechnical manner. Several photographs illustrate measurements taken for protection from radiation, and typical exposure records are shown on graphs. NSA 5-6085

10274

Naval Radiological Defense Lab.
THREE KEYS TO RADIOLOGICAL SAFETY. Paul C. Tompkins, Director. 16p. (NP-3333).

This is a pocket-size pamphlet giving safety rules for the nonscientific laboratory worker who is working in a laboratory where radioactive materials are used. NSA 5-6084

10275

Technical Information Division, ORE, AEC
RADIOACTIVE WASTE DISPOSAL, A BIBLIOGRAPHY OF UNCLASSIFIED LITERATURE. Robert L. Shannon. Aug. 1950. 8p. (TID-375)

A bibliography on various processes and methods of radioactive waste disposal has been compiled. NSA 4-6514

10276

COMPLEMENTARY QUALITY OF BLOOD SERUMS OR ALEXIN REACTION AFTER ROENTGEN RADIATION. J. Heeren. *Strahlentherapie* **42**, 189-197(1931). (In German). BA 23-28418

10277

IRRITATION AND PARALYSIS OF ANIMAL CELLS THROUGH ROENTGEN RADIATION. EXPERIMENTAL STUDIES ON FROG OVA AND LARVAE. V. Hoffmann. *Strahlentherapie* **13**, 285-298(1922). (In German).

10278

BIOLOGICAL STUDIES WITH ARSENIC⁷⁶. III THE EFFECT OF ARSENIC⁷⁶ UPON THE CLINICAL COURSE OF PATIENTS WITH TUMORS OF THE HEMATOPOIETIC TISSUES. Matthew Block, Leon O. Jacobson, and William Neal. nd. 25p. (AECU-533, UAC-108)

Twenty-four patients with tumors of the hematopoietic tissues, 2 with polycythemia rubra vera, and 1 with metastatic carcinomas have been treated with intravenous injections of radioarsenic (As^{76}). Since both arsenic and irradiation have been used independently in the treatment of tumors of the hematopoietic tissues it was thought that it might be advantageous to utilize radioarsenic (As^{76}), a substance that is metabolized like stable arsenic, exerts a similar chemotherapeutic effect, and is, at the same time, a source of radiation. In this way it might be possible to benefit the patient by simultaneous chemotherapy and radiation therapy. Results are described in each case. Considering various uncontrolled factors such as previous therapy, duration of the disease, supplemental therapy, rest, psychic factors, etc., this radio-

isotope appeared to offer no advantages over the types of therapy already in use for these conditions. 27 references. NSA 3-1842

10279

RECENT RESULTS OF METABOLISM STUDIES WITH THE HELP OF ISOTOPES. Karl Bernhard. Bull. Schweiz. Akad. Med. Wiss. 5, 331-60(1949) Dec. (In German).

An account is given of recent uses of stable and radioactive isotopes in the study of many types of biological processes. Deuterium, C^{13} , C^{14} , N^{16} , S^{34} , and S^{35} , among others, have been applied with great advantage to difficult problems in intermediate metabolism. 116 references. NSA 4-4542

10280

PRELIMINARY REPORT ON JAPANESE SPECIMENS. A. M. Brues and W. Kistebeski. 1947-1948. (AECD-2024-K). NSA 1-40-K

10281

ACCELERATING EFFECT OF A SMALL RADIATION DOSE ON ANIMAL EGGS. V. Haecker and N. Lebedinsky. Arch. Mikrosk. Anat. 85, 555-560(1914). (In German).

10282

ABSORPTION AND DISTRIBUTION IN RATS OF RADIOACTIVE PHOSPHORUS BIOLOGICALLY INCORPORATED IN FOOD. B. Kawin and R. F. Palmer (General Electric Co., Richland, Wash.). Nature 181, 127-8(1958) Jan. 11. NSA 12-4680

10283

ABSORPTION AND EXCRETION OF CARBON 14 AS CO_2 AND BICARBONATE. Austin M. Brues and Agnes Naranjo. nd. 1p (AECU-509, UAC-45)

This document is in abstract form, it is reproduced below in its entirety. As shown previously, the mouse exposed to $C^{14}O_2$ in a closed system rapidly attains a steady state in which the C^{14} in the animal approximates the amount originally in a volume of air ten times the volume of the mouse. This labile carbon compartment appears to be somewhat greater than the inorganic body carbon, excluding bone carbonate. Excretion rates after a 30-min. confinement period show a small portion of the body C^{14} to be in somewhat more stable combination. Because of the great rapidity of absorption of $C^{14}O_2$, we have measured the clearance of the tracer gas from air breathed through a tracheal cannula by rats under Nembutal anesthesia. Incidentally, the expired air contains less than one-half the $C^{14}O_2$ concentration of the inspired air, although the CO_2 concentration is naturally much higher. To make conditions as favorable as possible for fixation of C^{14} , mice were injected with labelled sodium bicarbonate and allowed to rebreathe expired air for 10 hr in a 20-liter chamber. Various tissues were analyzed at intervals up to 2 months after removal. It is estimated that less than 2% of the body carbon had exchanged with blood bicarbonate at the end of exposure. Of this retained carbon, about 90% was lost within a week, beyond this time the rate of loss was relatively slow. Newborn mice receiving C^{14} by exposure of their mothers prior to delivery lose C^{14} much more slowly than adult mice, but the specific activity of their body carbon decreases rapidly due to growth. NSA 3-1799

10284

THE ACCUMULATION OF RADIOACTIVE IODIDE BY THE THYROID GLAND IN NORMAL AND THYROTOXIC SUBJECTS AND THE EFFECT OF THIOCYANATE ON ITS DISCHARGE. M. Stanley and E. Astwood. Endocrinology 42, 107-123(1948).

After the administration of anti-thyroid medication, thyroid hormone synthesis was also almost completely inhibited, but the human thyroid gland was still able to collect appreciable quantities of radioactive iodine. After administration of thiocyanate or large quantities of

ordinary iodine the collected iodine was promptly, although not completely discharged from the thyroid gland. The uptake of radioactive iodine in thyrotoxic patients was much greater than normal, and the rate of discharge was more rapid after administration of thiocyanate or normal iodide. NSA 1-249

10285

EXPERIMENTS ON THE DISPOSITION OF ACUTELY INHALED $C^{14}O_2$. Austin M. Brues and Agnes N. Stroud (Argonne National Lab., Lemont, Ill.). J. Natl. Cancer Inst. 15, 1071-6(1955) Feb.

Clearance of $C^{14}O_2$ from air into the blood of rats and mice proceeds with almost theoretical efficiency. Calculated rates of passage of alveolar CO_2 into the blood are $24 \mu M$ per minute in the mouse and $160 \mu M$ per minute in the rat. Uptake of C^{14} is essentially unaffected by the CO_2 concentration of inhaled air. Passage of C^{14} from the bicarbonate compartments into inner compartments proceed at a somewhat slower rate: $10 \mu M$ per minute in the mouse and $80 \mu M$ per minute in the rat. At the end of a 45-minute exposure, the specific activity of venous blood is 55 to 60 percent that of alveolar air. After a 45-minute exposure, one half of the absorbed C^{14} in the mouse and one third in the rat, have passed through the bicarbonate pool into inner compartments. These include bone carbonate and both alcohol-soluble and alcohol-insoluble organic compounds in tissue. (Auth) NSA 9-2611

10286

Tennessee Univ.
AGRICULTURAL RESEARCH PROGRAM. SEMI-ANNUAL PROGRESS REPORT FOR JULY 1 TO DECEMBER 31, 1953. Apr. 1954. 114p. Contract AT-40-1-GEN-242. (ORO-110)

Data are presented which indicate that Sr^{90} and Ca^{45} were exchanged into bone and absorbed from the digestive tract to the same degree. However, ingested Ca^{45} was preferentially secreted into the milk of dairy cows by a factor of 6 to 10 over Sr^{90} . Also, dietary Ca was preferentially utilized for new bone formation in rats by a factor of 3 over Sr^{90} . Fecal excretion of Ca^{45} varied from 3% of the ingested dose in 10-day-old calves to 83% in aged cattle. The daily fecal endogenous Ca was in the range of 14 to 21 mg/kg of body weight for 30-day-old to aged cattle. The use of these methods is described for estimation of the maintenance requirement and true availability of Ca in various feeds. From Ca^{45} distribution results, it was estimated that in 6-month-old cattle, the percent of exchangeable bone Ca was somewhere between 9 and 60 whereas in aged cattle the value fell somewhere between 2 and 5. Estradiol administered to lambs was shown to increase the length of trabecular bone and also the amount of medullary bone. Mass spectrographic analysis of blood and milk Ca showed that there was no isotope effect in the secretion of Ca from blood to milk. Paper electrophoresis of Ca^{45} -labeled blood showed that all Ca in blood serum migrated as Ca ion. Similar studies on milk revealed the presence of large amounts of protein-bound or other colloidal Ca which exchanged only slowly with ionized Ca. In addition to the usual effects of Protamone on milk production, it was shown that this substance decreases the ability of the cow's thyroid to pick up I^{131} , of particular interest was the rapid return to normal of the thyroid function shortly after Protamone feeding was stopped. Data are tabulated on the clinical and pathological response of burros subjected to daily dosages until death of whole-body γ radiation at the following levels: 400 r/day, 200 r/day, 100 r/day, 50 r/day and 25 r/day. Specific reports are included which discuss the suppression of the gonadotropin principles by whole-body irradiation of the rabbit. Also presented are data which demonstrate the alteration

of thyroid function and the reduction of serum alkaline phosphatase by whole body irradiation of the burro. (For preceding period see ORO-98.) (auth) NSA 8-2735

10287

EXPERIENCES WITH RADIOACTIVE GOLD (Au^{198}). T. Howard Clarke and George V. LeRoy. *Proc. Inst. Med.* Chicago, 18, 64-5(1950) Mar.

Radiogold in colloidal suspension injected into tissues remains fixed at the site of injection. A 50,000 r dose has been found effective without harmful local or systematic reactions. When radiogold is injected into the blood stream approximately 80% is fixed in the liver. NSA 4-2552

10288

Argonne National Lab.

SUMMARY OF CONFERENCE ON THE TOXICITY OF CARBON 14 HELD AT ARGONNE NATIONAL LABORATORY JANUARY 15-16, 1952. A. M. Brues and D. L. Buchanan. *Mar.* 1952. 14p. (ANL-4787)

This summary of a conference on the toxicity of C^{14} covers discussions of inorganic C, organic C compounds, routes of excretion of various non-physiologic C compounds, theoretical aspects of C turnover, toxicity studies, a resume of C^{14} retention, and low-level counting methods. NSA 6-3202

10289

STUDIES OF THE METABOLISM OF GALLIUM, III, DEPOSITION IN THE CLEARANCE FROM BONE. H. C. Dudley and H. H. Marrer. *Jour. Pharmac. and Exper. Therapeutics* 106, 129-134(1952).

10290

EXPERIMENTS WITH RADIOACTIVE PHOSPHORUS IN RATS. H. J. Born. *Naturwissenschaften* 28, 476(1940).

Rats were injected in the tail vein with aqueous Na_3PO_4 containing P^{32} , and were killed and dissected 72 hours later. The ratio of active to inactive P in different parts of the skeleton and various organs was then determined. It is lowest in the teeth and highest in the sex organs. NSA 1-47

10291

ISOTOPES IN BIOCHEMICAL INVESTIGATIONS W. A. J. Borg. *Chem. Weekblad* 47, 708-17(1951) Sept. 22. (In Dutch).

A fairly extensive review of representative applications of D, T, C^{13} , C^{14} , N^{15} , S^{35} , and I^{131} to problems in bio-synthesis, isotopic-dilution analysis, and metabolism is presented. 72 references. NSA 6-73

10292

THE DEVELOPMENT OF TROUT EGGS AFTER FERTILIZATION WITH RADIUM-IRRADIATED SPERMATOZOA. K. Oppermann. *Arch. mikrost. Anat.* 83, 307-323(1913). (In German).

10293

STUDIES OF INTESTINAL RADIOLUTETIUM (Lu^{177}) IN THE DOG. William M. Christopherson, Harold F. Berg, G. C. Kyker, and Marshall Brucer. *Arch. Pathol.* 62, 441-4(1956) Dec. NSA 11-4262

10294

United Kingdom Atomic Energy Authority. Industrial Group H. Q., Risley, Lancs, England. OBSERVATIONS ON THE METABOLISM OF SOLUBLE URANIUM IN HUMANS. A. Butterworth and A. S. McLean. *Dec.* 9, 1955. 11p. (IGO-R/R-8)

Autopsy specimens from an employee who died as a result of coronary thrombosis were analyzed for uranium. The employee has been engaged in the production of uranium hexafluoride until the day prior to death. The results of continuous air monitoring surveys and uranium in urine analyses are recorded, and their relation to the uranium found in the autopsy specimens of kidneys and lungs is discussed. The validity of certain of the metabolic data and values quoted in the recommendations of the

International Commission on Radiological Protection is questioned. (auth) NSA 13-2878

10295

PULMONARY PENETRATION OF PARTICLES ADMINISTERED BY INTERACHEAL INSUFFLATION. Herman Cember, Theodore F. Hatch, Joseph A. Watson, and Thomas B. Grucci (Univ. of Pittsburgh, Penna.). *Arch. Ind. Hyg. Occupational Med.* 10, 124-9(1954) Aug.

Radioactive barium sulfate particles were administered intratracheally to rats in order to study the pulmonary penetration and distribution of particles. Autoradiographs made from lung sections showed that, although the particles were generally distributed in all the lobes of the lungs, the distribution was not uniform. The radioactive particles were found in irregularly shaped areas throughout all parts of the lungs. Retention data showed that about 40% of the material inside the syringe actually was deposited in the deep respiratory tract. The method of intratracheal insufflation directly through the pharynx may therefore be considered useful for the investigation of particulates in the lungs. NSA 8-640

10296

THE CHANGE IN SPERM CHROMATINE OF ECHINOIDA AFTER RADIUM IRRADIATION. G. Hertwig. *Arch. mikrosk. Anat.* 79, 201-241(1912). (In German).

10297

Wisconsin Univ.

STUDIES OF BIOLOGICAL NITROGEN FIXATION WITH N^{15} . R. H. Burris. p. 68-80 "Conference on the Use of Isotopes in Plant and Animal Research." Apr. 1953. 13p. (TID-5098)

General techniques for conducting studies with N^{15} as a tracer are reviewed, and certain specific applications of N^{15} in research on biological N fixation are discussed. Tests are described for the ability of organisms to fix N, distribution of N^{15} among nitrogenous compounds in cells, and distribution of N^{15} among the soluble constituents of cells and growth media. Competition experiments in which the N-fixing agent is given the choice of fixing N_2 or using a combined source of N are discussed. (C.H.) NSA 8-77

10298

COMPARATIVE INVESTIGATIONS INTO THE INFLUENCE OF RADIOGOLD AND RADIOTRITIUM ON THE BONE MARROW. R. Stadmeister. *Schweiz. Med. Wochschr.* 86, 51-52(1956).

10299

CALCIUM-45 IN METABOLIC STUDIES. H. Staub. *Schweiz. Med. Wochschr.* 84, 499-506(1954). CA 48-10886

10300

STUDIES OF THE METABOLISM OF GALLIUM. II. H. C. Dudley, J. I. Munn, and Katherine E. Henry. *J. Pharmacol. Exptl. Therap.* 98, 105-10(1950) Jan. (See also NSA 3-1179)

Radiogallium (Ga^{72}) with a specific activity of 0.11-0.12 mc/mg was injected subcutaneously as gallium citrate 20 mg amounts into a series of 12 rats in order to determine the distribution of the gallium. Similar experiments were performed with rabbits and dogs, in rabbits the excretion of the isotope was also investigated. It was found that in the rat, rabbit, and dog only bone and the kidneys receive large amounts of the element. Following the subcutaneous injection of the element as citrate, the rabbit excretes 30-55% of the total dose in the urine within 16 hr, while the osteoid structures absorb an additional 30-48% within this time. Definite amounts are also excreted into the stomach and intestines by the gastrointestinal mucosa, the contents of the tract contain 1-2% of the subcutaneous dose within 12-18 hr after injection. NSA 4-1656

10301

Naval Medical Research Inst., Bethesda
EFFECTS OF INJECTION OF RADIOGALLIUM (Ga^{72}).
H. C. Dudley, L. J. Louviere, and J. C. Shaw Sept.
15, 1951. 11p (NP-3509)

Radiogallium (Ga^{72}) citrate has been administered to five species of animals. The toxicity of the carrier gallium limits the radiation dosage of Ga^{72} so that the only effect of radiation observed was transitory reduction of leucocytes. A reduction of total leucocytes in the mouse, rabbit, and guinea pig have been produced at dosages of 2.3 to 9.0 mc of Ga^{72} /kg. The degree and duration of the leukopenia varies with the dose and species. Repeated injection of dogs and rabbits with gallium citrate indicates that this element is a cumulative poison for which these species cannot develop a tolerance. Subacute doses repeated twice weekly produced lethal results within four weeks. The final injection produced the typical results of an acutely toxic dose. In the dog, repeated injections of gallium citrate produced an exfoliating dermatitis which may appear several weeks after stoppage of the injections. Methods for the estimation of both total body radiation and individual tissue dose, as delivered by Ga^{72} citrate, are given. The total body irradiation (in roentgens) for man is estimated to be $D(\beta\gamma) = 86$ mc of Ga^{72} /kg of body weight. (auth) NSA 6-527

10302

DEPOSITION OF RADIOGALLIUM (Ga^{72}) IN PROLIFERATING TISSUES. H. C. Dudley, G. W. Imire, Jr., and J. T. Istock. Radiology 55, 571-8(1950) Oct.

Radiogallium, Ga^{72} , has been shown to concentrate at areas of osteogenic activity, i.e., the epiphyseal junction and the callus of healing fractures in rabbits, and in osteogenic sarcoma of the mouse. In certain fibroadenomas, fibrosarcomas, and mixed mammary tumor of animals, no significant localization of Ga^{72} occurred. Autoradiographic studies of the deposition of Ga^{72} in bone, by impregnation of bone sections with liquid photographic emulsion, has made possible more detailed localization of this element. It is suggested that radiogallium citrate is worthy of clinical trials in tracer amounts for diagnostic purposes and at higher levels for possible therapeutic effect. (auth) NSA 5-329

10303

TOXICITY OF TRITIUM OXIDE TO MICE. Austin M. Brues, Agnes N. Stroud, and Leola Rietz. Proc. Soc. Exptl. Biol. Med. 79, 174-6(1952) Jan.

A 30-day median lethal dose of H_2^3O for CF No. 1 female mice is about 1 mc per g body weight when given in a single injection. The estimated radiation dosage is about 800 rep in the first 3 days and about 1000 rep in the first 12 days after injection. It is concluded that no unexpected factor of biological effectiveness exists for tritium β rays in relation to x or γ rays (auth) NSA 6-1979

10304

Naval Medical Research Inst., Bethesda
INFLUENCE OF VITAMIN D ON DEPOSITION OF GALLIUM IN BONE. H. C. Dudley and Leo Friedman. July 9, 1951. 7p (NP-3727, Memorandum Report 51-9).

Radiogallium (Ga^{72}) citrate when parenterally injected is deposited in the bones of both normal and rachitic rats. The age and body weight do not significantly affect the uptake of gallium, nor does the oral administration of vitamin D to rats on an adequate diet. Vitamin D orally administered to rachitic rats serves to increase the deposition of gallium in the ends of the long bones (epiphyseal region). Such deposition seems to be a result of normal increased metabolism rather than as a direct result of the vitamin D. Gallium does not seem to offer a reliable indication of vitamin D dosage. (auth) NSA 6-2838

10305

PARTHENOGENESIS IN VERTEBRATE ANIMALS CAUSED BY RADIUM RADIATION OF THE SEMEN. G. Hertwig. Arch. mikrosk. Anat. 81, 87-127(1913). (In German).

10306

AUTORADIOGRAPHIC VISUALIZATION OF S^{35} INCORPORATION AND TURNOVER BY THE MUCOUS GLANDS OF THE GASTROINTESTINAL TRACT AND OTHER SOFT TISSUES OF RAT AND HAMSTER. Leonard F. Belanger (Univ. of Ottawa, Canada). Anat. Record 118, 755-71 (1954) Apr.

Following a subcutaneous injection of S^{35} -labeled H_2SO_4 , the radiosulfur has been localized by autoradiography to various tissues and organs, with a large range of relative radioactivity. The mineralizing tissues and the mucous glands have exhibited the largest synthesis, with the exception of the surface cells of the stomach and the Brunner glands of the duodenum which do not seem to pick up radiosulfur. The mast cells of connective tissue and all areas rich in collagen have taken in radiosulfur. The region of the basement membrane in the gastrointestinal tract and genito-urinary system have also shown evidence of sulfate fixation. The medulla of the kidney and the megakaryocytes of the spleen have also given positive S^{35} autoradiographs. All these localizations seem related to the building up and concentration of sulfopolysaccharides and stain metachromatically with toluidine blue. The radiosulfur has disappeared within two days from all mucous glands except from the olfactory mucosa. The connective tissue seems to have lost most of its organic bound sulfate at the end of that period with the exception of the mast cells which were still strongly positive after 4 days. NSA 8-4494

10307

CHANGES IN THE SERUM LIPIDS OF RABBITS WITH ACUTE URANYL NITRATE POISONING. Frederick C. Bauer, Jr., Grant C. Johnson, Lynn Carbonaro, and Edwin F. Hirsch. Arch. Path. 51, 441-5(1951) Apr.

Uranyl nitrate poisoning in rabbits was associated with transient azotemia and lipemia of 2 to 3 weeks' duration. All lipids participated in this increase, but the greatest increase was in the neutral fat fraction. The nonprotein N returned to near the control level several days before the lipids. The significance of these results with other forms of nephritis is discussed. NSA 5-3856

10308

Naval Medical Research Institute.
STUDIES OF THE ACUTE TOXICITY OF GALLIUM. Horace C. Dudley and Milton D. Levine. Jan. 13, 1949. 13p. (NM-011-013-Report No. 3)

Rats exposed to aerosols of gallium chloride were effected but slightly in concentrations of 0.125 μg Ga/liter of air in exposures of from one-half to four hours. The acidity of the solution (pH 2.2) of both gallium chloride and the sodium chloride controls produced the effects noted. The minimum lethal doses (LD₅₀) of gallium lactate for rats and rabbits is as follows:

Rats	Intravenous injection	46 mg Ga/kg
	Subcutaneous injecting	121 mg Ga/kg
Rabbits	Intravenous injection	43 mg Ga/kg
	Subcutaneous injection	97 mg Ga/kg

The distribution of gallium in animals receiving injected gallium lactate varies with time, the kidneys initially containing the greatest amount, followed by bone, liver, spleen, muscle, etc. The concentration of gallium falls off rapidly in all tissues except bone, in which the gallium

is fixed, and is given up slowly over a period of months. The symptoms resulting from lethal and near-lethal injections of gallium salts may include rapid loss of weight, hyperexcitability, and in some cases photophobia, blindness and terminal flaccid paralysis. NSA 3-217

10309

A STUDY OF RADIOACTIVE PHOSPHORUS ACTIVITIES IN PLEURAL EFFUSIONS. Robert E. Bauer, Irwin H. Moss and Aubrey D. Richardson (Univ of Maryland School of Medicine, Baltimore) *Cancer* 7, 852-5(1954) Sept.

Significant differences were observed in the P^{32} activities of pleural effusions resulting from malignant and nonmalignant lesions. The P^{32} index appears to be independent of the total number of red blood cells, white blood cells, and the concentration of protein. The index may be closely correlated with the metabolic activities of neoplastic and to a lesser extent of inflammatory cells. (auth) NSA 8-6655

10310

STUDIES OF THE METABOLISM OF GALLIUM. Horace C. Dudley, George E. Maddox, and Herbert C. LaRue. Naval Medical Research Institute NM-011-013 Report No. 4. Jan. 25, 1949. 12p.

The excretion of gallium is predominantly via the urine, with 85 per cent or more of a near-toxic dose retained in the rabbit more than 10 days. Retention in the liver and kidneys of the rat is moderate for up to 30 days, while bone retains large concentrations of the element for 90 days and longer. Gallium is transported wholly by the plasma, the initial concentration dropping rapidly so that at the end of 24 hr a concentration of less than $1 \mu\text{g Ga/ml}$ is reached. Formed elements show no significant change. It is postulated that gallium may offer a new approach to the study of bone metabolism. Gallium seems to act as a neuromuscular poison. NSA 3-218

10311

STUDIES ON THE TOXIC ACTION OF GALLIUM. H. C. Dudley, Katherine E. Henry, and B. F. Lindsley. J. Pharmacol. Exptl. Therap. 98, 409-17(1950) Apr.

In order that radiogallium studies may be properly evaluated, work on the toxicity of gallium, including the effects of injected gallium lactate on larger animals, the toxic action of gallium citrate on many different species of animals, and the changes in blood and urine of rabbits receiving toxic doses of gallium citrate was instituted. The experiments are briefly described and some of the results are tabulated, the authors conclude that: gallium lactate is much more toxic on a mg/kg basis for larger animals than for smaller ones, gallium citrate is more suitable as a means of administering soluble gallium to experimental animals than gallium lactate, gallium citrate is not absorbed by the gastrointestinal tract and produced no significant effect when fed to rats for 13 weeks, the toxicity in terms of LD_{50} in ten days of gallium citrate, expressed in mg/kg body weight, was found to be 600 for mice, 220 to 240 for small rats (50 to 100 g), 100 for larger rats (200 to 300 g), 45 for 2.0 to 2.5 kg rabbits, and 10 to 15 for goats and dogs, blood and urine analyses showed that toxic doses of gallium citrate in the rabbit induced marked kidney changes followed by albuminuria and glycosuria, an increase in blood urea nitrogen and nonprotein nitrogen, and an uncompensated acidosis with significant changes in the serum sodium and potassium levels. NSA 4-4190

10312

Naval Medical Research Inst., Bethesda
CHEMICAL AND RADIOCHEMICAL STUDIES OF THE DISTRIBUTION OF GALLIUM IN THE ORGANISM Horace C. Dudley, John I. Munn, and Katherine E. Henry. Oct 20, 1949. 12p. (NP-3496). NSA 6-494

10313

CHANGES IN DEVELOPMENT AFTER RADIUM IN UNFERTILIZED TRITON AND FISH EMBRYOS. Paula Hertwig. Arch. mikrosk. Anat. 87, 63-122(1916). (In German).

10314

DEPOSITION OF RADIO GALLIUM (Ga^{72}) IN SKELETAL TISSUES. H. C. Dudley and G. E. Maddox. J. Pharmacol. and Exptl. Therap. 96, 224-7(1949) July (See also NSA 2-68).

The results of a radioautographic study of the distribution of Ga in the skeletal tissues of the rabbit and dog following injections of non-toxic doses of radio-gallium (Ga^{72}) are presented. The radio-gallium was injected as the lactate or citrate into the animals at a dosage level of 0.5 mc/kg of body weight, the animals were sacrificed 12 hr after the injections, and the bones were removed, cleaned of adhering tissue, mounted in dental stone, sectioned, and placed on emulsion x-ray film. The radioautographs show that in young animals the Ga is selectively deposited in the areas of greatest osteogenic activity (the epiphyseal line); in adult animals there is also a deposition in this general area, but it takes place in a more diffuse manner throughout the trabecular bone. The most significant finding is the rapidity of deposition of the Ga. NSA 3-1179

10315

Argonne National Lab.

EFFECT OF GROWTH AND BODY SIZE ON FIXED CARBON TURNOVER. Donald L. Buchanan and Akira Nakao. June 1952. 18p. (AECU-2138, UAC-594).

The effect of growth and animal size on fixed-C turnover was studied in rats, mice, and chick embryos constantly exposed to $C^{14}O_2$. As a result of this study it was concluded that protein turnover, rather than CO_2 fixation, determines the accumulation rate of fixed C in these species. NSA 6-5037

10316

Argonne National Lab.

BONE CARBONATE TURNOVER. Donald L. Buchanan and Akira Nakao. Jan. 1952. 31p. (AECU-1867; UAC-499)

The effects of age, growth, body size, duration of exposure, and ambient CO_2 concentration on bone carbonate turnover were studied in mice and rats. Results indicate that the carbonate of new bone forming in infant mice arises wholly or largely by incorporation of soluble inorganic C into the precipitating bone salt, approximately 30% of the carbonate in the bone of fully grown animals exchanges quite rapidly with the soluble carbonate system whereas approximately 40% exchanges very slowly, turnover rates in the adult are largely determined by the physical and chemical properties of bone salt, growth of bone stimulates the turnover of bone carbonate out of all proportion to the net increase in bone mass, and long term retention of isotopic carbonate in the entire skeleton of mice is approximately proportional to the duration of the exposure regardless of the age of the animal when exposed. On the basis of the data presented it was concluded that adult or growing mammals can exist continuously and indefinitely in an atmosphere which contains as much as $49 \mu\text{c of } C^{14}O_2$ per cubic meter of air and yet never exceeds a radiation dose rate to bone of 0.3 repper per week. NSA 6-1609

10317

THE UPTAKE OF TRITIUM-LABELLED WATER VAPOUR BY THE MAMMALIAN LUNG. I. G. Campbell, D. F. White, and P. R. Payne. Brit. J. Radiology 24, 682-84 (1951) Dec.

The rate of uptake of tritiated water vapor by the lung of the mouse has been measured, 86 to 100% of inspired THO molecules have been found to pass into the body water. The relationship between these figures and a tolerance concentration of THO in laboratory air is discussed. (auth) NSA 6-1088

10318

PROGRESS REPORT: RADIUM TOXICITY PROGRAM. L. D. Marinelli, P. F. Gustafson, R. E. Rowland, and C. E. Miller. (Argonne National Laboratory). p.59-64 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT FOR AUGUST, SEPTEMBER, AND OCTOBER 1951. A. M. Brues, ed. (ANL-4713)

10319

Hanford Works, Richland, Wash.
PERCUTANEOUS ABSORPTION OF TRITIUM OXIDE. C. W. DeLong. July 30, 1951. Decl. with deletions Dec. 27, 1955. 14p. Contract W-31-109-eng-52. (AECD-4207)

Data are presented on the absorption of tritium oxide vapor through human skin. Under the experimental conditions used, the average rate constant was found to be $0.28 \pm 0.08 \mu\text{c}/\text{cm}^2 \text{ skin}/\text{min per } \mu\text{c}/\text{cc}$ of atmosphere for the forearm exposures, but some of the data suggested a higher rate constant for other portions of the body surface. The effects of various parameters on percutaneous absorption are discussed, and the relationship of the data to estimation of maximum permissible limits is mentioned briefly. (auth) NSA 10-7112

10320

PERMEABILITY OF EXCISED MOUSE, RAT, AND HUMAN SKIN TO GASEOUS TRITIUM. Chester W. DeLong, Roy C. Thompson, and Harry A. Kornberg (General Electric Co., Richland, Wash.) Radiation Research 1, 214-17(1954) Apr.

The percutaneous absorption of tritium gas was studied using excised skin from mice, rats, and man. In terms of μc tritium absorbed/ $\text{cm}^2/\text{min}/\mu\text{c}$ tritium/ cm^3 atmospheres, absorption rates found were, for mice $(254 \pm 44) \times 10^{-4}$, for rats, $(207 \pm 26) \times 10^{-6}$, and for man, $(72 \pm 16) \times 10^{-6}$. Although there is considerable uncertainty as to the applicability of these figures to intact animals, the relative permeability of human, rat and mouse skins should be useful in the extrapolation of animal data to humans. (auth) NSA 8-3659

10321

EXCRETION OF RADIOACTIVE ZINC (Zn^{65}) IN BILE, PANCREATIC AND DUODENAL SECRETIONS OF THE DOG. Martin Birnstingl, Bernard Stone, and Victor Richards (Stanford Univ. Hospitals, San Francisco) Am. J. Physiol. 186, 377-9(1956) Sept. NSA 10-11675

10322

General Electric Co. Hanford Atomic Products Operation, Richland, Wash.
METABOLISM OF ZINC⁶⁵. J. E. Ballou. p.81-6 of HANFORD BIOLOGY RESEARCH ANNUAL REPORT FOR 1958. J. J. Davis, ed. Jan. 5, 1959. (HW-59500)

Approximately 50% of ingested Zn^{65} is absorbed from the gastrointestinal tract of mature rats as judged from ratios of urinary to fecal excretion of the radioisotope during and following a period of chronic feeding. Tissues attaining the highest concentrations of Zn^{65} , during 200 days of chronic administration, were bone and dorso-lateral prostate. The MPC calculated for bone as critical organ was $1.4 \times 10^{-2} \mu\text{c}/\text{ml}$. Based on prostate as critical organ, the calculated MPC is $3 \times 10^{-3} \mu\text{c}/\text{ml}$. The 24-hr retention of Zn^{65} absorbed from the gastrointestinal tract of very young rats was as much as 5.5 times the adult level. (auth) NSA 14-468

10323

THE FATE OF SOME INTRAVENOUSLY INJECTED ZINC COMPOUNDS. 1. THE DETERMINATION OF ^{65}Zn IN TISSUES. 2. THE FATE OF INJECTED ZINC CARBONATE AND PHOSPHATE AND A ZINC DITHIZONE COMPLEX. T. E. Banks, R. L. F. Tupper, and A. Wormald. Biochem. J. 47, 466-72(1950) Oct.

A step-by-step method for the determination of Zn^{65} in animal tissues is described. This method is a modification of one employed by Gettler and Bastian (Am. J. Clin. Path. 17, 244(1947)), and consists basically of a selective extraction of the zinc from aqueous solution by dithizone at pH 8.5 to 9.0 and subsequent radiometric analysis. The recovery of added Zn^{65} is usually 95 to 100%. A study has been made of the distribution of radioactive zinc in the tissues of rabbits following the intravenous injection of Zn^{65} -containing zinc carbonate or phosphate or a zinc dithizone complex. NSA 5-956

10324

STRONTIUM-CALCIUM DISCRIMINATION FACTORS IN THE RAT. C. L. Comar, R. H. Wasserman, and M. M. Nold (Oak Ridge Inst. of Nuclear Studies, Tenn.). Proc. Soc. Exptl. Biol. Med. 92, 859-63(1956) Aug.-Sept. NSA 10-11683

10325

DISTRIBUTION OF GALLIUM IN MAN, AUTOPSY EVIDENCE. Marshall Brucer. Paper presented at the American Society for Pharmacology and Experimental Therapeutics Fall Meeting, Boston, Nov. 13-15, 1950.

An abstract of this paper appeared in J. Pharmacol. Exptl. Therap. 101, 4-5(1951) Jan. and is reproduced here in its entirety.

One 14-yr-old patient with osteogenic sarcoma (primary removed) metastatic to the lungs was given 50 mc of Ga^{72} in 375 mg of stable Ga as a gallium citrate complex. It was administered intravenously in divided doses of 5 to 15 mc at 4-day intervals. At autopsy the distribution in 38 types of tissue was found relatively uniform. Only in kidney, liver, and bone was there increased retention of Ga^{72} . All metastatic nodules sampled showed greater activity per gram than did any normal organ. One 68-yr-old patient with multiple myeloma received intravenously 178 mc of Ga^{72} in 681 mg of stable Ga in the citrate complex. The doses of 4-day intervals ranged from 20 to 50 mc each. On autopsy, the marrow, cortical bone, liver, kidney, and spleen showed the greatest retention of Ga^{72} . There was no normal bone, but the greater relative distribution in areas of increasing myeloma activity was shown by autoradiograms.

NSA 5-2105

10326

THE USE OF RADIOISOTOPES OF COPPER AND MOLYBDENUM IN NUTRITIONAL STUDIES. C. L. Comar. In Copper Metabolism, A Symposium On Animal, Plant, and Soil Relationships. Wm. McElroy and D. Glass, eds. Baltimore. The Johns Hopkins Press, 1950. p.191-215.

After a discussion of availability of isotopes, methods of measuring radioactivity, and preparation of samples for solution measurement, the author gives a detailed summary of previously reported nutritional studies using Cu^{64} and Mo^{99} which have been performed by himself and others on animals. An over-all picture has been obtained of the behavior of Cu in the animal body. The high points are the poor absorption of ingested Cu, the entrance of Cu into the hematopoietic centers, the liver storage of this element, the nature of the equilibrium between red blood cell and plasma Cu, the mucosal accumulation of Cu, and the increased liver storage of Cu by very young individuals. Through the use of Cu^{64} , Mo^{99} , and P^{32} the physiological interrelationships of these elements have

been studied, certain possible mechanisms have been ruled out and others are suggested. NSA 5-3875

10327

PROCEEDINGS OF THE AUBURN CONFERENCE ON THE USE OF RADIOACTIVE ISOTOPES IN AGRICULTURAL RESEARCH, DEC. 18-20, 1947. C. L. Comar. (The Alabama Polytechnic Institute, Auburn). 137-146(1948).

The internal Metabolism of Cobalt and Copper with their Radioactive Isotopes. NSA 2-1153

10328

TIME AND SITE STUDY FOR OPTIMUM LYMPH NODE CONCENTRATION OF RADIOGOLD FOLLOWING INTRA-BRONCHIAL INJECTION. Harold F. Berg, William M. Christopherson, and J. Ray Bryant (Univ. of Louisville School of Medicine, Kentucky). Cancer Research 14, 775-9(1954) Dec.

Colloidal Au¹⁹⁸ was injected into the bronchial mucosa of dogs in an attempt to determine the rapidity of concentration within the regional lymph nodes and the site of injection for optimum concentration within the nodes. Specimens of the regional lymph nodes and viscera were measured for radioactivity. Histologic sections and autoradiographs were examined and compared with those from a group of animals receiving a similar dosage of Au¹⁹⁸ and sacrificed in from 1 to 5 weeks. Colloidal radiogold of this particle size concentrated within the regional lymph nodes well within the effective activity range of the isotope. Radioactivity was concentrated in the lymph nodes and was not distributed in any appreciable amount to other organs. The most effective site of injection within the bronchial tree was found to be the most dependent accessible site within the bronchus. Radiation necrosis within the lymph nodes had a patchy distribution when small doses of Au¹⁹⁸ were used. This distribution was confirmed by autoradiographs. (auth) NSA 9-1457

10329

Argonne National Lab.

EFFECT OF RADIOPHOSPHORUS ON RATS WITH CO-BALT-INDUCED POLYCYTHEMIA (ABSTRACT). p. 25-6 "Division of Biological and Medical Research Quarterly Report, May, June, July, 1950. W. F. Bethard, Ellen Skirmont, and L. O. Jacobson. July 1950. 2p. (ANL-4488)

No significant difference in sensitivity of the blood-forming tissues to P³² exists between normal rats and rats with an established Co-induced polycythemia. In contrast, the initial bone marrow hyperactivity following Co administration apparently affords some protection against the destructive effects of P³² when the two are begun simultaneously. NSA 5-2319

10330

Oak Ridge Inst. of Nuclear Studies, Inc., Tenn.

RADIOISOTOPES IN MEDICINE. Gould A. Andrews, Marshall Brucer, and Elizabeth B. Anderson, eds. Sept. 1953. 825p. (ORO-125)

Lectures are presented which were given during a course on clinical uses of radioisotopes. Topics discussed include the availability of isotopes, problems in radiation, radiation measurement and dosimetry, tumor localization, diagnostic and therapeutic uses of radioiodine, metabolic and vascular studies, isotopes in the study and treatment of hematologic disorders, therapy with radioactive colloids, and therapy with external and implanted sources. 1785 references. (C. L.) NSA 10-3773

10331

California. Univ., Berkeley. Radiation Lab.

COPPER METABOLISM IN NORMAL LONG-EVANS RATS. James K. Ashikawa, Elmer R. Smith, and Harold L. Helwig. Sept. 25, 1956. 29p. Contract W-7405-eng-48. (UCRL-3530) NSA 11-2807

10332

Argonne National Lab., Illinois.

ALTERATIONS IN THE SODIUM SPACE OF THE GASTROINTESTINAL TRACT OF X-RAYED AND OF FASTED RATS. Elizabeth E. Painter. p.88-95 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT, NOVEMBER 1948 TO FEBRUARY, 1949. A. M. Brues and H. Lisco, eds. February 1, 1949. (ANL-4253)

10333

Argonne National Lab., Illinois.

INFLUENCE OF ESTROGENS ON X-IRRADIATION EFFECTS. H. M. Patt, M. N. Swift, D. E. Smith, E. B. Tyree, and R. L. Straube. p.61-70 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT AUGUST 1948 TO NOVEMBER, 1948. A. M. Brues and H. Lisco, eds. Nov. 1, 1948. (ANL-4227)

10334

PROGRESS IN NUCLEAR ENERGY. SERIES VI. BIOLOGICAL SCIENCES. J. C. Bugher, J. Coursaget, and J. F. Loutit, Editors. New York, McGraw-Hill Book Co., Inc. 1956. 215p. NSA 11-5753

10335

Argonne National Lab., Illinois.

(1) FURTHER STUDIES OF THE INFLUENCE OF ESTROGENS ON X-IRRADIATION EFFECTS. (2) THE EFFECT OF ADRENAL CORTICAL STEROIDS ON THE RESPONSE TO X-IRRADIATION. H. M. Patt, D. E. Smith, R. L. Straube, and E. B. Tyree. p.70-5 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT NOVEMBER 1948 TO FEBRUARY, 1949. A. M. Brues and H. Lisco, eds. Feb. 1, 1949. (ANL-4253)

10336

THE METABOLISM OF ¹³²TELLURIUM-IODINE MIXTURE IN MAMMALS. D. W. H. Barnes, G. B. Cook, G. E. Harrison, J. F. Loutit, and W. H. A. Raymond. J. Nuclear Energy 1, 218-30(1955) Feb.

Te¹³²-I¹³² has been given in 0.1N acid orally to guinea pigs and rats. The absorption from the gut is greater in the rat. The rat also retains more tellurium, in virtue of its concentration in the blood. In the rat, but not in the guinea pig, rabbit, or mouse, the red corpuscles take up tellurium and bind it to intracorpuseular protein, presumably hemoglobin. Thus tellurium may provide a useful marker for the red cells in physiological studies on the rat (auth) NSA 9-3754

10337

IRON METABOLISM. UTILIZATION OF INTRAVENOUS RADIOACTIVE IRON. Clement A. Finch, John G. Gibson, Wendell C. Peacock, and Rex G. Fluharty. Blood 4, 905-27(1949) Aug.

Studies to determine the dynamic relationship between storage and circulating iron in normal subjects and in patients with a variety of hematologic disorders through the use of radiation iron (Fe⁵⁵ and Fe⁵⁹) are reported. When single tracer doses of radio-iron were given intravenously to human subjects, it was observed that the radio-iron rapidly entered the hemoglobin cycle and tagged erythrocytes began to appear in the circulation within 24 hours, the radioactivity of the circulating red cells continued to rise up to two weeks after the injections. Radio-iron Fe⁵⁵ was usually given and in sufficient concentration to produce 1,000,000 counts/min in each case, patients with Fe deficiency, hemochromatosis, refractory anemia, uremia, infections, hemolytic anemia, pernicious anemia, malaria, malignancies, hepatitis disease, endocrinological disease or polycythemia were the subjects chosen and the results were compared against those obtained from normal

subjects. The internal Fe metabolism was measured by determining the percentage utilization of the intravenously administered radio-iron for hemoglobin production over a period of two to three weeks. It was found that in Fe depletion cases more complete and rapid utilization of the radio-iron occurred, states of Fe excess, such as hemochromatosis displayed profound depression of radio-iron utilization. The rate of erythropoiesis was estimated by the slope of the utilization curve, and evidence of abnormal red cell destruction was found in cases showing an early and abrupt plateau of the utilization curve. A correlation is made between the radio-iron utilization and the clinical factors of the hematological disorders studied. 24 references. NSA 3-1325

10338

THE SUPPRESSION OF SPERM CHROMATINS IN FROGS BY RADIUM RADIATION. A CYTOLOGICAL PROOF FOR THE PARTHENOGENIC DEVELOPMENT OF RADIUM IRRADIATED LARVAE. Paula Hertwig. Arch. mikrosk. Anat. 81, 173-182(1913). (In German).

10339

BIOLOGICAL STUDIES WITH POLONIUM, PLUTONIUM, AND RADIUM. PART III, CHAPTER 1. TOXICITY OF POLONIUM, PLUTONIUM, AND RADIUM IN RATS. Edited by Robert M. Fink. Jan. 1, 1947. Decl. May 18, 1949. 132p. For publication in NNES. (AECD-2593)

Pilot studies on polonium, plutonium, and radium to determine the 20-day LD₅₀ were made. Polonium dosages ranged from 50 to 170 microcuries per kilogram, plutonium dosages ranged from 18.5 to 185 microcuries per kilogram, and radium dosages ranged from 17 to 8000 microcuries per kilogram. In general, there were two to three animals at each dosage level. The 20-day LD₅₀ dosage values in terms of microcuries per kilogram for polonium, plutonium, and purified radium (polonium at approximately 0.07% of equilibrium value) were found to be approximately 50, 130, and 4000 microcuries per kilogram, respectively. The microcurie toxicities relative to purified radium as defined by the ratio of the 20-day LD₅₀s were approximately 93 and 32 for polonium, and plutonium, respectively. A radium preparation estimated to contain about 2 microcuries of polonium per 1000 microcuries of radium appeared to be about two to four times as toxic as the above purified radium in the period of 40 to 100 days after injection. The weights seemed to be the best clinical criterion of the condition of the rat. In general, as the dosages increased the rate of weight loss increased. Pathology studies were made on some of the animals at death. Polonium produced changes in the hematopoietic system at all dosage levels used. These changes were marked atrophy of lymphoid elements in the spleen and lymph nodes and marked depression of cellular elements in the marrow. Visceral engorgement was a constant finding. Liver changes were unimpressive. The changes in the 50 microcuries per kilogram range suggest a lesser degree of toxicity than higher levels. The changes with 140 to 170 microcuries per kilogram were not quantitatively different. Visceral hyperemia was inconsistent with x-radiation effects. Radium caused changes in the hematopoietic system, liver, kidney, bowel, bone, testes, aorta, and coronary arteries. The changes in the hematopoietic system bone, testes, and bowel were compatible with x-radiation effects. Liver, renal, and vascular effects were unlike changes produced by x-radiation. Plutonium produced damage to the hematopoietic system, bone liver, testis, and kidney similar to x-radiation. Testes may be less sensitive in comparison with other tissues than it is in high voltage x-radiation experiments. 47 references. NSA 3-17

10340

DISTRIBUTION OF RADIOACTIVE PHOSPHORUS AND

IODINE IN ORGANS OF THE RABBIT IN NORMAL CONDITION, IN PENTOTHAL NARCOSIS, AND UNDER INTENSE STIMULATION. I. I. Fedorov, P. K. Khodosevich, Z. P. Fedorova, and E. A. Gosteva. Lvov Research Inst. for Blood Transfusion). Doklady Akad. Nauk S.S.S.R. 100, 393-6(1955) Jan. 11. (In Russian). NSA 9-2544

10341

OBSERVATIONS ON THE FIXATION IN VITRO OF URANIUM TO SECTIONS OF BONE. R. Amprino. *Experientia* 9, 291-3(1953) Aug. 15. (In English).

Preliminary results are reported of an autoradiographic study of sections of whole fresh bone, bone fixed in ethanol or formalin, and bone freed of its organic components which had been treated with 0.1% uranyl nitrate in a 0.025N buffer of NaHCO₃. The distribution of U is qualitatively the same as that of Ca⁴⁵, but the differential uptake in recent as compared to old bone tissue is much greater for Ca⁴⁵ than for U. Removal of the organic components increases the ability of bone tissue to fix U. The U partially replaces Ca⁴⁵ previously fixed but causes no change in the relative distribution of Ca⁴⁵. Concurrent fixation of Ca⁴⁵ and U takes place, and sections treated with U can still fix a remarkable amount of Ca⁴⁵. Nearly all the U can be removed by treatment with 0.025N NaHCO₃ or Na₂CO₃, by glycol ashing or microincineration at 700°C, or by decalcification with dilute HNO₃. No removal of U occurs on treatment with 0.025N NaCl or Na phosphate solutions. (G. Y.) NSA 7-5911

10342

INFLUENCE OF PARATHYROID EXTRACT, CORTISONE AND DIENESTROL DIACETATE ON METABOLISM OF CESIUM IN RATS. F. Mraz, Marie LeNoir, J. Pmajian, and H. Patrick (U. S. Atomic Energy Commission Agricultural Research Program, Oak Ridge, Tenn.). Arch. Biochem. Biophys. 63, 73-6(1956) July.

The effects of parathyroid extract, cortisone, and dienestrol diacetate on cesium extraction in rats, were studied. Parathyroid increases urine flow and decreases Cs excretion by the kidneys, 100 mg cortisone increases excretion but 50 mg decreases excretion. Dienestrol diacetate increases Cs retention by muscle, femur, liver, kidney, and spleen. (F. S.) NSA 10-9911

10343

BIOLOGICAL STUDIES WITH POLONIUM, PLUTONIUM, AND RADIUM. PART III, CHAPTER 2. TOXICITY OF POLONIUM, PLUTONIUM, AND RADIUM IN RATS.

Edited by Robert M. Fink. Jan. 1, 1947. Decl. May 18, 1949. 172p. For publication in NNES. (AECD-2605)

Comparative lethal dosage studies of radium, plutonium, and polonium in rats were made to determine the relative toxicities of plutonium, polonium, and radium. Clinical observations, gross and microscopic pathological studies, and hematological studies were made. At death the rats were analyzed for total polonium and radium in their bodies. The retention of plutonium was not determined. NSA 3-15

10344

EFFECT OF ROENTGEN RADIATION ON THE FUNCTION OF SECRETORY ORGANS W. Hartock and M. Israelleski. Strahlentherapie 44, 557-574(1932). (In German).

10345

Argonne National Lab. Biological and Medical Division CYTOLOGY AND CYTOCHEMISTRY PROGRESS REPORT: (1) TISSUE CULTURE (2) CARBON¹⁴ EXPOSURE OF MICE AND RATS. A. M. Brues, D. L. Buchanan, T. N. Tahmisiian, A. Naranjo and L. Rietz. 1948. 116p. (ANL-4253)

Rats and mice were exposed to C¹⁴O₂ via a tracheal cannula attached to a 2-way valve permitting collection of

expired air samples. Both species clear over 50% of inhaled air of $C^{14}O_2$, suggesting that rapidly exchanging C compartment is composed of two portions of which only one is in direct equilibrium with alveolar air. Rate of loss is much slower than rate of uptake and rates are almost independent of CO_2 content of inhaled air.

10346

THE EFFECTS OF URANIUM DIOXIDE POWDER APPLIED SUBCUTANEOUSLY THROUGH AN INCISION IN THE SKIN OF RABBITS. Roberta Allen. May 23, 1949. Decl. Oct. 4, 1949. 7p. (AECD-2709)

Insoluble UO_2 was applied in incisions made under the skin of 4 rabbits to determine its effect on wound healing and the extent, if any, of its systemic absorption. The animals, as compared with 3 controls (incision only), were observed for a month for local and systemic changes and finally, an analysis of the skin area was made to determine the amount of uranium remaining at the site of application. The normal course of wound healing was not altered by the administration of as much as 40 mg of UO_2 Powder to a 3 cm incision, nor was uranium absorbed to any significant degree from its site of application. NSA 3-2041

10347

INVESTIGATIONS ON THE PROBLEM OF RADIUM POISONING. VII. THE EXCRETION OF RADIOACTIVE SUBSTANCES FROM THE ANIMAL BODY DURING THE FIRST WEEK AFTER INOCULATION. (EXPERIMENTAL RESULTS OF STUDIES ON DOGS.). Hermann Muth (Max-Planck Institut für Biophysik, Frankfurt (Main), Germany). Strahlentherapie 94, 126-36(1954). (In German).

Blood level and excretion determinations were made following oral and intravenous administration of Ra to dogs. Applications of the results to the diagnosis of Ra poisoning by the determination of uranium and fecal Ra excretion are discussed. (J.S.R.) NSA 8-5114

10348

THE DISTRIBUTION AND EXCRETION OF A SOLUBLE BERYLLIUM COMPOUND USING Be^7 AS A TRACER. Roberta Allen, Geraldine Bonner, and Arnold Sparks, William Neuman, James K. Scott, and George Kosel June 2, 1948, decl. July 9, 1948. 22p. For oral presentation; and will also be for publication in Journal of Pharmacology and Experimental Therapeutics. (AECD-2104, UR-35)

Beryllium sulphate containing Be^7 was administered to rats, rabbits, and guinea pigs by different routes. Later the animals were dissected and the beryllium content of the organs determined. Following intravenous administration approximately 30% was excreted in the urine, 30% was recovered from bone and 30% in liver. There were wide species variations in the distribution and excretion, and the amount of beryllium administered to the animal affected the distribution and excretion. NSA 1-606

10349

INVESTIGATIONS ON THE PROBLEM OF RADIUM POISONING. V. RESULTS OF PHYSICAL MEASUREMENTS IN A CASE OF PROFESSIONAL RADIUM POISONING WITH A FATAL END. Hermann Muth and Hans-Helmut Roth. Strahlentherapie 80, 271-80(1949). (In German).

A chemist working in the radium industry died from continuous exposure to strong γ radiation over a period of 10 yr, he had handled approximately 15, 150 mg of radium (as radium salts) and about 7,200 mg of mesothorium (γ equivalent of radium). Physical measurements of 6 different parts of his body during his life time disclosed a deposit of 3 to 4 mg of radium, measurements taken from his suits and laundry revealed strong radiation. Measurements carried out post mortem determined the radioactive deposits present in 1 g of tissue from the lungs, liver, spleen, kidney, brain, skin,

skeletal muscle, and heart muscle, and the total activity for the different organs was established; the calculated values are shown in two tables. A special pathological difference found in this case as compared with others was the combined existence of aplastic anemia and fibrosis of the lungs. NSA 4-2585

10350

THE EFFECT OF ADDED CARRIER ON THE DISTRIBUTION AND EXCRETION OF SOLUBLE Be^7 . R. R. Allen, G. Bonner, G. E. Kosel, W. F. Neuman, J. K. Scott, and A. F. Sparks. May 11, 1949. 22p. (AECU-294).

A soluble compound of Be^7 only and one to which $BeSO_4$ was added as carrier were administered intravenously to rabbits and rats. The distribution and excretion of the Be^7 was determined by tracer techniques. It was found that when the isotope only was given that the Be^7 was deposited in bone and excreted in the urine. When $BeSO_4$ was injected simultaneously with the isotope appreciable amounts of the Be^7 were found in the liver, spleen and bone marrow in addition to that deposited in the skeleton and excreted in the urine. The rate of clearance of Be^7 from the circulating blood was much more rapid when isotope only was given than when carrier was added to the isotope. The urinary excretion of Be^7 was more rapid when isotope only was injected than when carrier was added. Significant amounts of Be^7 were excreted in the feces when isotope plus carrier was administered. NSA 3-1049

10351

COLLECTION OF REPRINTS ON RADIUM POISONING. Harrison S. Martland, reprinted by Technical Information Service, AEC. 1925-1939. 193p. (NP-3544).

Several papers by this author are reprinted here, including data gathered on the effects of Ra poisoning on dial painters, occurrences of osteogenic sarcoma and anemia due to Ra toxicology, and interrelationship of certain blood diseases. NSA 6-787

10352

Naval Medical Research Inst., Bethesda
THE URINARY EXCRETION OF GALLIUM. J. I. Munn and H. C. Dudley. Dec. 17, 1951. 20p. (NP-3731, R6279)

A method was devised for the quantitative estimation of Ga^{72} in urine, based on the colorimetric or fluorometric determination of the 8-hydroxyquinoline- Ga^{72} complex formed in a $CHCl_3$ solution containing Ga^{72} extracted from the urine with acidified diethyl ether. Intravenous injection of Ga^{72} -citrate in rabbits and dogs resulted in lower urinary excretion of Ga^{72} than when the animals were given the same doses subcutaneously. Urinary excretion of Ga^{72} during the first 24 hr subsequent to intravenous administration in humans varied from 4 to 78%. No correlation was observed between the clinical manifestations and the rate or amount of Ga^{72} excreted. The studies indicate that in both dogs and man the initial rate of urinary excretion of Ga^{72} is high and that it falls rapidly by 18 hr. Blood- Ga^{72} levels decline quickly after intravenous injection and reach low values within 6 hr. (Published in part in the J. Lab. Clin. Med. 37, 676(1951). (NRS abst.) NSA 6-5538

10353

Los Alamos Scientific Lab.
ABSORPTION OF LIQUID HTO AND HTO VAPOR THROUGH THE SKIN OF MAN. Ernest A. Pinson, Ernest C. Anderson and Virginia Lotz. June 1952. 17p. (AECU-2571, LADC-1326)

Data are presented on percutaneous absorption of HTO by the arm of a man from an atmosphere saturated with HTO vapor, and with the arm immersed in liquid HTO. Comparison with data on HTO absorption through the lung indicates that the tritium taken into the body through

the total skin surface from an environment containing HTO or T_2O , when the possible but undetermined protective effect of clothing is ignored, would approximately equal that absorbed via the respiratory tract. (C. H.) NSA 7-4302

10354

Argonne National Laboratory, Biological and Medical Division

PROGRESS REPORT: IN VITRO PROTECTION AFFORDED BY CITRATE AGAINST X-IRRADIATION. R. Bryan and E. Lorenz. 1951. 13p. (ANL-4713)

10355

Los Alamos Scientific Lab.

INCORPORATION OF TRITIUM INTO THE ORGANIC COMPONENTS OF VARIOUS TISSUES OF THE MOUSE. Ernest A. Pinson. Oct. 1952. 17p. (LA-1467)

Two groups of mice were given chronic and acute exposures, respectively, to tritium as HTO in body fluids. Both groups eliminated the tritium from body fluids with an initial half time of 1.6 to 2.0 days. After most of the tritium had been eliminated, the half time for elimination increased to about 12 days as the rate of growth of tritium out of the organic constituents of the body became the limiting factor in the elimination rate. Mice killed when the half time for elimination had lengthened to about 12 days showed a specific activity of tritium in the organic components of tissues which was many times the specific activity of tritium in body water. However, the radiation dose to the mice from the tritium incorporated in the organic constituents was small in comparison with the radiation dose from tritium in body water at levels necessary to induce the activity into the organic components either on chronic or acute exposure. It was concluded that the over-all radiation hazard due to incorporation of tritium into the organic constituents of mice is minor compared to the radiation hazard from tritium in body water. The same is probably true for man. (auth) NSA 7-1036

10356

California. Univ., Los Angeles. Atomic Energy Project. THE DISCRIMINATION OF CALCIUM AND STRONTIUM BY THE KIDNEY. N. S. MacDonald, P. Noyes, and P. C. Lorick. May 31, 1956. 23p. Contract AT-04-1-GEN-12. (UCLA-369)

The skeletal retention and the excretion of Sr were directly compared with those of Ca, by injecting solutions containing both radioisotopes, Ca^{45} and Sr^{90} , into rats and rabbits. In normal animals, a greater fraction of the injected dose of Ca^{45} was retained in the skeleton than was observed for Sr^{90} . In complementary fashion, the fraction of the injected Sr^{90} which appeared in the urine was greater than the fraction of the dose of Ca^{45} which was excreted. However, in rats which were actively calcifying tibial fractures, this difference disappeared. The enhanced accumulation of radioactivity in deposits of new bone possessed the same ratio of Sr^{90} : Ca^{45} as the solution injected. Furthermore, when the functions of the kidneys of normal rabbits were impaired by poisoning with mercuric chloride or completely extinguished by nephrectomy, again the usual differences in Ca^{45} and Sr^{90} deposition in bone tissue disappeared. When plasma containing both Ca^{45} and Sr^{90} was shaken with powdered bone, both radioisotopes were extracted in equivalent amounts. It was concluded that the avidity of bone tissue, per se, for Sr ions is not discernibly different from that for Ca ions. The retention by the skeleton of a larger fraction of an injected quantity of Ca than of simultaneously administered Sr was attributed to a renal discrimination causing a greater relative loss of Sr to the urine. (auth) NSA 10-4518

10357

Atomic Energy Project, Univ. of Rochester
THERMAL BURNS FROM THE ATOMIC BOMB. Herman

E. Pearse and Harry D. Kingsley. Apr. 30, 1953. Decl. with deletions June 30, 1953. 43p. (AECD-3532, UR-254)

Primary thermal burns from the explosion of an atomic bomb are caused by brief exposure to intense radiant energy. Gross and microscopic evaluation of burn lesions produced by intense radiant energy from a carbon arc light and burning Mg have been carried out in the laboratory. Since the time of application, the intensity, and the spectrum of applied energy influence the character of the resultant lesion, it was necessary to compare the burns from an atomic bomb explosion to those produced in the laboratory. Experiments using anesthetized pigs and dogs were carried out at atomic bomb explosions and a range of thermal energies from 1.1 to 43 cal/cm² studied in respect to the skin effects. The time of burn production from various portions of the thermal pulse was determined by the use of various electrically operated shutters. The spectral effects of the bomb light were evaluated by the use of limiting filters over the exposed skin and also in front of calorimeters for measuring the energy causing the burns. Preliminary but inconclusive tests were made of the protective effects of certain fabrics. Some observations were obtained regarding the effects of combining ionizing radiation and burns. Sufficient data are obtained from the field to confirm and advance laboratory investigations of this type of burn. (auth) NSA 7-4702

10358

PRELIMINARY STUDIES OF THE TOXICITY OF THORIUM. H. Ackerman, R. P. Allen, G. Bonner, W. L. Downs, H. C. Hodge, E. A. Maynard, W. F. Neuman, J. K. Scott, A. Sparks and H. E. Stokinger. February 26, 1948, decl. September 15, 1948. 44p. Informal disposition. Document for sale by AEC. (AECD-2283, UR-13)

Thorium Nitrate: Acute Toxicity in Rats. Adult albino rats were given various doses intraperitoneally of an aqueous solution of thorium nitrate. The LD50 in 24 hours is of the order of 1770 mg/kg. This represents a low order of toxicity. Toxicity Following Intratracheal Administration. The LD50 of thorium nitrate (24-hour kill) was found to be of the order of 85 mg/kg. A comparable value for thorium dioxide could not be determined, 1000 mg/kg were tolerated apparently without effect for at least four months. In surviving animals studies are underway in which mortality is recorded, periodic lung x-rays are made, and lung pathology is observed in sacrificed animals. No consistent lesions which could be attributed to the thorium compounds were found in any organs other than the lung. Thorium nitrate provoked a peculiar focal coalition of monocytes in the alveolar sacs. Thorium dioxide provoked minimal or no response. Short-Term Feeding Studies of Thorium Nitrate. In a pilot study a few young and two adult rats were fed diets containing very high percentages of thorium nitrate, viz., 10 and 20% for the weanlings, 10% for the adult rats. The weanlings fed 20% died promptly. The weanlings fed 10% grew very little but survived for 11 months. A small scale paired feeding study demonstrated clearly that the weight depression was only partly due to the decreased food consumption. Based on earlier experiments, larger groups of male and female rats were fed diets containing 0, .05, 1, and 10% thorium nitrate. Severe weight reductions and deaths were recorded on the highest dietary percentages. Weanling rats, in groups of 20 males and females each, were placed on diets containing 0, .05, 1.0, 3.0, 5.0, 8.0, and 10% thorium. In a 6-week period, a regular pattern of growth depression was established, with increasing effect observed in the rats fed higher amounts of thorium nitrate. Distribution and Excretion Studies. A natural radioisotope of thorium, UX_1 (Th-234) is available, having a half life of about 25 days, and emitting a hard

beta radiation. Small amounts of thorium marked with UX_1 were administered intravenously, intramuscularly, by stomach tube, and intratracheally to a number of animals including rats, rabbits, and guinea pigs. Administered intravenously, thorium is slowly lost from the blood and appears in major proportion in the liver. At 6 hours the balance is present in the spleen, intestine, and other organs, including bone and bone marrow. Fourteen days after an intravenous dose, the liver still contains a large fraction of the total amount given. About one-third of the dose is excreted in the feces, a much smaller percentage in the urine. Roughly, one-tenth of the dose is in the carcass, probably mostly in the bone and the bone marrow. The other organs still account at this late date for approximately 15% of the dose. Administered by other routes, the principal idea that emerges is that wherever thorium is placed, it tends to stay; for example, in rats given a soluble thorium compound intramuscularly, 91 to 94% of the dose has been recovered from the site four days later. Rats and guinea pigs given a solution of thorium nitrate by stomach tube excrete 67 to 100% in the feces, absorption is very limited, i.e., considerably less than 1%. A soluble thorium compound administered intratracheally either stays in the lung or is brought up by the ciliated epithelium and deposited in the gastrointestinal tract. Recoveries of 85 to 90% of an intratracheal dose have been found four days later in lung and gastrointestinal tract combined. NSA 1-1095

10359

INFLUENCE OF FEMALE SEX HORMONE ON UPTAKE OF RADIOACTIVE IODINE BY THE THYROID. K. E. Paschkis. Federation Proceedings 6, 176-177 (1947). NSA 1-250

10360

Argonne National Laboratory, Biological and Medical Divisions

ISOTOPE EFFECTS WITH CARBON 14 - A SURVEY (ABSTRACT). Progress Report. D. L. Buchanan and Nakao. 1951. 103p. (ANL-4713)

10361

Atomic Energy Project, Univ. of Calif., Los Angeles
MECHANISMS IN SKELETAL ACCUMULATION OF IONS. Norman S. MacDonald, Ralph E. Nusbaum, Florita Ezmirlian, Richard C. Barbera, Patricia Spain, and Donald E. Rounds. Issued Sept. 11, 1952. 13p. (UCLA-222)

The deposition of Sr and of Pb in the femurs of rats as a function of parenteral dosage was studied. A single injection was administered and the content of metal ion determined after 24 hours. Dosages ranged from 0.10 to 75.00 mg of Sr^{++} per 200 g of body weight and from 0.03 to 10.00 mg per 200 g of body weight in the case of Pb^{++} . The uptake indicated that at least two modes of accumulation occurred. The dominant process at low doses was described satisfactorily by an equation of the same form as the Langmuir gas absorption isotherm. However, an abrupt discontinuity in the graph of the data appeared as the dose was increased. This departure from linearity was interpreted as the point where saturation of the initial mode of deposition was attained. The values of these saturation levels for Sr and Pb were 125 ppm and 60 ppm, respectively. The various compartments in which the cations might conceivably be found in bone were discussed. It was estimated that if the first stage saturation were the result of adsorption or ionic exchange at surfaces of bone salt crystals, the average burden would be approximately 32 atoms of Sr per crystal and 6 per crystal in the case of Pb. However, the combining power of the sulfate present in the organic matrix of bone could equally well account for the binding of the saturation levels of Sr and Pb. (auth) NSA 6-5971

10362

CHANGES IN MEAN BLOOD LEVELS OF METALLURGICAL EMPLOYEES DURING THE FIRST YEAR OF EMPLOYMENT, AS RELATED TO WORKING CONDITIONS. N. Perlman and G. A. Sacher. June 1946, decl. June 3, 1948. 7p. (To be included in the NNES-MPTS). (AECD-2030, CH-3865)

Mean levels of several blood elements were investigated for a control group and for groups exposed to radiation and uranium toxicity hazards in the Metallurgical Laboratory at six months and one year after employment. No significant decrease in mean level was found for any blood element. Lymphocytes of the groups exposed to radiation hazards and those of the metal working groups increased significantly after employment. The increase of lymphocyte count in hazard groups in excess of a slight increase in the control group is on the borderline of significance ($p = 0.05$). Thus it is possible that working in the presence of radiation or metal hazards somehow brings about slight lymphocytosis. Individual daily monitoring indicates that the average measured exposure is less than 0.1 r per day for all individuals in these groups. NSA 1-13

10363

Oak Ridge National Lab., Tenn.

RELATIVE BIOLOGICAL HAZARDS OF RADIATIONS EXPECTED IN HOMOGENEOUS REACTORS TBR AND HPR. E. D. Arnold and A. T. Gresky. Dec. 2, 1955. Decl. Mar. 12, 1957. 55p. Contract W-7405-eng-26. (ORNL-1982)

An evaluation of the relative health hazards of radioisotopes produced in nuclear reactors is reported. The most important hazards were indicated to be I^{131} , the Sr^{90} - Y^{90} chain, the Ce^{144} - Pr^{144} chain, Sr^{89} , the Ba^{140} - La^{140} chain, Y^{91} , the Zr^{96} - Nb^{96} chain, Pr^{143} , La^{140} , and Pa^{233} . The most critical body organs affected by air-borne contamination are the thyroid gland, the bone marrow, the lungs, and the gastrointestinal tract. Where possible, continuous daily removal of gaseous and solid fission products from the reactor environment can be shown to permit very significant reductions in the total hazards. Homogeneous reactors, such as the Thermal Breeder Reactor and the Homogeneous Plutonium Producer Reactor, specifically studied in this report, are designed with daily removal cycles and may be considered potentially safer than heterogeneous reactors. (auth) NSA 11-11558

10364

URINARY EXCRETION OF GALLIUM BY MAN AND ANIMALS. J. I. Munn, N. H. Walters, and H. C. Dudley. J. Lab. Clin. Med. 37, 676-82 (1951) May.

A method is described for the separation of Ga from urine by ether extraction of 6N HCl solution. Colorimetric or fluorimetric estimation of 8-hydroxyquinoline-Ga complex in chloroform is the basis for quantitative determination. In the rabbit and dog, intravenous injection promotes greater retention of parenterally administered Ga citrate, with lessened urinary excretion. The 24-hr urinary excretion of Ga by 22 patients varied widely. Studies of the rate of uranium excretion of Ga^{72} in man and dog indicate that in both the initial excretion rate is high and reaches a low level in less than 18 hr. Blood-Ga levels fall rapidly after intravenous injection and approach low constant values within 6 hr. (auth) NSA 5-3340

10365

THE DISTRIBUTION IN RABBIT TISSUES OF INTRAVENOUSLY INJECTED IODINE AS SHOWN BY THE RADIOISOTOPE, I-130. Walter Mann, William F. Bale, Harold C. Hodge and Stafford L. Warren. J. Pharmacol and Exptl. Therap. 95, 12-17 (1949) Jan.

The distribution of intravenously-administered I^{130} in rabbit thyroid, blood, muscle, kidney, lung, liver, spleen, and heart, up to 12 hours after injection, was measured. The total iodine present in these tissues was also determined chemically. The thyroid gland contained relatively high percentages of the injected dose. After 12 hours the I^{130} concentration was more than 1000 times that in other tissues. From this work and the data of others, it is concluded that to produce maximal concentrations of radioiodine in the thyroid gland, the total dose of iodine (I^{127}) should be kept as small as possible. NSA 2-1295

10366

DISTRIBUTION AND PATHOLOGY RESULTING FROM THE INTRACEREBRAL AND INTRAVENTRICULAR INJECTION OF RADIOACTIVE GOLD AND SILVER COATED RADIOGOLD COLLOIDS. C. C. McClure, Jr., E. L. Carothers, and P. F. Hahn (Meharry Medical Coll., Nashville, Tenn.). Am. J. Roentgenol. Radium Therapy Nuclear Med. 73, 81-7(1955) Jan.

Injection of radioactive gold colloids and silver coated radioactive gold colloids into the brain substance resulted in localization of the material roughly in proportion to the volume administered. When such colloids were injected into the lateral ventricle of the brain there was a diffuse parallel distribution of the colloid in both the right and left side with slight concentrations in some regions in the fore and hind part of the brain. There was a considerable concentration of the material in the choroid plexus but gross and histological examination of this structure did not show anything but minimal changes. The possibilities of the use of such inert colloids in treatment of malignant brain tumors and hydrocephalus are briefly discussed. (auth) NSA 9-1172

10367

X-RAYS AND RADIUM IN THE TREATMENT OF DISEASES OF THE SKIN. George M. MacKee, Lea and Febiger, Publishers, Minneapolis, 1946. 668p.

Approximately the first half of this book is concerned with the essentials of physics and biology. The various forms of radiation, methods of measurement, dosages, control techniques, and the biological effects of the radiations on the organs and tissues of the body are fully discussed. The last part of the book discusses clinical uses and problems for the application of radiation therapy. Several chapters cover the methods of treating diseases caused by fungi or due to pyogenic organisms, eczema, psoriasis, lichen planus, pruritis, hypertrichosis, diseases of the hematopoietic system, diseases due to the tubercle bacillus, verrucous lesions, nevi, and benign and malignant new growths. The medico-legal aspects of x-ray and radium therapy are also discussed.

NSA 3-591

10368

DEPOSITION OF RADIOACTIVE CALCIUM IN RACHITIC AND NONRACHITIC CHICK TIBIA FROM ORAL AND INTRAMUSCULAR DOSES OF Ca^{45} . B. B. Migicovsky and A. R. G. Emslie. Arch. Biochem. 28, 324-8(1950) Oct.

Experiments on the deposition of calcium in rachitic and nonrachitic chick tibia from oral and intramuscular doses of Ca^{45} indicate that vitamin D does not exert a direct effect on the mineralization of bones of chicks.

NSA 5-328

10369

Hanford Atomic Products Operation, Wash, and Oregon Univ., Portland. Medical School. NORMAL ABUNDANCE OF RADIUM IN CADAVERS FROM THE PACIFIC NORTHWEST. R. F. Palmer and F. B. Queen, July 6, 1956, 21p. Contract W-31-109-Eng-52, (HW-31242). NSA 11-67

10370

Division of Biology and Medicine, AEC. METABOLISM OF STRONTIUM, CESIUM AND YTTRIUM BY ANIMALS. Paul B. Pearson. June 24, 1955, 17p. (M-7120)

Data are summarized from a series of studies on the metabolism of fission products by domestic animals. Tabulated results are included on the effect of age on the absorption and renal excretion of strontium-90 by cattle, the rate of excretion of orally ingested strontium-90 by cattle, the secretion of strontium-90 into milk, the deposition of strontium-90 in eggs, and the excretion pattern of cesium-137 in rats and cattle. The deposition and excretion of yttrium in rats are discussed briefly. (C. H.) NSA 13-17646

10371

TOXICOLOGY STUDIES OF CERTAIN THORIUM SALTS. Paul A. Mattis. June 8, 1950. 47p (NYO-1607)

The results of studies designed to determine the toxic manifestations following the administration of soluble thorium salts by various routes are presented. Experiments on methods for the detection of microgram quantities of thorium in biological material are described. The acute toxicology of thorium nitrate or thorium chloride following oral, intraperitoneal, intravenous, or subcutaneous administration is given. The results of feeding thorium nitrate to rats during most of their life span are presented. The distribution of thorium in the body as determined by the use of the thorium isotope $UX_1(Th^{234})$ is indicated. A tolerance figure for thorium in man is estimated. (auth) NSA 4-6527

10372

Argonne National Lab. CUMULATIVE INDEX FOR QUARTERLY REPORTS OF THE DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH FOR AUGUST 1949- JANUARY 1952. Antreen M. Pfau, Helen C. Supert, and Austin M. Brues. (nd), 45p. (ANL-4894). NSA 7-2

10373

INFLUENCE OF AGE, SEX, AND SEASON UPON RADIOIODINE UPTAKE BY THE HUMAN THYROID. Edith H. Qumby, Sidney C. Werner, and Charlotte Schmidt. Proc. Soc. Exptl. Biol. Med. 75, 537-40(1950) Nov.

The percentage of a tracer dose of radioiodine deposited in the thyroid gland at the end of 24 hr was determined by measurement of radioactivity directly over the gland in 1050 tests in apparently euthyroid individuals. It is concluded that, within the New York area, there is statistically no effect of season on the average uptake of radioiodine by the thyroid gland of the euthyroid individual. The 24-hr uptake of radioiodine decreases progressively but slightly. NSA 5-958

10374

ASCORBIC ACID CONTENTS IN BLOOD AND IN URINE DURING EXPERIMENTAL INTOXICATION WITH URANIUM CHLORIDE. Aldo Masturzo. Folia Med. (Naples) 34, 74-83(1951) Feb. (In Italian).

Changes in the ascorbic acid economy of the organism were found in rabbits experimentally intoxicated, for 60 days, with uranium chloride. The lowering of the vitamin C content in blood must be considered as one of the causes of alterations in blood vessels and of coagulation reactions, already observed in such intoxications. The increase in vitamin C content in the urine points to the destruction of reservoirs of that substance and to disorders in the elimination functions, to be correlated with observed lesions in the liver and the kidneys. NSA 5-5539

10375

THE DISTRIBUTION AND RADIATION EFFECTS OF INTRAVENOUSLY ADMINISTERED COLLOIDAL Au^{198} IN

MAN. Samuel W. Root, Gould A. Andrews, Ralph M. Kniseley, and Malcolm P. Tyor (Oak Ridge Inst. of Nuclear Studies, Tenn.). *Cancer* 7, 856-66(1954) Sept.

Radioactive gold in colloidal form can be injected intravenously into the human being without immediate untoward reactions. The isotope rapidly leaves the blood stream and deposits largely in reticulo-endothelial organs. Neoplasma that replace reticulo-endothelial tissue in liver do not concentrate the isotope and these lesions contrast strikingly with surrounding tissue having high levels of activity. This information on a small number of cases suggests that intravenous colloids radiogold has no promise the treatment of discrete primary or metastatic lesions of the liver but does not rule out the possibility that very fine diffusion lesions could be treated advantageously. (auth) NSA 8-6646

10376

New York, State Univ. Veterinary Coll., Ithaca. Lab. of Radiation Biology.

DEPOSITION AND REMOVAL OF RADIOISOTOPES FROM THE BODY. Quarterly Progress Report for April 1, 1958 - June 30, 1958. C. L. Comar and R. H. Wasserman. 17p. Contract DA-49-007-MD-897. (AD-200487)

In the living animal containing cesium-137 it has been shown there is a metabolic dissociation of the radioactive daughter barium-137m. This means that some tissues such as bone and plasma will have a significantly increased level of barium-137m as compared with that expected from the usual radio-assay measurements of cesium-137. The technique of peritoneal lavage was used to study metabolic processes involved in the removal of alkaline earths from bone. Methods have been established for studying the factors that govern the movement of alkaline earths from the digestive tract to the body. Special attention is being given to the ability of certain sugars to enhance gastrointestinal absorption. Lactose and xylose increased strontium absorption more than that of calcium. The enhancing effect of lactose occurred mainly in the small intestine, and there is a suggestion that an active transport process is involved. Lactose also tended to decrease the emptying rate of the stomach. (auth) NSA 13-3514

10377

Atomic Energy Project. Univ. of Calif., Los Angeles
THE EFFECTS OF CALCIUM AND PHOSPHATE IN FOODS ON RADIOSTRONTIUM ACCUMULATION. N. S. MacDonald, Patricia C. Spain, Florita Ezmirlan, and Donald E. Rounds. Dec. 7, 1954. 20p. Contract AT-04-1-GEN-12. (UCLA-317)

Each of a series of common food materials, accompanied by a fixed dose of $\text{Sr}^{90}\text{-Y}^{90}$, was administered by gavage to rats. The femurs were removed forty-eight hours later and analyzed for radiostrontium activity. The Ca and PO_4 contents of each of the materials was also determined. There was a clearcut reduction of Sr^{90} bone burden with increase of ingested Ca. The reduction of Sr^{90} bone burden was even more pronounced if the PO_4 as well as the Ca dose was elevated. Milk powder was an exception. Accumulation of Sr^{90} was enhanced by the presence of milk even though the dose was rich in Ca and PO_4 . Some speculations concerning the inter-relationships of orally administered Ca and Sr^{90} are presented. Assuming that Sr^{90} acted as a 'tracer' for Ca, the results imply that the percentage of an oral dose of Ca which deposits in the skeleton decreases as the size of the dose increases. It is suggested that the potential hazards from ingestion of foods contaminated with radiostrontium are somewhat diminished in proportion to the Ca and PO_4 concentrations existing in the foods naturally or by enrichment. (auth) NSA 9-846

10378

DISTRIBUTION OF RADIOACTIVITY IN RATS AND MAN. AFTER INTRAVENOUS ADMINISTRATION OF DIETHYL β -RADIOIODOETHYL AMINE HYDROCHLORIDE AND OF RADIOACTIVE SODIUM IODIDE. Alexander M. Ruthenburg, Orrie M. Friedman, and Arnold M. Seligman. *Cancer* 3, 336-41(1950) Mar.

A comparison of the rate of disappearance of radioactivity from the blood and tissues of Wistar rats following the intravenous injection of I^{131}NM (diethyl β -iodoethyl amine hydrochloride) and NaI^{131} indicated that most of the I^{131}NM rapidly cyclized to the ammonium ion with the loss of the iodide ion, but that a small fraction persisted in the blood, reached tissues intact, and penetrated the cells. The highest concentration of radioactivity due to I^{131}NM was noted in thyroid and blood. Lower concentrations were present in lung, kidney, Bagg lymphosarcoma, and spleen. A similar distribution study in a patient with reticulum-cell sarcoma of the tonsil revealed a higher concentration of radioactivity in tumor, blood, and muscle following the injection of mustard than following sodium iodide; the tumor had the highest concentration of radioactivity following injection of both I^{131}NM and NaI^{131} . Persistence of higher concentrations of I^{131}NM than of NaI^{131} in the blood of three patients was not observed. The distribution of radioactivity in the tissues of rats following injection of carrier-free radioactive iodide is described. 18 references. (auth) NSA 4-2969

10379

University of California at Los Angeles.

THE ULTIMATE SITE OF SKELETAL DEPOSITION OF Sr AND Pb. N. S. MacDonald, Florita Ezmirlan, Patricia Spain, and Clare McArthur. Nov. 6, 1950. 25p. (UCLA-96)

X-ray diffraction studies were made on the bone ash of rats receiving repeated injections of SrCl_2 and of Pb acetate. Debye powder patterns showed no evidence of a second solid phase, even in bone samples containing as much as 8% Sr or 5% Pb. Determinations of the unit cell dimensions were made with a precision of 0.1% using a symmetrical focusing back reflection camera. These determinations showed definite distortions of the normal apatite-like lattice due to the presence of the foreign ions. It is concluded that when Sr or Pb are accumulated by skeletal tissue, some and perhaps most of the foreign cations ultimately become part of the crystalline structure of the bone salt. (auth) NSA 5-317

10380

DISTRIBUTION OF RADIOIODINE IN ERYTHROCYTES AND PLASMA OF MAN. J. E. Rall, Marschelle H. Power, and A. Albert. *Proc. Soc. Exptl. Biol. Med.* 74, 460-1 (1950) June.

To venous blood drawn from normal individuals there was added various amounts of labeled sodium iodide (NaI^{131}). The ratio of chloride content of the erythrocytes to that of the plasma was found to be 0.59, and the corresponding ratio for radioiodide was 0.67. The data indicate that a portion of iodide added to human blood is not freely diffusible and may be bound in some manner within the erythrocytes. NSA 4-4790

10381

THE EFFECTS OF VARIOUS DOSES OF RADIOACTIVE IODINE ON THE FUNCTION AND STRUCTURE OF THE THYROID OF THE RAT. Farahe Maloof, Brown M. Dobyns, and Austin L. Vickery. *Endocrinology* 50, 612-38(1952) June.

Anatomical and functional changes in the thyroid gland of growing rats were studied simultaneously following the administration of graded doses of I^{131} . Changes observed at various times up to one and one-half years are described. (C. R.) NSA 7-492

10382

THE ELECTROPHORETIC PATTERNS OF THE PLASMA OF GOATS AFTER X RAY IRRADIATION WITH AN APPENDIX OF THE ELECTROPHORETIC PATTERNS OF THE PLASMA OF GOATS EXPOSED TO THE ATOM BOMB EXPLOSION AT BIKINI ON JUNE 30, 1946 D. L. Buchanan and E. S. Guzman Barron. ARGONNE NATIONAL LABORATORY, BIOLOGICAL DIVISION QUARTERLY REPORT NOV. 1946 TO JAN. 1947. A. M. Brues, ed. 1946. 52p. (CH-3782). NSA 10-3408

10383

THE EFFECT OF HYPOPHYSECTOMY ON THE UPTAKE OF RADIOACTIVE IODINE BY THE THYROID OF THE RAT. Raymond V. Randall and A. Albert. *Endocrinology* 48, 327-33(1951) Mar.

The effect of hypophysectomy on the thyroidal collection of radioiodine was determined by an in vivo method following injection of 1.0 μ c of I^{131} . Following hypophysectomy, the rat thyroid collects about 12% as much I as before hypophysectomy. The defective collection of I occurs soon after operation and becomes maximal between 5 and 6 days after operation. (auth) NSA 5-3865

10384

THE METABOLISM OF CARRIER-FREE RADIOBERYLLIUM IN THE RAT. Josephine F. Crowley, Joseph G. Hamilton, and Kenneth G. Scott. *J. Biol. Chem.* 177 975-984(1949) Feb.

This article is based on AECD-2254. An abstract of the document has been listed in Nuclear Science Abstracts as abstract No. I-1092. NSA 2-1331

10385

Argonne National Laboratory
THE BLOOD PROTEINS OF HUMANS AFTER IRRADIATION (SINGLE DOSE). D. L. Buchanan and E. S. Guzman Barron. *Biology Division Quarterly Report Nov. 1946 to Jan. 1947*. A. M. Brues, ed. 1946. 64p. (CH-3782)

10386

Argonne National Laboratory Biological and Medical Division

I. THE SIMULTANEOUS ADMINISTRATION OF METHYL-CHOLANTHRENE AND $\alpha\beta$ EMITTER. II. EFFECTS OF VARIATION IN DOSAGE RATE ON SURVIVAL FOLLOWING TOTAL BODY X-IRRADIATION III. STUDY OF THE HISTOPATHOLOGY OF MICE TREATED WITH FRACTIONATED AND DURATION-OF-LIFE EXPOSURES TO X-RADIATION. Progress Report. A. M. Cloudman, R. Clayton and D. Vining. 1948. 83p. (ANL-4227)

10387

STUDIES OF THE UNSATURATION OF PHOSPHOLIPID FATTY ACIDS OF THE LIVER, KIDNEY AND BLOOD OF URANIUM-POISONED RATS. R. S. Crossland, F. L. Haven and V. M. Edwards. Jan. 1946. Dec. 29, 1948. 46p. Proposed for publication in *Proc. Soc. Exptl. Biol. and Med.* (AECD-2428, M-1877)

The effect of uranium nitrate on the unsaturation of the phospholipid fatty acids of the liver, kidney and blood of rats has been studied. It was found that with an acute dose (5 mg/kg injected intraperitoneally) the iodine number of the liver was increased about 14 per cent. The iodine number of the kidney was decreased about 25 per cent. A limited number of determinations on the blood fatty acids showed an increase of 20 per cent. When repeated small doses (0.33 mg/kg) of uranium nitrate were given followed by an acute dose, the iodine numbers of both the liver and kidney of these tolerant animals were normal. Apparently the repeated small doses prevent the changes in unsaturation, which are caused by a single acute dose. Two series of rats, which had survived an acute dose of uranium nitrate showed normal average and low average iodine num-

bers, respectively, for liver. Those values showed the greatest variation of any series of liver, with a large percentage of the figures falling below normal. The iodine numbers for the kidney were, likewise, normal and low normal, respectively, for the two series. When rats were given a sub-acute dose of uranium nitrate (2.5 mg/kg) the iodine number for the liver was elevated about 11 per cent. The value for kidney, however, was a low normal. If any injury to the kidney had occurred, as was indicated by the ratio of kidney to body weight, such injury had been repaired, while the corresponding injury to the liver apparently persisted. NSA 2-406

10388

TURNOVER OF P^{32} IN DIFFERENT TYPES OF NUCLEI FROM RABBIT LIVER. A. Marshak and Audrey Peck. *Proc. Soc. Exptl. Biol. Med.* 73, 479-80(1950) Mar.

Radioactive phosphorus, P^{32} , was administered intravenously to two rabbits as Na_2HPO_4 , and 3 hr later the livers were perfused, and the nuclei were isolated and separated into two groups, the spherical hepatic-cell type and the nonspherical type consisting of fibroblast, reticulo-endothelial, endothelial, and polymorphonuclear leukocyte nuclei. The specific activity of the spherical nuclei from the first animal was 34 per cent greater than that of the nonspherical nuclei, while with the second animal the difference was 23 per cent. The data indicated a higher rate of turnover of phosphorus in the spherical as compared with the nonspherical nuclei. It was previously shown that most of the P^{32} in liver nuclei was in nucleic acid and that it was re-concluded that nucleic acid turnover in the nuclei of hepatic cells is more rapid than that of nuclei of other cells in the liver. NSA 4-3402

10389

Wyoming Univ.
DISTRIBUTION OF P^{31} AND P^{32} IN THE TISSUES OF NORMAL ANIMALS AND CHRONIC SELENOSIS. Irene Rosenfeld and O. A. Beath. (nd). 12p. (AECU-2316)

Data are presented from a study of the distribution of P in total tissue, total acid-soluble, organic and inorganic phosphate of the acid-soluble fraction in kidney, heart, spleen, and brain of normal rats and in rats with chronic selenosis following intraperitoneal injection of P^{32} . Data indicate that the rate of uptake of P is not directly related to the total phosphate content of the tissues but is governed by cellular permeability and tissue barriers within the organ. (C. R.) NSA 7-507

10390

DISTRIBUTION OF COLLOIDAL RADIOACTIVE CHROMIC PHOSPHATE AFTER INTRACAVITARY ADMINISTRATION. Samuel W. Root, Malcolm P. Tyor, Gould A. Andrews, and Ralph M. Kniseley. (Oak Ridge Inst. of Nuclear Studies, Inc., Tenn). *Radiology* 63, 251-9(1954) Aug.

Preliminary studies indicate that the distribution of chromic phosphate after intracavitary injection is similar in most respects to that of colloidal radioactive gold. There is evidence, however, for some ionization of the chromic phosphate and this ionized portion follows the distribution expected for phosphate ion. From the point of view of distribution, chromic phosphate appears to be suitable for intracavitary therapeutic use. (auth). NSA 8-6076

10391

TRANSPORT OF RADIOACTIVE COLLOIDAL GOLD BETWEEN SEROUS CAVITIES Irving L. Cowan, Roland S. Cron, Gordon F. Burgess, and Frank G. Kariotis (Milwaukee Hosp. and Marquette Univ., Wisconsin). *Surg. Gynecol. Obstet.* 98, 721-4(1954) June.

Following administration of a therapeutic dose of Au^{198} to a patient with a clinical diagnosis of ovarian carcinoma

with ascites and hydrothorax there was a rapid transport of radioactive colloidal gold from the peritoneal cavity to the pleural space. A maximum concentration was obtained within 2 hours. Radioactive gold was found in the abdominal cavity following right pleural space administration with a maximum concentration in 1 hour. The concentration of Au^{198} in the abdominal fluid decreased exponentially with time, the rate of decrease being typical of Au^{198} that is injected directly into the abdominal cavity. Little or no therapeutic effect on the development of ascites was obtained in the case of this patient. The pleural fluid reaccumulation seemed, however, to be slightly repressed. (auth) NSA 8-4490

10392

SYMPOSIUM. THE INTRODUCTION OF THE RAD IN RADIOTHERAPY PRACTICE. I. Radiation Units in Use in Great Britain. R. Paterson. *Brit. J. Radiol.* **29**, 353-69 (1956).

10393

Argonne National Lab., Ill.

PROGRESS REPORT: COMPARATIVE EFFECTS OF X IRRADIATION AND RADON ON THE TESTES OF MICE. A. B. Eschenbrenner and J. Holcroft. p.14-15 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1951. Austin M. Brues. (ANL-4713)

10394

ON THE DANGERS OF RADIUM. Claude Regaud. *Bull. de L'Acad. de Medicine*, **21** (1921). (In French).

Dangers of those handling or working near Ra: 1. danger of gas (emanation) - inhalation "not dangerous". 2. damage to skin of hands. 3. damage of deep tissues and organs, especially hematopoietic tissues.

10395

EFFECT OF URANIUM POISONING IN PARTIALLY PANCREATECTOMIZED DOGS. F. Grande Covian, J. C. de Oya, and C. Jimenez Diaz. *Bull. Inst. Med. Research, University Madrid* **2**, 53-5 (1949).

The results of experiments in which dogs were partially pancreatectomized (70-80%) and were observed for the incidence of diabetes are described. It was shown that diabetes did not occur in these dogs, blood sugar levels were normal. In dogs treated similarly, but also given 3 mg/kg of uranium nitrate parenterally after the pancreatectomy, no incidence of diabetes was demonstrated. NSA 3-2044

10396

Univ. of Chicago Toxicity Lab.

EFFECT OF VITAMIN B_{12} ON X-RAY TOXICITY TO MICE. VITAMIN B_{12} AFFORDED NO PROTECTION FROM X-RAY. Quarterly Progress Report No. 4 on Radiobiology. R. N. Feinstein and Daniel D. Hendley. 1950. 70p. (TID-364)

10397

RADIOACTIVITY DISTRIBUTION IN THE TISSUES OF MICE BEARING MELANOSARCOMA AFTER ADMINISTRATION OF DL-TYROSINE LABELED WITH RADIOACTIVE CARBON. James C. Reid and Hardin B. Jones. *Journal of Biological Chemistry* **174**, 427-437 (1948) June. (See also MDDC-1404)

The synthesis of DL-tyrosine labeled with C^{14} in the β -position. The distribution of radioactivity following intravenous administration of DL-radiotyrosine to mice bearing melanoma has been investigated. At 72 hours, about 30 per cent of the administered dose has appeared in the breath, about 40 per cent in the urine and feces, with 30 per cent remaining in the body. Radioactivity is found in every tissue of the body. The adrenals, thyroids, intestines, kidneys, liver, plasma, spleen, and tumor show the highest specific activities. Erythrocytes

are lowest, with bone next. In this species, the total activity in the body diminishes by half during the 60 hour period between the 12th and 72nd hour after administration of radiotyrosine. NSA 1-252

10398

CONCERNING THE MAMMARY EXCRETION OF RADIOACTIVE IODINE AFTER THE ADMINISTRATION OF LABELED IODIDES OR IODOCASEIN. R. Courrier, J. Roche, G. H. Deltour, M. Marois, R. Michel, and F. Morel. *Compt. rend. soc. biol.* **144**, 599-601 (1949) May. (In French).

Lactating rabbits were injected intraperitoneally with iodocasein and potassium iodide labeled with I^{131} and the method of iodine fixation in the breast-fed young was studied. The breast milk transmitted a minimal fraction of the labeled iodine derived from the iodide to the young, iodocasein provided an even smaller amount of traceable substance. It was determined that the thyroid gland of the breast-fed animal fixed the iodine received into the iodide form NSA 3 1801

10399

EFFECTS OF FEEDING URANIUM NITRATE HEXAHYDRATE IN THE DIETS OF BREEDING WHITE RATS Elliott A. Maynard, Challiss Randall, Harold C. Hodge, and James K. Scott. *J. Pharmacol. Exptl. Therap.* **95**, 421-8 (1949) Apr.

Two groups of 50 pairs of rats each were maintained for 7 months on a control diet and on a diet containing 2% of uranium nitrate hexahydrate, respectively. The growth rate of both male and female rats receiving the 2% uranium nitrate hexahydrate diet was notably depressed. An increased growth rate, insufficient to compensate entirely for the previous loss, occurred when the experimental rats were placed on the control diet 7 months after the start of the experiment. Uranium feeding sharply reduced the number of female rats having litters. In addition, the experimental rats had fewer young per litter. When the experimental rats were replaced on the stock diet the females having litters were more productive than the control rats. Females which failed to have litters on the experimental diet did not have litters later on the stock diet. Rats fed 2% uranium nitrate hexahydrate exhibited a slightly greater mortality during the 12-month period, 17% to 10% for the controls. Uranium nitrate hexahydrate feeding produced an irregularity of the oestrus cycle since only 19 of 44 experimental female rats had regular oestrus cycles and regular mating. Uranium, except in traces, does not cross the placental barrier since very little was found in the newly-born of the experimental females upon assay. 11 references. NSA 3-213

10400

Univ. of Chicago Toxicity Lab.

EFFECT OF X-RADIATION ON INTESTINAL CATHEPSINS. NEGATIVE RESULTS IN THIS EXPERIMENT. Quarterly Progress Report No. 4 on Radiobiology. R. N. Feinstein, C. L. Butler and D. D. Hendley. 1950. 61p. (TID-364)

10401

TWO-YEAR FEEDING TEST. URANYL FLUORIDE. Elliott A. Maynard, W. L. Downs, and Harold C. Hodge. *nd. Decl. Dec. 22, 1949. 35p.* (Proposed for publication in *NNES, Div. VI, Vol. 1. Chap. 20, Sec. 5, Part 3*). (AEC-D-2776)

Groups of male rats, for the most part 25 each, were fed diets containing 0, 0.01, 0.05, 0.10, 0.15, 0.25, and 0.50% of uranyl fluoride for two years. Groups of female rats, 15 to 25 per group, were fed diets containing 0, 0.01, 0.05, 0.25, and 0.50% uranyl fluoride for a period of two years. In the male rats and in the female rats the 0.05% diet did not depress body weight. In the male rats 0.1% uranyl fluoride was the lowest dietary percentage producing weight depression. Diets containing 0.15%

consistently depressed the body weights of male rats, and diets containing 0.25% produced depressed body weights in both male and female rats. The addition of 0.25% of uranyl fluoride shortened the life span of the male rat but not that of the female. The addition of 0.05% was without effect on the life span. Hematological observations showed a trend for red blood cell counts and hemoglobin values to be depressed in male rats with increasing percentages of uranyl fluoride. A tendency toward higher white blood cell counts in the rats on the higher doses of uranyl fluoride was also found. Urine analyses for sugar and protein was surprisingly free from evidence of a positive response to the administration of such amounts of uranium. Uranium content of the kidneys and of the femurs increased with increasing percentages of uranyl fluoride in the diets. The fluoride content of bones and teeth increased with increasing concentration of uranyl fluoride in the diet. Based on the amounts of uranium and amounts of fluoride found in the bone, it is probable that about 5000 times as much fluoride is absorbed as uranium. As a result of histological examinations, the addition of 0.10% or lower percentages of uranyl fluoride was described as producing no evidence of injury. Adding 0.15% produced minimal and inconsistent renal tubular changes, this level may be considered as the lowest producing just detectable change. Testicular atrophy was also described. There is no evidence that the frequency of spontaneous disease was affected by adding uranyl fluoride to the diets. (auth) NSA 4-1914

10402

INFLUENCE OF RADIUM EMANATION ON MONOSODIUM URATE IN THE ORGANISM. Leo Fofanow. Z. Klin. Med. 71, 322-37(1911). (In German)

Radium reduces the inflammation surrounding tophi and lowers the WBC count. Monosodium urate subjected to radium radiation becomes more easily soluble in the organism. CA 5-3080

10403

THE DISTRIBUTION OF RADIOMERCURY OF A MERCURIAL DIURETIC IN SOME OF THE BODY FLUIDS OF MAN. C. T. Ray, G. E. Burch, S. A. Threefoot, and F. J. Kelly. Am. J. Med. Sci. 220, 160-5(1950) Aug. (See also NSA 2-68)

The distribution of radio-mercury ($\text{Hg}^{203, 205}$) in edema fluid, ascitic fluid, pleural fluid, bile, saliva, gastric juice, cerebrospinal fluid, sweat, and erythrocytes following intravenous administration of a single dose of a mercurial diuretic is described. No measurable quantities entered the cerebrospinal fluid, sweat, gastric juice and erythrocytes, and only low concentrations were reached in the saliva, edema, peritoneal and pleural fluids. Relatively high concentrations were attained in the bile. (auth) NSA 4-5599

10404

Division of Biology and Medicine. Civil Defense Liaison Branch, AEC.

PLUTONIUM HAZARDS CREATED BY ACCIDENTAL OR EXPERIMENTAL DETONATION OF ATOMIC WEAPONS R. L. Corsbie. Based on work done by W. H. Langham, P. S. Harris, and T. L. Shipman, Los Alamos Scientific Lab, May 1956. 5p. (AECU-3258)

Hazards from Pu resulting from atomic explosions are discussed. Protective measures and decontamination procedures are outlined. (C. H.) NSA 10-5472

10405

ONE-YEAR FEEDING EXPERIMENTS ON DOGS. Elliott A. Maynard and Harold C. Hodge (nd). Decl. Dec. 22, 1949. 38p. (AECD-2778)

A total of 30 dogs were fed various daily doses of five uranium compounds, i. e., UO_3 , UF_4 , $\text{UO}_2(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$, UCl_4 , and UO_2F_2 at levels that were tolerated for

a period of one year. Sixteen control dogs were also studied. The daily dosage levels ranged from 0.0002 g/kg body weight of the soluble UO_2F_2 to 10 g/kg body weight of the insoluble UO_3 . At the end of the one-year feeding period the only dogs in which an adverse effect on growth was noted were those which received uranyl nitrate at a daily dosage of 0.2 g/kg body weight. A questionable effect was noted when UF_4 was fed daily at a level of 5 g/kg. When blood NPN (nonprotein nitrogen) and urea nitrogen values were used as criteria of toxicity it was apparent that in most of the dogs studied there was not produced a marked acute uranium poisoning. Some scattered abnormal urinary protein and sugar values were found. This was particularly noticeable in the dogs fed UCl_4 at a daily level of 0.05 g/kg body weight. Most of the recorded values did not deviate greatly from normal values. Histological studies disclosed that renal cortical tubular changes are the principal pathological effects of feeding uranium compounds to dogs. No marked abnormalities occurred in the hematological picture when observations were made on red cell counts, white cell counts, hemoglobin, and differential white cell counts at various intervals during the one-year feeding period. A limited number of uranium analyses were made of tissues from dogs fed uranyl nitrate hexahydrate and UCl_4 . The highest liver value reported was 2 $\mu\text{g/g}$ for a dog fed 0.05 g/kg. Kidney values mostly ranged below 1 $\mu\text{g/g}$. Bone values ranged from 1 to 5 $\mu\text{g/g}$. When blood fluoride determinations were made on the dogs which received daily doses of UF_4 for a period of 1 year it was evident that the dependence of the blood fluoride level on dietary intake of fluorine is essentially a linear function. Analyses of bone and tooth samples from these same dogs also demonstrated that the dependence of bone and tooth content of fluorine on the amount of fluorine ingested is nearly linear. NSA 4-1916

10406

STUDIES OF BONE METABOLISM. I. COMPARISON OF THE METABOLISM OF STRONTIUM⁹⁰ IN LIVING AND DEAD BONE. Robert D. Ray, Duane La Violette, Harold D. Buckley, and Roscoe S. Mosiman (Univ. of Washington School of Medicine, Seattle). J. Bone and Joint Surg. 37A, 143-55(1955) Jan. NSA 10-9110

10407

BONE METABOLISM. III. THE EFFECTS OF VARIOUS DIETS ON THE MOBILIZATION OF STRONTIUM FROM THE RAT SKELETON. Robert D. Ray, Dorothy E. Stedman, and Norvelle K. Wolff (Univ. of Washington School of Medicine, Seattle). J. Bone and Joint Surg. 38A, 637-54(1956) June.

A study has been carried out to determine the effect of various diets on body growth, histological structure of bone, and chemical composition and mobilization of Sr from the skeletons of young growing rats. Animals having from 5 to 6% of the mineral portion of their skeletons as Sr were maintained on a standard laboratory diet, a low-protein diet, a high-calcium and high-vitamin-D diet, a subminimal-phosphorus diet, a cereal rachitogenic diet, a cereal rachitogenic diet containing ammonium chloride, and a low-phosphorus diet. The low-phosphorus diet had the most profound effect on Sr mobilization and skeletal mineralization, while the standard diet and the low-protein diet has the least effect. (auth) NSA 10-9915

10408

TWO-YEAR FEEDING TEST. URANYL NITRATE HEXAHYDRATE. Elliott A. Maynard, W. L. Downs, and Harold C. Hodge. nd. Decl. Dec. 22, 1949. 30p. (Proposed for publications in NNS, Div. VI, Vol. 1, Chap. 20, Sec. 5, Part 4.) (AECD-2777)

Groups of 15 to 25 male and female rats were fed diets containing 0, 0.01, 0.05, 0.1, 0.5, 1.0, and 2.0% uranyl

nitrate hexahydrate for a period of two years. For the male rats, diets containing up to 0.05% uranyl nitrate hexahydrate produced no detectable depression in weight, female rats tolerated a diet containing 0.10% without effect on growth. The lowest percentage in the diet associated with detectable growth depression was 0.1 for the male rats, and 0.5 for the female rats. Even 2% of uranyl nitrate hexahydrate did not lessen the life span over a two-year period. The hematological observations were essentially negative for the male rats, but revealed a tendency for an anemia and a low-grade increase in white blood cell counts for the female rats fed the 1.0% and the 2.0% diets. Urine analyses for sugar and protein gave no evidence of a chronic or continuing uranium effect. On the contrary, there was an apparent trend toward a lessened positive response with increasing amounts of uranyl nitrate in the second year. Uranium contents of the kidneys and femurs of the rats increased with increasing uranium in the diet. On the basis of detailed histopathological examinations, the kidney has been found to be the only organ exhibiting significant changes. There was a clear-cut dependence of the degree of injury on the dosage. No histological change identified as uranium poisoning was found in the kidneys of rats fed the 0.01, 0.05, and 0.1% diets. The kidneys of the rats fed the 0.5% diets exhibited subtle, borderline changes, this percentage may be identified as a + or - zone of minimal response. In the rats fed the 1 and 2% diets the changes were typical and consistent. A number of male rats showed degenerative changes in the testes. The common pathological findings were seen, there was no evidence of a relation between the frequency of spontaneous disease and the feeding of uranyl nitrate hexahydrate in the diet. Evidence of tolerance to acute uranium poisoning was found in rats that had been ingesting diets containing uranyl nitrate for two years.

(auth) NSA 4-1915

10409

TWO-YEAR FEEDING TEST. URANIUM DIOXIDE. Elliott A. Maynard, W. L. Downs, and Harold C. Hodge. nd. Decl. Dec. 22, 1949. 21p. (Proposed for publication in NNES, Div. VI, Vol. 1, Chap. 20, Sec. 5, Part 1). (AECD-2774)

Groups of 50 male and 50 female rats were fed diets containing 0, 0.5, 2.0, and 20% UO_2 for a period of two years. There was no evidence of a depression of body weight in any of the groups. The mortality for each group compared favorably with the mortalities observed in control rats. There was no indication of a shortening of life span. Results of hematological observations were uniformly negative. Uranium analyses for sugar and for protein were essentially negative. Pathological examinations showed none of the changes characteristic of uranium poisoning. The usual scattering of incidental pathological changes was noted. The uranium content of the kidneys did not increase as the percentage of UO_2 increased in the diets. The uranium content of the femurs increased slightly with increase in UO_2 content of the diets. (auth)

NSA 4-1912

10410

University of California Radiation Laboratory
MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT,
JANUARY, FEBRUARY, AND MARCH, 1950. May 2,
1950. Decl. Aug. 23, 1950. 105p. (AECD-2901)

Metabolic Properties of Plutonium and Allied Materials. The localization of Ca^{45} , Sr^{90} , Pm^{147} , Am, and Pu in the skeletal tissue of rats has been investigated by radioautography of the costochondral junction. Photographs and radioautographs of histological sections through the junction are presented. The distribution of tracer Ca and Sr coincides exactly with that of bone salt and of Ca deposited in cartilage. None of the other three elements

examined were localized in this pattern. The evidence for Pm indicates that it is deposited both at calcified surfaces and in potentially osteogenetic tissues found free from any osseous component. It is also found in spotty deposits in the vascular or perivascular regions within bone. Americium is similar to Pm except for the absence of the spotty distribution. Plutonium is demonstrated only with difficulty in any cartilaginous tissue, whether perichondrium, noncalcified, or calcified cartilage. Nevertheless, the possibility of demonstrating it 1 hr after injection suggests that there is a transitory localization adjacent to calcium salts. Its main localization is limited to the bony part of the rib, where its clear occurrence on both aspects of the bone (inner and outer) and its presence in the periosteal extension beyond bone proper suggest that it localizes mainly in actively osteogenetic tissues. Tracer Studies on the Metabolism of the Fission Products. The metabolic fate of Ta^{182} has been studied in rats following intravenous and intramuscular administration as a citrate complex and as uncomplexed Ta salts. The metabolism of inhaled Ta aerosols formed by burning Ta metal containing Ta^{182} in an electric arc is also reported. Studies have been carried out on the organic binding of astatine to the thyroglobulin protein by the thyroid of rats and on the red cell/plasma At-concentration ratio. The Mechanism of Skeletal Deposition of Radioactive Strontium in Young, Adult, and Rachitic Rats. Young rachitic rats show the same rapid initial uptake of $\text{Sr}^{89,90}$ as do young normal animals, and the maximum uptake is as great, but this radiostrontium does not remain fixed in the skeleton and is lost rather rapidly. Less than $\frac{1}{2}$ of the dose present at 1 hr remains at the end of 24 hr. The rapid initial uptake may be associated with the potential bone growth and large amount of osteoid matrix present in these animals. The failure of the radiostrontium to remain fixed in the skeleton may be a result of the low phosphate level and failure of actual new bone-salt deposition in the rachitic rats. The rapid removal of radiostrontium in these rachitic animals suggests the possibility of important decontamination of radiostrontium deposited in the skeleton if similar conditions can be reproduced in normal animals. Role of Alkaline Phosphatase in Bone Metabolism, Inhibitory Effect of Phosphate in Vivo. The intraperitoneal injection of inorganic phosphate, even in low concentrations, into young rats lowers the blood phosphatase level. Effect of Zirconium Citrate on the Distribution and Excretion of Nb^{95} in Rats. The value of massive doses of Zr citrate as a decontaminant for Nb^{95} is demonstrated. The initial rapid drop in blood Nb^{95} level and the high urinary excretion rate are maintained by the Zr citrate action. Versene Acid as a Radio-yttrium Decontaminant. Data on the effectiveness of Ca versenate (ethylenediaminetetracetate) in removing Yt already deposited in the body are presented, and the toxicity of versene acid and Ca versenate to rats is determined. Astatine²¹¹ Studies. Effects on the Thyroid Autopsies on rats following 1.2 μc to 157 μc doses of At^{211} show that At has a highly selective destructive affinity for thyroid gland tissues. Photomicrographs of the thyroid tissues are given. Hematological studies are also reported. Radiochemistry. Improved methods are given for the production of mc amounts of At^{211} and for the recovery and analysis of At in tissues. The preparation of carrier-free $\text{Re}^{183,184}$ from Ta and from W, and carrier-free Os^{185} from W is reported. The Metabolism of the Lipoproteins. Studies are being made on the metabolism of cholesterol and the serum lipoproteins in the rabbit. Preliminary results are reported on the incorporation of tritium-labeled water into tissue cholesterol and on the rate of cholesterol turnover. The lipoproteins found in the blood of labeled-cholesterol-fed rabbits have been segregated

and the specific activities of the various fractions found to be comparable. Lipoproteins labeled by giving radioactive phosphate to rabbits are found to have varying specific activities. Disappearance rates of all lipoprotein fractions injected intravenously are comparable whether the recipient is normal, cholesterol-fed-hypercholesteremic, or atherosclerotic. Blood Lipids and Human Atherosclerosis. The presence of a class of lipid and lipoprotein molecules in the serum of the human and the cholesterol-fed rabbit associated with atherosclerosis in both species has been demonstrated. These molecules do not represent any part of the acute alimentary lipemia. The presence of these cholesterol-bearing lipid and lipoprotein molecules cannot be predicted from the analytical total serum cholesterol level. Partial dietary restriction of fat and cholesterol in the human results in a gradual decrease in the serum level of such molecules over a period of weeks to months. These molecules are present with a much higher frequency and at higher concentrations in patients who have survived a myocardial infarction than in corresponding individuals without known vascular disease. The presence of these molecules with increased frequency in other diseases associated with excessive atherosclerosis (diabetes mellitus, the nephrotic syndrome, hypothyroidism, hypertension, and coronary insufficiency) supports the hypothesis of their association with atherosclerosis
NSA 4-5845

10411

Rochester. Univ., New York.
TWO-YEAR FEEDING TEST URANIUM TETRAFLUORIDE.
Elliott A. Maynard, W. L. Downs, and Harold C. Hodge.
nd. Decl. Dec. 22, 1949. 12p (Proposed for publication in *ENES*, Div. VI, Vol. 1, Chap. 20, Sec. 5, Part 2).
(AEC-2775)

Groups of 50 male and female rats were fed diets containing 0, 0.5, 2.0, and 20 per cent of UF_4 for a period of two years. Only the groups fed a 20 per cent UF_4 diet exhibited a growth depression, but even in these rats the effect was not large. There was no indication that UF_4 even up to 20 per cent of the diets decreased the life span. In the hematological observations there was little or no indication of any change ascribable to the UF_4 . Urine analyses for sugar and protein were uniformly negative. Only in the kidneys were any changes found on histological examination that could be attributed to the administration of uranium; and in this organ mild tubular degeneration with typical and atypical regeneration were described only in the rats fed the 20 per cent diets. The usual nonspecific pathological changes were also found. The uranium content of the kidneys and femurs increased somewhat with increasing the percentage of UF_4 in the diet.
NSA 4-1913

10412

Rochester. Univ., New York.
ONE-YEAR FEEDING TEST SERIAL STUDY OF URANYL NITRATE. Elliott A. Maynard, T. B. Barnett, W. F. Downs, W. F. Neuman, and Harold Hodge. (nd). Decl. Dec. 22, 1949. 55p. (AEC-2773)

Groups of male and female rats have been maintained on diets containing 0 (a control group), 0.1, 0.5, and 2.0% uranyl nitrate hexahydrate, respectively, for various periods up to one year. In a large-scale, serial sacrifice study, rats were examined at daily intervals for the first 5 days, at weekly intervals for the first month, at intervals of 2 weeks for the first 6 months, and at the 30th, 38th, and 52nd weeks. The growth was notably depressed in rats maintained on a diet containing 2% uranyl nitrate hexahydrate. The addition of 0.1% produced a negligible, if any, effect on growth. The growth rates of rats on the 0.5% diets consistently averaged slightly below those for the control rats. Mortality data are available on 125 male

and female rats, respectively, at each of the dietary levels during the first week. Data are available on 100 of each sex during the first 14 weeks, on 75 of each sex during the first 36 weeks, and 50 of each sex during the balance of the year. An abnormally-high mortality was observed in the rats on the 2% diet, in contrast, the rats on the 0.5 and 0.1% diets exhibited the same order of mortality as did the control rats. The uranium content of the kidneys increased with increasing percentages of uranyl nitrate in the diet. The uranium content of the femurs of the rats on the 0.5% diet ultimately reached values of approximately 20 μg U/g, on the 2% diet the values became as great as 200 μg U/g. Based on a number of assumptions, it has been calculated that the rat absorbs about 0.1% of the uranium from the diet. From hematological observations it was concluded that long-continued administration of uranyl nitrate hexahydrate at a dietary level of 2% was accompanied by a low-grade anemia and a tendency toward a low-grade leukocytosis. Extensive histological examinations failed to reveal any renal abnormalities in rats maintained on the diet containing 0.1% of uranyl nitrate hexahydrate. In rats fed the 0.5% diet, mild tubular necrosis occurred during the first week, followed by epithelial regeneration, so that only slight traces of injury were present at the end of the experiment. The kidneys of rats maintained on the 2% diets showed moderately severe tubular necrosis initially, followed by regeneration. In these rats, however, pathological changes developed progressively, different from the initial injury and characterized by tubular atrophy, increase in stroma, and narrowing the cortex. The only other abnormalities appearing regularly were found in the testes of the male rats on the 2% diet. The origin of these changes is obscure.
NSA 4-1911

10413

Univ. of California Radiation Lab.
RADIOCALCIUM TURNOVER AND EXCRETION IN ADULT YOUNG, AND RACHITIC RATS. D. H. Copp and D. M. Thomson. July 1951. 1p. (UCRL-1401)

The report is reproduced here in its entirety. The bone turnover and urinary excretion of radiocalcium (Ca^{45}) was studied in mature female rats, in normal young animals 2 months old, and in rats of the same age made rachitic by restricting them to a synthetic low-phosphorus diet from weaning. They were sacrificed at intervals up to 16 days following IV injection of Ca^{45} . Initial bone uptake of Ca^{45} was rapid in both groups of young animals. In the normals, it remained fixed in the skeleton, in the rachitic rats it appeared "labile," and was rapidly removed. Uptake in adult bone was slower. Urinary excretion of radiocalcium was very high in the rachitic group, and the renal clearance of Ca^{45} was 10 to 15 times as great as in young or adult normal animals. This suggests a direct effect of low-phosphorus rickets on calcium excretion by the kidney. NSA 5-5035

10414

THE BEHAVIOR OF RADIOIODINE IN THE BLOOD.
William M. McConahey, F. Raymond Keating, Jr., and Marschelle H. Power. *J. Clin. Invest.* 28, 191-8 (1949) Mar.

A study is reported of the behavior of I^{131} in blood after its oral administration, the comparison of the disappearance rates of I^{131} from the blood as determined directly and by urine sampling methods, and the appearance in the blood of organically bound I^{131} on 31 humans with various thyroid conditions. The patients received 150 cc of an aqueous solution of 100 μg of sodium iodide containing 100 μc of I^{131} . The method and controls are completely described, and a breakdown of the type of dose (therapeutic or tracer) and thyroid conditions of the subjects are given. Time

graphs up to 150 hr after injection are given for $I^{131}\%$ of dose per liter of serum, and a table of urine excretion is also included in the report. The results are extensively discussed, with special considerations of the inadequacy of the method used for making quantitative conclusions. The authors believe that the data indicate that the rate of disappearance of radioiodine from the blood reflects variations in thyroidal function, and the two methods of determining the rate of disappearance of radioiodine from blood do not give significantly different results. 15 references. NSA 4-3651

10415

Northwestern Univ. Medical School

INTRAPROSTATIC INJECTION OF RADIOACTIVE COLLOIDS. I. DISTRIBUTION AND EXCRETION FOLLOWING INJECTION IN THE DOG. John A. D. Cooper, George J. Bulkley, and Vincent J. O'Conor. nd. 7p. (AECU-2609)

Excretion and distribution of chromic phosphate containing P^{32} and colloidal gold (Au^{198}) after intraprostatic injection in dogs are discussed. Tabulated data are given on the above. Materials and methods for performing the experiment are given. (J. A. G.) NSA 7-5287

10416

DISTRIBUTION OF COLLOIDAL RADIOACTIVE CHROMIC PHOSPHATE AFTER INTRACAVITARY ADMINISTRATION IN THE RAT. John A. Cooper and Elinor M. Zorn. J. Lab. Clin. Med. 42, 867-7(1953) Dec.

The distribution and excretion of various preparations of radioactive colloidal chromic phosphate after intracavitary administration in the rat have been studied. Colloid with particle sizes of $0.2\ \mu$ was found in large amounts in the liver after intrapleural and intraperitoneal administration. With larger particle size a smaller fraction appeared in the liver. Urinary excretion was negligible in all animals studied. (auth) NSA 5-5035

10417

ON THE ACCUMULATION OF MICROBES AND THE DESTRUCTION OF PHAGOCYTES IN FIELDS EXPOSED TO HIGH RADIATION DOSES, UNFILTERED RADIATION. Antoine Lacassagne. C. R. Soc. Biol. 84, 861(1921). (In French).

β and γ radium irradiation of muscle by "radio-puncture" produces a zone of total degeneration, a secondary zone of congestion, edema and leukocyte infiltration, and a zone of healthy muscle. In first zone, author observed staphylococcal infection when sterile precautions were not used, showing tissues are more sensitive than are the microorganisms.

10418

VARIATIONS IN THE QUANTITY OF RADIUM EMANATION IN THE ATMOSPHERE. I. Grabley. Z. Klin. Med. 71, 338-43(1910). (In German).

Variations in atmospheric levels of Ra emanation are responsible for the nervous symptoms displayed by most persons preceding a storm. CA 5-3080

10419

INFLUENCE OF IONIZING RADIATION ON THE APPEARANCE IN THE SERUM OF RABBITS OF HUMORAL FACTORS SLOWING DOWN CELL DIVISION. J. Muller (Inst. of Industrial Hygiene and Occupational Diseases, Prague). Nature 178, 43-4(1956) July 7. NSA 10-9947

10420

THE INFLUENCE OF CHELATION ON RADIOMANGANESE EXCRETION IN MAN AND MOUSE. Lawrence S. Maynard and Sidney Fink (Brookhaven National Lab., Upton, N. Y. and Montefiore Hospital, New York). J. Clin. Invest. 35, 831-6(1956). NSA 10-11029

10421

THE ANEMIA OF INFECTION. XII. THE EFFECT OF TURPENTINE AND COLLOIDAL THORIUM DIOXIDE ON THE PLASMA IRON AND PLASMA COPPER OF DOGS.

George E. Cartwright, Clark J. Gubler, and Maxwell M. Wintrobe. J. Biol. Chem. 184, 579-87(1950) June.

The intramuscular injection of 5 ml of turpentine into each of 10 dogs resulted in an average decrease in plasma iron of 77 per cent within 24-48 hr. The intravenous injection of a single dose of colloidal thorium dioxide (2 ml/kg of body weight) into each of 13 dogs resulted in an average decrease in plasma iron of 29 per cent in 24 hr. The administration of three consecutive daily intravenous injections of colloidal thorium dioxide into each of 9 dogs resulted in an average increase in the plasma iron of 446 per cent within 3 to 7 days. The intramuscular injection of 5 ml of turpentine into each of 5 dogs previously given three consecutive daily intravenous injections of colloidal thorium dioxide resulted in an average decrease in plasma iron of only 18 per cent. These studies suggested, to the authors, the possibility that the hypoferrremia which follows the intramuscular injection of turpentine is the result of increased activity of the reticulo-endothelial system. 18 references. NSA 4-4515

10422

DELAYED EFFECTS OCCURRING WITHIN THE FIRST DECADE AFTER EXPOSURE OF YOUNG INDIVIDUALS TO THE HIROSHIMA ATOMIC BOMB. Robert W. Miller. (Atomic Bomb Casualty Commission, San Francisco) Pediatrics 18, 1-18(1956). NSA 10-36

10423

LEUKEMOGENIC EFFECTS OF IONIZING RADIATION ON ATOMIC BOMB SURVIVORS IN HIROSHIMA CITY William C. Moloney and Marvin A. Kastenbaum (Atomic Bomb Casualty Commission, Hiroshima, Japan). Science 121, 308-9(1955) Feb. 25.

Classification of survivors of the atomic bomb explosion in Hiroshima according to distance from the hypocenter and degree of irradiation permitted statistical confirmation of the suspected high incidence of leukemia among the survivors. (C. H.) NSA 9-2586

10424

SOIL-PLANT-ANIMAL RELATIONSHIPS OF FISSION PRODUCTS CONFERENCE, JULY 21-23, 1955. PAPER 15. SUMMARY OF LEADING POINTS A. C. Chamberlain. (Gt. Brit. Atomic Energy Research Establishment, Harwell, Berks, England). July 1955. 3p. (AERE-SPAR-15)

Data presented at this conference on fission product metabolism by plants and animals are briefly summarized. (C. H.) NSA 10-4503

10425

PERMEABILITY OF NORMAL AND ARTIFICIALLY CONSTRUCTED CANINE URINARY BLADDERS TO I^{131} , Na^{22} , AND P^{32} . Horace D. Marucci, William C. Shoemaker, Arthur W. Wase, Herbert D. Strauss, and Samuel V. Geyer (Hahnemann Medical College and Hospital of Philadelphia, Penna.). Proc. Soc. Exptl. Biol. Med. 87, 569-71(1954) Dec.

A method for determining ion transportation through the mucosa of the urinary bladder is described. This method has been used on normal and artificially constructed bladders in dogs. Rapid and continuous absorption of iodide, sodium, and phosphorus ions takes place through the mucous membrane lined bladders, while only minimal amounts of these ions are absorbed through the normal bladder and through bladders constructed by means of seromuscular grafts. (auth) NSA 9-1732

10426

TOXICITY OF RADIOIODINE AND RADIOPHOSPHORUS IN RATS IN DOSES COMPARABLE TO THOSE USED CLINICALLY. Campbell Moses, Joseph B. Boatman, Robert S. George, and Agatha M. DeLacio. Proc. Soc. Exptl. Biol. Med. 79, 343-4(1952) Mar.

Radioactive phosphorus (P^{32}) was administered by intubation to young male rats in doses equivalent to 4.6 mc, 7.0 mc and 11.6 mc for a 70 kg man. Similar radioiodine doses of I^{131} equivalent to 14.0 mc, 42, and 420 mc were given. All animals were sacrificed 6 weeks after dosing. Except for a significant decrease in the testes/body weight ratio and a moderate lymphopenia at the time of autopsy no growth curve, organ weight or histologic evidence of damage was discerned in the animals receiving P^{32} . Although no changes in weight gain or histologic evidence of organ damage was observed following the administration of I^{131} , some variations in organ weight/body weight ratio were recorded. In the doses here employed, which were comparable to those used clinically no evidence of serious radiation damage was recorded. (auth) NSA 6-3939

10427

UPTAKE OF RADIOACTIVE IODINE IN THE THYROID OF PATIENTS WITH IMPAIRED LIVER FUNCTION. Richard Mueller, Charles C. Brausch, Eugene Z. Hirsch, Richard S. Benua, and Brown M. Dobyns (Western Reserve Univ. School of Medicine, Cleveland, Ohio). *J. Clin. Endocrinol and Metabolism* 14, 1287-99(1954) Nov.

The I^{131} thyroidal uptake was 50 per cent or higher in 20 out of 50 patients with liver disease but no evidence of thyroid disease. Among the patients with liver disease, elevated I^{131} thyroidal uptakes were associated most frequently with spider angiomas, jaundice, and microscopic evidence of severe cellular damage of the liver. No correlation could be established between elevated I^{131} thyroid uptakes and either the presence of ascites or the results of any single test for liver function. In spite of the elevated I^{131} uptakes by the thyroid in some patients with liver disease, there was no evidence for increased production of thyroid hormone, either by clinical findings or by laboratory determinations of the basal metabolic rate, the serum protein-bound iodine level, or the height of thyroid cells. Although abnormal kidney function may be present in patients with cirrhosis, the normal urinary excretion of radioiodine found in sample patients in this series indicated that renal disturbance at the time of the tests was not the cause of the elevated I^{131} thyroidal uptakes. (auth) NSA 9-499

10428

STUDIES OF THE KINETICS OF POTASSIUM EXCHANGE BETWEEN CELLS AND PLASMA OF CANINE BLOOD IN VITRO USING K^{42} . C. W. Sheppard and W. R. Martin. Aug. 12, 1948, decl. Aug. 26, 1948. 23p. From oral presentation before a meeting of the Society of General Physiologists to be held at Woods Hole, Massachusetts, September 8-10, 1948. (AECD-2249)

Freshly-drawn heparinized canine whole blood is equilibrated in vitro (paraffin lined vessels) at 38.1°C with a normal pulmonary atmosphere saturated with water vapor. It is then tagged by mixing with a small amount of plasma containing dextrose and radioactive KCl. The potassium content of the resulting plasma is thus raised by not more than 3% of the normal and the blood sugar to about 400 mg%. By this procedure cells are maintained in a healthy state for periods up to 10 hours as shown by minimal hemolysis, nearly constant hematocrit and minimal potassium leakage. In whole blood the activity of the plasma decreases initially at a rapid rate which is correlated with the appearance of activity in the cells (red cells, white cells, and platelets). The initial decrease follows an exponential curve to an elevated base line, half of this change being complete in about 50 minutes. However, if the white cells and platelets are previously removed by repeated differential centrifugation, the behavior is different. The plasma activity declines very slowly, at the rate of about 1% per hour. The initial

rapid decrease in plasma activity for whole blood is attributed to a rapid exchange of potassium in the fraction containing the white cells and platelets. A typical value for the amount of this easily exchangeable potassium is about 30% of the total potassium in the plasma. It is evident that studies of potassium exchange of erythrocytes must give equivocal results unless the white cells and platelets are removed in advance or otherwise taken into account. 10 references. NSA 1-1212

10429

RAPID PRODUCTION OF ATHEROSCLEROSIS BY ADMINISTRATION OF URANIUM IN PRESENCE OF HYPERCHOLESTEROLEMIA. Campbell Moses and Grace M. Longabaugh. *Proc. Soc. Exptl. Biol. Med.* 74, 92-3 (1950) May.

Rabbits were fed doses of cholesterol to produce a condition of hypercholesterolemia after which uranium acetate was administered subcutaneously to cause kidney damage. Two to 14 days after the administration of the uranium acetate the animals were sacrificed and the aorta was examined microscopically. In almost all cases atherosclerosis was very marked. NSA 4-4510

10430

Rochester, N. Y. Univ. Atomic Energy Project THE EARLY FATE OF POLONIUM²¹⁰ IN CATS. I. GASTROINTESTINAL ADMINISTRATION STUDIES II INTRAVENOUS ADMINISTRATION STUDIES. P. E. Morrow, Frank A. Smith, R. J. Della Rosa, Louis J. Casaretti, and J. N. Stannard. May 7, 1955. 25p. Contract W-7401-eng-49. (UR-396)

The absorption, distribution and excretion of polonium²¹⁰ citrate and neutralized polonium²¹⁰ chloride from isolated *in vivo* stomach pouches and intestinal segments and following intravenous administration to cats have been studied up to twelve hours. The experiments were designed to differentiate some of the effects of varying the dose, form, and absorption site of polonium by the use of tissue analyses, serial blood, bile, and uranium analyses, and autoradiography. Significant absorption of polonium from the cat stomach occurs irrespective of the chemical form of polonium administered. The rate of absorption of ionic polonium from the intestine exceeds that for polonium colloid by a factor of ten. In the dose range, 3-18 μ c polonium per kilogram cat body weight, the rate of polonium absorption from the stomach and the intestine is proportional to the dose. Quantitative differences in the polonium distribution among organs and in the urinary excretion are primarily related to the site of administration. In addition, autoradiography of the tissues indicates that the cellular location of polonium varies only quantitatively. The urinary excretion data confirm the view that the excretion of polonium is maximal after absorption from the gastrointestinal tract. The renal clearance of polonium varies between 0.005 and 0.03 ml of whole blood per minute according to the form and site of the administered polonium. (auth) NSA 9-5874

10431

ISOTOPIC STUDIES OF POTASSIUM EXCHANGE RATES BETWEEN CELLULAR ELEMENTS AND PLASMA OF HUMAN AND CANINE BLOOD IN VITRO. C. W. Sheppard and W. R. Martin. nd. Decl. Jan. 5, 1949. 1p. See also AECD-2249. (AECD-2453)

This document is an abstract, it is reproduced below in its entirety. Fresh heparinized blood is maintained in an apparently viable state for eight to ten hours *in vitro*. Hemolysis is generally at, or below, the lower limit of visual detection. Hematocrits are routinely determined and lie within 2 1/2 per cent of the mean. There is some evidence of occasional systematic increases of potassium concentration in the plasma late in the experiments, the total change being about 15 per cent. In human blood the

concentration of isotope K^{42} in the plasma decreases fairly rapidly. Equal specific activities of cells and plasma are reached at about 18 hours. The curve is a smooth exponential with a single half value time corresponding to an exchange rate of about 10^{-13} millimol of potassium per hour per cell. In the dog, the curve shows an initial rapid exponential decline to an elevated base line, which slowly declines at about one per cent per hour. Removal of a fraction of the cells containing leukocytes, platelets and probably young erythrocytes, eliminates the rapid exponential phase. The slow decline is evidently characteristic of the exchange of potassium in mature canine erythrocytes, the rate being about 4×10^{-15} per hour cell. NSA 2-1018

10432

Imperial Chemical Industries, Ltd., Widnes, England
TOXICITY OF URANIUM IN INDUSTRIAL PROCESSES.
J. S. Mitchell and A. Thelwall Jones. Sept. 11, 1945. 3p.
(BR-644A). NSA 5-6998

10433

THE METABOLISM OF Ac^{227} AND ITS DAUGHTERS Th^{227} AND Ra^{223} BY RATS. J. E. Campbell, E. S. Robajdek, and D. S. Anthony (Mound Laboratory, Miamisburg, Ohio).
Radiation Research 4, 294-302(1956) April. NSA 10-7457

10434

TREATMENT OF DISEASES OF THE BLOOD. G. Lovell Gullend. Brit. Med. J. 2, 271(1921).

Author stresses importance of determining right doses and the need for more information about whether to use single or fractionated doses and so forth. The various clinical entities considered vary in radiosensitivity.

10435

STUDIES IN PERCUTANEOUS ABSORPTION OF RADIO-
IODINE. Otis B. Miller and W. A. Selle. J. Investigative
Dermatol. 12, 19-29(1949) Jan.

Methods demonstrating absorption of iodine from the skin with the use of I^{131} (aqueous sodium iodide) are presented. Studies on human subjects indicate that iodine applied to the skin remains in the skin for several days, gradually disappearing either by absorption or by evaporation and other surface loss. The application of radioiodine to the skin of a pregnant animal results in marked concentration of the iodine not only in the thyroid gland but also in the gastric fluid of the fetus; approximately 70 per cent of all the iodine present in the fetus is recoverable from the stomach. The distribution of radioactive iodine in various organs of the rabbit and guinea pig following percutaneous absorption is shown in a table. NSA 2-1298

10436

PRELIMINARY REPORT ON THE CHEMICAL USE OF
RADIOACTIVE IODINE (I^{131}). Earl R. Miller, Mayo H. Soley and Morris E. Dailey. Am. J. Roentgenol.
Radium Therapy 60, 45-50(1948) July.

This study was made to determine if possible the uptake of radioiodine in microcuries in the human thyroid in situ after oral administration of I^{131} . Patients with Graves' disease and thyroiditis were given iodine solution calibrated in microcuries per centimeter in 50 cc of water. Measurements were made during the following two days and then at one- or two-week intervals to the end of a month when the patients were clinically re-evaluated. A Geiger counter, with a lead shield to permit recording of harder radiation only, was used vertically 29 to 53 cm from the patient's thyroid for determining the number of microcuries in the thyroid. Readings were also taken over the thigh just above the knee. They were subtracted from the readings taken over the neck and thyroid to give the readings of the iodine in the thyroid only. Doses of I^{131} varied from 800 microcuries in a single dose to 250 microcuries per week for six weeks. Composite curves of the

results on metabolic rate and the protein-bound iodine show a fall at first, but this is soon followed by a return to normal. The amounts of iodine used were too small to be effective. NSA 1-847

10437

MOBILIZATION OF RADIOACTIVE SODIUM FROM THE
GASTROCNEMIUS MUSCLE OF THE DOG. Peter W. Stone and William B. Miller, Jr. Proc. Soc. Exptl. Biol. Med. 71, 529-34(1949) Aug.

The study reported here involve the use of radioactive sodium on dogs (1) to determine the role of the lymphatics in the mobilization and removal of intramuscularly injected radioactive sodium, and (2) as a means of qualitatively estimating the radioactive sodium in the blood draining from the injection site. In the lymphatic experiments a 0.1-0.2 cc solution of sodium chloride containing 5-20 μ c of Na^{24} was injected into one of the gastrocnemius muscles, dogs were injected with a saline solution containing 7-17 μ c in the capillary and venous system experiments. A determination of the sodium content of the thoracic duct indicated that the lymphatic system of the dog's hind extremity does not play a significant role in the mobilization of intramuscularly injected sodium, nor does the radioactive material diffuse along intramuscular planes beyond the region of the injection. A study of the collected blood and the Geiger counter readings from the injection site indicated that sodium can be quantitatively recovered from the femoral vein blood if the collateral venous system of the upper thigh is occluded, the rate of removal of the Na^{24} measured external to the injection site was the same as that determined directly from the blood draining from the muscle.

NSA 3-2063

10438

CARCINOGENIC EFFECTS OF RADIATION. Austin M. Brues. "Advances in Biological and Medical Physics." Vol. 2. New York, Academic Press, Inc. 1951.

10439

STUDIES ON THE VERY EARLY DISTRIBUTION OF
 ^{45}Ca IN THE TISSUES AND SKELETON OF THE MOUSE.
K. Dawson, E. O. Field, J. E. Gibbs, and M. M. Gwyther (Royal Cancer Hospital, London). 14p.
(A/CONF.15/P/93)

The distribution of calcium-45 in the body at short intervals after intravenous injection was investigated in mice by the low-temperature autoradiographic technique. To correct for effects due to different degrees of vascularization, a control series of mice was given sulfur-35 labeled thiosulfate. Although calcium and thiosulfate ions in general behave very similarly in their extra-skeletal distribution, the higher renal clearance rate of thiosulfate resulted in a relatively higher concentration of this material in the kidney. The rate of exchange with skeletal calcium was consistent with rates deduced from analyses of plasma clearance curves for a rapidly exchangeable bone fraction. (auth) NSA 13-6063

10440

ENDOCRINE INFLUENCES UPON THE UPTAKE OF
COLLOIDAL THORIUM BY THE RETICULOENDOTHELIAL
SYSTEM. Sherwood M. Richard, Abraham Edelmann, and Albert S. Gordon (New York Univ. and Brookhaven National Lab., Upton, N. Y.). J. Lab. Clin. Med. 48, 431-41(1956) Sept. NSA 10-11025

10441

UPTAKE OF RADIOACTIVE IODINE BY THE THYROIDS
OF UNDERFED RATS. Joseph Meites and L. F. Wolterink. Science 111, 175-6(1950) Feb. 17.

The uptake of I^{131} by the thyroids of starved rats was compared with the uptake noted in control animals in order to determine whether thyroid activity in rats remains unchanged during starvation, when computed on a body-

weight basis. Fifty young female rats of the Sherman strain were divided into five groups of ten each and were fed ad libitum, 3/4, 1/2, 1/4, and no-feed regimens; the unfed group was sacrificed at the end of 7 days and the other groups at the end of 14 days, 8 hr previous to sacrifice, each rat was injected intraperitoneally with 0.2 ml of carrier-free ^{131}I (estimated to contain approximately $2\text{ }\mu\text{C}$). The thyroids were removed, weighed, dried, and counted and it was found that the weights of the thyroids of the underfed rats were decreased but remained relatively unchanged on the basis of 100 g/body weight . Underfeeding also did not affect the ability of thyroid tissue/ μg to concentrate the radioiodine, counts being similar for all the groups. It is concluded that the primary effect of underfeeding was that it did tend, however, to reduce the total thyroid activity. NSA 4-2264

10442

THE METABOLIC FATE OF SYNTHETIC METAPHOSPHATES AND THEIR INFLUENCE ON URANIUM EXCRETION. Robert Megirian. (Atomic Energy Project, Univ. of Rochester). Sept. 17, 1953. 65p. Contract W-7405-eng-49. (UR-281)

Various polyphosphates were injected into rats simultaneously with sublethal amounts of uranyl nitrate given intraperitoneally. The cyclic polymers enhanced the excretion of U whereas the linear polymers depressed the excretion when given by the same route of administration as the uranyl nitrate. Evidence is presented to show that the polyphosphates are able to affect the excretion of U only during the first 24-hr period after the injection of the heavy metal. (auth) NSA 8-991

10443

THE EFFECT OF CERTAIN GOITROGENIC DRUGS ON THE ABSORPTION OF RADIOACTIVE IODINE BY THE THYROID GLAND. PART II. COLLECTION OF RADIOIODINE BY THYROIDS OF RATS AND CHICKS FOLLOWING A SINGLE INJECTION OF THESE AGENTS. D. A. McGinty, R. W. Rawson, R. G. Fluhrty, Mary Wilson, Charlotte Riddell, and Hilda Yee. J. Pharmacol. Exptl. Therap. 92, 246-57(1948) June.

The antithyroid action of several goitrogenic compounds was studied quantitatively by comparing the effect and duration of effect of varying doses of these agents, when injected subcutaneously, on the collection of radioiodine by the thyroids of rats and chicks. The drugs studied included thiouracil, propylthiouracil, benzylthiouracil, methylthiouracil, 5-aminothiadiazole-2-thiol (TC-68), 3-(phenylaminomethyl)-thiazolidine-2-thione (TC-105), 2-aminothiazole and potassium thiocyanate. In the rat, it was observed that propyl and benzylthiouracil were ten times as effective as thiouracil and methylthiouracil in inhibiting the natural capacity of the thyroid to collect iodine. The duration of inhibitory action of minimal effective doses of these drugs was not materially different. In all cases at least partial escape from the drug effect occurred eight hours after administration. In the cockrel, the minimal effective inhibitory doses of all compounds were greater than in the rat. Benzylthiouracil was observed to be approximately ten times more effective than thiouracil, propylthiouracil and TC-68. TC-105 aminothiazole and potassium thiocyanate had about one-half the activity of thiouracil. The duration of action of minimal effective doses was six hours. With the exception of aminothiazole, in all instances escape from the block to iodine collection was complete 24 hours after injection of the drug. Certain fundamental differences between the iodine-blocking effect and the goitrogenic action of these agents are discussed. NSA 1-711

10444

California. Univ., Berkeley. Radiation Lab.
THE METABOLISM OF THE LANTHANONS IN THE RAT.

II. TIME STUDIES OF THE TISSUE DEPOSITION OF INTRAVENOUSLY ADMINISTERED RADIOISOTOPES. Patricia W. Durbin, C. Willey Asling, Muriel E. Johnston, Joseph G. Hamilton, and Marilyn H. Williams. Nov. 8, 1955. 23p. Contract W-7405-eng-48. (UCRL-3191)

Tracer studies have been performed to study the fate of citrate-complexed high-specific-activity Ce^{144} , Eu^{154} , Tb^{160} and Tm^{170} following intravenous administration. Preliminary investigations of the mode of transport of microgram amounts of these lanthanons complexed with sodium citrate are also described. At a mole ratio of 1000:1 citrate to lanthanon, the distribution is similar to that previously found following intramuscular administration. It is postulated that following the introduction of microgram amounts of lanthanon-citrate into the blood stream, the citrate complex is destroyed and the lanthanon recomplexed by one of the plasma proteins. The distribution studies at postinjection intervals from one minute to 24 hours showed that the rate of disappearance of intravenously administered lanthanons is dependent on the rate of circulation in the target organ, the greater skeletal deposition of the heavy lanthanons are apparent as early as 1 mm after intravenous injection, both the liver and the skeleton are capable of accumulating lanthanons against a rather large concentration gradient. The urinary excretion rate of the lanthanons is dependent on the plasma level, i. e., the kidney does not seem to be able to excrete lanthanons against a concentration gradient. (auth) NSA 10-1694

10445

RADIOACTIVE SULFUR AND ITS APPLICATIONS TO BIOLOGY. Harold Tarver. "Advances in Biological and Medical Physics." Vol. 2. New York, Academic Press, Inc. 1951.

10446

PASSAGE OF SELENIUM THROUGH THE MAMMARY GLANDS OF THE WHITE RAT AND THE DISTRIBUTION OF SELENIUM IN THE MILK PROTEINS AFTER SUBCUTANEOUS INJECTION OF SODIUM SELENATE. Kenneth P. McConnell, J. Biol. Chem. 173, 653-57 (1948) April.

It has been demonstrated that after subtoxic subcutaneous injections of selenium (radioactive) as sodium selenate, selenium passes through the mammary gland into the milk of the white rat. Further, it has been found that administered inorganic selenium was converted into organoselenium in the protein fraction of milk because approximately 54 per cent of the selenium present in the milk was in the casein fraction, while smaller amounts, namely 40 and 7 per cent, were in the albumin and globulin fractions, respectively. NSA 1-383

10447

DISTRIBUTION OF SELENIUM IN SERUM PROTEINS AND RED BLOOD CELLS AFTER SUBCUTANEOUS INJECTION OF SODIUM SELENATE CONTAINING RADIOSELENIUM. Kenneth P. McConnell and Betty J. Cooper. J. Biol. Chem. 183, 459-66(1950) Apr.

Studies were made on the distribution of selenium in the blood, serum proteins, and red blood cells of the dog after subcutaneous injections of radioseelenium, Se^{75} , as sodium selenate. It was found 24 hr after the last of three injections that the whole blood activity in red blood cells for four dogs averaged 79%, while in plasma it averaged 22%, it was calculated that 2.0 to 3.9% of the selenium administered was present in the total circulating blood. The results obtained from serum protein fractionation revealed that selenium was present in albumin, globulin, euglobulin, and pseudoglobulin and that the amount of selenium in the various fractions when expressed as micrograms of selenium per gram of protein was similar, but not identical. Results from dialysis studies indicated

that there was a certain amount of selenium fixation in blood proteins which existed in a fairly stable protein-like combination. It has been shown that selenium is present in crystalline hemoglobin and hemin and in globin, the amounts of selenium in hemin, when calculated on the gram basis, are greater than in globin. (auth) NSA 4-3374

10448

SKELETAL EFFECTS OF RADIO-IODINE INDUCED THYROID DEFICIENCY IN MICE AS INFLUENCED BY SEX, AGE, AND STRAIN. Ruth Silberberg and Martin Silberberg (Snodgrass Lab. and Washington Univ. School Med., St. Louis, Mo.). *Am. J. Anat.* **95**, 263-89(1954) Sept.

In male and female mice of strains DBA and C57BL, thyroid deficiency induced by radioactive iodine, I^{131} , retarded growth and development of the tibia. The underlying histogenetic mechanisms consisted of delayed growth and ossification of the epiphyseal cartilage and of marked inhibition of resorption of cartilage and bone. These changes, in particular the inhibition of resorption, were more prominent in females than in males and more pronounced in strain DBA than in strain C57BL. The skeletal response to thyroid deficiency decreased with advancing age at the time of administration of the isotope. The possible relationship of strain and sex differences to the genetic hormonal make-up is discussed. It is suggested that the sex difference in skeletal response to thyroid deficiency induced by I^{131} are primarily due to the action of estrogenic hormone in the female and that the strain differences are related to strain differences in thyroid activity of mice of the two strains investigated. In addition, the strain differences in the skeletal response of females to the thyroid deficiency seem to be determined by the amount or relative potency of the endogenous estrogenic hormone produced. (auth) NSA 9-485

10449

Univ. of Calif., Berkeley. Radiation Lab.
MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT [FOR] OCTOBER, NOVEMBER, DECEMBER 1954. Feb. 28, 1955. 46p. Contract W-7405-eng-48. (UCRL-2881)

Results are reported from tracer studies in the rat employing either carrier-free or high-specific-activity radioisotopes of La, Pm, Gd, Tb, and Er. Data are tabulated from a series of tracer studies on the bone deposition of Ca^{45} and Sr^{90} - Y^{90} mixture in rats and monkeys. In the skeletons of rats sacrificed from 4 to 265 days after injection the Sr^{90} - Ca^{45} ratios were consistently less than unity and averaged approximately 0.65. A method is described for mounting uniform samples for radiometric analysis of α and soft- β emitters dissolved in salt solution. Propylthiouracil treatment increased the thyroidal accumulation of At^{211} in rats and the combination of this treatment with thyroxine and propylthiouracil decreased the thyroidal uptake of At^{211} . Preliminary results are discussed on the pathological effects of At^{211} on rats and monkeys. Preliminary results are reported in the *in vivo* determination of two isotopes simultaneously, human blood volume studies with Cr^{51} -labeled red cells, the relationship of age and sex to the early mixing of Na^{24} in humans, the incorporation of P^{32} into the deoxyribonucleic acid (DNA) of hypophysectomized rats, the total DNA content of livers and small intestine after whole-body x irradiation of mice, the relationship between serum lipoproteins, coronary atherosclerosis, and coronary disease, and early cardiovascular disturbances following thermal injury. (For preceding period see UCRL-2823.) (C. H.) NSA 9-3730

10450

Technical Information Service, AEC
THORIUM: A BIBLIOGRAPHY OF UNCLASSIFIED

LITERATURE. Lore R. David, comp. Nov. 1943. 124p. (TID-3044)

This annotated bibliography contains 1046 references to Th research published from 1947 to Sept. 1953. Subjects in physics, chemistry, metallurgy, biology, and geology are included. NSA 8-3182

10451

A QUANTITATIVE AUTORADIOGRAPHIC STUDY OF RADIOIODINE DISTRIBUTION AND DOSAGE IN HUMAN THYROID GLANDS. W. K. Sinclair, John D. Abbatt, Helen E. A. Farran, Eileen B. Harriss, and L. F. Lamerton (Royal Cancer Hospital, Hammersmith Hospital, and New End Hospital, London). *Brit. J. Radiol.* **29**, 36-41(1956) Jan.

Using autoradiographic techniques, a study has been made of the non-uniformity of radioactivity distribution and radiation dosage in human thyroid glands following administration of I^{131} to the patient. The ratio of the maximum to the mean radiation dose in the gland has been measured for a number of different cases and the significance of the findings is briefly discussed. (auth) NSA 10-5497

10452

OBITERATING TRACHEITIS, A COMPLICATION FOLLOWING ADMINISTRATION OF RADIOACTIVE IODINE. Ruth Silberberg, Martin Silberberg, and Frank J. Dixon, J. *Lab. Clin. Med.* **39**, 256-9(1952) Feb.

In male mice of strain Dba receiving, at the age of one month, 35 μ c of I^{131} per gram body weight, a fatal, obstructive endo- and peritracheitis were observed three to four months after beginning of the treatment. The lesion showed the typical microscopic features of radiation reaction. (auth) NSA 6-2834

10453

THE DISTRIBUTION OF RADIOACTIVE IODINE IN MICE WITH AND WITHOUT TUMOR 15091A AFTER INJECTION OF RADIOACTIVE SODIUM IODIDE. Charles D. Stevens, Mary Ann Meinken, Patricia M. Quinlin, and Paul H. Stewart. *Cancer Research* **10**, 155-6(1950) Mar.

Measurements were made of the distribution of I^{131} among the tissues of 206 mice killed either 45 min or 25 hr after injection of labeled sodium iodide in quantities varying from 0.0013 to 1.3 μ g of iodine/g of mouse. Smaller quantities of I^{131} were found in the thyroid glands of mice with implants of tumor 15091a than in the thyroids of control mice, although the concentration of I^{131} in their blood were similar. Higher concentrations of I^{131} were found in the spleens of tumor mice than in their blood on some occasions. Compared to the concentrations of I^{131} in the sera, the livers and ear pinnae of mice contain lower concentrations of I^{131} , and their thymus glands contained higher concentrations than noted in the corresponding tissues in rats. Otherwise, the distribution of the injected iodide was similar in mice and rats. NSA 4-2968

10454

THE ACTION OF RADIOACTIVE RADIATIONS ON THE FUNCTIONAL STATE OF RETINA. G. G. Demirchoglyan, G. T. Adunts, and Ts. Avakyan. p.164-9 of **WORKS OF THE ALL-UNION CONFERENCE ON MEDICAL RADIOLOGY. EXPERIMENTAL MEDICAL RADIOLOGY.** Translated from a publication of the State Publication House of Medical Literature, Moscow, 1957. (AEC-tr-3661(Bk. 1))

Data are presented on the effects of phosphorus-32 on electric characteristics of the eye retina which reflect its functional state. It is concluded that in the clinical use of phosphorus-32 and of other radioactive isotopes it is necessary to take into account the possibility of effects of even very small amounts on the retina. (C. H.)

NSA 14-3304

10455

RADIOACTIVE ISOTOPES IN CLINICAL DIAGNOSIS. Edith H. Quimby. "Advances in Biological and Medical Physics." Vol. 2. New York, Academic Press, Inc. 1951.

10456

THE RADIOAUTOGRAPHIC TECHNIQUE. Dorothy Axelrod Heller. "Advances in Biological and Medical Physics." Vol. 2. New York, Academic Press, Inc.

10457

EFFECT OF A SINGLE DOSE OF URANYL NITRATE. W. L. Downs, Elliott A. Maynard, and Harold C. Hodge. (nd). Decl. Dec. 22, 1949. 21p. (AEC-D-2772).

Fifty male and 50 female rats were given access to a diet containing 2% uranyl nitrate hexahydrate for a single 24-hour period and thereafter maintained for 10 months on the stock ration. Equal groups of control rats were observed during the same period. The rats were kept in pairs, 1 male and 1 female in each cage. The male rats were removed from the cage near the end of the gestation period. The litters were removed at birth and the rats remated. There was no interference in growth associated with the single dose of uranyl nitrate hexahydrate. A single 24-hour feeding of uranyl nitrate did not reduce the number of females bearing litters. The experimental female rats had a small reduction in the number of litters but a larger reduction in the total number of pups. It seems to be reasonable to conclude that, under the circumstances of this experiment, uranium administration adversely affected the reproductive functions in the absence of a severe derangement of nutrition. NSA 4-1910

10458

THE APPLICATION OF THE CARBON ISOTOPES TO A STUDY OF ANIMAL METABOLISM. Charles Heidelberger. "Advances in Biological and Medical Physics." Vol. 2. New York, Academic Press, Inc. 1951.

10459

BIOLOGICAL EFFECT OF ROENTGEN RADIATION. H. Holthusen. *Strahlentherapie* **18**, 241-262(1924). (In German).

10460

California. Univ., Berkeley. Crocker Lab. and California Univ. Berkeley. Donner Lab.

ESTIMATION OF THE TURNOVER EQUATION OF STRONTIUM-90 FOR HUMAN BONES. Patricia Durbin and Hardin Jones. 4p. (A/CONF.15/P/887; UCRL-8083)

Prepared for the Second U. N. International Conference on the Peaceful Uses of Atomic Energy, 1958. Experiments are reported in which the turnover equations for Ca^{45} and Sr^{90} in adult rats and for Sr^{90} in monkeys were obtained. Similarities between Sr^{90} turnover equations for rat and monkey suggest that the turnover equation for the monkey may approximate that of the human skeleton. (T. R. H.) NSA 12-14527

10461

ABSORPTION OF METALLIC COBALT-60 FROM A SUBCUTANEOUS SITE. M. Nickson, L. F. Lamerton, and W. V. Mayneord. *Nature* **164**, 613(1949) Oct. 8 (letter to the editor)

In order to determine the behavior of subcutaneously administered cobalt, mature rats were implanted with active and inactive cobalt wire. The wire (0.01 in. diameter) was cut into lengths of about 1 in. and each radioactive length was estimated to contain $24 \mu\text{c}$ of cobalt-60. When the animals were sacrificed (4 to 14 days later) localized inflammatory reactions were found in all animals implanted with bare cobalt (active or inactive). When gold-covered cobalt wires were used the only tissue reactions were at the open ends of the tubes. Although no attempt was made in these experiments to determine the

quantity of cobalt absorbed, tissues which had been near the bare radioactive wire were found to be more active than tissues near the gold-covered cobalt. Similar inflammatory reactions were obtained in a group of rats implanted with active and inactive cobalt disks. It was also shown that bare metallic cobalt-60 can be absorbed from a subcutaneous site and may be found in the adjacent tissues, in the liver, kidneys, remaining parts of the body and excreta. It was concluded that neither cobalt-60 nor its alloys should be used parenterally without prior investigation of possible absorption. NSA 3-2049

10462

Harvard School of Dental Medicine
SUMMARY REPORT ON STUDIES ON THE METABOLISM OF THE TEETH. Reidar F. Sognaes and James H. Shaw. Dec. 1, 1952. 16p. (AECU-2359)

A series of experiments on the interactions between saliva, enamel, dentin and the internal blood supply of the teeth has been conducted. The first problem to be explored has been conclusively answered to the effect that the enamel of P^{32} -injected monkeys attains its major radioactivity from a direct contact with salivary P^{32} per se. Two P^{32} gradients have been observed in the teeth of intact rhesus monkeys following intravenous P^{32} administrations: one increasing from the internal to the external enamel surface, the other increasing from the external to the internal dentin surface. The former gradient could be nearly completely abolished by avoiding contact between the enamel and the salivary P^{32} secretion, the latter by removal of the pulpal P^{32} supply to the teeth. The P^{32} uptake of enamel was greater in young than old teeth, lower in extracted than vital teeth, and was reduced in teeth exposed to radioactive saliva containing 20% sucrose. Observations on P^{32} , which forms an integral part of the tooth, have more recently been compared with the distribution of radioisotopes, such as radioiodine and tritiated water which give clues to processes of diffusion. Measurements of radioactivity have been made with procedures described in detail in published works. In addition, we have continued to refine the radioautograph technique, exploring the application of ultra-thin section. (auth) NSA 7-1600

10463

California. Univ., Berkeley. Radiation Lab.
THE METABOLISM OF THE LANTHANONS IN THE RAT. Patricia W. Durbin, Marilyn H. Williams, Margaret Gee, Ruth N. Newman, and Joseph G. Hamilton. July 1955 41p. Contract W-7405-eng-48. (UCRL-3066)

The metabolism of the lanthanons has been studied in the rat on a systematic basis using tracer techniques. High-specific-activity preparations were administered orally or intramuscularly as citrate complexes. Data are presented for the 15 lanthanons one and four days after administration, and at intervals up to eight months for those isotopes with sufficiently long half-lives. In general, absorption from the parenteral injection site was relatively complete at four days. Gastrointestinal absorption of the four lanthanons administered orally was insignificant. (auth) NSA 9-7654

10464

MORPHOLOGICAL CHANGES IN THE KIDNEYS DURING ACUTE RADIATION SICKNESS INDUCED BY RADIOACTIVE PHOSPHORUS. E. I. Shcherban and Z. A. Vlasova. p.382-7 of WORKS OF THE ALL-UNION CONFERENCE ON MEDICAL RADIOLOGY, EXPERIMENTAL MEDICAL RADIOLOGY. Translated from a publication of the State Publishing House of Medical Literature, Moscow, 1957. (AEC-tr-3661(Bk. 2))

Morphological changes are described which were observed in the kidneys following the administration of phosphorus-32 to rabbits and mice. Histological studies

of the kidneys revealed signs of circulatory disturbances one hour after administration of the phosphorus-32 and reaching a maximum at the time of death of the animals. Autoradiograms showed the pattern of deposition of phosphorus-32 in the kidneys. (C. H.) NSA 14-3338

10465

CALCIUM EXCHANGE AS THE MECHANISM FOR ADSORPTION OF THE RADIOACTIVE ISOTOPE BY BONE. M. Falkenheim, E. E. Underwood, and H. C. Hodge. NNES Div. 6, Vol. 1, Pt. 4, p.1959-70 (J. Biol. Chem. 188, 805-17(1951).

In vitro experiments in which powdered bone ash was exposed to solutions of calcium chloride containing Ca^{45} have shown that bone exchanges calcium with the solution. The Ca^{45} concentration rises rapidly until it reaches a "quasi equilibrium." The exchangeable bone calcium represents at the most less than 20% of the total bone calcium, this fraction is of the same order of magnitude as that previously reported for the exchangeable bone phosphate. This reaction is reversible to the same "quasi equilibrium" point. 14 references. (auth) NSA 4-1923

10466

Radioisotope Lab., Naval Hospital, St. Albans, New York, and Brookhaven National Lab.

PHARMACOLOGICAL STUDIES OF RADIOGERMANIUM (Ge^{71}). [PART] 2. H. C. Dudley. nd. 8p. (BNL-1555)

Studies of the rate of clearance of Ge and GeO_2 dusts from the lungs of rats indicate that these materials are rapidly eliminated through oxidation and/or simple solution. The findings strengthen the earlier conclusions that neither elemental Ge nor the oxide constitutes an acute industrial hazard. Good housekeeping methods are mandatory, however, due to possible hydrides of Ge, As, and small amounts of Sb in Ge samples.

(auth) NSA 7-5698

10467

California University

DISTRIBUTION OF INTRAVENOUSLY INJECTED RADIOACTIVE PHOSPHORUS (P^{32}) AMONG SHEEP TISSUES. Arthur H. Smith, Max Kleiber, Arthur L. Black, Jack R. Luick, Robert F. Larson and William C. Weir. nd. 9p. (AECU-2069)

An investigation is reported of the utilization of plasma inorganic phosphorus by the soft tissues of sheep at different ages, and at different times after injection of P^{32} as a tracer. NSA 6-4384

10468

Univ. of Rochester Atomic Energy Project
ON THE MECHANISM OF SKELETAL FIXATION OF RADIUM. W. F. Neuman, J. B. Hursh, E. S. Boyd, and H. C. Hodge. Oct. 11, 1954. 22p. Contract W-7401-eng-49. (UR-365)

A series of studies was made of the incorporation of radium from approximately physiological solutions by the prototype mineral of bone. It was established that the fixation process *in vitro* involved a nonequivalent ionic exchange of radium ions for calcium ions residing in the surfaces of the microcrystalline solid phase. The significance of this ion exchange mechanism in the skeletal fixation of radium *in vivo* is discussed. (auth) NSA 9-847

10469

Laboratory of Pathology, Harvard Cancer Commission and Cancer Research Inst., New England Deaconess Hospital, Boston

AUTORADIOGRAPHIC ARSENIC LOCALIZATION IN ADULT AND EMBRYONIC EPITHELIUM AND CONNECTIVE TISSUES. Sheldon C. Sommers, Barbara S. Geyer, and Rosanna N. Chute. 1953. 6p. (AECU-2716)

Autoradiography showed specific localization of As^{73} and As^{74} in adult mouse epidermis and skin adnexa. In

tissue cultures embryonic mouse epidermis and chicken fibroblasts both absorbed the radioactive As. Histochemical methods so far developed have evidently not accurately demonstrated the locations of As in tissues. (auth) NSA 8-67

10470

STUDIES OF THE METABOLISM OF RADIUM IN MAN. William P. Norris, Thomas W. Speckman, and Philip F. Gustafson (Argonne National Lab., Lemont, Ill.). Am. J. Roentgenol. Radium Therapy Nuclear Med. 73, 785-802(1955) May.

The retention of radium was studied in a group of 19 patients who received multiple intravenous injections of radium chloride (10 micrograms radium element per dose) at weekly intervals over periods ranging from two to six months during 1931. Results were available for measurements on Ra retention made on two separate occasions within the first year following administration of the RaCl_2 , and unopened samples of the RaCl_2 used for the injections were obtained for comparative analysis. Measurements were made for radium content in 1951 and again in 1953. Results are presented in tabular form and are compared with the earlier data. (C. H.) NSA 9-4361

10471

THE UPTAKE OF RADIOACTIVE PHOSPHORUS IN NORMAL BREAST AND BREAST TUMORS. N. N. Das Gupta, K. L. Bhattachary, R. Dutt Choudhuri, A. Bose, and P. K. De. Acta Radiol. 45, 69-80(1956) Jan.

Radioactive phosphorus (P^{32}) was administered to 48 patients with breast tumors and the superficial beta activity over the tumor and over a corresponding site of normal breast measured. The relative activity in 85% of the histologically proved malignant tumors was found to range from 130 to 350% of the normal, while 82% of the benign tumors showed an uptake ratio ranging from 100 to 130% of the normal. In about 17% of the total number of cases, the probable diagnosis based on radioactivity measurement was at variance with the histologic report. It is suggested that the use of P^{32} in the diagnosis of malignancy can be a useful adjunct to the already existing pathologic test. (auth) NSA 10-6508

10472

BIOLOGICAL DOSIMETRY OF RADIUM RADIATION. O. Jungling and H. Langendorff. Strahlentherapie 48, 174-186(1933). (In German).

10473

ON THE POSSIBILITY OF EXPERIMENTALLY MODIFYING RADIOSENSITIVITY BASED ON KNOWLEDGE OF THE EFFECTS OF RADIATION ON TISSUES. S. Jolly. Bull. Acad. Med. 93, 276-279(1925). (In French).

10474

EXPERIMENTAL STUDIES ON THE INJURIOUS EFFECTS OF ROENTGEN RAYS ON EYES. Dr. Jacoby. Strahlentherapie 16, 492-506(1924). (In German).

10475

DISTRIBUTION OF INTRAVENOUSLY INJECTED RADIOACTIVE PHOSPHORUS (P^{32}) AMONG SWINE TISSUE. Arthur H. Smith, Max Kleiber, Arthur L. Black, Melvin Edick, Robert R. Robinson, and Hubert Heitman, Jr. J. Animal Sci. 10, 892-901(1951) Nov.

The distribution of intravenously injected radioactive phosphate in the tissues of swine of different ages and at different times after injection is reported. NSA 6-796

10476

STUDIES WITH RADIOACTIVE PHOSPHORUS ON THE INFLUENCE OF VITAMIN D ON PHOSPHORUS METABOLISM IN YOUNG PIGS. Sam Nordfeldt. Kgl. Lantbruks-Hogskol. Ann. 16, 114-26(1949).

These experiments were done with pigs seven days old and sacrificed on the tenth day. There were no

symptoms of rickets, some diarrhea occurred when the 1500 I. U. vitamin D supplement was fed, and the results were clearer when it was injected intraperitoneally. In the muscles, the P^{32} tended to decrease, while in the skeleton it increased more than 12%; in the kidneys, blood, feces, and urine there was no significant difference. The structure of the bone tended to be more compact when vitamin D was administered. NSA 4-4536

10477

BIOLOGICAL STUDIES WITH ARSENIC⁷⁶. II. EXCRETION AND TISSUE LOCALIZATION. Howard S. Ducoff, William B. Neal, Robert L. Straube, Leon O. Jacobson and Austin M. Brues. *Proc. Soc. Exptl. Biol. and Med.* **69**, 548-554(1948) Dec.

Arsenic excretion was studied in man, rats, and rabbits. Less than 10% of the excreted arsenic is found in feces in any of these species, rats have by far the slowest rate of excretion. Data are given for arsenic distribution in various organs in man, the rat, the rabbit, and 2 strains of mouse. The degree of individual variation within each species was very great, in contrast to man and to other animals studied, the rat retains most of the injected dose in the blood for a considerable length of time. The ratio of arsenic concentration in kidney, liver, and spleen of healthy inbred mice was found to be fairly constant for a given time after administration, and this ratio is suggested as a criterion for effects of various types of treatment. Using this ratio as criterion, it was found that arsenic distribution is altered by the presence of transplanted tumors. Factors changing arsenic distribution are discussed in relation to effects on levels of sulfhydryl-containing substances. NSA 2-1026

10478

THE EFFECT OF RADIUM EMANATION. von E. Knaffl-Lenz. *Wiener Klin. Wochensh.* **25**, 441-42(1912).

10479

RATE OF EXCRETION OF RADIOACTIVE SULFUR AND ITS CONCENTRATION IN SOME TISSUES OF THE RAT AFTER INTRAPERITONEAL ADMINISTRATION OF LABELED SODIUM SULFATE. Dominic D. Szwiatkowski. *J. Biol. Chem.* **178**, 197-202(1949) Mar.

The excretion by rats in urine and feces of S^{35} in the form of sodium sulfate appears to be rapid and accounts for the major portion of the S^{35} given. Approximately 95% was found to have been eliminated by these routes at the end of 120 hours. During that period the concentration of S^{35} in the blood, liver, and brain fell to relatively low levels. A similar concentration of S^{35} in the blood and liver was reached at 48 hours, and in the blood and brain at 72 hours. In contrast to the rapid fall observed in the liver and blood, the concentration of S^{35} was found to increase until about the 8th hour in bone and until the 24th hour in bone marrow. The subsequent fall in the S^{35} concentration of the bone and bone marrow was also slower than in blood, liver, and brain. NSA 2-1729

10480

Argonne National Lab., III. THE DISTRIBUTION OF URANIUM IN TISSUES OF DOGS ADMINISTERED URANIUM METAL OR OXIDE (U_3O_8) BY ORAL OR PULMONARY ROUTES. J. J. Nickson, R. Ferretti, and S. T. Cantrell. May 1, 1948. Decl. October 22, 1948. 8p. (AECD-2356; ANL-4190)

A study was made of the distribution of uranium in the tissues of 5 dogs given talc, uranium oxide, or uranium metal either orally or by pulmonary insufflation over a period of several months. The animals were sacrificed about 3 years after the last dose was given. High concentrations of uranium were found in the adrenals of all dogs used in this study. All values reported have been corrected for fluorescence quenching. Oxide vs. metal by pulmonary insufflation: The dog given uranium oxide retained approxi-

mately 4 times the amount of uranium in the lung and kidney cortex than did the dog that received metal. The average concentration of uranium in the brain, liver, and spleen was slightly more in the dog that received the metal than in the oxide-treated animal. Oxide vs. metal by feeding: The concentration of uranium in the kidney cortex of the dog that received the metal was 6 times greater than that of the dog that received the oxide, and the concentration of uranium in the brain tended to be somewhat higher in the oxide-treated dog than in the dog receiving the metal. The concentration of uranium in the bone shaft and rib was much greater in the dog administered the metal than in the dog which received the oxide.

NSA 1-1533

10481

Rochester Univ., New York.

PRELIMINARY OBSERVATIONS OF URANIUM METAL ON WOUND HEALING WITH REFERENCE TO GAS FORMATION. W. F. Neuman, Roberta Allen and B. J. Mulryan. Jan. 13, 1949. Decl. Feb. 21, 1949. 5p. (AECD-2476, UR-50)

Small scale tests were conducted to determine whether uranium caused gas-formation when exposed to tissue fluid. In-vitro experiments and in-vivo experiments using rabbits were carried out. It is clear that uranium metal did not result in gas-formation when exposed to tissue fluids. The apparent absorption of gas in the in-vitro experiment probably resulted from the solution (as a bicarbonate complex) of some partially oxidized uranium. Clinically, if gas-formation is observed in wounds containing uranium metal, it appears justifiable to assume that bacterial contamination is responsible for the gas-formation.

NSA 2-1179

10482

THE BIOLOGICAL EFFECT OF GRENZ RAYS IN CONTRAST TO EFFECTS OF HARD ROENTGEN RAYS. E. Lachmann and H. Stubbe. *Strahlentherapie* **43**, 489-516(1932). (In German).

10483

Mound Lab., Miamisburg, Ohio

THE EFFECTS OF SMALL AMOUNTS OF POLONIUM ON RATS. R. K. Davis, G. T. Stevenson, K. A. Busch, and D. S. Anthony. Aug. 1955. 25p. Contract AT-33-1-GEV-53. (MLM-1062)

Large groups of Sprague-Dawley rats were given either small single intravenous injections of 0.75, 0.5 or 0.25 microcurie of Po^{210} per kilogram body weight, or repeated doses designed to maintain a relatively constant polonium burden of 0.01 microcurie per kilogram body weight. Since the most sensitive criteria of polonium damage had been shown to be shortening of life span, or possibly increased tumor incidence, these two possible effects were given the most attention in observations continuing throughout the adult life of the animals. Definite shortening of life span occurred in male rats that had received the single doses of 0.75 or 0.5 microcurie per kilogram body weight. Life span shortening at the 0.25 microcurie level was not as definite, though probable. None of the groups of females receiving single doses showed significant life span shortening, possibly in part because of the greater variance of the female populations. A maintained polonium burden of 0.01 microcurie per kilogram body weight was completely without measurable effect. No effect on tumor incidence was observed in any of the single or multiple dose groups. However, the tumor incidence in all groups of old injected and control rats was very high. (auth)

NSA 13-12343

10484

THE DIPHASIC CHARACTER OF THYROIDAL I^{131} CLEARANCE. John H. Nodine, William H. Perloff, Danilo De

Albuquerque, Leon Perezek, and Bertram Channick (Temple Univ. School of Medicine and Philadelphia General Hospital, Philadelphia, Penna.). *J. Clin. Endocrinol. and Metabolism* **15**, 347-53 (1955) Mar.

The occurrence of a biphasic thyroidal radioiodide clearance in which the second phase is slower than the first phase, has been observed in 13 of 15 normal subjects. This shift in clearance rate has been correlated with changes in the rates of serum I^{131} disappearance and urinary I^{131} excretion. An apparatus has been constructed and tested, for use in correlating these findings with an initial phase of equilibrium and a final phase of hormonal synthesis. (auth) NSA 9-2603

10485

UPTAKE OF RADIOACTIVE SULFATE BY ELEMENTS OF THE BLOOD AND THE BONE MARROW OF RATS. T. T. Odell, Jr., F. G. Tausche, and W. D. Gude (Oak Ridge National Lab., Tenn.). *Am. J. Physiol.* **180**, 491-4 (1955) Mar.

The in vivo uptake of S^{35} -labeled sulfate by platelets, megakaryocytes, and myeloid elements of the bone marrow of rats has been demonstrated. The results provide additional indirect evidence of the origin of platelets from megakaryocytes, and they also indicate a platelet life span of about 4 days. (auth) NSA 9-4695

10486

PHARMACOLOGICAL STUDIES OF RADIOGERMANIUM (Ge^{71}). H. C. Dudley and E. J. Wallace. *Arch. Ind. Hyg. Occupational Med.* **6**, 263-7 (1952) Sept.

A method is presented by which the Ge in tissues and excreta may be determined by radiochemical counting of Ge^{71} . Studies of the distribution and excretion of radio-germanium oxide in the rabbit and the dog indicate that this compound is rapidly eliminated, chiefly by way of the urine. No selective tissue localization occurred. Studies of both stable and radioactive particulate Ge preparations indicate that the organism can easily dissolve finely divided elemental Ge and rapidly eliminate it, probably as the oxide. Ge oxide appears to be pharmacologically inactive. Because of the low energy (9 kv) of the radio-activity form Ge^{71} , the biological effectiveness of this isotope is not significant. (auth) NSA 7-61

10487

AN AUTORADIOGRAPHIC STUDY WITH P^{32} OF THE RABBIT UTERUS. Erik Odeblad and Bjorn Westin. *Acta. Endocrinol.* **11**, 311-16 (1952) Dec.

The autoradiographic picture with P^{32} (mainly in nucleic acids) of the rabbit uterus was studied in castrates, after treatment with oestradiol monobenzoate and progesterone and in anoestrous animals. The epithelium contained larger amounts of P^{32} than the myometrium and the myometrium more than the endometrial stroma within each experimental group. Oestrogen increased the amount of P^{32} in all layers. Progesterone superimposed upon oestrogenic stimulation caused an additional increase, especially in the endometrial epithelium. The pictures of anoestrous animals resembled those of the castrates, and three days of oestrogen-withdrawal had no appreciable effect. (auth) NSA 7-2252

10488

APPLICATION OF RADIOISOTOPES TO A COMPARATIVE STUDY OF CALCIUM AND PHOSPHORUS METABOLISM IN THE LAYING HEN. J. B. O'Neil, and J. W. T. Spinks. *Chem. Can.* **2**, No. 6, 23-25 (1950) June.

Hens were fed salts containing radioactive calcium or phosphorus and a check for radioactivity was made in the shell, white, and yolk of their eggs and in their excretions during successive days. More than 5% of the phosphorus fed as calcium phosphate appeared in the egg, with more than 80% of this being in the yolk. The calcium fed as $CaCO_3$ was a maximum (20%) in the shell and the second

egg after feeding and then fell off rapidly in the shells of later eggs. NSA 4-4783

10489

REPEATED INTRAPERITONEAL INJECTIONS OF URANYL NITRATE. Ann G. Dinse, T. B. Barnett, Harold C. Hodge, and Elliott A. Maynard. *nd. Decl. Dec. 22*, 1949. 29p. (NNS, Div. VI, Vol. 1, Pt. 3, Chap. 20, Sec. 1). (AECD-2770)

Groups of male and female rats were injected daily for one month with the same volumes (10 cc/kg) of various concentrations of uranyl nitrate hexahydrate in aqueous solution. In the first experiment weanling female rats were treated as follows: (1) control group, no treatment, (2) control group, injected with distilled water daily, (3) dose of 0.08 mg/kg daily, (4) dose of 0.40 mg/kg daily, (5) dose of 2.0 mg/kg daily. In the second experiment weanling male rats were treated as follows: (1) single dose of 1.0 mg/kg, (2) dose of 0.17 mg/kg daily, (3) dose of 0.67 mg/kg daily (4) dose of 1.0 mg/kg daily. None of the control rats and none of the rats receiving up to and including 0.40 mg/kg daily died. Of the remaining three groups, the mortalities were as follows: 0.67 mg/kg daily, 20%, 1.0 mg/kg daily, 60%, 2.0 mg/kg daily, 90%. During the one-month period of treatment of growth rates of the control rats, those receiving the single dose, and those receiving daily doses of 0.08 and 0.17 mg/kg, respectively, were all closely similar, specifically, the average body weights at the end of the month were within 10 grams of each other. Considerable growth depressions followed the daily injection of 0.40 to 2.0 mg/kg. At the time of autopsy, organ weights were recorded. In general, the rats had sacrificed body weight in order to maintain the vital organs. An exception was the liver which showed a loss of weight. When the daily doses are computed as cumulative doses the total amounts administered are found to be small, for example, a daily dose of 0.08 mg/kg gave a total dose of only 0.3 mg during the month, and the highest dose, 2.0 mg/kg, amounted to only 4.0 mg in the month. The anatomical diagnosis showed the following progressive increase in renal injury with dosage: 0.08 mg/kg, very slight changes, 0.17 mg/kg, slight changes, 0.40 mg/kg, mild to moderate injury, 0.67 mg/kg, moderate to moderately severe injury, 1.0 mg/kg, moderately severe injury. There were too few survivors to assess the relative damage following the administration of 2.0 mg/kg. These data provide the basis for indicating the relationship between percentages of uranyl nitrate mixed into the diets of rats and ingested for one month and the daily doses given intraperitoneally. Using mortality as a criterion, 1% of uranyl nitrate hexahydrate in the diet is roughly equivalent to 0.2 to 0.3 mg/kg intraperitoneally. Using weight depression as a criterion, 1% in the diet is roughly equivalent to 0.33 to 0.39 mg/kg intraperitoneally. Using the pathological changes as a criterion, 0.5% in the diet is compared with 0.17 mg/kg and 2.0% in the diet is compared with 0.67 mg/kg, therefore, 1% in the diet is intermediate between 0.17 and 0.67 mg/kg intraperitoneally. (auth) NSA 4-1908

10490

STUDIES ON THE THYROIDAL ACCUMULATION OF RHENIUM IN THE RAT. C. J. Shellabarger (Brookhaven National Lab., Upton, N. Y.) (1955?). 25p. (BNL-2305) NSA 9-5245

10491

EXPLANATION OF THE BIOLOGICAL EFFECTS OF RADIATION. F. Dessauer. *Strahlentherapie* **16**, 208-221 (1923-24). (In German).

10492

EFFECT OF RESORCINOL ON THE THYROID UPTAKE OF I^{131} IN RATS. I. Doniach and Russell Fraser. *Lancet* **1**, 855-856 (1950) May 6.

Adult rats weighing 150 to 250 g (mostly females of the hooded Lister strain) were injected intraperitoneally with 10 μ c of I^{131} along with 0.5 μ g of carrier potassium iodide and were sacrificed 1.0, 1.5, and 2 hr later, the radioactivity in the alkaline digest of the dissected thyroid glands was then determined. Radioautographs were made on other rats 2 hr after an intraperitoneal injection of 18 μ c of the isotope. The antithyroid effects of 4-methyl-2-thiouracil, sodium thiocyanate, and resorcinol were measured in separate experiments, a subcutaneous injection of the particular drug to be studied was made 10 to 30 min before the administration of the I^{131} , the injection sometimes being repeated 1 hr later; the results were compared with the thyroid uptake seen in controls. Resorcinol effects were found to be similar to those of methyl thiouracil in all respects tested, that is, the maximal depression of thyroid uptake of iodine which can be induced, the abolition of organic binding as evidence by radioautographs, and the enhancement of its antithyroid effect obtainable by the additional injection of thiocyanate but not of methyl thiouracil. NSA 4-4195

10493

RADIOIRON EXCRETION BY THE SKIN AND KIDNEY OF DOGS. W. B. Stewart, R. T. Snowman, C. L. Yuile, and G. H. Whipple. *Proc. Soc. Exptl. Biol. Med.* **73**, 473-5 (1950) Mar.

Dogs were given Fe^{55} intravenously or orally and then were thoroughly scrubbed with a commercial detergent, and their urine was collected in order to determine the radioiron excretion by the kidney and the skin over a period of 1 day to 1 week. Little or no Fe^{55} could be washed from the skin and hair, indicating that no significant amounts are excreted through the skin over the period studied. There was considerable urinary excretion of the isotope. NSA 4-3392

10494

THE QUESTION OF THE FUNDAMENTAL PROCESSES OF THE BIOLOGICAL EFFECTS OF RADIATION. F. Dessauer. *Strahlentherapie* **30**, 506-518 (1928).

10495

THE PRIMARY PROCESS IN RADIATION EFFECTS. F. Dessauer. *Arch. Exp. Zellforsch.* **11**, 65-68 (1931).

10496

STUDIES ON THE EFFECTS OF ROENTGEN RADIATION ON THE VEGETATIVE SYSTEM. P. Del Buono. *Strahlentherapie* **34**, 301-312 (1929).

10497

EFFECT OF PRETREATMENT WITH PROPYL THIOURACIL ON ACCUMULATION OF ASTATINE²¹¹ BY THYROID GLAND OF THE RAT. Patricia W. Durbin, Joseph G. Hamilton, and Marshall W. Parrott (Univ. of California, Berkeley and San Francisco). *Proc. Soc. Exptl. Biol. Med.* **86**, 369-71 (1954) June.

A study has been made of the accumulation of I^{131} and At^{211} in normal and propyl thiouracil-treated rats. A very marked enhancement of the accumulation of At^{211} in the thyroid gland has been observed following administration of propyl thiouracil. This is in contrast to the diminution of the uptake of I^{131} by the thyroid glands of the rats receiving propyl thiouracil. (auth) NSA 8-5489

10498

ABSORPTION AND DISTRIBUTION OF RADIO-TUNGSTATE IN BONE AND SOFT TISSUES. Arthur W. Wase (Hahnemann Medical College, Philadelphia, Pennsylvania). *Arch. Biochem. Biophys.* **61**, 272-7 (1956) April. NSA 10-7451

10499

RADIOIRON ABSORPTION IN ANEMIA DOGS. FLUCTUATIONS IN THE MUCOSAL BLOCK AND EVIDENCE FOR A GRADIENT OF ABSORPTION IN THE GASTROINTESTINAL TRACT. Wellington B. Stewart, Charles L. Yuile,

Herbert A. Claiborne, Richard T. Snowman, and George H. Whipple. *J. Exptl. Med.* **92**, 375-82 (1950) Oct. 1.

Radioiron, Fe^{55} , has been used to study the absorption of iron from the gastrointestinal tract of normal and anemic dogs. The control of iron absorption appears to reside in the mucosa of the gastrointestinal tract. The colon absorbs very little iron. The stomach and duodenum seem to be the most active in its absorption. This suggests the existence of a gradient in the capacity of the gastrointestinal tract to absorb iron. NSA 4-6319

10500

THE EFFECT OF PHYTATE AND OTHER FOOD FACTORS ON IRON ABSORPTION. Leon M. Sharpe, Wendell C. Peacock, Richard Cooke, and Robert S. Harris. *J. Nutrition* **41**, 433-45 (1950) July 10.

The effect of 7 test meals upon the absorption of either reduced Fe^{55} or reduced Fe^{59} fed to adolescent boys was measured. The test meals considered of (I, VI) milk, rolled oats, tomato juice, white bread, and omelet, (II) milk, (III) milk and sodium phytate, (IV, VII) milk and rolled oats, and (V) water. Each meal contained approximately the same amount of iron. Meals I, VI, and VII contained the same level of natural phytate in rolled oats; meal III contained the same quantity of phytate, as the sodium salt; meal IV contained approximately half as much rolled oats and phytate as meal VII; phytate was absent from the meals II and V. The following percentages of radioactive iron were absorbed from these meals: (I) 4.43, (II) 17.4, (III) 1.74, (IV) 9.81, (V) 26.9, (VI) 5.76, and (VII) 8.84. Milk reduced the absorption of iron by one-third. This was not due to the action of phytates, as the milk contained none. Rolled oats and milk reduced the absorption of iron by two-thirds. Thus, rolled oats interfered no more than did milk. There was no correlation between the phytate content of rolled oats and the reduction in iron absorption. Sodium phytate reduced the absorption of iron by 15-fold, indicating that added soluble phytates can interfere with iron absorption. The absorption of iron from the breakfast was one-fifth that from the water meal. Medicinal iron should be more effective if administered between meals. Evidence is presented for the inverse correlation of iron absorption with the solids content of the test meals. 18 references. (auth) NSA 4-5143

10501

Argonne National Laboratory. p.38-41 of DIVISION OF BIOL. AND MED. RESEARCH QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1951. Austin M. Brues, ed. (ANL-4713)

10502

IN VIVO LOCALIZATION OF RADIOACTIVE SILVER AT PREDETERMINED SITES IN TISSUES. PRELIMINARY REPORT. Harold D. West, Raven Rivera Elliott, Alphonso P. Johnson, and Charles W. Johnson. *Am. J. Roentgenol. Radium Therapy* **64**, 831-4 (1950) Nov.

Radioactive silver, Ag^{110} , was injected into rats and was shown to localize at the site of spontaneous or *Staphylococcus aureus* induced infections. A possible explanation of the phenomenon consists in the theory that the silver, being transported by white blood cells, concentrates in these areas as a result of phagocytosis. NSA 5-959

10503

BEHAVIOR OF THORIUM IN GRAVID AND NON-GRAVID RATS. A. Engels, W. Maurer, and A. Nikias. *Exptl. Med.* **115**, No. 5, 525-33 (1950). (In German)

In a previous paper (*Deut. med. Rundschau* **3**, 261 (1949)) the authors have shown that thorium injected into

animals was accumulated mainly in the liver, the spleen, and the bones. In the present work the same technique (intravenous introduction to thorium nitrate into a rat's tail, Th being labeled with UX_1) was applied to a study of differences in the distribution of Th in gravid and non-gravid rats. It was found that the above mentioned organs were chiefly involved in both cases, however, in gravid animals the Th concentrations were lower, and the decrease of Th content in blood proceeded more slowly than in nongravid individuals. It was also established that the volume of blood contained in the adrenals of a gravid rat is twice that found in those of a nongravid animal, the body weight being only slightly increased in the former case. NSA 4-5848

10504

Los Alamos Scientific Lab., N. Mex.

COMPARATIVE BIOLOGICAL EFFECTS OF URANIUM²³³ AND URANIUM²³⁸ (NORMAL URANIUM); RENAL FUNCTION STUDIES. W. J. Eversole. Jan. 10, 1953. 25p. (LA-1333)

Renal function tests reveal that either U^{233} or normal uranium (U^{238}), in a dose of 1 mg/kg body weight causes severe damage to the kidneys. Following an initial period of equal impairment by U^{233} or U^{238} , kidney function in animals given U^{233} returns toward normal more slowly than in animals given U^{238} . Evidence presented indicates that the toxicity of U^{233} is a result of its chemical rather than its general radiation effects on the kidney.

NSA 7-2745

10505

BIOLOGICAL INJURY FROM PARTICLE INHALATION.

Falconer Smith, D. W. Boddy, and Marvin Goldman (National Inst. of Arthritis and Metabolic Diseases, Bethesda, Md.). June 18, 1952. Decl. with deletions Sept. 25, 1959. 55p. Project 2.7 (of) OPERATION JANGLE. (WT-396(Del. 2)) OTS.

Mongrel dogs and sheep were exposed at 2500, 5000, and 8000 feet from surface and underground zero. The purpose of the exposure was to assess the hazard due to inhalation of the dust associated with surface and underground atomic detonations, and to compare the internal and external doses obtained in the exposed test animals. Animals were sacrificed at from H + 10 to H + 24 hours, and at D + 2, D + 4, D + 9, and D + 70 days. Dry ashed homogenates of lung, liver, spleen, kidney, blood, bone, urine, and gut contents were assayed for radioactivity. Representative pieces of soft tissues were fixed by a freezing dehydration method for the preparation of autoradiographs. Samples of bone were wet ashed and assayed for their radioactivity. Radioactivity in tissues taken from animals exposed during the surface shot was extremely low and total body amounts of radioactive materials found at the time of sacrifice were estimated to range between 0.06 and 2.13 μ c. Total-body activity for animals exposed during the underground test ranged between 2.22 and 31.1 μ c. Integrated internal dosage due to β emission ranged from 0.10 to 0.43 rep. Dosage for dog lungs due to β emission ranged between 0.25 and 7.03 rep and between 0.19 and 8.83 rep for sheep lungs. Tissue radioactivity had fallen below limits of detection in all animals by D + 9 following the underground shot. Embryonic tissues and associated fluids contained just detectable activity. Three types of radioactive particles were detected in autoradiographs of lung tissue. One of these particles was a pure α emitter of 5 mev energy and was probably Pu^{239} . A second type of active particle emitter α and β particles while a third was a pure β emitter of indeterminate energy. Autoradiographs of soft tissue other than lungs showed no blackening. A few bone samples contained suf-

ficient activity to cause some blackening on Ilford plates after 29 days of exposure. No evidence of α activity could be detected in bone samples. Radiochemical analysis of the femurs strongly indicated that their activity was due to Ba^{140} and Sr^{90} . Amounts of activity taken up by the combined action of inhalation and ingestion in animals exposed to the dust associated with either type of detonation were not physiologically significant. The mixture of materials thus taken up was undetectable in tissues of animals sacrificed 4 days after the surface shot and 9 days after the underground shot. It is calculated that the underground detonation of a 20 KT weapon would not result in a short term inhalation and ingestion hazard to dogs and sheep exposed under conditions comparable with those prevailing during the JANGLE underground test. NSA 14-6106

10506

QUANTITATIVE STUDIES ON SKELETAL ACCRETION IN LABORATORY AND DOMESTIC ANIMALS. R. H. Wasserman (New York State Univ. Veterinary Coll., Ithaca). 16p. (A/CONF.15/P/816)

Prepared for the Second U. N. International Conference on the Peaceful Uses of Atomic Energy, 1958. In all animals there are two processes occurring simultaneously in the skeleton: bone accretion and bone resorption. The net increase in bone is equal to bone accretion minus bone resorption and can be determined by gross measurements of bone growth. Until the use of radiotracer techniques it was not possible to measure each process separately. There are two general methods whereby accretion and resorption data can be obtained. Both methods are initially worked out with the rat. The first procedure is based on a combination of balance and radiotracer techniques. The principle is, as follows: radiocalcium (Ca^{45}) is incorporated into the diet or drinking water of the experimental animal, and the intake of dietary calcium and Ca^{45} measured. After a short period on this labeled diet, the rat is killed and the retained skeletal Ca^{45} determined. Total bone growth, or accretion, is equivalent to the amount of Ca^{45} retained in the skeleton divided by the specific activity ($SA = Ca^{45}/Ca^{40}$) of the diet. When, under conditions of continuous Ca^{45} ingestion, the integrated, plasma specific activity curve and retained skeletal Ca^{45} were employed for this calculation, similar values were obtained. Bone resorption values are determined by difference between the calculated accretion values and net bone growth measured by conventional methods. In the second method, Ca^{45} is parenterally administered in a single dose, and bone accretion estimated from the Ca^{45} disappearance curve and retained Ca^{45} . Mathematical analysis of this kind of data has indicated that the movement of Ca^{45} into bone by accretion can be distinguished from that due to exchange reactions, accretion rates can thus be calculated. These methods have been used for preliminary calculations of bone accretion and bone resorption in domestic animals since such values are not available in the literature. NSA 12-14559

10507

DISTRIBUTION OF RADIOACTIVE GALLIUM IN THE TEETH AND JAWS OF EXPERIMENTAL ANIMALS. J. A. English and H. C. Dudley. (Naval Medical Research Institute). May 3, 1949. 14p. (NM-008-009-Report 1)

Radiogallium in the form of soluble Ga lactate (pH 7.0 - 7.4) was injected subcutaneously into rats and rabbits. The dosage was 0.2 to 0.4 mc of Ga^{112} per kg of body weight (6 mg/kg), which is well below the toxic level. The animals were killed six hours after injection and thin sections (50 - 100 μ) were made of the bone and teeth by cutting with high speed abrasive discs and grind-

ing to the desired thickness against an abrasive wheel. These thin sections were placed next to special x-ray film for 24-48 hr. The rays emanating from the radioactive isotope affected the film just as do the rays from an x-ray tube. The developed negatives were compared with transillumination photographs which were subsequently made from the ground sections. By this means it was determined that radiogallium is predominately deposited in endosteum, periosteum, tooth pulp, and peridontium. There appears to be a moderate deposition in cancellous bone. Cortical bone and the dentin of the root portion of teeth take a barely perceptible amount of radiogallium, whereas coronal dentin and enamel give no indication that any radiogallium is deposited. The main advantages of the autoradiographic method over methods using the electroscope or Geiger counter for determining the radioactivity are that fractional portions of teeth and bone are not required, and the visual localization is rapid and effective. The relative distribution of the radioactive substance in each anatomic area is apparent, however, quantitative measurements were not attempted in this study. 40 references. NSA 3-1180

10508

California. Univ., Los Angeles. Atomic Energy Project QUARTERLY PROGRESS REPORT FOR PERIOD ENDING MARCH 31, 1956. Stafford L. Warren. April 1, 1956. Decl. Apr. 22, 1959. 132p. Contract AT-04-1-GEN-12. (UCLA-362)

Progress is reported in the following studies: the synthesis of labeled fatty acids, the pharmacological properties of a series of oxazolium compounds in mice, the effects of atropine on the response of rat uterus to 5-hydroxytryptamine and acetylcholine, the effect of quinoxaline 1:4 di-n-oxide on survival time of irradiated mice, the effect of acute and chronic intravenous infusions of clinical dextran in irradiated rabbits, the effect of particle size on pulmonary absorption and distribution, the development of kidney function tests employing radioactive Diodrast and external gamma ray scintillation counting techniques, blood radioactivity measurements, the mechanism of the skeletal deposition of Ca^{45} and Sr^{90} , the production, extraction, and purification of an antibiotic substance produced by an intestinal lactobacillus, the late effects of total-body x irradiation on rats exposed under 5% hypoxia, radio-induced lesions in the eye of the newly metamorphosed toad, routine monitoring and health physics procedures, the development of procedures for the spectrographic analysis of bone ash, design of a freeze-dryer for the preparation of tissue specimens for electron microscopy, the production and calibration of chemical systems of radiation measurement having medical applications, the physiological effects of air blast in mice, tracer studies on the plant uptake of Sr and Cs from various soil types, tracer studies on the effect of Ca on the uptake of Sr by plants and the uptake of Sr from plant material ingested by animals, and the biological accumulation and persistence of fission products from radioactive fall-out. (For preceding period see UCLA-357.)

NSA 13-11749

10509

THE BIOLOGICAL SIGNIFICANCE OF X-RAY DOSE. Holzknecht. Munch. Med. Wchnschr. 68, 1180(1921). (In German).

It is necessary to have a proper treatment method for each malady, not a single universal treatment method. One must use maximum dose for malignant tumors, minimally effective doses for benign conditions. Author cautions against use of maximum dose in all cases, citing ill effects in tbc. Disorders of hypophyseal function, testicular and ovarian irradiation are included among conditions treated by radiation therapy.

10510

CIBA FOUNDATION SYMPOSIUM ON IONIZING RADIATIONS AND CELL METABOLISM. G. E. W. Wolstenholme and Cecilia M. O'Connor, eds. Boston, Little, Brown and Company, 1956. 328p. NSA 11-6611

10511

SIZE OF DOSE: ITS EFFECT ON DISTRIBUTION IN THE BODY. Herbert E. Stokinger. Nucleonics 11, No. 4, 24-7(1953) Apr.

Often substantial quantitative, and at times qualitative, differences in distribution and excretion of an element in the body follow upon the administration of different dosage levels. With certain elements these differences can be so great as to result in erroneous conclusions as to the tendency of an element to accumulate in certain organ sites. Current physiochemical theory and experimental results thus far available are used to furnish a reasonable explanation as to why certain of these differences in distribution with dose occur. This review develops the fact that there are at least three distinct mechanisms that regulate the distribution of an element in the body. 16 references. NSA 7-2985

10512

Royal Veterinary Coll., Stockholm
METABOLISM OF STRONTIUM 90 IN LACTATING AND PREGNANT GOATS. Lars Ekam and Bertil Aberg. 12p. (A/CONF. 15/P/175)

Data are tabulated on the distribution of strontium-90 in lactating and pregnant goats, milk, and fetuses following the administration of single and multiple oral doses of strontium-90. Excretion and retention data are discussed. Strontium-90 was readily taken up in many tissues of the fetus, especially those containing calcium. Strontium-90 was found to accumulate in the udder before milk excretion started and thus affected the activity of first milk. NSA 13-6085

10513

EFFECT OF IONIZING RADIATIONS ON VITAMIN K. L. R. Richardson, P. Woodworth, and S. Coleman. Federation Proc. 15, 924(1956).

10514

New York University Hospital and New York University
STUDIES OF THORIUM X APPLIED TO HUMAN SKIN. I. ROUTES AND DEGREE OF PENETRATION AND SITES OF DEPOSITION OF THORIUM X APPLIED IN SELECTED VEHICLES. V. H. Witten, Milton S. Ross, Eleanor Oshry, Arthur B. Hyman, and Vera Holmstrom. nd. 22p. (AECU-1470) NSA 5-4999

10515

ON THE DANGERS OF RADIUM. Tuffier. Bull. de l'Acad. de Medecine 21, 617(1921). (In French).

Survey of American practices in handling Ra over long periods and in large amounts. Dangers can be controlled and accidents prevented.

10516

THE LOCALIZATION OF RADIOSULFATE IN BONE TISSUE. B. Engfeldt, A. Engstrom, and H. Boström (Karolinska Institutet, Stockholm, Sweden). Exptl. Cell Research 6, 251-3(1954)

Data obtained by autoradiographic, microradiographic, and chemical procedures on the localization of radiosulfate in bone tissue are presented. NSA 8-6654

10517

IN VIVO STUDIES WITH RADIOISOTOPES. Enrique Strajman and Nello Pace p. 193-241 "Advances in Biological and Medical Physics, Vol. II." New York, Academic Press, Inc. 1951

Part I of this review includes sections on analysis of the factors involved in *in vivo* studies, instrumentation and determination of the radioisotope concentration in tissue.

Part II reviews the results obtained by application of the *in vivo* method to the study of various biological problems. 152 references. NSA 5-7002

10518

DANGERS OF RADIUM AND MEASURES TO AVOID THEM. Bordier. Bull. de l'Acad. de Medecine 17, 512(1921). (In French).

Emphasizes need for caution in handling; periodic blood counts (rbc).

10519

THEORETICAL CONSIDERATIONS AND EXPERIMENTAL RESULTS ON THE ACTION OF THORIUM X AND OTHER SUBSTANCES ON ENZYME ACTIVITY. INVESTIGATION IN THE HYALURONIC ACID-HYALURONIDASE SYSTEM. Ch. Wilberg. Arztl. Wochschr. 7, 127-9(1952) Feb. 8. (In German).

A brief discourse on the action of hyaluronidase in various joint diseases and bone metastases, the difference in pH between sound and diseased joints and its effect on hyaluronidase activity, and the enzyme-inhibiting action of ThX (Ra²²⁴), steroids, vitamins C and P, etc. is presented. NSA 6-3494

10520

THYROID UPTAKE OF RADIOACTIVE IODINE IN THE DOG, EFFECT OF DIET, HYPOPHYSECTOMY, AND TSH. Donald S. Fredrickson, William F. Ganong, and David M. Hume (Harvard Medical School and Surgical Service, Peter Bent Brigham Hospital, Boston). Proc. Soc. Exptl. Biol. Med. 89, 416-19(1955) July.

A scintillation counter adapted to the determination of thyroid I¹³¹ uptakes in the unanesthetized dog is described. The dog was shown to have a relatively slow rate of accumulation of I¹³¹ by the thyroid, but a total uptake of the same order of magnitude as man and the rabbit if the dog was maintained on a dietary intake of 70 μ g of iodine or less per day. Hypophysectomy markedly depressed the thyroidal uptake and blood I¹³¹ clearance rate, and TSH administration elevated the rate of uptake and release. NSA 8-6175

10521

THE ACTION OF SALTS OF ZIRCONIUM AND OTHER METALS ON PLUTONIUM AND YTTRIUM DISTRIBUTION AND EXCRETION. Marcia R. White and Jack Schubert. J. Pharmacol. Exptl. Therap. 104, 317-24(1952) Mar.

Treatment of rats with zirconium prior to injection of Pu²³⁹ and Y⁹¹ lowered the amount of Pu and Y subsequently deposited in the skeleton and increased the amount of Pu in the kidneys. The deposition of both Pu and Y in the bone was correlated with the length of time between pretreatment and their injection. Zr injected 24 hours after Pu and Y prevented further deposition of the radioelements in bone, but had no other observable effect on their organ distribution. In addition to Zr other hydrolyzable elements - manganese, iron, titanium, aluminum, and thorium - reduced bone deposition of Pu, but had various effects on the amounts deposited in other organs. Al and Th increased the Pu content of the liver and other soft tissues. Non-hydrolyzable magnesium had no significant effect on the distribution of either Pu or Y. The mechanism by which salts of Zr and other hydrolyzable elements may affect Pu and Y metabolism is discussed. This includes adsorption of the radioelement on colloidal aggregates in the circulation and the relation between particle size and the resulting distribution of the aggregate plus adsorbed radioelement NSA 6-3206

10522

Argonne National Lab., Ill.

THE EXCRETION, RETENTION, DISTRIBUTION, AND CLINICAL EFFECTS OF STRONTIUM⁸⁹ IN THE DOG. PART II, STATISTICAL ANALYSIS OF EXCRETION AND

RETENTION OF STRONTIUM⁸⁹ FOR INDIVIDUAL DOGS. George Sacher. June 1946, decl. July 19, 1948. 18p. (AEC-2108; CH-3866)

Excretion data of 17 dogs injected with Sr⁸⁹ were analyzed. Excretion was assumed to conform to the function $\log E = b \log t$, where E_t is the excretion per day at time t , E_1 is the instantaneous excretion at the end of the first day, and b is the slope of the $\log E$ versus $\log t$ diagram. Values of E_1 and b were estimated for urinary and fecal excretion of individual dogs. Errors of estimate were also computed. A negative correlation ($r = -0.575$) was found between the urinary and fecal excretion slopes of adult dogs. Slopes and intercepts of urinary and fecal excretion lines of beagle pups were lower than those of adult dogs. In the urine-feces correlation and in dependence of excretion parameters on age, the Sr⁸⁹ results paralleled the results with plutonium. The total elimination, Q_∞ , was defined and estimated for individual adult dogs. It was found that on the average more than 90 per cent of the injected Sr⁸⁹ could be accounted for by extrapolation of the excretion line based on observed excretion in the first few weeks after injection. The calculated total elimination of pups, based on the observed excretion behavior, showed at least 40 per cent of the injected Sr⁸⁹ unaccounted for, presumably because of the increase of total-body strontium concomitant with bodily growth. NSA 1-607

10523

THE EFFECT OF ADRENOCORTICOTROPHIC HORMONE ON TISSUE DISTRIBUTION AND TOXICITY OF BERYLLIUM. M. R. White, A. J. Finkel, and J. Schubert (Argonne National Lab.). May 1952. 5p. (AECU-2111, UAC-578)

Adrenocorticotrophic hormone (ACTH) had no striking effect on the distribution or retention of radioberyllium, injected into mice with and without carrier beryllium sulfate, although it caused a statistically questionable decrease in retention of carrier-free radioberyllium. It also had no effect on the survival of mice acutely poisoned with beryllium sulfate. NSA 6-4714

10524

REACTIONS WITH HEAVY METALS AND THEIR BEARING ON POISONING AND ANTIDOTE ACTION. James L. A. Webb, Iqbal Singh Bhatia, Alsoph H. Corwin, and Alvin G. Sharp. J. Am. Chem. Soc. 72, 91-5(1950) Jan.

Sulfhydryl compounds are essential for the growth of many, and probably all, cells. Recently a large group of enzymes has been shown to contain -SH groups essential for enzymatic activity. This activity is inhibited by mercury and arsenic compounds and is restored by glutathione. The poisoning thus results from metallic combination with essential sulfhydryl groups. Detoxicant action is a preliminary combination of a substance with the metallic poison in a compound so firm that the metal is not available for reaction with essential sulfhydryls. Antidote action is observed after combination has taken place with the essential sulfhydryls, but when the affinity of the antidote for the metal is greater than that of the essential sulfhydryls displacement takes place. Dithione, $C_6H_5N=NC(SH)=NNHC_6H_5$, will react with the mercury in mercurials of the types HgX_2 , $R'HgX$, R'_2Hg , $R'HgSr''$, and $(R'S)_2Hg$. Dithione will cleave C-Hg bonds to form S-Hg bonds. Alkyl and aryl mercuric dithizonates tested could be cleaved further to yield mercuric bisdithizonate. Mercury can exchange between different sulfur compounds. Mercuric bis-dithizonate and certain other material dithizonates are reversibly sensitive to light. NSA 4-2954

10525

RATE OF ELIMINATION OF RADIOACTIVE CARBON ADMINISTERED AS CARBONATE FROM THE TISSUES AND TISSUE COMPONENTS OF MATURE AND GROWING

RATS. Jack Schubert and W. D. Armstrong. *J. Biol. Chem.* **177**, 521-527(1949) Feb.

Eight mature rats and 6 growing rats were given intraperitoneal injections of C^{14} -labeled sodium carbonate in order to study the change in C^{14} concentration of the soft and calcified tissues and derived components with time. The rats were killed in pairs at different time intervals from 8 to 30 days after the last of the injections. In general the specific activity of C^{14} in the tissues and tissue components of the growing rats greatly exceeded those of the mature animals. The overall retention of C^{14} , however, was greater in the mature rats. In the latter practically no change in the overall C^{14} retention was observed after the 15th day, while an appreciable decrease in overall retention of C^{14} was observed in the growing animals. Beyond the 8th day the biological half lives of the C^{14} in intact and inorganic bone were 12 to 15 days in the growing rats and 30 to 40 days in the mature rat. In the case of the serum proteins the specific activity of C^{14} and the rates of decrease in C^{14} content were about the same for the 2 groups of rats. The rate of decrease of C^{14} in the soft tissues of the mature rats had decreased appreciably by the 20th day. No significant turnover of C^{14} in the brain protein was observed in the young animals following its incorporation. NSA 2-1464

10526

RADIOACTIVE ISOTOPES IN MEDICINE. I. PHOSPHORUS. R. G. Wood. *Atomics (London)* **2**, 217-29, 237(1951) Aug.

A survey of the medical application of P^{32} includes general discussions on isotopes of P, biochemical applications, uses of inorganic P, uses of organic P, physiological applications, diagnostic application, therapeutic applications, and dosage. NSA 5-6625

10527

VALUE OF RADIATION IN LEUKEMIA. James Metcalf. *Brit. Med. J.* **2**, 273(1921).

Author describes his observations on patients, observations leading him to believe effects on WBC are secondary. An important primary effect is increased viscosity of plasma and seminal fluid, etc., and it is suggested that all those working with radiation should drink much water and maintain especially good general hygiene. Healthy x-ray workers are less susceptible than those of poor physique.

10528

Argonne National Lab.

THE TOXICITY OF POLONIUM 210 IN MICE. I. THE 30-DAY LD_{50} , RETENTION, AND DISTRIBUTION. Miriam P. Finkel, William P. Norris, Walter E. Kisielewski and Gertrude M. Hirsch. June 1952. 24p. (AECU-2176, UAC-609)

A method for the quantitative determination of Po^{210} in animal tissues is presented. The 30-day LD_{50} of Po given intravenously in HC1 to young adult female mice was determined to lie between 30 and 40 $\mu\text{c}/\text{kg}$. The deleterious effects of 10 $\mu\text{c}/\text{kg}$ were manifest as early as 2 weeks after injection by failure to the mice to grow. Data on tissue distribution and excretion of Po in mice are included. NSA 6-5556

10529

STRONTIUM⁸⁵ METABOLISM IN MAN AND EFFECT OF CALCIUM ON STRONTIUM EXCRETION. Herta Spencer, Milton Brothers, Eva Berger, H. E. Hart, and Daniel Laszlo (Montefiore Hospital, New York) *Proc. Soc. Exptl. Biol. Med.* **91**, 155-7(1956) Jan.

Radiostrontium metabolism following intravenous administration of tracer doses of Sr^{85} was studied in 4 human subjects. Plasma levels, and urinary and fecal Sr excretion were measured. The plasma levels declined rapidly. The main route of excretion is via the kidney.

Rate of Sr excretion seems to depend upon the state of bone metabolism. It was low in Paget's disease and high in senile osteoporosis. Simultaneous administration Ca gluconate significantly enhanced the Sr excretion. NSA 10-5506

10530

DISCUSSION ON THE CHANGES INDUCED IN BLOOD CONSTITUENTS BY RADIATION. Sidney Russ. *Brit. Medical J.* **2**, 268(1921).

Author reports studies on rats and on patients receiving radiation therapy. Lymphocytes in peripheral blood are decreased in number, decrease is not greater with larger dose but recovery is slower. Neutrophil changes are erratic.

10531

ON THE MECHANISM OF MULTIPLICITY REACTIVATION ON BACTERIOPHAGE. W. Harm. *Virology*, **2**, 559-64 (1956).

Author compares U-V and ionizing radiation effects on T_4 coliphage and finds it difficult to accept the pure "genetic substitution" hypothesis as the explanation of the inactivation curve.

10532

DISCUSSION OF PAPER BY J. C. MOTTRAM. Archibald Leitch. *Brit. Med. J.* **2**, 271(1921).

Author is highly skeptical about significance of changes in blood counts in radiation exposures. Reports he "was loath to attempt such experiments because a blood count to him was a rather serious matter, for anything less than 2 1/2 hours was insufficient time to spend upon a blood count..." Nevertheless, Leitch did some experiments, and found great variability in results and remained skeptical. A long discussion about techniques, etc. follows

10533

RELATIVE RESISTANCES OF MICROORGANISMS TO CATHODE RAYS. I. NONSPOROFORMING BACTERIA. W. Y. Koh, C. T. Morehouse and V. L. Chandler. *Appl. Microbiol.* **4**, 143-46(1956).

The radiosensitivities of a number of organisms responsible for food spoilage are given.

10534

Argonne National Lab., Ill.

FEMALE MICE. M. P. Finkel. p.76-78 of BIOLOGY DIVISION QUARTERLY REPORT MAY 1947 TO AUG. 1947. A. M. Brues, ed. Aug. 1, 1947. Decl. May 26, 1948. (AECU-2024; ANL-4078). NSA 1-40

10535

Argonne National Lab.

URANIUM TOXICITY IN MICE. I. EXPERIMENTAL DESIGN AND RESULTS AT 30 DAYS. Miriam P. Finkel and Gertrude M. Hirsch. Oct. 1950. Decl. Jan. 22, 1951. 10p. (AECU-3045, ANL-4531)

The results of a study of the toxicity of U^{233} in CF-1 female mice are summarized for the first 30 days. The preinjection handling of the mice and the experimental routine were essentially the same as those employed in the long-term polonium mouse experiment (ANL-4401). U^{238} was used as a chemical control and U^{232} as a radiation control. Dosage of U^{233} , injected into a lateral tail vein in the form of $UO_2(NO_3)_2 \cdot 6H_2O$ solution, ranged from 0.0001 to 0.1 $\mu\text{c}/\text{g}$ (0.01 to 10 $\mu\text{g}/\text{g}$). The tentative LD_{50} 30-day dose is 0.027 to 0.031 $\mu\text{c}/\text{g}$. 5 figures. NSA 5-2364

10536

PREVENTION OF POSTIRRADIATION MITOTIC DELAY IN CULTURES OF MOUSE CELLS BY CALCIUM SALTS. Rixon Whitfield. *Exper. Cell Research* **27**, 154(1952).

10537

ACTION OF CYSTAMINE ON THE RESISTANCE OF THE RAT AT LOW BAROMETRIC PRESSURE. Z. M. Bacq, Y. Cuypers, E. Evrard, and R. Sotens. *Compt. rend. soc. biol.*, **149**, 2014(1955). (In French).

One possible mechanism of protective effect of cysteine: slowing of circulation, (rats) leading to O₂ desaturation of venous blood and probably tissue hypoxia. Cystamine protects mice against O₂ poisoning and is 5 X as effective as cysteine.

10538

Western Reserve Univ., Atomic Energy Project
THE MECHANISM OF POTENTIATED LETHAL ACTION OF CERTAIN RADIOISOTOPES IN RATS AND MICE.
Hymer L. Friedell, Paul R. Salerno, and Saul A. Rosenberg. Issued July 23, 1953. 22p. (NYO-4020)

A potentiated lethal action was observed in rats and mice when a bone-localizing internal emitter such as P³² or Sr⁸⁹ was administered in combination with colloidal Au¹⁹⁸. It was noted that the toxicity of colloidal Au¹⁹⁸ in rats and mice was not altered by splenectomy. However, the lethal action of the bone-seeking radioactive isotopes was found to be clearly more effective in splenectomized animals. This sensitizing action of splenectomy was found to be of the same order of magnitude as the degree of potentiation observed when P³² was combined with colloidal Au¹⁹⁸. Furthermore, the intensity of the combined lethal action of these two isotopes was found to be the same in both normal and splenectomized animals. Since the acute effects of relatively small doses of colloidal Au¹⁹⁸ are equivalent to splenectomy, the level of sensitivity of animals which receive Au¹⁹⁸ in combination with P³² or Sr⁸⁹ is reduced to that of splenectomized animals. Splenectomy did not greatly modify the sensitivity of either rats or mice to x rays. Apparently the total body dose in the lethal range severely injures the spleen. Since the bone marrow can partially recover independently, the injured spleen without its special protective function is not a major determinant in survival. It was noted that more than four times as much Sr⁸⁹ could be tolerated by mice with intact spleens as by splenectomized mice. As would be anticipated, it was found that when colloidal Au¹⁹⁸ was given in combination with Sr⁸⁹, the potentiation of the lethal effect was also increased approximately four-fold. This potentiation is much more striking in the mouse than in the rat, and these data suggest that the mouse may be unique with respect to the potentiality of the spleen in influencing survival following radiation injury to the bone marrow.
NSA 7-5271

10539

Brookhaven National Lab.
THE TURNOVER OF CARBON IN THE MOUSE AS STUDIED BY THE USE OF TAGGED CARBOHYDRATE.
Robert Steele. nd. 32p. (BNL-1222)

The excretion in respiratory CO₂, urine, and feces of carbon derived from ingested sucrose was measured during the 36-day period following the ingestion of uniformly tagged C¹⁴ sucrose by young adult C-57 black male mice. The retention of carbon derived from sucrose in each of 28 organs or tissues of the mice under these conditions was measured in ten animals sacrificed at various times during the 36-day period. The specific activity of the respiratory CO₂ of the mice under standard conditions of dosage with uniformly tagged C¹⁴ sucrose was ascertained and was expressed as an empirical mathematical function of time. It was deduced, after demonstrating that an application of the Zilversmit-Entenman-Fishler precursor-product relationship gives incongruous results for tissue carbon turnover that either (1) the interchange of carbon between the tissue constituents and the pool of CO₂-producing metabolites is less than expected on the basis of the previously observed turnover half times of individual tissue constituents or (2) that a physiological mechanism exists which reduces the movement of carbon from the small molecule metabolites to the tissue constituents when

exogenous carbohydrate is being metabolized. If possibility (1) above is correct the general concept of exogenous, as opposed to endogenous, metabolism cannot be attacked by citing the shortness of the turnover times of the major tissue constituents. If possibility (2) is correct there then exists an obvious demarcation of exogenous from endogenous metabolism.
NSA 6-5968

10540

AN AUTORADIOGRAPHIC STUDY OF THE DISTRIBUTION OF POLONIUM IN THE RAT DURING 24 HOURS AFTER INTRAVENOUS INJECTION. John C. Gallimore, George A. Boyd (Oak Ridge Inst. of Nuclear Studies, Tenn.) and J. N. Stannard (Univ. of Rochester School of Medicine and Dentistry, N. Y.). Anat. Record 118, 253-67 (1954) Feb.

The distribution of polonium chloride in the liver, spleen, kidney, muscle, and blood of rats after intravenous administration has been studied autoradiographically and radiochemically. It was found that the polonium in the blood immediately after injection existed in two systems: a system of polonium aggregates characterized by sunbursts in the autoradiograms and a system of non-grouped singly dispersed atoms or molecules. The aggregates were removed from the blood stream over an approximate two-hour period and deposited in the liver and spleen. The non-particulate polonium was observed to concentrate in the proximal convoluted tubules of the kidney. No particulate polonium was observed to be deposited in this organ. The polyatomic groupings deposited in liver and spleen are seen to become diffuse and to gradually disintegrate beginning at about 10 hours after administration and continuing to the end of the observation period (24 hours). It is concluded that the aggregates are taken up by elements of the reticulo-endothelial system and inferred that distribution, excretion, and toxicity may be affected by the relative number of aggregated and dispersed atoms present under any given conditions.
NSA 8-3225

10541

COMBINED EFFECTS OF CYSTEINE AND IRRADIATION ON GROWTH AND CYTOLOGY OF ALLIUM CEPA ROOTS.
A. Forssberg and N. Nybom. Physiol. Plantarum, 6, 78 (1953).

10542

TRITIUM-INDUCED EFFECTS IN PARAMECIUM AURELIA. E. L. Powers and D. Shefner. Proc. Soc. Exptl. Biol. Med., 78, 493-97 (1951).

Authors compare effectiveness of β and γ irradiation in inducing lethal effects in paramecium.

10543

RECOVERY-STIMULATING ACTIVITY OF BACTERIAL RIBONUCLEIC ACID POLYNUCLEOTIDE MATERIAL. G. E. Stapleton, D. H. Woodburg, and A. Hollaender. Radiation Research, 5, 597 (1956).

Authors describe an RNA polynucleotide fraction from E. coli β/r which stimulates recovery of irradiated organisms of the same strain if amino acids are also supplied. There is suggestive evidence that the compound may also be protective in mice.

10544

UPTAKE OF RADIOACTIVE SULFUR BY CHONDROSARCOMAS IN MAN. Raymond G. Gottschalk and Herbert C. Allan, Jr. Proc. Soc. Exptl. Biol. Med. 80, 334-9 (1952) June.

Two patients with chondrosarcomas received, respectively, 6.7 and 2.9 millicuries of S³⁵ as sodium sulfate. Tissue samples were obtained at operations and at necropsy several days after the injection and were analyzed for S³⁵ content. The highest concentrations of isotope were found in the chondrosarcomas. Progressively smaller amounts were found in other tissues in the sequence: cartilage, bone marrow, spleen, kidney, skin, liver, bone adipose

tissue, and muscle. Radioautographs indicated maximum concentration in the growing portions of the chondrosarcoma and in those containing abundant ground substance. The findings are discussed in relation to the possibility of diagnostic or therapeutic applications. NSA 6-5723

10545

LOCALIZATION OF RADIOACTIVE COLLOIDS IN LYMPH NODES. Leonard A. Walker. *J. Lab. Clin. Med.* **36**, 440-9(1950) Sept.

The quantitative uptake of radioactive colloids by lymph nodes when the colloids are introduced into the lymphatic channels has been studied. Unsuccessful attempts were made to cause colloids injected subcutaneously to enter the lymphatic vessels and localize in the regional nodes. Only P^{32} -labeled casein left the site of injection, but it did not localize in the regional nodes. A method for intralymphatic injections was developed, and quantitative studies were made on the irradiation of rabbit lymph nodes by means of two Y^{90} -labeled yttrium hydroxy-citrate colloids, called the C and E type colloids. The C type colloid has an average molecular weight of 20,000, whereas the molecular weight of the E type is much higher, possibly millions. The C type gives an average concentration of radiation in the most active node 284 times that in the most active tissue. The E type average ratio is 7900. Although variation of the volume of colloid injected over the values of 0.05, 0.10, and 0.20 ml resulted in some change in the percentage uptake by the nodes, these changes were not striking. It was found that previous intralymphatic injection of yttrium colloids caused an increase in the uptake by the nodes in subsequent injections. No explanation for this effect is offered. Iodinated bovine albumin incorporating radioactive iodine, I^{131} , when injected intralymphatically in the rabbit is not taken up by the nodes. This technique for specific irradiation of lymph nodes might be of use in Hodgkin's disease, in primary lymphosarcoma, or in irradiation of metastases to the nodes, as in cancer of the breast. NSA 4-6315

10546

INACTIVATION OF BACTERIA BY DECAY OF INCORPORATED RADIOACTIVE PHOSPHORUS. C. R. Fuerst and G. S. Stent. *J. Gen. Physiol.*, **40**, 73-90(1956)

Authors studied importance of disintegration of P^{32} incorporated into protoplasm of *E. coli* β/r . Organism is inactivated in multi-target (3) manner, straight line exponential portion of survival curve being linearly related to the number of decaying P^{32} atoms. Approximately 2% of all P^{32} disintegrations are effective in inactivating a unit.

10547

NEW STUDIES BY MEANS OF Fe^{59} ON ERYTHROPOIESIS IN THE IRRADIATED RAT. H. Maisin, A. Dunjic, P. Maldague, D. Sempoux, and J. Maisin. *Comptes. rend. soc. biol.* **150**, 1031-35(1956).

10548

THE EFFECTS OF HYPOPHYSECTOMY, GROWTH, AND ADRENOCORTICOTROPIC HORMONES ON THE INCORPORATION OF P^{32} INTO LIVER PHOSPHOLIPIDS. Irving I. Geschwind, Choh Hao Li, and Herbert M. Evans. *Endocrinology* **47**, 162-5(1950) Sept.

The uptake of phosphorus by rat liver phospholipids has been investigated by intraperitoneal injection of P^{32} -labeled Na_2HPO_4 solution. Ageing causes a decrease in the uptake of P^{32} by liver phospholipids. Hypophysectomy, with or without growth or adrenocorticotrophic hormone treatment, does not influence the concentration of phospholipids in liver, but does result in a decreased turnover of liver phospholipids. Growth hormone produces an increase in the turnover of liver phospholipids in normal or hypophysectomized rats. Treatment of the hypophy-

sectomized animal with ACTH results in an increased turnover of liver phospholipids. NSA 4-6542

10549

MORPHOLOGICAL CHANGES IN THE TISSUES FOLLOWING INTRA-TISSUE INTRODUCTION OF RADIOGOLD (Au^{198}). M. I. Svetlakov and V. A. Odinkova (Moscow Regional Scientific Research Chemical Inst. and Central Inst. for Advanced Training for Physicians, Moscow). *Med. Radiol.* **4**, No. 4, 61-4(1959) Apr. (In Russian).

An investigation was made of the morphological changes which develop in tissues of patients with cancer of the larynx at the site of introduction of radiogold (20, 40, 108 mc). Analysis of 15 observations shows that the introduction of radiogold directly into the cancer tumor tissue provokes necrosis with subsequent development of focal sclerosis. In these tissues acute circulatory disorders and dystrophic changes occur, the degree and character of which is determined by the specificity of tissue structure and the dose of the preparation. NSA 13-15875

10550

SELECTIVE PLACENTAL TRANSMISSION OF RADIOACTIVE ALKALINE EARTHS AND PLUTONIUM. Paul N. Wilkinson and Frank E. Hoecker. (Kansas Univ.). *nd.* **33p.** (AECU-2400)

A series of experiments are described in which the placental transmission of several of the alkaline earth metals and Pu is investigated, and results are presented which demonstrate the existence of significant differences in the physiological activity of those elements. It was found that the arrangement of these compounds in order of the magnitude of transmission is $Ca^{46} > Ba^{140} > Pu^{239} > Ra^{226}$. A discussion of the possible significance of these results and the results obtained by other workers is presented. It was concluded that the placental transmission of the compound investigated is dependent upon the molecular weight of the cation and that analogies between the known properties of one member of the group and those of another member should be made with extreme caution. It was conjectured that the results were indicative of a fundamental difference in metabolic handling of these substances by the animal organism and that similar differences might exist in the mechanism of deposition of these elements in mammalian bone. NSA 7-1863

10551

THE LOCALIZATION OF RADIO-PHOSPHORUS IN SOFT TISSUES WITH RESULTING DESTRUCTION. B. Grad, C. E. Stevens, and C. P. Leblond. *Acta Unio Intern. contra Cancrum* **7**, 534-8(1952).

Male and female albino rats were injected with a single large dose of P^{32} and were sacrificed at various intervals from 5 minutes to 10 days later. The tissues were fixed in Orth fluid. Histological sections of the tissues were examined for radiation damage, and their P^{32} content was detected by the radioautographic technique. The destructive effects of P^{32} were intense only in some of the tissues with a high P^{32} content, e.g., hemopoietic tissues, intestinal crypts and ovarian follicles. In all organs and tissues with a low P^{32} content, little or no destructive effect occurred, e.g., pancreas, nervous tissue. However some tissues with a high P^{32} content showed no destructive action, e.g., liver and kidney NSA 6-3499

10552

Michigan State Coll. and Michigan Agricultural Experiment Station

ISOTOPES IN HORMONAL AND NUTRITIONAL STUDIES IN ANIMALS. Lester F. Wolterik. p.122-54 "Conference on the Use of Isotopes in Plant and Animal Research." Apr. 1953. **33p.** (TID-5098)

General methods applicable to the use of radioactive isotopes as indicators when introduced into the metabolic

stream are reviewed. Specific techniques for turnover rate studies and space studies are described in detail. Hormone studies in general are discussed, and details of studies of normal I^{131} thyroid turnover, interrelations between the thyroid and the ovary, the effects of exogenous thyroxine upon the thyroid, techniques for use in studies of factors regulating the development and function of the mammary gland, and the effect of growth hormone on Ca^{45} uptake by bone are described in detail. Specific nutrition studies described include the effects of treatment with thyroxine, thiouracil, on estrogen on Ca^{45} exchange in the skeleton, and studies of the effects of vitamin B_{12} and penicillin on the absorption, deposition, and renal and hepatic blood clearance of Co^{60} . NSA 8-80

10553

THE ESTIMATION OF THE RADIATION-SENSITIVE VOLUME OF ACTH BY DEUTERON BOMBARDMENT. R. G. Child, A. W. Moyer, E. C. Pollard, and H. R. Cox. Arch. Biochem. Biophys. **61**, 291-98(1956).

Authors irradiated adrenocorticotrophic hormone molecules in dry state. They estimate the mol. wt to be about 2500, assuming exponential inactivation.

10554

DISTRIBUTION OF RADIOACTIVE SILVER COLLOIDS IN TISSUES OF RODENTS FOLLOWING INJECTION BY VARIOUS ROUTES. James C. Gammill, Brownell Wheeler, E. L. Carothers, and P. F. Hahn. Proc. Soc. Exptl. Biol. Med. **74**, 691-5(1950) Aug.

Intramuscular injection of dextrin-protected Ag^{111} -radiosilver colloid results in a high concentration of the injected material at the site of injection. Intravenous injection of a dextrin-silver colloid into rats and intraperitoneal injection of a gelatin-silver colloid into mice result in deposition of the silver in highest concentration in the reticuloendothelial system. Considerable silver was eliminated through the intestines and feces. The possible causes of such elimination under the conditions of this experiment are discussed. A method of preparing tissues of small bulk for determining radiosilver activity with the G-M counter is described. NSA 4-6310

10555

Michigan State College of Agriculture and Applied Science HORMONAL AND NUTRITIONAL FACTORS WHICH ALTER THE EFFECTIVE HALF-LIVES AND DIFFERENTIAL ABSORPTION RATIOS OF CALCIUM, MANGANESE, AND COBALT IN THE ANIMAL BODY, SEMI-ANNUAL REPORT. L. F. Wolterink and E. P. Reineke. Feb. 20, 1950. 14p. (AECU-1015)

In pair-fed rats as little as 10 μ g of thyroxine daily for two weeks, an amount only slightly in excess of their own secretion rate, increased the rate of calcium turnover in the liver and the retention of calcium by the femur. Thiouracil had the opposite effect. In addition, thiouracil made the animals extremely sensitive to the subcutaneous radio-calcium chloride injections, particularly if the animals were on a vitamin D assay diet. If shock occurred, there appeared to be a diversion of the calcium to the lungs and liver. Daily subcutaneous injections of 10 μ g of the dimethyl ether of stilbestrol had no effect on calcium turnover although this treatment usually depresses iodine turn-over in the thyroid. Vitamin B_{12} administration to deficient chicks and pigs usually increased iodine turnover in the thyroid. When administered to normal rats or mice, iodine uptake by the thyroid was reduced. The effect of vitamin B_{12} on calcium retention is currently being investigated in the light of its antithyrototoxic effects. Cobalt turnover will then be studied.

10556

Technical Information Service, AEC
UTILIZATION OF GROSS FISSION PRODUCTS. A BIBLIO-

GRAPHY OF UNCLASSIFIED REPORT LITERATURE. Gifford A. Young, comp. Feb. 1954. 32p. (TID-3046)

In order to realize the important potential benefits to industry, the general public, and the Atomic Energy Commission of industrial utilization of the waste fission products from nuclear reactors, the Commission has instituted research programs at various universities and institutions designed to develop uses for these products. Both practical applications of intense radiation and fundamental studies of chemical, physical, and biological effects of radiation are in progress. All unclassified reports related to this program that have been issued up to January 1, 1954 by the cooperating establishments are abstracted in this bibliography of 92 references. NSA 8-2275

10557

A CRITICAL TEST OF THE RECOMBINATION THEORY OF MULTIPLICITY REACTIVATION. R. Dulbecco. J. Bacteriol., **63**, 199-207(1952).

Eliminating *E. coli* cells of varying surface areas is not enough to bring observed inactivation curves of T_4 phage (after ionizing radiation exposures) in line with theoretical curves in the genetic substitution hypothesis.

10558

PLASMA IRON AND SATURATION OF PLASMA IRON-BINDING PROTEIN IN DOGS AS RELATED TO THE GASTRO-INTESTINAL ABSORPTION OF RADIOIRON. C. L. Yuile, J. W. Hayden, J. A. Bush, H. Tesluk, and W. B. Stewart. J. Exptl. Med., **92**, 367-73(1950) Oct. 1. NSA 4-6318

10559

Stanford Research Inst.
AN EXPERIMENTAL STUDY OF THE DIRECT AND INDIRECT EFFECTS PRODUCED BY X-RAY IRRADIATION AND BY RADIOACTIVE ISOTOPES, WITH SPECIAL REFERENCE TO THE PROTECTIVE ROLE OF THE SPLEEN: FINAL REPORT, NOV. 1, 1952. 23p. (AECU-2491). NSA 7-2953

10560

Rochester Univ., New York.
URANYL NITRATE, FOUR ONE-YEAR INHALATION TOXICITY STUDIES OF ANIMALS. Robert G. Yaeger. May 17, 1948. Dec. 1, 1948. 112p. NNS Div. 6, Vol. 1, Pt. 3, Chap. 21. (AECU-2129; UR-30)

A comparison of the effects of daily inhalation exposure of animals for one year to uranyl nitrate was made by 4 studies performed concurrently at concentrations of 0.08, 0.3, 0.5 and 4 mg/m^3 of air, respectively. Approximately 24 dogs and 200 rats were exposed to each level, 20 rabbits and 30 guinea pigs were added to the 2 highest levels 5 1/2 months after the start of exposure of dogs and rats. Neither the dog nor the rat exposed to concentrations below 0.5 mg/m^3 of dust (approximately 0.3 mg/m^3 at the end of a one-year period showed appreciable weight loss, significant biochemical change, or renal damage when compared with controls. Exposure at this level produced some degree of injury in almost all exposed dogs, in 50 per cent of the rabbits, but only in an occasional rat, and no changes whatsoever in the guinea pig. Associated with renal injury was biochemical evidence of blood NPN elevation, urinary protein and plasma carbon dioxide decrease. At the 4 mg level only one dog was free from renal injury of some degree from uranium. In this group of animals injury was marked in 1, moderate in 11 and mild in 3. Likewise all rabbits showed renal injury from extensive to slight and 2/3 of all rats showed varying degrees of renal injury from traces of acute injury to marked atrophy, the guinea pig kidney showed no changes at this level. The guinea pigs and the rabbits, however,

were exposed for only 6.5 months. Only at the highest level did appreciable accumulation of uranium occur in the tissues and this was confined chiefly to the hard tissues, minimal amounts of uranium were found in both bone and tooth at the 0.5 mg level. In the 4 studies comprising almost 1000 animals, only 1 dog and 22 rabbits died from causes attributable wholly or in part to uranium. Thus, exposure at concentrations below 0.5 mg uranyl nitrate/ m^3 for one year appears to be essentially noninjurious and constitutes safe exposures for dogs and rats. The level of 0.5 however, was moderately injurious to the majority of dogs and rabbits exposed, mildly so to rats, and completely nontoxic to guinea pigs. Four milligrams of uranium nitrate dust was almost uniformly injurious to dogs, rabbits, and rats, though less so to the rabbit species, and completely nontoxic to guinea pigs
NSA 1-612

10561

INFLUENCE OF POST-IRRADIATION ADMINISTRATION OF METHIONINE ON THE LEVELS OF DEOXYRIBONUCLEIC ACID IN BONE MARROW, SPLEEN AND LIVER OF RATS. M. K. Nerurkar, A. J. Baxi, N. S. Ranadive, M. V. Nerurkar, and M. B. Sahasrabudhe. *Nature* 180, 193(1957).

Administration of methionine after irradiation reduced the loss of DNA from spleen and marrow cells of rats.

10562

DISTRIBUTION AND EFFECT OF COLLOIDAL RADIOACTIVE GOLD IN PERITONEAL FLUID CONTAINING FREE SARCOMA 37 CELLS. Horace Goldie and Paul F. Hahn. *Proc. Soc. Exptl. Biol. Med.* 74, 638-42(1950) July.

Two to five days after intraperitoneal inoculation of 10,000 (in one series, 50,000) free sarcoma 37 cells from peritoneal fluid, several series of CFW mice were treated with a single intraperitoneal injection of 0.2 to 0.44 mc of colloidal radioactive gold. Control mice remained untreated or were treated with inactive (decayed) gold preparations. On 3 consecutive days after treatment, specimens of peritoneal fluid were withdrawn by exploratory puncture from treated and control mice. Stained smears from these specimens revealed the absence of tumor cells or cytological abnormalities therein in gold treated mice, while in controls the tumor cells were numerous and showed high proportion of mitoses. The nonviability of morphologically altered cells was demonstrated by their inability to multiply or even to survive after their transfer into new mice. Ultramicroscopic colloidal gold particles mixed immediately after injection with the peritoneal fluid became condensed, after 24 to 48 hr, into dot-like particles in the cytoplasm of macrophages and during the following days into coarse clumps. The macrophages loaded with gold particles maintained their structural and functional integrity, lymphocytes and polymorphonuclears were partially and temporarily destroyed by radiation effect. It is concluded that in the cellular peritoneal exudate from mice inoculated intraperitoneally with S-37 cells, the tumor cells were highly sensitive to small amounts of radiation well tolerated by the mice themselves while macrophages showed very high resistance to the same agent. Thus, the complete destruction of free tumor cells in the peritoneal cavity of the mice may be described as a selective radiotherapeutic effect of radioactive colloidal gold. 12 references. (auth) NSA 4-5597

10563

THE EFFECT OF PARTICLE SIZE ON BLOOD CLEARANCE AND TISSUE DISTRIBUTION OF RADIOACTIVE GOLD COLLOIDS. D. B. Zilversmit, George A. Boyd, and Marshall Brucer. *J. Lab. Clin. Med.* 40, 255-60(1952) Aug.

It has been shown that relatively large colloidal gold particles were removed from the blood stream of dogs at a more rapid rate than the smaller ones. The liver and spleen took up 80 to 90 per cent of the injected gold independent of particle size within the range studied.
NSA 6-6297

10564

MULTIPLICITY REACTIVATION OF BACTERIOPHAGE INACTIVATED BY IONIZING RADIATIONS. J. J. Weigle and G. Bertani. *Virology*, 2, 344-55(1956).

Studies on the "multiplicity reactivation" phenomenon in T_2 coliphage after ionizing irradiation indicate that radiosensitivity is greater when only one treated particle is present/host cell in the mixture of phage and bacteria. "Multiplicity infection" (more than one phage particle/bacterium) results in reactivation. This reactivation is seen after γ irradiation of isolated T_2 . When soft x-rays are used, however, sensitivity is changed only after irradiation of phage absorbed in host cells. Damage in the virus can be substituted for by another damaged particle, probably a genetic phenomenon like that after U-V. (Genetic substitution).

10565

Univ. of Calif., Los Angeles, Atomic Energy Project THE AVAILABILITY OF RADIO-STROMTIUM TO MAMMALS BY WAY OF THE FOOD CHAIN. Warren J. Gross, Janice F. Taylor, Joshua A. Lee, and James C. Watson. Issued June 18, 1953. 26p. (UCLA-259)

Sr^{90} is selectively metabolized by rats when ingested in the form of barley or lettuce grown on $Sr^{90} + Y^{90}$ contaminated soil. Aggregation occurs in the tissues (mainly skeletal) when such doses are administered at the rate of 500 to 1000 dis/sec/day. Deposition from contaminated plant material is less than from equal doses of $Sr^{90} + Y^{90}$ in aqueous solution. The rate of deposition of Sr^{90} from equal daily oral doses of $Sr^{90} + Y^{90}$ decreases with time during a prolonged feeding experiment. Thus young rats fed daily $Sr^{90} + Y^{90}$ in solution over a seven-day period retained 7.9% total dose while young rats given daily doses of $Sr^{90} + Y^{90}$ over a seventeen-week period retained only 1.8% total dose. The amount of Sr^{90} deposited from oral doses is influenced little, if any, by the amount of stable Sr in the diet at the time of the Sr^{90} ingestion. Stable Sr, however, apparently effects the release of deposited Sr^{90} from the tissues when it is administered orally in massive doses ten days following the ingestion of Sr^{90} . This suggests stable Sr as a therapeutic agent. No radiation effects are identified in any of the experimental animals even in the extreme case where rats were given doses of $Sr^{90} + Y^{90}$ of 2783 dis/sec over a seventeen-week period. A method for predicting the maximum level of retention under a given set of conditions for any radioisotope of any physiological element is discussed. Rats fed $Sr^{90} + Y^{90}$ over a seventeen-week period with the daily dose of 2733 dis/sec for a cumulative dose of 431,000 dis/sec averaged a retention of 5976 dis/sec or sixty-six % of the calculated maximum. The observed retention after thirty daily doses of 688 dis/sec was 2293 dis/sec, also sixty-six % of the calculated maximum. (auth) NSA 7-4717

10566

Argonne National Lab.

EFFECT OF SODIUM AND ZIRCONIUM CITRATES ON BLOOD LEVEL, DISTRIBUTION, AND EXCRETION OF INJECTED RADIOLEAD. Jack Schubert and Marcia R. White. Feb. 1951. 22p (AECU-1227, UAC-356)

The effects of Zr and Na citrates on the blood disappearance, tissue distribution, and excretion of soluble Pb salts injected intravenously into rats at two concentrations- carrier-free and with added carrier- have been studied. At the tracer level, Pb^{210} disappeared from the

blood (essentially the cellular fraction) with a half time of 30 hr. When injected with carrier Pb, the half time of disappearance of Pb^{210} from plasma was 42 min. Na or Zr citrate injected after carrier-free Pb^{210} did not affect the rate of disappearance of Pb^{210} from the blood, the tissue distribution, or the fraction excreted. In rats injected with carrier amounts of Pb labeled with Pb^{210} , Zr and Na citrate both caused some redistribution of Pb^{210} , but neither affected the immediate rate of disappearance of Pb^{210} from the blood. Zr citrate caused at least a threefold increase in the Pb^{210} excreted during the first 24 hr. The action of many drugs used to treat Pb poisoning is explained by the supposition that they slow down the rate of transfer of Pb from the tissues into the circulation, the ensuing natural rapid drop in the plasma Pb level relieves the symptoms of Pb poisoning. (auth)

NSA 5-3326

10567

THE EFFECTS OF HYPOPHYSECTOMY AND OF GROWTH HORMONE ON THE UPTAKE OF RADIOACTIVE PHOSPHORUS BY TISSUES. Irving I. Geschwind, Choh Hao Li, and Herbert M. Evans. *Arch. Biochem. Biophys.* 31, 168-82 (1951) Apr.

Normal and hypophysectomized animals, fed ad lib., both with and without growth hormone treatment, were injected with $4\mu c$ of P^{32} /100 g body weight and then were autopsied at varying time intervals following the injection. The effects of hypophysectomy and of growth hormone therapy on P^{32} uptake in plasma, liver, kidney, thymus, muscle, and tibia were also studied. In general, hypophysectomy resulted in increased uptake in the first 4 and decreased uptake in the last 2. Growth hormone tends to counteract, at least partially, the effects of hypophysectomy. NSA 5-3864

10568

CONCENTRATION OF IODINE IN THE HUMAN STOMACH AND OTHER TISSUES AS DETERMINED WITH RADIOACTIVE IODINE. Richard E. Goldsmith, Charles D. Stevens, and Leon Schiff. *J. Lab. Clin. Med.* 35, 497-503 (1950) Apr.

The distribution of I^{131} in the tissues of 14 subjects injected intravenously with varying quantities of radioactively labeled sodium iodide was measured, these subjects died from 3 to 159 hr after the administration of the iodine. The thyroid gland contained much higher concentrations of I^{131} than did the blood serum, stomach tissue from 10 of 13 subjects sampled contained two or more times the concentration of I^{131} present in the blood serum, none of the other nine tissues examined showed similar ability to concentrate the I^{131} . In tissues other than the stomach and thyroid, I^{131} was distributed like chloride only in those subjects who received large quantities of sodium iodide and who died shortly thereafter. 24 references.

NSA 4-3367

10569

STUDIES ON THE SALIVARY SECRETION OF IODIDE. Zeth Gabrielsen and Arthur L. Kretschmar (Oak Ridge Inst. of Nuclear Studies, Tenn.). *J. Clin. Endocrinol. and Metabolism* 16, 1347-53 (1956) Oct. NSA 10-11681

10570

FUNCTIONAL AND MORPHOLOGICAL CHANGES OF THE THYROID GLAND IN THE RAT FOLLOWING THE ADMINISTRATION OF VARIOUS DOSES OF RADIOACTIVE IODINE I^{131} . M. Jovanovic, V. Pantic, et al. (*Univ. of Belgrade*). 16p. (*A/CONF.15/P/479*)

The rate of the basal metabolism in rats was measured for 80 days after the administration of radioiodine in doses of 20, 50, 100, and 300 μc in order to establish the degree of the injuries in thyroid gland and the intervals after which these injuries took place. The results obtained by examination of the oxygen consumption were compared

with the results obtained by the examination of the radioiodine fixation and with the morphological structure of the thyroid gland. Data indicate that the oxygen consumption rate is not a sufficiently sensitive indicator for establishing the lighter morphological and functional injuries in the thyroid gland. NSA 13-6116

10571

George Williams Hooper Foundation for Medical Research and California Univ.

SUBJECT INDEX TO RADIOISOTOPE RESEARCH AND TECHNIQUES. (INCLUDING USE OF RADIOACTIVE CALCIUM, FLUORINE, PHOSPHORUS, SODIUM AND STRONTIUM.) Elizabeth Jennings. nd. 113p. (NP-1926)

Subject headings and division cover the following: general use of radioisotopes in biology, medicine, and dentistry, health physics, instruments; methods, nuclear physics, radiocalcium, radiochemistry, radiochemical laboratories, radiofluorine, radioisotopes in bacteriology; radiophosphorus, radiosodium, radiostrontium; books, review articles, statistical and mathematical evaluations, and index of authors. NSA 5-2026

10572

THE BASAL METABOLISM OF RATS FOLLOWING THE INJECTION OF RADIOACTIVE IODIDE. C. L. Gemmill, K. R. Crispell, and K. M. Browning (Univ. of Virginia, Charlottesville, Va. School of Medicine). *Endocrinology* 59, 522-5 (1956) Nov.

Large doses of radioactive iodide were given to rats. Their basal metabolism was followed before and after this injection. For a period of several months following the injection cyclic changes were noted in their metabolic activity. These changes are interpreted as attempts on the part of the thyroid gland to recover. The final value of basal metabolism following radioactive iodide removal of the thyroid gland was comparable to the values obtained following surgical removal. For the testing of compounds for metabolic activity, rats may be used with their thyroid glands removed by radioactive iodide or by surgery interchangeably. NSA 11-842

10573

University of California, Berkeley
IMMEDIATE AND DELAYED BIOCHEMICAL AND BIOLOGICAL EFFECTS OF IRRADIATION ON ANIMAL TISSUE. Hardin B. Jones and others. (Status Report No. 3, June-December, 1947). 1947. (TIP-U-547)

Adult rats were injected intraperitoneally with 14, 170, and 500 microcurie of I^{131} . Animals were sacrificed after injections. The I of the thyroid gland was fractionated into organic and inorganic, both chemical and radioactive measurements were made. The gland began to lose I rapidly 24 hours following injection of 500 microcurie of I^{131} . The effect of irradiation upon the thyroxine-I metabolism was insignificant up to dosages of 35,000 β -r equivalents. Thyroxine was formed as long as the cells were intact. The colloidal substance of the thyroid was particularly sensitive to irradiation. Its disappearance was one of the first changes noticed, but in spite of its absence synthesis of thyroxine took place. Methods for localizing radioactive compounds in the liver, spleen, and bone marrow are summarized. NSA 1-30

10574

RECOVERY FROM LETHAL X-RADIATION INJURY IN AMOEBAE AFTER INJECTION OF CENTRIFUGAL PORTIONS OF NONIRRADIATED CELLS. E. W. Daniels. *Radiation Research*, 5, 604-5 (1956).

Irradiation of *Pelomyxa illinoisensis* (an amoeba) followed by injection of protoplasm from unexposed cells prevented death of the irradiated cells. By centrifuging donor cells, it was possible to test various fractions of cytoplasm.

10575

SELECTIVE STERILIZATION OF YOUNG FEMALE MICE BY RADIOIODINE TRANSMITTED THROUGH THE MOTHER'S MILK. R. Rugh. *Proc. Soc. Exptl. Biol. Med.*, 83, 762-64 (1953).

All female offspring of mice were sterile within ten months after ingesting I^{131} in milk from mothers fed 300-600 μC I^{131} (and transmitting about 5% of dose to sucklings). Total dose received by female offspring was not more than 30 μC I^{131} . Males were not affected.

10576

DETERMINATION OF THE INITIAL UPTAKE RATE OF RADIOIODINE BY THE THYROID BY MEANS OF TWO SCINTILLATION COUNTERS. G. Joyet. *Z. Med. Isotopenforsch.* 1, No. 1, 11-25 (1956) Nov. (In French).

With the aid of a statistics in 222 cases, it is shown, that the initial tangent T'_0 of the radioiodine uptake curve, after intravenous injection of radioactive iodine, is the determining element for the differentiation of normal and pathological thyroid behavior. A new instrument is described with two scintillation counters, which enables the correct determination of T'_0 on the reclining patient, after an injection of 10 to 20 microcuries of I^{131} . A main counter, properly suspended with an appropriate collimator and an optical adjustment for determining the distance, measures the activity of the thyroid and the neck. A second counter enables the determination of the correction for the extra-thyroidal activity, based on measurements on the thigh and around the thyroid. This correction is essential for obtaining an accurate determination of the initial uptake rate of the thyroid. NSA12-6427

10577

URINARY EXCRETION OF RADIOACTIVE SULFUR. Paul Gyorgy. p.15-19 of TRANS. OF SEVENTH CONFERENCE ON LIVER INJURY HELD JAN. 15-16, 1948, AT NEW YORK CITY. F. W. Hoffbauer, ed. New York, Josiah Macey, Jr. Foundation, 95p.

The detection of S^{35} compounds in the urine by a "paperogram" method is described. The paperogram for rats which were fed methionine shows an S^{35} peak in the inorganic sulfate fraction. It was found that oral administration of radioactive methionine followed by injection of C_6H_6 gave a peak in the ethereal sulfate fraction. The ethereal peak was small and the inorganic sulfate peak was absent when C_6H_5OH and methionine were administered simultaneously and the oral administration of C_6H_5Br resulted in 2 peaks which were attributed to inorganic sulfate and mercaptic acid. From these preliminary experiments it is concluded that this method may be useful in the investigation of the metabolism of methionine in the urine NSA 2-2237

10578

Argonne National Lab.

THE EFFECT OF BAL ON THE DISTRIBUTION AND METABOLISM OF P^{32} AND Sr^{90} . Walter E. Kiseleski and William P. Norris. *Apr.* 1951. 7p. (AECU-1368, 383)

The effectiveness of 2,3-dimercapto-1-propanol (British antilewisite, BAL) in increasing the elimination of injected P^{32} and Sr^{90} in mice was investigated. It is concluded that BAL is essentially without effect although, in the case of P^{32} , the rate of uptake in bone appears to be reduced during the first hour. No such difference could be demonstrated after 24 hr. NSA 5-4665

10579

ACTION OF IONIZING RADIATIONS ON THE COURSE OF PREGNANCY AND ON THE FETUS. V. V. Kholin. Translated from *Klin. Med.* (U. S. S. R.) 33, No. 6, 24-7 (1955). 4p. (AEC-tr-3603)

Results are summarized from a number of studies on the effects of ionizing radiations on the course of preg-

nancy and on the fetus. Disturbances of pregnancy during various stages are described. It was concluded that the occurrence of concrete anomalies of development under the influence of radiations is characteristic for various stages of the formation of the fetus. The doses which cause abnormalities of development during the period most characteristic for their occurrence differ with the anomalies. Results are included from a study of the tissue distribution of strontium-89 and plutonium in the developing fetus. Considerable concentration of strontium was found to occur in the fetus, where its accumulation was greater than in the mother. Plutonium was retained primarily in the mother. NSA 13-10789

10580

EFFECTS OF RADIOACTIVE IODINE ON FREE SARCOMA 37 CELLS IN THE PERITONEAL FLUID OF THE MOUSE. Horace Goldie and Paul F. Hahn. *Proc. Soc. Exptl. Biol. Med.* 74, 634-8 (1950) July.

CFW mice of 25 g weight were inoculated intraperitoneally with requisite numbers (mostly 10,000) of S-37 cells and treated intraperitoneally with radioactive iodine (I^{131}) (0.2 or 0.4 mc). The fate of tumor cells was studied by repeated withdrawal and examination of peritoneal fluid in each mouse and compared with their fate in control animals (inoculated with the same dose of cells, but untreated or treated with decayed I^{131}). The examination of each specimen of peritoneal fluid consisted (a) in the microscopic assay of integrity and ability for multiplication (percentage of mitoses) of free tumor cells which multiplied in the peritoneal fluid before treatment, and (b) in the biological assay of viability of tumor cells, i. e., their ability to survive and multiply after transfer into new mice. The results indicate that with a single exception (tumor strain C isolated from a treated mouse) all tumor cells suffered loss of viability even after treatment with the minimal dose (0.2 mc) of I^{131} . In most mice this effect was detected only after the failure of tumor cells from treated animals to grow in the peritoneal fluid of new animals. In other animals, where higher dose of radiation was used, or, presumably, where nutrient environment was drastically changed, the tumor cells disintegrated in the body of the treated mouse. Rapid disappearance (after 24 to 48 hr) from the peritoneal fluid of injected radioactive preparation suggested the differentiation between its early and primary effect (which may be the production of a "lethal mutation") and its later secondary effect (cell disintegration) may be due to additional factors (higher dose of radioactivity), drastic changes in the biological medium. NSA 4-5369

10581

Anesthesia Lab., Harvard Medical School and Biophysical Lab., Harvard Medical School
BRAIN POTASSIUM EXCHANGE IN NORMAL ADULT AND IMMATURE RATS (THESIS). Robert Katzman and P. Herbert Leiderman. 1953. 30p. (AECU-2677)

Sixty-eight normal adult male rats were injected intraperitoneally with radioactive K. The animals were sacrificed at intervals of 4, 16, 39, 54, and 72 hr by decapitation, and plasma and brain activity and total K were measured. The general exchange equation, $d(K^{42})_{br}/dt = k_1(K^{42})_{pl} - K_2(K^{42})_{br}$, was solved by graphical methods for the transport coefficients k_1 and k_2 and from these values the influx and outflux were calculated. Similar studies were done on animals 4, 15, and 35 days old and on animals more than 18 months old. The influx of K into the brain of normal adult rats was found to be 2.89 meq/kg/hr, the outflux rate 3.64 meq/kg/hr, and the influx/outflux ratio 0.80. Since a steady state obtains, the outflux must be equivalent to influx. Therefore 20 meq of K per kg of wet brain is not exchangeable with K^{42} . The influx in 4-day- and 15-day-old animals is 3.9 meq/kg/hr and in 35-

day animals the influx is 3.1 meq/kg/hr. All brain K was found to be exchangeable in 4-, 15-, and 35-day rats. Brain K exchange in older rats was found to be similar to that of normal young adults. NSA 7-6358

10582

THE EFFECT OF IONIZING RADIATION ON THE INTERFERING PROPERTY OF INFLUENZA VIRUS. W. F. Powell and E. C. Pollard. *Virology*, 2, 321-36(1956).

The part of the influenza A virus that represents its interfering property (interfering with production of hemagglutinins, infective virus, and complement fixation antigen) is shown by irradiation studies to have a molecular weight of 1.6×10^6 .

10583

THE DISTRIBUTION OF I^{131} IN TISSUE OBTAINED AT NECROPSY OR AT SURGICAL OPERATION IN MAN. George S. Kurland and A. Stone Freedberg. *J. Clin. Endocrinol.* 11, 843-56(1951) Aug.

The distribution of I^{131} is reported in seven euthyroid patients given 300 to 850 μ c of I^{131} 4 to 168 hr before orchidectomy or oophorectomy and in six cases given 1.7 to 39.1 mc 1 to 8 days before death. Data indicate that the major portion of the radiation was to the thyroid gland. Other organs were shown to receive 1% or less of the radiation delivered to the thyroid. In order of decreasing I^{131} uptake per gram of tissue, these organs were lung, kidney, pituitary, liver, gonad, spleen, adrenal, and pancreas. NSA 5-6609

10584

DISAPPEARANCE OF ISOTOPICALLY LABELED GOLD COLLOIDS FROM THE CIRCULATION OF THE DOG. C. W. Sheppard, Gilbert Jordan, and P. F. Hahn. *Am. J. Physiol.* 164, 345-50(1951) Feb. 1; (ORNL-689)

Immediately following injection of radioactively tagged colloidal gold particles in the dog the circulatory level drops exponentially with time, the half-value time being about 1 1/2 min. A very low residual level is reached in about 10 to 20 min showing occasional fluctuations. A high concentration of activity is then found in the buffy coat fraction, and if blood is withdrawn and transfused into a second animal the initial rapid rate of decline is not observed. The possibility is explored that the rate of the initial disappearance might be quantitatively related to the total blood flow rate to the liver. NSA 5-2104

10585

SELECTIVE UPTAKE OF Zn^{65} BY DORSO-LATERAL PROSTATE OF RAT. S. A. Gunn, Thelma C. Gould, S. S. Ginori, and Jerome G. Morse (Univ. of Miami, Fla.). *Proc. Soc. Exptl. Biol. Med.* 88, 556-8(1955). NSA 9-4462

10586

UPTAKE OF RADIOACTIVE IODINE AFTER INTRAVENOUS ADMINISTRATION OF TRACER DOSES. Joseph P. Kriss. *J. Clin. Endocrinol.* 11, 289-97(1951) Mar.

The thyroid uptake of I^{131} after intravenous administration has been studied in euthyroid subjects and in patients with various thyroid states. The uptake value 1 hr after administration of the tracer has been found to differentiate satisfactorily between the euthyroid and hyperthyroid state, and it exhibits excellent correlation with the degree of clinical toxicity. The method also offers advantages over the 24-hr oral method in rapidity and in diagnostic accuracy by reducing the overlap values between normal and hyperthyroid subjects. NSA 5-3339

10587

NOTIONS ON SENSITIVITY OF CELLS TO RADIATION. O. A. Schjeide, J. F. Mead, and L. S. Myers. *Science*, 123, 1020-22(1956).

Authors propose that cellular radiation damage is the result of radiation-produced oxidants in the cell nucleus.

10588

THE EXPERIMENTAL APPLICATION OF RADIOACTIVE COLLOIDAL GOLD IN THE TREATMENT OF PELVIC CANCER. Alfred I. Sherman, James F. Nolan, and Willard M. Allen. *Am. J. Roentgenol. Radium Therapy* 64, 75-85(1950) July.

Radioactive gold (Au^{198}) suspended in pectin solution was used as an interstitial therapy method in the treatment of transplanted squamous cell carcinoma in mice. It was found that these tumors could be safely and completely cured, with high survival rates using this therapy. The optimum dose required for cure was found to be 200 to 300 μ c per cm^3 of tumor tissue. Radioactive gold in colloidal pectin suspension was injected into the paracervical tissue of rabbits. It was found that the gold entered the lymphatic system and reached the primary and secondary regional lymph nodes. There were definite irradiation effects noted in these areas. Radioactive gold when injected into the peritoneal space found its way into the retroperitoneal lymph nodes causing marked irradiation effects. Radioactive gold in pectin solution was introduced into the uterine horns of rabbits and left in situ. In the presence of this material the usual progestational response with rapid growth and mitosis resulting from stimulation with chorionic gonadotrophin was inhibited. The range of irradiation included the ovaries which also showed irradiation effects. The normal tissue responsiveness had not returned after 6 weeks. The gold was also found phagocytosed and carried to the lymphatics of the submucosal and subperitoneal tissues and to the immediate lymph nodes draining these areas. During the experiments with radioactive gold it became necessary to study and define tissue tolerance levels by this form of radiation therapy. The tissue selected for study was the parametrium of the rabbit. The results indicate that doses of radiogold at therapeutic levels are not injurious to normal structures. The results of these experiments in lower animals qualify the effectiveness and limitations of radioactive colloidal gold in pectin solution as a mode of treatment in carcinoma of the uterus. The physical characteristics of the material and its behavior in relation to biologic processes suggest its use as an adjunct to present methods of radiation therapy in this disease. 21 references. NSA 4-5368

10589

RADIOCALCIUM AS AN INDICATOR IN THE STUDY OF THE ACTION OF ESTRADIOL ON CALCIUM METABOLISM. J. Govaerts, M. J. Dallemagne, and J. Melon. *Endocrinology* 48, 443-52(1951) Apr. NSA 5-3871

The influence of estrogen on Ca metabolism in soft tissues and skeleton has been studied in pigeons by the use of Ca^{45} . Daily estrogen injections produce an increase of Ca metabolism to a higher degree than can be observed to occur by normal hormonal secretion. The excretion of Ca is decreased by estrogen injections and at the same time the over-all retention of Ca is increased, yielding a biological half life of Ca of about 75 days instead of the 45 days in the controls. The distribution of Ca in bone was also studied by the radioautographic technique. NSA 5-3871

10590

HISTOLOGICAL STUDIES OF THE ADRENAL OF INBRED C57B MICE AFTER TOTAL BODY X-IRRADIATION. J. Haase and F. Kroning. *Endokrinologie*, 32, 8-23(1954). (In German).

Authors describe changes in irradiated adrenals in mice. They feel that adrenal damage correlates well with incidence of leukemia in C57Black mice.

10591

EFFECT OF IONIZING RADIATION ON HAEMOGLOBIN AND CYTOCHROME. H. Laser. *Nature*, 176, 361(1955).

The initial reaction brought about by ionizing radiation is mainly dependent on the state of the material and its ability to react with either oxidizing or reducing agents independently of the presence of oxygen. The initial reaction product may undergo secondary or even a series of further changes during irradiation or, as with cytochrome c, after irradiation on admission of oxygen to an anaerobically irradiated sample.

10592

THE INDUCTION OF HAPLOIDY IN TETRAHYMENA PYRIFORMIS FOLLOWING X-IRRADIATION. A. M. Elliott and G. M. Clark. *J. Protozool.* **3**, 181-87 (1956).

Conjugation in *Tetrahymena pyriformis* was disturbed by high x-ray doses but there was no disturbance in nuclear behavior at conjugation (300 kr).

10593

THE ANEMIA OF INFECTION. XI. THE EFFECT OF TURPENTINE AND COBALT ON THE ABSORPTION OF IRON BY THE RAT. Clark J. Gubler, George E. Cartwright, and Maxwell M. Wintrobe. *J. Biol. Chem.* **184**, 575-8 (1950) June.

The influence of turpentine-induced abscesses and of cobalt administration on the absorption of iron has been investigated in weanling male Sprague-Dawley rats by determining the total amount of radioactive iron retained in the body during the period of treatment. Turpentine was found to decrease the absorption of iron, and this effect could be reversed by the administration of cobalt. Cobalt administration did not significantly affect the absorption of iron in normal rats. NSA 4-4514

10594

BIOLOGIC EFFECTS OF RADIOACTIVE PHOSPHORUS POISONING IN RATS. Simon Koletsky and James H. Christie. *Am. J. Path.* **27**, 175-94 (1951) Mar.-Apr.

Lethal doses of P^{32} produced extensive morphologic lesions in rats. These were similar to previously described effects of radiation, from either external or internal source, in both animals and man. Similar changes result also from the nitrogen mustards. By virtue of its distribution, P^{32} acted as a powerful hemopoietic poison producing aplasia of the bone marrow and hypoplasia of the lymphoid tissues of the body, including spleen and thymus. This was reflected in the peripheral blood by rapidly developing leukopenia, thrombocytopenia, and anemia. In addition, the intestinal tract, especially the small bowel, and the gonads were sensitive to radiation. Organs such as liver, pancreas, adrenals, kidney, heart, and brain were radioresistant. Destruction of tissue occurred rapidly, being well developed from 6 to 12 hr after injection of the P^{32} . The principal mode of cell destruction was by karyorrhexis. Most of the resulting debris was removed by the 2nd or 3rd day. Involution of the hemopoietic organs was marked at the end of 24 hr and was then progressive over the next several days. During the period of necrosis and involution the animals usually were in good condition and asymptomatic. However, this latent interval was followed by progressive inanition, debility, and weight loss, terminating in death within 3 weeks after administration of the P^{32} . At the time of death there were aplasia of bone marrow, atrophy of lymphoid tissues, and persistent leukopenia, but the hemopoietic system often revealed beginning or even fairly substantial regeneration, the intestinal damage was largely repaired, whereas the injury to testes was progressive. In animals that recovered there was usually good repair of bone marrow and lymph nodes after a few months. Regeneration was less effective in spleen and thymus, and in the testis generally ranged from slight to negligible. One of the late effects of P^{32} poisoning was the development of malignant neoplasms. The mechanism of radiation death is not established. With massive doses of P^{32} , after

which death takes place within a few days, the outcome is usually attributed to a general toxemia resulting from extensive destruction of tissue. With LD_{50} doses of P^{32} , after which death occurs within a few weeks, the almost constant presence of infectious lesions suggests that bacterial toxemia may be significant. 30 references.

NSA 5-2333

10595

Western Reserve University, Atomic Energy Project
EFFECT OF ANTIBIOTICS ON MORTALITY FROM INTERNAL RADIATION. Simon Koletsky. Sept. 28, 1950. 14p. (NYO-1614).

Streptomycin and penicillin in combination proved effective in reducing the mortality of rats given lethal doses of radioactive phosphorus. Morbidity was also reduced and survival time prolonged. NSA 5-759

10596

SOME RESULTS AND INTERPRETATIONS OF X-IRRADIATION STUDIES WITH ESCHERICHIA COLL. C. R. Goucher, L. Kamei, and W. Kocholaty. *Arch. Biochem. Biophys.*, **65**, 522-33 (1956).

Authors discuss results of various studies on effect of cell concentration on survival of bacteria after x-irradiation, and report results of studies on respiratory activity as determinant of radiosensitivity. Pre-exposure incubation with succinate does not protect *E. coli* B/r unless O_2 equilibration with air is prevented during exposure. Malonic acid did not affect succinate protective effect.

10597

PRODUCTION OF MALIGNANT TUMORS IN RATS WITH RADIOACTIVE PHOSPHORUS. Simon Koletsky, Frederick J. Bonte, and Hymer L. Friedell. *Cancer Research* **10**, 129-38 (1950) Mar.

Adult white male rats of the Wistar strain, weighing about 150 g, were used in experiments in which the incidence of neoplasms was observed following either the injection of a LD_{50} dose of P^{32} (4.5 μ c/g of body weight) or repeated injections of P^{32} (1.5 μ c/g body weight every three weeks) for a total dose of 9 or 12 μ c/g, spontaneous bone tumors have not been observed among control animals of this strain. Complete autopsies were performed on all rats which died or were sacrificed, and in almost all the animals routine microscopic sections of the femur and vertebrae were taken. Of the 19 animals in the first group, 9 developed malignant neoplasms but were otherwise in good condition, except for the last few weeks of life. Of 15 rats in the second group, 4 were discarded, and of the remaining 11, 4 developed neoplasms. Of the total of 13 neoplasms, 3 were squamous-cell carcinoma involving the face and were associated with exophthalmos, 10 were osteogenic sarcomas, 4 of which were located in the jaw, 2 in the spine, 2 in the tibia, and 1 each in the femur and pelvis, 4 of these latter tumors metastasized to the lungs. The incidence of tumor development was about 40%. A typical proliferation of bone was usually found in the rats and the lesions, it is concluded, may have served as a precursor to malignant changes. NSA 4-2864

10598

UPTAKE OF P^{32} INTO VARIOUS PHOSPHORUS-CONTAINING FRACTIONS IN THE BRAIN OF NORMAL, HYPOPHYSECTOMIZED AND ACTH-TREATED HYPOPHYSECTOMIZED RATS. J. J. Koesis (Chicago Univ., Chicago, Ill Dept. of Pharmacology). *Endocrinology* **59**, 591-3 (1956) Nov. NSA 11-901

10599

ACTION OF X-RAYS ON MAMMALIAN CELLS. T. T. Puck and P. I. Marcus. *J. Exptl. Med.*, **103**, 653-66 (1956).

The ability of the HeLa cell to form colonies is a radiosensitive cell function with a multi-hit response curve

having a shoulder extending to about 200 r. Some cells that cannot form colonies continue to grow without dividing and become giant cells.

10600

STUDIES ON NAGASAKI (JAPAN) CHILDREN EXPOSED IN UTERO TO THE ATOMIC BOMB. A ROENTGENOGRAPHIC SURVEY OF THE SKELETAL SYSTEM. Wataru W. Sutow and Emory West (Atomic Bomb Casualty Commission). *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 74, 493-9(1955) Sept.

A roentgenographic survey of the skeletal system was made on 74 children who were exposed in utero to the atomic bomb explosion in Nagasaki, Japan at distances under 2,000 meters from the hypocenter. The findings were compared with those on a group of 91 children also exposed while in utero to the bomb but at distances of 4,000 to 5,000 meters. No differences in the incidence of skeletal abnormalities were found between the two groups. NSA 9-6828

10601

Hanford Atomic Products Operation, Richland, Wash. GASTROINTESTINAL ABSORPTION, DISTRIBUTION, AND RETENTION OF PHOSPHORUS (P^{32}) BY RATS FOLLOWING FEEDING IN VARIOUS FORMS. B. Kavin and R. F. Palmer. June 21, 1956. 23p. Contract W-31-109-Eng-52. (HW-43836)

Following a single feeding of rats with either inorganic P^{32} , P^{32} incorporated in fish muscle, or P^{32} incorporated in plant leaves, no statistically significant differences in P^{32} distribution and excretion ascribable to the source of radioactivity were found over an experimental period of 40 days. About 25% of the P^{32} fed was not absorbed from the gastrointestinal tract and was rapidly excreted in the feces. The excretion of the absorbed fraction of P^{32} appeared to be distributed equally between urine and feces. There was no significant change in the quantity of radioactivity in the skeleton, which amounted to 13.5% of the fed dose of P^{32} , throughout the period covered by the experiment. The concentrations of P^{32} in the liver and other soft tissues were proportional to the P^{32} concentration of the blood. Studies of the distribution of inert and radioactive phosphorus in teeth and bones of the rat skeleton following intragastric administration showed a high concentration of inert phosphorus in teeth as compared to bone. The P^{32} was rapidly taken up and retained without loss by both bones and teeth. The P^{32} concentration was greatest in the incisors, less in the bones, and least in the molars. The femur was found to be a reliable measure of total skeletal P^{32} deposition, and the ratio, skeletal P^{32} to femur P^{32} , amounted to 24.6 ± 1.2 . Compared to those reported for humans, the calculated differential absorption coefficients were similar, but the P^{32} concentrations of the bones differed. NSA 11-1761

10602

OBSERVATIONS ON THE SKIN REACTION TO THE SUBCUTANEOUS APPLICATION OF METALLIC POLONIUM IN MICE. Leiv Kreyberg and Finn Devik. *Acta Radiol.* 35, 356-62(1951) May-June.

A nickel plate covered by polonium was introduced under the skin in a series of mice. Some of the polonium was dissolved in the tissue fluid and caused general and local radiation damage. The local changes are described in some detail, and the mechanism of the very marked hyperplasia is discussed. The evidence in favor of the existence of an indirect effect through the connective vascular system is stressed. NSA 5-6069

10603

Southern Research Institute
STATUS REPORT NO. 8 ON BODY RETENTION OF
CARBON-14 TO ATOMIC ENERGY COMMISSION, DIV-

ISION OF BIOLOGY AND MEDICINE, PROJECT NO. 121.
Oct. 9, 1950. 20p. (AECU-1014, Status Report No. 8)

A new series of long-term experiments designed to obtain information on the degree of radiation in the area of the bone shaft where $C^{14}O_2$ is laid down following a single exposure are underway. An experiment which entailed exposure of mice to a very active $BaC^{14}O_3$ aerosol followed by tissue-activity determinations, lung autoradiographs, and measurement of the exhaled CO_2 activity is described. Preliminary results indicate very rapid exchange of barium carbonate carbon with inactive carbonate ions in the lung as was to be expected. Studies on the effect of repeated injection of C^{14} -labeled formate (a rather specific precursor of nucleic acid moieties) on the pattern of leukemia in Ak-4 mice are underway. Monthly doses of $50 \mu c$ of C^{14} formate per mouse are being employed. Such a dose has been found to give tissue activities of $50 \mu c$ /mole of carbon, and nucleic acid purine activities of $1800 \mu c$ /mole of carbon at 6 hr after injection. The short-term distribution of formate carbon in tissues and organs has been investigated. Over-all distribution and excretion studies have been carried out with methyl-labeled nitrogen mustard and 2,6-diaminopurine labeled in the 2 position. NSA 5-513

10604

THE EFFECT OF DIFFERENT DOSE LEVELS OF ZIRCONIUM ON THE EXCRETION AND DISTRIBUTION OF PLUTONIUM AND YTTRIUM. Jack Schubert and Marcia R. White. *J. Biol. Chem.* 184, 191-6(1950) May.

Early administration of zirconium citrate to rats previously injected with tracer levels of plutonium, Pu^{239} , and yttrium, Y^{91} , results in a marked increase in the urinary excretion and a considerable decrease in the bone content of the injected radioelements. Relatively large amounts of zirconium, about 200 mg/k, were used in these experiments. In order to clarify the mechanism involved, graded dose levels ranging from 12.3 to 1336 mg/k as Zr have been given. NSA 4-4189

10605

THE METABOLISM OF SILVER IN THE RAT WITH RADIOSILVER USED AS AN INDICATOR. Kenneth G. Scott and Joseph G. Hamilton Univ. Calif. *Pubs. Pharmacol.* 2, 241-62(1950).

The preparation of carrier-free radiosilver from Pd and the biological methods used to study silver metabolism are described. The findings on the way in which rats handle small amounts of silver differ from the findings reported on argyria. After the administration of about 10^{13} atoms of silver, excretion is immediately and thoroughly accomplished, principally by the liver. Silver administered intragastrically was not absorbed within the limits of sensitivity of the method. The distribution of silver in the rat after intravenous injection is the same as that observed after intramuscular injection. When the dose of silver atoms per rat was increased from 10^{13} to 10^{18} , a concentration commonly used in therapy, a 10- to 100-fold increase in the concentration of silver was observed in such organs as liver, kidney, spleen, skin, bone, and muscle. The effect of liver damage and bile-duct ligation and the blood chemistry of tracer concentrations of silver are discussed. NSA 4-6072

10606

THE EFFECT OF BAL ON THE EXCRETION AND TISSUE DISTRIBUTION OF POLONIUM IN RATS. John B. Hursh. *J. Pharmacol. Exptl. Therap.* 103, 450-9(1951) Dec.

Experiments showed intramuscular injections of BAL (2,3-dimercaptopropanol) doubled in ten-day excretion of Po administered to rats as a single dose, as well as bringing about a general shift from the bone marrow, spleen,

and testis into muscle tissue. A mechanism of action for BAL is proposed. NSA 6-2281

10607

Hanford Works

RETENTION BY MICE OF TRITIUM ADMINISTERED AS THE OXIDE. R. C. Thompson. June 19, 1951. 14p. (HW-21494)

Tritium oxide was administered to mice by intraperitoneal injection. The retention of tritium activity in the body water and in the dry carcass was determined. The biological half life of body water in the mouse is approximately 1.1 days. The curve of tritium loss from the tissue-bound state can be fairly well resolved into components of 9-day and 90-day half lives. These components are thought to represent, respectively, groups of relatively dynamic body constituents, and of relatively stable body constituents. They are of comparable tritium binding capacity and under chronic exposure to tritium would accumulate about 17% as much activity as would be present in the body water. NSA 5-5455

10608

ON THE METABOLIC EQUIVALENCE OF DEUTERIUM AND TRITIUM IN ANIMAL EXPERIMENTATION. Roy C. Thompson and John E. Ballou. Arch. Biochem. and Biophys. 42, 219-20(1953) Jan.

Preliminary results reported from studies of the comparative metabolic behavior of deuterium-labeled and tritium-labeled compounds injected into rats showed no significant differences in retention, although small isotopic effects were suggested in certain tissues. NSA 7-1908

10609

Hanford Works

STUDIES OF METABOLIC TURNOVER WITH TRITIUM AS A TRACER. 3. COMPARATIVE STUDIES WITH TRITIUM AND DEUTERIUM. Roy C. Thompson and John E. Ballou. July 2, 1953. 15p. (HW-28595)

Thirty-two rats were administered HTO and D₂O in a constant ratio over a 5-week period. Animals were then sacrificed in groups over a 2-month period and the ratio of bound T to bound D determined in various tissues. Fat, brain and muscle showed a significant preferential incorporation of D. There was no consistent trend of change in ratios for a given tissue over a 60-day period.

NSA 7-5490

10610

CALCULATION OF THE ENERGY DEPOSITION BY FAST NEUTRONS IN SOFT TISSUE. J. H. Tat. Brit. J. Radiol., 23, 282-86(1950).

10611

Argonne National Lab.

PROGRESS REPORT, THE EXCRETION OF Sr⁸⁹ BY GOATS. p. 11-20 "Division of Biological and Medical Research Quarterly Report, May, June, July, 1950. S. A. Tyler and Joan Gurian. July 1950. 10p. (ANL-4488)

In an effort to investigate in greater detail the time distribution of Sr⁸⁹ excretions for goats, an analysis of the time course of excreted radiostrontium for individual goats from data of previous experiments was made, and the interrelationship between individual patterns was noted. Daily excretion (in per cent of the injected dose) were assumed to follow the empirical model $E_t = E_1 t^b$, where E_t is the per cent of the injected dose excreted during day t , t = time in days after injection, and E_1 and b are empirically determined constants. Thus the correspondence $Y - \log E_t$, $X - \log t$ was adopted as the rectifying transformation. The excretion data were corrected for decay on the assumption that all activity consisted of Sr⁸⁹ with a half-life of 55 days. The least-square parameters of the characterizing linear equation based on

daily excretion from day 2, $\log E_t = \log E_1 + b \log t$, are tabulated in three tables. The scatter diagram of paired slopes (urine versus feces) is presented, and the dependence of urinary excretion slope on age of animal is illustrated. NSA 5-2365

10612

Univ. of Calif., Berkeley, Radiation Lab.

THE EFFECT OF AGE AND LOW PHOSPHORUS RICKETS ON THE METABOLISM OF CALCIUM⁴⁵ IN RATS (THESIS). Duncan MacLaren Thomson. Aug. 1953. 130p. Contract W-7405-eng-48. (UCRL-2302)

Tracer techniques, employing Ca⁴⁵, were applied to a comparison of Ca metabolism in adult, young, and rachitic rats, particularly with respect to the skeletal uptake and urinary and fecal excretion of Ca and the effects of increased or decreased Ca or P supply on Ca metabolism. Data are presented in tabular form. NSA 8-997

10613

THE DEPOSITION OF ³⁵S IN CORTICAL BONE. P. W. Kent, J. Jowsey, L. M. Steddon, R. Olver, and J. Vaughan (Univ. of Oxford, England and Churchill Hospital). Biochem. J. (London) 62, 470-6(1956) Mar. NSA 10-6517

10614

THE DEPOSITION OF Sr⁸⁹ IN RABBIT BONES FOLLOWING INTRAVENOUS INJECTION. Margaret Tutt, Barbara Kidman, Barbara Rayner, and Janet Vaughan. Brit. J. Exptl. Path. 33, 207-15(1952) Apr.

The uptake by the skeleton of a single dose of Sr⁸⁹ given by intravenous injection is extremely rapid, in young animals 70% of the injected Sr⁸⁹ is present in the bone within 4 hours, with a consequent rapid lowering of the blood level. The fall in skeletal Sr⁸⁹ follows a smooth curve for 9 days, reaching a figure of 55%. In older animals the uptake is equally rapid but reaches a lower maximum, and the curve for retention fall unevenly and to a greater extent in the first 9 days. In older animals retention is greater in the flat bones than in the long bones. This may be associated with the fact that in young animals there is red marrow throughout the shaft of the long bones, while in older animals there is more red marrow in the flat bones. There is no significant difference in retention in different long bones or different flat bones. In rabbits of 3 to 4 months the concentration of Sr⁸⁹ is at first greater in the epiphyseal plate and later in the metaphysis, this displacement is evidently due to subsequent bone growth. The localized concentration of radioactive strontium within the bone must be remembered in considering toxic hazards. NSA 6-5041

10615

METABOLISM OF RADIOACTIVE STRONTIUM IN THE RABBIT. Margaret Tutt and Janet Vaughan. Biochem. J. 44, 35(1949) No. 4.

Normal rabbits with an average calcium intake of 3 to 5 g in a 9-day period received intravenous injections of Sr⁸⁹ and Sr⁹⁰ as the chloride in a NaCl solution. Fecal, urinary, and carcass Sr determinations were made which showed that most of the Sr retained was found in bone and that the retention varied with age from 10 to 55%. Suckling mothers transferred about 20% to the litters, but pregnant mothers transferred only 1 to 3%. NSA 4-2951

10616

SELECTIVE IRRADIATION OF LYMPH NODES BY RADIO-LUTECIUM (Lu¹⁷⁷). Granvil C. Kyker, W. M. Christopherson, H. F. Berg, and Marshall Brucer (Oak Ridge Inst. of Nuclear Studies, Tenn. and Univ. of Louisville School of Medicine, Ky.) Cancer, 9, 489-98(1956) May-June. NSA 10-9981

10617

DISTRIBUTION OF INTRAVENOUSLY INJECTED COLLOIDAL RADIOACTIVE IRON IN IRON PROTEINS OF THE

NORMAL RABBIT AND OF RABBITS WITH TURPENTINE ABSCESS AND DIPHTHERIA TOXICOSIS. Ignazio Indovina. *Am. J. Physiol.* **165**, 348-51(1951) May 1.

Intravenously injected bivalent colloidal iron (Fe^{55} and Fe^{59}) is found in all the Fe-containing proteins of the rabbits. The ratio cpm/γ of Fe is increased more in the ferritin and in the cytochromes than in the other compounds. In the turpentine abscess and diphtheria toxicosis the Fe goes especially into the liver (where the preformed apoferritin is resident), and the radioactivity in the myoglobin and in the cytochromes is low. No alterations were noted in the formation of hemoglobin.

NSA 5-3862

10618

EXCRETION OF ADMINISTERED RADIOCALCIUM FOLLOWING THYROPARATHYROIDECTOMY, OR BILATERAL NEPHRECTOMY, AND THE INJECTION OF PARATHYROID EXTRACT. W. R. Tweedy, M. V. L'Heureux, and E. M. Zorn. *Endocrinology* **47**, 219-27 (1950) Oct.

The urinary and fecal excretion of administered radiocalcium, Ca^{45} , by rats during an 18-hr period was determined at intervals of 1 to 40 days after thyroparathyroidectomy. On an adequate diet, containing approximately 1.18% of calcium and 0.98% of phosphorus, the urinary excretion of administered Ca^{45} was unchanged but the fecal excretion was diminished and remained below the control level for several days. Administered Ca^{45} appeared to accumulate in the kidneys of thyroparathyroidectomized rats, injected with parathyroid extract, prior to the elevation of the serum calcium level, but the fractions of the Ca^{45} excreted in the urine and feces were not increased. Normal rats injected with toxic doses of parathyroid extract showed an increased urinary excretion of Ca^{45} concomitant with a decreased fecal excretion. Bilaterally nephrectomized rats excreted smaller amounts of Ca^{45} than their normal controls. The injection of parathyroid extract in nephrectomized rats did not increase the fecal excretion of Ca^{45} .

NSA 5-334

10619

THE METABOLISM OF URANIUM²³³ IN MICE. Walter E. Kisieleski, William G. Faraghan, William P. Norris and James S. Arnold. *J. Pharmacol. Exptl. Therap.* **104**, 459-67 (1952) Apr.

A study was made of the retention and distribution of U^{233} given intravenously to mice at dose levels of 0.05 and 0.005 $\mu\text{c/g}$. Animals were sacrificed at intervals of from 30 minutes to 120 days and their body content and tissue concentrations of U^{233} were determined. Analysis of the data indicates that at both dose levels 60% of the injected dose is retained after 1 day and only 15% remains after 120 days. The U^{233} is chiefly deposited in bone and kidneys. A number of radioautographs are accompanied with a discussion of the cellular distribution of U^{233} .

NSA 6-4388

10620

Argonne National Lab.

PROGRESS REPORT, A COMPARATIVE STUDY OF THE TIME PATTERNS OF Sr^{89} EXCRETION CHARACTERIZING VARIOUS LABORATORY ANIMALS. p. 16-21 "Biological and Medical Divisions Quarterly Report, February, March, April, 1950. S. A. Tyler and Joan Gurian. nd. 6p. (ANL-4451)

Sr^{89} excretion data for the dog and goat are used to establish the excretion-time pattern for these laboratory animals. The following four empirical fitting processes are employed in determining this relationship: (1) the method of exponentials, (2) log-log regression analysis, (3) modified power fit, and (4) adjusted power fit.

NSA 5-1783

10621

Argonne National Lab.

THE RETENTION AND DISTRIBUTION OF U^{233} IN MICE. W. E. Kisieleski, W. G. Faraghan, and W. P. Norris. Nov. 1950. Dec. Feb. 2, 1951. 2p. (AECD-3057)

A study of the metabolism and organ distribution of U^{233} injected intravenously in mice is reported. The major portion of the injected material was rapidly excreted; about 50% was retained at 3 to 4 days and only about 20% at 6 days. The bone was the principal site of deposition.

NSA 5-2091

10622

CALCULATED DEPTH DOSE CURVES IN TISSUE FOR BROAD BEAMS OF FAST NEUTRONS. W. S. Snyder and J. Neufeld. *Brit. J. Radiol.* **28**, 342-50 (1955).

10623

Hanford Works

RELATIVE EFFECTIVENESS OF VARIOUS AGENTS FOR PREVENTING THE INTERNAL DEPOSITION OF PLUTONIUM IN THE RAT. J. Katz, M. H. Weeks, and W. D. Oakley. Jan. 1, 1954. 12p. Contract W-31-109-Eng-52. (HW-30231)

The prompt administration of zirconium citrate was at least twice as effective as the prompt administration of the calcium disodium salt of ethylenediaminetetraacetic acid (CaEDTA) in preventing deposition of plutonium in the skeleton. On the other hand, CaEDTA was twice as effective as zirconium citrate in preventing the deposition of plutonium in soft tissues. The combined administration of zirconium citrate and CaEDTA was the most effective treatment for preventing the deposition of plutonium in the total rat. This combined treatment reduced by about two-thirds the plutonium retained after 30 days. Zirconium malate offered no advantage over zirconium citrate, and appeared to be somewhat more toxic. Three doses of the zirconium salts over a four-day period were no more effective than a single dose. All forms of therapy (single injection) initiated 30 days after plutonium administration were ineffective in removing the plutonium fixed in the body of the rat. Various skeletal segments were separately analyzed in both control and therapeutically treated rats and were shown to exhibit a comparable affinity for plutonium with the exception that bones of the skull were found to contain a lower concentration of plutonium by a factor of about two.

NSA 8-6077

10624

ROLE OF CALCIUM IN RADIATION INJURY. M. H. Toosy (Nishtar Medical Coll., Multan, West Pakistan). 19p. (A/CONF.15/P/1405)

Results are presented from a study on the effects of beta particles on the skin of mice. A 90-mc strontium-90 applicator was used as the radiation source. The influence of calcium content of the skin and the effects of various injected hormones on skin reaction were investigated. The hormones employed increased the calcium content of the epidermis significantly. An association was noted between calcium content and the reduced tendency of the irradiated epidermis to ulcerate. The relationship of irradiation, endocrines, and calcium metabolism is discussed.

NSA 13-6198

10625

Hanford Works

ABSORPTION OF PLUTONIUM FED CHRONICALLY TO RATS. I. EFFECT OF SEX ON FRACTION ABSORBED AFTER HIGH DOSAGE LEVELS. J. Katz, C. W. DeLong, M. E. Getzendaner, A. C. Case, and Ester S. Miller. Mar. 13, 1951. 11p. (HW-20941(pt. 1))

Preliminary investigations undertaken to determine the percentage absorption from the rat's gastrointestinal tract of Pu administered chronically and to find whether

the sex of the animal plays a role in the rate of absorption are described. Five male and five female rats each received perorally an average of $5.9 \mu\text{g}$ of $\text{Pu}^{239} (+4)$ as the nitrate over a period of 90 days. Radiochemical analyses indicate that an average of 0.0095% of the administered dose was deposited in the total carcass. The pelt contained negligible amounts, but the gastrointestinal tract and contents retained considerable quantities of Pu even after a fast of 3 to 5 days. There was no evidence of any sex difference in Pu retention. NSA 5-6950

10626

DEPTH DOSE CURVES FOR GRIDS IN X-RAY THERAPY. R. Loevinger. Radiology, 58, 351-60(1952).

10627

Georgetown Univ., Medical Center.

DYNAMICS OF CALCIUM METABOLISM. I. THE DISTRIBUTION OF INTRAVENOUSLY ADMINISTERED RADIO-CALCIUM. R. O. Thomas, T. A. Litovitz, M. I. Rubin, and C. F. Geschickter. 1951. 24p. (AECU-2457)

The disappearance from the blood, the uptake by the bones, and the excretion via the urine and feces of tracer radiocalcium have been investigated for groups of normal young and adult rabbits. Mathematical analysis of the blood disappearance curves obtained in this study indicated that four exponential terms are needed to represent the data. From the first two terms the rates of exchange of Ca between plasma and extravascular compartments were calculated and shown to be in good agreement with data previously obtained by others for other ions. Within the experimental accuracy these above rates were found to be the same in both young and adult rabbits. The third term in the blood disappearance equation has been correlated with the bone uptake of Ca. The bone uptake of radiocalcium in the young age group was greater than in the adult age group. Therefore, it has been shown that the third blood terms for the disappearance of Ca is a measure of bone activity. The fourth term from the equations expressing blood disappearance rates has been correlated with the excretion of Ca via the urine and feces. This excretory output has been found to be an inverse function of the bone uptake of Ca. From this study it was deduced that a mathematical analysis of blood disappearance data and excretion data for Ca can yield information regarding bone activity. NSA 7-3338

10628

THE TISSUE DISTRIBUTION AND EXCRETION OF RADIO-ACTIVE HAFNIUM¹⁸¹ MANDELATE IN THE RAT. C. Frederick Kittle, E. R. King, and Marshall Brucer. Paper presented at the American Society for Pharmacology and Experimental Therapeutics Fall Meeting, Boston, Nov. 13-15, 1950. An abstract of this paper has appeared in J. Pharmacol. Exptl. Therap. 101, 21(1951) Jan. and is reproduced here in its entirety.

The tissue distribution and excretion of Hf^{181} was determined in 17 rats sacrificed in groups of 3 at intervals of 1, 2, 3, 4, 8, and 16 days after intravenous administration of the mandelate salt. After pseudoashing the tissues with HNO_3 , radioactivity was measured utilizing a thin-walled, end-window, G-M counter. Seven per cent of the Hf was excreted in 16 days (5% urinary, 2% fecal) with 5% being eliminated within 4 days. The liver, skeletal, muscular, and integumentary systems, respectively, showed greatest retention calculated on an organ basis, while the spleen, liver, and bone were highest when expressed on an activity per gram basis. Slight but significant amounts were found in the adrenal glands and other parenchymatous organs. Results were correlated with tissue autoradiographs. The 10-day LD_{50} for stable Hf mandelate given in a single intravenous dose was of the order of 100 mg/kg, while with Hf gluconate administered

in successive daily intraperitoneal doses, the LD_{50} was 2 to 3 g/kg. NSA 5-2029

10629

Univ. of California, Radiation Lab.

A STUDY OF THE METABOLISM OF RADIOACTIVE CALCIUM (Ca^{45}) IN YOUNG, ADULT, AND RACHITIC RATS. D. M. Thomson and D. Harold Copp. Oct. 24, 1950. 4p. (UCRL-960 (excerpt)).

In the adult rats, the relatively slow uptake of radio-calcium by the skeleton reflects ion exchange with the Ca in the bone salt, since there is little or no new bone formation in these animals. Initial rapid uptake in the normal and rachitic young rats is associated with the metabolically active tissue in these animals. However, while the Ca becomes fixed in the skeleton of the normal animals, it is rapidly lost from the rachitic skeleton, suggesting that it is initially taken up in a very labile form. High urinary excretion and renal serum clearance in the rats with low phosphorus rickets, despite a normal level of blood Ca, indicates that there is a direct effect of rickets on the Ca clearance by the kidney. This may be associated with the low level of blood phosphate in these animals. In the adult rats, the renal serum clearance is almost the same as in young normals, and the urinary excretion is low, but fecal excretion is relatively high. The loss of radiocalcium from the body in these animals is not due to the kidney, but to fecal excretion. NSA 5-1786

10630

Atomic Bomb Casualty Commission, Hiroshima
EFFECTS OF RADIATION ON HUMAN DENTITION-
PRELIMINARY REPORT. PROGRESS REPORT FOR
PROJECT OA-44. T. Terasaki and K. Shiota. June 30,
1953. Changed from OFFICIAL USE ONLY Oct. 11, 1956.
16p. Contract AT-49-1-GEN-72. (NYO-4464)

Preliminary data are presented from a dental survey conducted on children of Hiroshima to determine the effects of radiation from the atomic bomb on the tooth-germs which were forming within the jaw at the time of the bombing. NSA 13-17656

10631

BIOCHEMICAL CONSIDERATION OF DISTRIBUTION. Granvil C. Kyker (Oak Ridge Inst. of Nuclear Studies, Tenn.). Am. J. Med. Sci. 227, 572-89(1954) May.

There are several well established factors known to influence prominently the metabolic pattern of distribution of internally administered radioisotopes. The potential value of most isotopes for internal use in therapy remains largely obscure. New ones will undoubtedly arouse interest and offer apparent advantages. Besides the many factors profoundly affecting their distribution, removal of internally administered radioisotopes is in general an unsolved problem. Extensive information and experience from a study of a radioisotope in animals prior to its medical use are therefore emphasized as measures of extreme importance. NSA 8-5120

10632

Southern Research Inst.

BODY RETENTION OF CARBON 14. (STATUS REPORT NO. 9). Jan. 12, 1951. 18p. (ORO-41)

Preliminary results are reported on a new experiment having to do with long-term retention of C^{14} in bone and bone fractions. After a period of 4 months, the greatest part of the injected C^{14} can be found in the bone. The "active" volume of the bone shaft was receiving approximately 0.16 rep/day from 1 to 2 weeks after injection of $18 \mu\text{C}$ of $\text{NaHC}^{14}\text{O}_3$ and about 0.04 rep/day at from 5 to 6 months. In studies of the effect of C^{14} -formate on the pattern of deaths from spontaneous leukemia in Akm mice which have been under way about 4 1/2 months, experimental

animals have now received a total of 200 μc each. None of the mice in either the experimental or control groups has developed leukemia to date. Rather extensive studies have now been completed on the incorporation and turnover of C^{14} from sodium formate in normal and neoplastic mice. In mice with lymphoid Ak 4 leukemia, the thymus, spleen, and lymph nodes have been observed to incorporate C^{14} from formate much more rapidly than was the case in normal mice. Sarcoma 180 tissue picks up C^{14} rapidly when compared to most other tissues. Blood-smear autoradiograms have shown that C^{14} from formate is present in leukemic cells in relatively high levels at 1 hr after injection while normal lymphocytes, myelocytes, or erythrocytes are almost entirely inactive at this time. NSA 5-5028

10633

MEASUREMENT OF NEUTRON DOSE AS A FUNCTION OF LINEAR ENERGY TRANSFER. H. H. Rossi and W. Rosenzweig. *Radiation Research*, **2**, 417-25 (1955).

Authors compare experimental findings with Boag's computations of the LET of protons produced in H_2O by neutrons.

10634

CYCLOTRON NEUTRON AND GAMMA-RAY DOSIMETRY FOR ANIMAL IRRADIATION STUDIES. E. Tochilin, S. W. Ross, B. W. Shumway, G. D. Kohler and R. Golden. *Radiation Research*, **4**, 158-73 (1956).

10635

METABOLISM OF CALCIUM IN NORMAL, RACHITIC, AND VITAMIN D-TREATED RATS AS EVIDENCED BY RADIOCALCIUM Ca^{45} STUDIES. Elizabeth Underwood, Salomon Fisch, and Harold C. Hodge. *Am. J. Physiol.* **166**, 387-93 (1951) Aug. 1.

Results indicate that vitamin D in rachitic rats increases the absorption of calcium from the gastrointestinal tract, aids in mobilizing inorganic phosphorus from organic sources, and locally accelerates the mineralization of bone. Active healing of rachitic bone, as shown by the upswing in the curve of deposition of Ca^{45} , begins between the 48th and 72nd hour after the administration of the vitamin. NSA 5-6106

10636

THE EFFECT OF OXYGEN ON THE SENSITIVITY OF GROWING BONE TO FAST NEUTRONS. P. Howard-Flanders, D. Moore and E. A. Wright. "Progress in Radiology 456," Springfield, Illinois, C. H. Thomas Pub. Co., 1956. 557p.

10637

ACCUMULATION OF ASTATINE 211 BY THYROID GLAND IN MAN. Joseph G. Hamilton, Patricia W. Durbin, and Marshall W. Parrott (Univ. of California, Berkeley and San Francisco). *Proc. Soc. Exptl. Biol. Med.* **86**, 366-9 (1954) June.

Accumulation of At^{211} by thyroid gland in patients suffering from various disorders of that organ has been demonstrated. Accumulation of At^{211} by thyroid glands of these patients appears to be relatively higher than has been observed in experiments employing rats. There may be a correlation between the uptake of At^{211} and stable iodine in thyroid tissue. One patient with papillary adenocarcinoma showed no discernible accumulation of At^{211} in metastases present in cervical lymph nodes. (cf. UCRL-2604.) NSA 8-5488

10638

California. Univ. Berkeley. Radiation Lab. MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT [FOR] MAY, JUNE, AND JULY, 1953. AEROSOL STUDIES. J. G. Hamilton and Patricia Wallace. Sept. 21, 1953. Decl. Jan. 13, 1956. 6p. Contract W-7405-eng-48. (UCRL-2345(Suppl.))

Preliminary work is reported in a study of the fate of radioactive aerosol particles having a size range from 1 to 5μ following intratracheal injection in monkeys. Methods for preparing and injecting Pu oxide are described, and data are tabulated on fecal and urinary excretion following intratracheal injections. NSA 10-6097

10639

Univ. of Calif., Berkeley, Radiation Lab. THE EFFECTS OF CaEDTA UPON THE METABOLIC PATTERN OF PLUTONIUM IN RATS. Joseph G. Hamilton and Kenneth G. Scott. Aug. 11, 1952. 15p. (UCRL-1905)

Studies indicate that the oral administration to rats of the Ca salt of (ethylenediamine) tetraacetic acid did not produce a pronounced depletion of Pu in the soft tissues and apparently had very little effect upon the skeletal content of Pu. The parenteral administration of a small amount of CaEDTA likewise appeared to be productive of little effect. An increase of urinary excretion was noted after prolonged feeding but it was not of sufficient magnitude to influence sufficiently the content of either the skeleton or soft tissues. The parenteral administration of large amounts of CaEDTA was shown to decrease the skeletal content of Pu and to increase the absorption from intramuscular injection sites. In the rat the amounts of CaEDTA necessary to secure an appreciable increase of urinary excretion are in the toxic range. It is concluded that while the immediate use of large amounts of CaEDTA following the accidental entry of Pu into the body through cuts or abrasions may offer some promise, the use of CaEDTA for the treatment of chronic Pu poisoning is of very limited practical value. NSA 6-6522

10640

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF FAST NEUTRONS IN MICE. R. E. Carter, V. P. Bond, and P. H. Seymour. *Radiation Research*, **4**, 413-23 (1956).

Biological end points in the experiments were: mortality, spleen, thymus, and gut weight loss. Neutron-irradiated mice had shortened survival time compared to x-irradiated mice.

10641

University of California, Radiation Laboratory THE METABOLIC PROPERTIES OF PLUTONIUM AND ALLIED MATERIALS, SECT. I OF MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT, APRIL, MAY, AND JUNE 1950. J. G. Hamilton. July 26, 1950. Decl. Sept. 8, 1950. 42p. (AECD-2928(sect. 1))

Radioautography and Histology. Studies on the histopathology of astatine, At^{211} , have continued following two lines: (1) the toxicity of the element to body tissues in general, and (2) the points of localization and destruction of thyroid tissue. Tracer Studies in Rats with Radioactive Materials. Studies on the deposition of tantalum in rats using Ta^{182} as a radioactive tracer have been continued. In general, these studies show that tantalum is rather readily eliminated from the body. That which remains deposited in the body 64 days after administration is primarily found in liver and kidney, skeleton, skin, and the musculature. Carrier-free Re^{183} has been administered to rats intravenously and its fate studied for 1, 4, 24, and 48 hr. With the exception of a relatively large accumulation of this isotope by the thyroid, rhenium was not deposited to any great degree in any of the tissues studied. The fate of carrier-free Os^{185} has been studied in rats following intramuscular administration. One day following administration, relatively large amounts of osmium were found in kidney and in the intestinal contents, with lesser amounts being deposited in liver, blood and spleen. Chelating Experiments. Necessary characteristics of chelating agents for hastening excretion of radioactive material are discussed. In view of the importance of the

toxicology of beryllium, a number of chelating agents were screened *in vivo* for possible use for removing beryllium which has been deposited in the body. Numerous cations have been tested for reaction with ethylenediamine tetraacetic acid (EDTA) to form soluble chelates. A Preliminary Report on the Effect of Whole-body Radiation on Extra- and Intracellular Electrolytes. Experiments have been aimed at establishing the pattern in rats of fecal and urinary excretion of electrolytes in acute radiation injury. Na²² was injected subcutaneously in an amount of 2.0 μ c 36 hr before various irradiations. The reactions of the animals are described, and the change in Na²² concentration in tissues and excreta is presented. Decontamination and Bone-Metabolism Studies. A study was made of the curves for distribution in rats of Ce¹⁴⁴, Nb⁹⁵, Y⁹⁰, and Pu²³⁹ during the first hour following intravenous injection. An initial rapid fall in blood level during the first 10 min was followed by a much slower decline. Treatment with massive doses of zirconium citrate prolonged the initial rapid rate of urinary excretion and fall in blood level. After injection of Ca⁴⁵ into normal young rats, feeding a phosphorus-deficient diet resulted in an immediate and marked increase in the urinary excretion of radiocalcium, with accelerated removal from the skeleton. This procedure would appear to have possibilities for decontamination of radiostrontium. The Effect of Calcium-Versene Complex on the Excretion of Radiocalcium in the Rat. Calcium-versene complex injected 0 or 15 min after administration of Ca⁴⁵ resulted in a very significant increase in the urinary excretion of radiocalcium. This treatment also produced a small reduction in the amount of Ca⁴⁵ in bone. Radiochemistry. The 52.9-day Be⁷, produced by (d, 2p) reaction on lithium, was isolated by dissolving the target in water to give a solution of lithium hydroxide containing the Be⁷ as a radiocolloid which is removed by passing the solution through a sintered-glass filter. The long-lived radioisotopes of tantalum, Ta¹⁷⁸, ¹⁸², were prepared by α -particle bombardment of hafnium according to the reaction Hf(d, α p) Ta. A carrier-free procedure was developed for isolating the radiotantalum from the hafnium oxide target material and from the röntgenium concurrently produced by (α , xn) reaction. The shorter-lived radioisotopes of tantalum, Ta¹⁷⁶, ¹⁷⁷, were prepared by deuteron bombardment of HfO₂ according to the reaction Hf(d, xn) Ta. A more rapid procedure has been developed for the separation of At²¹¹ from bombarded bismuth foils. The bismuth is heated to 425°C in a stream of nitrogen carrier gas at a pressure of 10⁻² to 10⁻⁹ mm. The At²¹¹ is collected on a cold finger which is covered with a thin layer of ice. NSA 4-6703

10642

PREVENTION OF INTESTINAL RADIATION DEATH BY REMOVAL OF THE IRRADIATED INTESTINE J. W. Osborne. Radiation Research, 4, 541-46(1956)

10643

Univ. of Calif., Berkeley, Radiation Lab.
MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT [FOR] OCTOBER, NOVEMBER, DECEMBER, 1953. Apr. 1954. 62p. Contract W-7405-eng-48. (UCRL-2553).

Cell-free extracts of dividing yeast cells were observed to exhibit several new macromolecular components not present in resting yeast cells. The appearance of the new macromolecular components was shown to be related to the condition of cell division by following the appearance of the new components as cells in a starved culture were induced to divide by the addition of an ingredient containing utilizable nitrogen. Preliminary studies of the stability of the macromolecular components under various conditions of extraction were made. Irradiation with x rays was found to have no influence on the stability of the microsomes or on the ability of cells to produce the new

components when induced to divide. Data are presented on the tissue distribution of Eu¹⁵²⁻¹⁵⁴, Lu¹⁷⁷, Th²²⁷, and Fe⁵⁹ in rats. The histopathological effects of At in rats were studied, and results are compared with the effects of I¹³¹. Data are included on the radiation chemistry of acetic acid exposed to cyclotron beam intensities as low as 0.010 μ a, the effects of dissolved oxygen in irradiation of aqueous solutions of acetic acid, and the radiation chemistry of aqueous glycine solutions. (For preceding period see UCRL-2418.) NSA 8-5466

10644

California. Univ., Berkeley. Radiation Lab.
METABOLISM OF FISSION PRODUCTS: Te¹²⁷, ¹²⁹. Joseph G. Hamilton. p.1-20 of PROGRESS REPORT FOR PERIOD ENDING AUGUST 15, 1944. Sept. 2, 1944. Decl. Feb. 14, 1956. 20p. (M-1091)

The preparation of a Te¹²⁷, ¹²⁹ source is described in detail. The tellurium was administered orally, intramuscularly, and through the lung to 36 rats weighing from 200 to 300 gm. and their tissues were sampled. It was concluded that Te is absorbed by way of the digestive tract, that the rates of elimination of absorbed Te by oral and intramuscular administration are rapid and essentially comparable, and that the principle organs of deposition for absorbed Te are blood, liver, and kidney NSA 10-6098

10645

California. Univ., Berkeley. Radiation Lab.
THE DEPOSITION OF PLUTONIUM AND CERTAIN FISSION PRODUCTS IN BONE AS A DECONTAMINATION PROBLEM. Joseph G. Hamilton, D. H. Copp, D. M. Greenberg, M. J. Chace, L. Van Middlesworth and E. M. Cuthbertson. May 15, 1946. Decl. July 22, 1947. 98p. (AECD-2483; CH-3591)

Many of the radioactive elements concerned in nuclear fission are deposited in the skeleton, subjecting the cells of the bone marrow and bone to the chronic effects of toxic radiations. These studies have been concerned with the deposition in bone of plutonium and of the radioactive isotopes of strontium, yttrium, and cerium which are formed by fission. They were conducted with particular reference to the problem of decontamination. Although most treatments had little influence on the absorption of Sr from the gut, both age and dietary calcium did have a profound effect, and growing rats, on a diet low in calcium, absorbed over 25 times as much of a given dose as did adult rats receiving ample calcium in the diet. There was also a 4-fold difference in the retention of injected radioactive Br when these two extremes were compared, but no appreciable effect on the retention of radioactive Y, Ce, or Pu. Parathormone, massive doses of vitamin D, and "carrier" strontium were found to have little effect on the retention of radioactive Sr. The chronic elimination by the rat of radioactive Sr, Y, Ce, and Pu was followed for a period of several months. No appreciable decontamination was obtained by prolonged treatment with parathormone, ammonium chloride, sodium citrate, and other methods suggested for the treatment of chronic radium poisoning. The only effect observed was a small increase in the excretion of Sr. Experiments on healing bone fractures showed that the peak uptake of radioactive Pu and Y by the callus occurred several days before the commencement of active calcification and deposition of radioactive Sr. A diet very low in phosphorus was prepared with washed beef blood fibrin as the protein base. Rats weaned to this diet at three weeks of age showed severe signs of phosphorus deficiency within two weeks, including low inorganic blood phosphate, aphosphaturia, and extreme decalcification of the bones. There was a four-fold reduction in the retention of radioactive Sr by these animals,

but no significant difference in the retention of radioactive Pu, Y, and Ce. It was found that these effects of severe phosphorus deficiency, including resorption of bone salts, could be produced by adding aluminum sulfate or freshly precipitated aluminum hydroxide to a normal diet. Some demineralization of bone could be produced even in adult animals. In animals with severe phosphorus deficiency, large areas of the bone, particularly below the epiphysis, consisted of organic matrix free from bone salts. Radioautographs of undecalcified bone sections from such animals showed that the radioactive Sr was deposited only in the presence of bone salts while radioactive Pu, Y, Ce, and Zr were laid down in the uncalcified organic matrix. These, and the preceding metabolic studies, indicate that while Sr follows the path of calcium and is deposited in the mineral of bone, the metabolism of the other elements is unrelated to that of calcium and they may be laid down in the organic bone matrix. Radioautographs of undecalcified bone sections of adult rat demonstrated the superficial deposition of plutonium, and the relative immobility of these deposits. By this technique, it was shown that these plutonium deposits in the skeleton may be overlaid with newly formed non-radioactive bone, thus shielding the sensitive cells of bone marrow and bone from the short range alpha particles. This has been suggested as a possible means of reducing the chronic toxicity of plutonium in the skeleton. 24 references. NSA 2-1326

10646

THE EFFECT OF ROENTGEN RAYS OF VARIOUS WAVE-LENGTHS ON BIOLOGICAL OBJECTS. H. Langendorff and M. and A. Reuss. *Strahlentherapie*, 46, 289-292(1933). (In German).

10647

ON THE EFFECT OF ROENTGEN RAYS ON THE ORGANISM. G. D. Lieber. *Wiener Klin. Wochensh.* 37, 979(1924). (In German).

10648

PHARMACOLOGICAL ACTION OF ANESTHETIC AGENTS IN IRRADIATED ANIMALS. J. E. Wilson. *Anesthesiology*, 16, 503-10(1955).

10649

BIOLOGICAL EFFECTS OF FAST NEUTRONS AND GAMMA RAYS. H. H. Vogel, Jr., J. W. Clark, and D. L. Jordan. *Am. J. Roentgenol. Radium Therapy Nuclear Med.*, 77, 524-30(1957).

Co^{60} rays cause death in mice by different mechanisms. Bacteremia is a significant cause of death and streptomycin reduces the mortality rate appreciably. Pretreatment with cysteine has a protective effect.

10650

DISTRIBUTION, RETENTION, AND ELIMINATION OF Be^7 IN THE RAT AFTER INTRATRACHEAL INJECTION. C. D. Van Cleave and C. T. Kaylor (Univ. of North Carolina School of Medicine, Chapel Hill). *Arch. Ind. Health* 11, 375-92(1955) May. NSA 9-4689

10651

General Electric Co., Hanford Atomic Products Operation, Richland, Wash.

RADIOSTRONTIUM-CALCIUM RELATIONS IN PLANTS AND ANIMALS. H. A. Kornberg. 12p. (A/CONF.15/P/1029)

Prepared for the Second U. N. International Conference on the Peaceful Uses of Atomic Energy, 1958. In laboratory experiments the uptake in plants of Strontium-90 was measured as a function of calcium in the root environment. In general, the uptake of Sr^{90} was not found to decrease as a result of the calcium present. When rats were intraperitoneally injected or fed in single doses mixtures of Sr^{90} and calcium, the deposition of Sr^{90} on the skeleton was not found to be affected by the presence of

calcium in the administered dose. Groups of rats which were maintained on diets containing several levels of calcium along with Ca^{45} and Sr^{90} were found to deposit less Sr^{90} and Ca^{45} on their skeletons as the calcium in the diet was increased. However, the decrease of Sr^{90} deposition with increase in dietary calcium was less than that which would have occurred if the strontium had deposited in inverse proportion to the calcium in the diet. The data also showed that beyond 0.5% of dietary calcium there was no further decrease of Sr^{90} deposition with increase of calcium. Similar observations were made with lambs that were fed Sr^{90} and calcium gluconate in milk. The gluconate ion was found to account for a significant amount of the decreased Sr^{90} deposition observed. These experimental observations point to the need for measuring Sr^{90} contamination in absolute units and tend to support theoretical considerations of the effect of isotopic dilution. The movement and deposition of substances can occur by only four processes: flow, diffusion, adsorption, and chemical reaction. Each of these processes may be separately considered to determine the effect of the addition of one isotope on the movement or deposition of another isotope. For the processes of flow and simple diffusion, isotopic dilution is without effect. For the processes of adsorption and chemical reaction, isotopic dilution will be effective only under the condition that some acceptor material upon which the element deposits approaches saturation. Even under this condition the effect of one isotope on another need not be a linear inverse relationship. Experimental data involving radioactive and non-radioactive isotopes other than radiostrontium and calcium which also support these hypotheses are presented. NSA 12-14593

10652

DISTRIBUTION OF ZINC IN NORMAL BLOOD AND ORGANS STUDIED BY MEANS OF Zn^{65} . Bert L. Vallee, Rex G. Fluharty, and John G. Gibson, 2nd. *Acta Unio Intern. contra Cancrum* 6, 869-73(1949).

Measurements of the zinc content of normal dogs demonstrated that zinc is present in all organs of the body, after the intravenous administration of Zn^{65} , the isotope was also found to be distributed to all the organs, and remained in the body up to six months later. There was no evidence of specific localization of the isotope in any organ studied, doses used resulted in irradiation of 0.001-0.06 r/day. The isotope was transmitted across the placental barrier in a pregnant dog and was found in each of its nine pups on parturition. The zinc content of erythrocytes and leucocytes was very low, with the leucocytes in dogs containing 100 times the concentration of the erythrocytes, human leucocyte concentrations of zinc were 25 times that of erythrocytes. The results of studies on zinc metabolism by the white and red blood cells suggest to the authors that zinc plays an important part in the metabolism of tissue and blood cells, and that the body has a mechanism for its conservation and reutilization. NSA 4-939

10653

THE METABOLISM STUDIED BY MEANS OF THE RADIOACTIVE ISOTOPE Zn^{65} . Bert L. Vallee and Rex G. Fluharty. *J. Clin. Invest.* 26, 1199(1947) Nov.

External scanning with a gamma ray Geiger-Muller counter has shown that, following intravenous administration, Zn^{65} becomes widely distributed throughout the entire body of the normal dog. The normal range of zinc content of organs has been determined in normal dogs by an improved dithizone method. The ranges, in completely perfused organs, in gamma per gram (wet weight), are: heart and great vessels 15-20; respiratory organs 10-20, digestive organs 10-60, genito-urinary tract 20-50, muscle

40-50; cortical bone 40-50, C. N. S. (brain) 10-15, endocrines 20-100, lymph glands 15-100, liver 50-60; spleen 10-20; marrow 60-80, plasma 2-4 (per cc), whole blood 7-9. Simultaneous measurements of Zn^{65} and total zinc content have not shown selective localization of the element in any of the above organs. The complete separation of white cells from blood can be effected by flotation of heparinized whole blood on an isosmotic solution of bovine serum albumin of specific gravity of approximately 1.079. The normal zinc content of white cells is 1×10^{-2} gamma and of red cells 1×10^{-4} gamma per million cells, respectively. Following the intravenous injection of Zn^{65} the isotope becomes concentrated within the circulating white cells in amounts sufficient for accurate x-ray detection in the leucocyte mass separated from 15 cc of whole blood (1.0 to 2.0×10^8 whole blood cells). Blood, white cells, and tissue samples are dry ashed, and the zinc extracted with dithizone for colorimetry. The zinc is removed from the dithizonate with sulfuric acid and electroplated from an alkaline solution with added carrier zinc on a copper disk. The x-ray counting procedures are similar to those used to measure Fe^{55} . These procedures have opened the way to a study of overall zinc metabolism in addition to the physiology of leucocytes. NSA 2-342

10654

EXCRETION BY THE RAT OF INTRAVENOUSLY INJECTED $Ga^{72}Cl_3$ AND Ga^{72} CITRATE. E. R. King, H. D. Bruner, J. D. Perkinson, and Joe Gray. Paper presented at the American Society for Pharmacology and Experimental Therapeutics Fall Meeting, Boston, Nov. 13-15, 1950. An abstract of this paper has appeared in J. Pharmacol. Exptl. Therap. 101, 21(1951) Jan. and is reproduced here in its entirety.

As a part of a general study of the biological significance of Ga, the excretion by the rat of a freely ionizing compound such as $GaCl_3$ was compared with that of a slowly ionizing compound, Ga citrate. $GaCl_3$ or Ga citrate tagged with Ga^{72} was administered intravenously in tracer doses to groups of 24 and 20 animals, respectively. Urine and feces were collected separately at 12-, 24-, 48-, 72-, and 96-hr intervals. The results expressed in terms of per cent of total dose excreted show the principal organ of excretion to be the kidney. About 35 per cent of the total dose of $GaCl_3$ was excreted during the first 12 hr, with 48, 52, 53, and 54 per cent cumulatively excreted at 24, 48, 72, and 96 hr. Of the citrate salt, 22 per cent was excreted during the first 12 hr while 52, 62, 72, and 72 per cent cumulatively was excreted during those 24-hr periods. The total fecal excretion at the end of 96 hr was 7.8 per cent for the $GaCl_3$ and 3.3 per cent for the Ga citrate. NSA 5-2097

10655

IS THE BIOLOGICAL ROLE OF POTASSIUM RELATED TO ITS RADIOACTIVITY? Guillaume Valette and Charles Combescot. Compt. rend. soc. biol. 145, 1625-7(1951). Nov. (In French).

Tyrode's solution was prepared without K but with enough tracer K^{42} to produce the same specific radioactivity as a solution containing normal K. In this solution a fragment of rabbit ileum ceased to contract in 180 to 220 min, rat duodenum ceased to contract in 40 to 60 min, the "potassium paradox" could not be observed, and spontaneous contractions could not be induced after 7-days refrigeration. In Tyrode's solution prepared by substituting the same molarity of K^{42} as that of K in normal solution, thus having 50,000 to 100,000 times the specific activity, no difference in behavior of intestinal fragments was noted except a 50% reduction in the contraction amplitude. It is concluded that the radioactive properties of K have no preponderant effect on the element's biological action. NSA 6-3163

10656

Kansas. Univ., Lawrence

THE METABOLISM OF Sr^{90} AND Y^{90} AND THE INFLUENCE OF LACTATION ON RETENTION. Frank E. Hoecker and Edward I. Shaw. 15p. (A/CONF. 15/P/1996)

Prepared for the Second U. N. International Conference on the Peaceful Uses of Atomic Energy, 1958. Detailed studies of the metabolic history of strontium 90 and yttrium-90 in terms of retention as influenced by gestation and lactation are reported for rats which received intraperitoneal injections either 52 days before parturition or within 24 hours after parturition. Retention periods ranging from 7 minutes to 100 days are covered for 11 body compartments including soft tissue, bones (excluding femurs), femurs, blood, mammary glands, kidneys, liver, muscle, testis, spleen, and litters. Data for Sr^{90} - Y^{90} in equilibrium are based on crystal detection of bremsstrahlung in which energy dependence errors are eliminated by spectrometric analysis and geometrical errors are avoided by digesting or homogenizing tissues. Y^{90} and Sr^{90} are studied separately by half-life measurements based on beta-particle detection. When compared with unbred controls the retention of Sr^{90} in the bones of rats injected 52 days prepartum is not significantly influenced by lactation, but that of animals injected at parturition is markedly affected. When the per cent of dose retained by the latter group is plotted versus time after injection, the depletion of calcium in the bones during gestation is reflected by increased Sr^{90} uptake for the first 5 hours after injection at which time the uptake in both the controls and in the postpartum group reaches a minimum of 42 percent. From this value the retention in both decreases with time although lactation in the postpartum group is responsible for a much greater rate of elimination of Sr^{90} during the first 18 days of lactation which results in a retention of only 5% of the dose at 100 days as compared with a retention of approximately 15% in the controls at that time. Data on soft tissue retention show approximately 80% in all groups at 7 minutes after injection. Greater avidity of the bones is again shown by a slightly lower soft tissue retention in the post partum group although this lower retention vanishes at 7 hours after injection, after which time the soft tissue content increases from 25% to reach a maximum of 37% in 24 hours. This increase in soft tissue retention coincides with the onset of lactation and reflects mobilization of calcium (and hence Sr^{90}) from the bones. It also coincides with the time of decreased bone retention referred to above. Sr^{90} concentration in the blood decreases by a factor of 7 during a period of 2 hours following injection. In the control group the blood content is essentially zero within 24 hours, while in the lactating group the Sr^{90} concentration reaches a minimum at 24 hours but undergoes an increase which coincides with the increase in soft tissue content resulting from the onset of lactation. NSA 12-14602

10657

BORON UPTAKE IN MOUSE BRAIN NEOPLASM. P. Gerald Kruger (Univ. of Illinois, Urbana and Brookhaven National Lab., Upton, N. Y.). Radiation Research 3, 1-17(1955) Sept. NSA 9-7227

10658

EXCRETION OF GALLIUM BY THE RAT AND BY MAN. E. R. King, Jesse D. Perkinson, Jr., H. D. Bruner, and Joe Gray. Science 113, 555-7(1951) May 11.

A detailed comparison is made between excretion of Ga in the rat following intravenous administration of $GaCl_3$, a rapidly ionizing salt, and the slowly ionizing complex, gallium citrate. The rats received 200 to 300 μ c of Ga^{72} in 1.5 to 2 mg of stable Ga. About 73% of the Ga given as the citrate was excreted in the urine by the fourth day compared with 59% for the chloride salt. The

fecal excretion of the GaCl_3 was about twice that of the citrate. At 96 hr the urine/feces ratio was ~ 8 for the chloride salt and 19.3 for the citrate complex. A second comparison is made between excretion by the rat and by man of tracer and larger intravenous doses of gallium citrate. In man the chief route of excretion is also the urinary tract. In the rat studies the effective half life at the dose level used was 8.33 hr. For the larger doses in man it was ~ 12.5 hr. NSA 5-4355

10659

SOME PHARMACOLOGIC EFFECTS OF DIBORANE. Anne M. Kunkel, Edmund F. Murtha, Aili H. Oikemus, Dorothy E. Stable, J. Palmer Saunders, and J. Henry Willis. (Army Chemical Center, Md.). Arch. Ind. Health 13, 346-51(1956) April.

The primary effect in poisoning by diborane appears to be the production of pulmonary edema. The earliest sign observed in dogs and rabbits during exposure was respiratory embarrassment. This was followed by a slight fall in blood pressure, an increase in activity of the smooth muscle of the intestine, and an increase and subsequent diminution in cortical activity. The latter effects were possibly associated with anoxia. Bradycardia occurred late in poisoning and was followed terminally by ventricular fibrillation or complete disappearance of ventricular activity. It appears that none of the drugs tested prophylactically possesses any significant value in preventing diborane intoxication.

10660

STUDY OF THE DEVELOPMENT IN ANIMALS OF BONE TUMORS ARISING UNDER THE INFLUENCE OF RADIOACTIVE SUBSTANCES. N. A. Krayevskii (Krayevskiy) and N. N. Litvinov. p.367-73 of WORKS OF THE ALL-UNION CONFERENCE ON MEDICAL RADIOLOGY, EXPERIMENTAL MEDICAL RADIOLOGY. Translated from a publication of the State Publishing House of Medical Literature, Moscow, 1957. (AEC-tr-3661 (Bk. 2))

A study was made of bone tissue changes in 100 rats into which strontium-90 had been introduced intraperitoneally at a dose of $0.4 \mu\text{C/g}$ of body weight. Changes in bone tissue are most pronounced in metaphyses of long tubular bones. They consist of a progressive disturbance of the processes of osteogenesis, with the formation of steadily more immature and primitive bone structures. These changes of a dysplastic nature terminate in a number of cases in malignant growth. At first, in the course thereof, during the 2nd and 3rd month following administration of radioactive strontium, disturbance of the processes of osteogenesis consist of a production of atypical, imperfect structures, mostly of osseous, fibrous, and amorphous nature. Later on, during the 4th month, in addition to atypical osseous, fibrous, and amorphous structures, there are formed extensive accumulations of osteogenic tissue consisting primarily of undifferentiated cell elements. During the 5th month a further distortion of processes of osteogenesis is observed. Extensive tissular proliferates are formed which consist of atypical osteogenic cells, and undergo propagation along the bone marrow cavity. By the end of the 5th and the beginning of the 6th month of the injury, there are formed among the growths of atypical osteogenic tissue, areas which have the appearance of tumors. They increase rapidly in size, fill the bone marrow cavity and extend outside of the bone. NSA 14-3336

10661

EFFECT OF BONE MARROW INJECTION OF RATS X-IRRADIATED WITH THE INTESTINE SHIELDED. S. T. Taketa, M. N. Swift and V. P. Bond. Federation Proc. 13, 523(1954).

10662

Los Alamos Scientific Lab., N. Mex.

PHYSIOLOGY AND TOXICOLOGY OF PLUTONIUM²³⁹.

Wright H. Langham. p. 256-75 "Proceedings of the Seventh Hot Laboratories and Equipment Conference." 1959. (AECU-4183)

When taken into the systemic circulation, Pu^{239} deposits predominantly in the skeleton where it may produce bone disease (including cancer) many years later. Its absorption rate from the gastrointestinal tract is only about 0.003 per cent. Absorption from the lung may be from 1 to 10 per cent of the inhaled dose, depending on particle size, solubility, etc. A small amount may be absorbed through the intact skin and through contaminated cuts and puncture wounds. Lung absorption is potentially the most important route of entry into the body and is largely responsible for the rigorous closed-systems and other industrial hygiene and engineering practices employed in plutonium processing. Once in the body, Pu^{239} is excreted extremely slowly (about 200 years being required to eliminate one-half the body burden). An individual who has reached the maximum permissible body burden, technically should be removed from further plutonium contact for the rest of his life. The maximum permissible body burden of Pu^{239} ($0.04 \mu\text{C}$) is established by comparison with Ra^{226} and is that amount which has the same improbability of producing harm to any person at any time during his natural life as does $0.1 \mu\text{C}$ of fixed Ra^{226} . Control of the industrial hazards of Pu^{239} processing is based on the premise that exposure of personnel should be as nearly zero as possible. This is not because less than the maximum permissible body burden is apt to do harm, but because it is sound industrial medical and economic practice. If presently recommended practices are maintained, there is little reason to feel that the health of a person working with Pu^{239} will be subject to any greater absolute risk than if he were engaged in any other chemical or industrial occupation. NSA 13 17618

10663

Oak Ridge National Lab., Tenn.

BIOLOGY DIVISION SEMIANNUAL PROGRESS REPORT FOR PERIOD ENDING FEBRUARY 15, 1956. Apr. 20, 1956. 67p. Contract W-7405-Eng-26. (ORNL-2060) NSA 10-3768

10664

SUMMARY OF NNES, DIV. VI, VOL. I, CHAPS. 19-28. H. C. Hodge. nd. Decl. Dec. 22, 1949. 163p. (AECU-2789)

This report summarizes the chapters on chemistry, biochemical methods, oral toxicity, inhalation toxicity, insufflation studies, metabolic studies, bone deposition, enzyme studies, maximum allowable concentration, and effects of uranium on plants for the proposed portion of the NNES volume listed above. NSA 4-1930

10665

Rochester N. Y. Univ. Atomic Energy Project THE CHEMICAL TOXICITY OF THORIUM DIOXIDE FOLLOWING INHALATION BY LABORATORY ANIMALS.

H. C. Hodge, E. A. Maynard and L. J. Leach. Jan. 5, 1960. 33p. Contract W-7401-eng-49. (UR-562)

Short-term inhalation studies of thorium dusts, soluble or insoluble, inhaled by laboratory animals in high concentrations for short periods, gave practically no evidence of chemical toxicity. Because toxic effects unpredicted for short-term studies sometimes appear in protracted exposures, a one-year inhalation study of thorium dioxide at an atmospheric concentration of 5 mg Th/m^3 was conducted. This study confirmed the inertness of thorium in the body. The retention of thorium in the tissues was followed in serially sacrificed dogs and rats. The data indicate appre-

ciable accumulation of thorium in the lung. For example, for the dog and the rat the lung values averaged 183 and 121 $\mu\text{g Th/g}$ fresh lung, respectively, at the end of the one-year exposure. Of the tissues examined (lung, liver, kidney, spleen, and bone) only the lung showed an increased thorium content with increased exposure. This is demonstrated when the average lung values after one month exposure for the dog (28 $\mu\text{g Th/g}$) and the rat (31 $\mu\text{g Th/g}$) are compared with the one-year values. This 5-fold increase was not seen in any of the other tissues examined. NSA 14-7204

10666

MULTIPLE MYELOMA: A STUDY OF 24 PATIENTS TREATED WITH RADIOACTIVE ISOTOPES (P^{32} AND Sr^{89}). John H. Lawrence and Louis R. Wasserman. *Ann. Internal Med.* 33, 41-55(1950) June.

Radioactive phosphorus and radioactive strontium have been used as therapeutic agents in multiple myeloma. Improvement was noted in some cases. The average length of life after the onset of the disease in this group of patients was approximately 3 years. These isotopes are valuable in producing whole body background irradiation which may in itself afford some relief. The combination of isotope therapy and x-ray or stilbamidine or urethane is suggested. 16 references. NSA 4-5123

10667

Oak Ridge National Lab., Tenn.
HEALTH PHYSICS DIVISION SEMIANNUAL PROGRESS REPORT FOR PERIOD ENDING JANUARY 31, 1956. May 3, 1956. 68p. Contract W-7405-eng-26. (ORNL-2049)

Educational, training, and consultation activities engaged in during the period are reviewed. Publications during the period are listed. Data are presented from the following studies: the distribution and excretion of U in man, the influence of soil fertility on the uptake of Sr by plants, the effects of γ irradiation on vigor and fertility of the beetle, *Onthophagus texanus*, the radiosensitivity of different species of arthropods, the uptake of fission products by earthworms, the separation of Cs^{137} from biological material, the spectrographic analysis of human tissues, investigations of waste-disposal pits for radioactive and chemical wastes, the disposal of radioactive waste material by fixation and fusing in an insoluble ceramic mass, factors affecting the ion-exchange removal of radioactive ions from contaminated water, the use of solvent extraction procedures for the separation of fission products from waste solutions, factors affecting the uptake of fission products by various soil types and clay storage-pit liners, the evolution of K^{42} from hot and boiling solutions, the efficiency of sand filters and lead shot columns in the removal of aerosols of various particle size, and developmental studies on design and improvement of radiation dosimeters. (From preceding period see ORNL-1942). NSA 10-3981

10668

MECHANISM OF URANIUM POISONING. H. C. Hodge (Univ. of Rochester, N. Y.). *Arch. Ind. Health* 14, 43-7(1956) July.

More is known about the toxicity of uranium than about the toxicity of any other element. Uranium in the body is highly toxic, providentially, it is hard to absorb into the body. Once absorbed, uranium is carried partly as a protein complex and partly as a bicarbonate complex. In the bone uranium is deposited principally on the surface of the mineral crystals by exchange with calcium. The kidney is the sole site of the characteristic histological injury. Uranium kills cells by blocking carbohydrate metabolism, apparently inhibiting specifically hexokinase in the cell surface. Finally, a tribute should be paid to the vigilant medical supervision of the Manhattan Project and the Atomic Energy Commission. This supervision has

been so successful at all their installations that severe uranium poisoning has never occurred and mild uranium poisoning is so rare that it is practically unknown. NSA 10-9990

10669

Oak Ridge National Lab., Tenn.
HEALTH PHYSICS DIVISION SEMIANNUAL PROGRESS REPORT FOR PERIOD ENDING JULY 31, 1955. Oct. 20, 1955. 40p. Contract W-7405-eng-26. (ORNL-1942).

Progress is reported in investigations of possible applications of the intravenous administration of fissionable U in man in neutron-capture therapy. Data are tabulated on the tissue distribution of U in man. Data are summarized from studies on the uptake of Sr^{89} by earthworms, studies on containers for the laboratory propagation of arthropods, the spectrographic analysis of bone ash, the removal of radioactivity from contaminated water by adsorption of organic complexes on carbon, the exploration of new fields and the performance of old fields for waste-storage pits, evaluation of procedures for the recovery from soil and identification of the major long-lived fission products, the cation-exchange capacity and exchange complex of rock materials from proposed waste-storage sites, the efficiency of sand as an aerosol filter, the half life of fission products at subsequent times after irradiation for various periods of reactor irradiation, variations of neutron damage with energy and geometry, and an aerial survey of the region between St. Louis, Mo., and Moline, Ill. Education, training, and consultation activities engaged in during the period are reviewed and summaries of papers published during the period are included. (For preceding period see ORNL-1860.) NSA 10-43

10670

THE COLONIZATION OF IRRADIATED TISSUE BY TRANSPLANTED SPLEEN CELLS. N. A. Mitchison. *Brit. J. Exptl. Pathol.* 37, 239-47(1956).

10671

HEALTH PHYSICS DIVISION SEMIANNUAL PROGRESS REPORT FOR PERIOD ENDING JANUARY 31, 1955. (Oak Ridge National Lab., Tenn.). May 9, 1955. 34p. (ORNL-1860)

Includes reports on distribution and excretion of uranium in man and on distribution of radioisotopes in animal tissues. NSA 10-42

10672

URINARY EXCRETION, TUBULAR REABSORPTION AND BILIARY EXCRETION OF COBALT 60 IN DOGS. Cheng-Chun Lee and L. F. Wolterink (Michigan State Univ. and Michigan Agricultural Experiment Station, East Lansing). *Am. J. Physiol.* 183, 167-72(1955) Oct. NSA 10-1205

10673

BLOOD AND TISSUE PARTITION OF COBALT 60 IN DOGS. Cheng-Chun Lee and L. F. Wolterink (Michigan State Univ. and Michigan Agricultural Experiment Station, East Lansing). *Am. J. Physiol.* 183, 173-7(1955) Oct. NSA 10-1206

10674

REABSORPTION OF COBALT-60 FROM URINE AND BILE SAMPLES OF EXPERIMENTAL DOGS. Cheng-Chun Lee and L. F. Wolterink (Michigan State Univ. and Michigan Agricultural Experiment Station, East Lansing). *Science* 123, 65(1956) Jan. 13.

After intravenous injection of Co^{60} a form of Co^{60} other than its inorganic form was found in bile and urine samples collected from experimental dogs. The Co^{60} in the samples was reabsorbed from the gut of young chicks following injection into the gizzard at a considerably faster rate than inorganic Co^{60} was absorbed. NSA 10-2007

10675

PRINCIPLES AND TECHNIQUES OF MIXED RADIATION

DOSIMETRY. APPLICATION OF ACUTE LETHALITY STUDIES OF MICE WITH THE CYCLOTRON. G. S. Hurst, W. A. Mills, F. P. Conte, and A. C. Upton. *Radiation Research*, 4, 49-64(1956).

10676
DISTRIBUTION OF RADIOPHOSPHORUS IN THE LONG BONES OF ADULT RABBITS. P. Lacroix, R. Devis, and E. Schucks. *Experientia* 8, 113-4(1952) Mar.

Studies on the specific activity of the epiphyses of the long bones of fully grown rabbits as compared with that of the diaphyses, after the administration of radiophosphorus, are described. Large doses of radiophosphorus were used so as to recover a fairly good activity in the smallest portions of the bones, even after 76 days. Up to the 76th day the phosphorus specific activities of the epiphyses and of the diaphyses do not show any tendency to be reduced to uniform activities. NSA 6-3209

10677
THE EFFECTS OF TOTAL-BODY FAST NEUTRON IRRADIATION IN DOGS. V. P. Bond, R. E. Carter, J. S. Robertson, P. H. Seymour, and H. H. Hechter. *Radiation Research*, 4, 139-53(1956).

Effects of single large doses of fast neutrons were compared with effects of 250-kvp x-irradiation. Dose distribution throughout the dog's thickness is uniform for both. There was no significant difference in response.

10678
A STUDY OF THE USE OF RADIOACTIVE GALLIUM IN MEDICINE. Frederick R. Lang. *Ann. Internal Med.* 35, 1237-49(1951) Dec.

Use of radioactive Ga in the diagnosis and therapy of primary or metastatic malignancy of the bone is discussed. The toxicity, metabolism, chemistry, and availability of Ga is reviewed. Included are case histories of six patients (having various types of bone malignancies) to whom Ga⁷² was administered. NSA 6-1106

10679
Atomic Energy Project, Rochester Univ.
METABOLISM OF CALCIUM IN NORMAL, RACHITIC, AND VITAMIN D TREATED RATS AS EVIDENCED BY RADIOCALCIUM (Ca⁴⁵) STUDIES. H. Hodge, E. Underwood, and S. Fisch. *Jan. 15, 1951*. 13p. (UR-148).

In agreement with the current theory, the evidence presented favors the view that vitamin D increases the absorption of calcium from the gastrointestinal tract, aids in mobilizing inorganic phosphorus from organic sources, and locally accelerates the mineralization of bone. In addition, vitamin D increases the blood-calcium concentration. Active healing of rachitic bone, as shown by the deposition of Ca⁴⁵, begins between the 18th and 72nd hr after the administration of the vitamin.

NSA 5-2382

10680
Atomic Energy Project, Univ. of Rochester
A PARTIAL BIBLIOGRAPHY ON URANIUM AND ITS COMPOUNDS WITH ESPECIAL REFERENCE TO PHARMACOLOGY AND TOXICOLOGY. Leo J. LaFrance. May 11, 1951. 32p. (UR-156)

This annotated bibliography contains 414 references to papers dealing with pharmacological, toxicological, and physiological effects of U and its compounds on animals. No references to the effects of U on plants are included. NSA 5-5004

10681
BIOLOGICAL STUDIES ON STABLE AND RADIOACTIVE RARE EARTH COMPOUNDS. I. ON THE DISTRIBUTION OF LANTHANUM IN THE MAMMALIAN ORGANISM. Daniel Laszlo, Daniel M. Ekstein, Ruth Lewin, and Kurt G. Stern. *J. Natl. Cancer Inst.* 13, 559-73(1952) Oct.

The distribution of La in normal and tumor-bearing mice was studied as a function of time, dose, route of administration, and chemical state of the element. La chloride, injected intravenously, is taken up rapidly by various tissues and the concentration was found to be highest in liver and spleen, and low in the skeletal system. The concentration in the lung was very low until a critical dose-level was reached, whereupon it rose sharply. Minimal transport occurred when La chloride was injected intraperitoneally or subcutaneously. This suggests its intracavitary or intratumoral use. La complexes are distributed more homogeneously than the ionized forms. The implications for therapy of tumors with rare-earth radioisotopes are discussed. NSA 7-3

10682
THE RELATIVE BIOLOGICAL EFFECTS OF X-RAYS AND BETA RAYS. William B. Seaman, Michel M. Ter-Pogossian, and William B. Ittner (Washington Univ. School of Medicine, St. Louis, Mo.). *Radiology* 65, 260-4 (1955) Aug.

The relative biologic efficiency of 200-kv x rays and the β rays of P³² in producing erythema on a rabbit's ear was studied. With equal doses and similar physical distribution in tissue, the β rays of P³² were found to be slightly less than one-half as efficient as 200-kv x rays in producing erythema on the rabbit's ear.

NSA 9-6844

10683
KINETICS OF OPEN SYSTEMS APPLIED IN RADIATION BIOLOGY. O. Hug and L. Wolf. p. 12 "Progress in Radiobiology." Springfield, Illinois. C. H. Thomas Pub. Co. 1956. 557p.

Authors consider living organisms to be "open systems," assuming, for purposes of the thesis, that production and degradation of a given substance are in equilibrium. Metabolic turnover of substances must be taken into account when irradiation time becomes comparable with turnover time of the substance in question. A formula is given for these two conditions and for recovery to equilibrium after exposure. Initial slope of recovery curve permits determination of "mean recovery time" which may be compared with "mean inactivation time" which in turn may be taken from the initial slope of the curve following irradiation. Theoretical concepts are compared with observed results in *Achromobacter fisheri* (light production). Dose rate and fractionation effects are evaluated.

10684
Naval Radiological Defense Lab.
A QUANTITATIVE STUDY OF PERCUTANEOUS ABSORPTION. IV. ABSORPTION OF MINUTE QUANTITIES OF RADIOSTRONTIUM CHLORIDE THROUGH BURNED RAT SKIN. (Technical Objective AW-6). R. Kenneth Loeffler, John W. Herron, and V. Thomas. Apr. 2, 1951. 25p. (AD-308(B))

The effect of thermal burns on percutaneous absorption of radiostrontium chloride has been studied. Burns were given both before and after contamination of intact and abraded rat skin with radiostrontium chloride. Intact skin with moderately severe or severe burns showed a tendency toward less absorption than unburned skin. This effect was noted when thermal energy was applied during the period from 24 hr preceding application of strontium chloride to 5 min following this contamination. No decrease in absorption was found following suberythermal energy doses. Absorption through abraded skin varied when thermal energy was applied 1 min after contamination. Specifically, in the suberythermal and first-degree burn range, absorption tended to increase. In the second- and third-degree burn range, absorption de-

creased. A much greater concentration of absorbed strontium was found in tissues surrounding the contaminated skin that was normal or mechanically damaged. This was noted even at an energy dosage slightly below that causing visible skin change. NSA 5-4995

10685

THE BIOLOGICAL EFFECT OF MESOTHORIUM. V. THE BIOLOGICAL EFFECT OF INGESTED THORIUM EMANATION IN MAN. Kenji-Kojo. Berl. Klin. Wochenschr. 49, 779-780 (1912). (In German).

Author demonstrated internally deposited thorium by demonstrating its presence in exhaled air and in urine.

10686

BIOLOGICAL STUDIES ON STABLE AND RADIOACTIVE RARE EARTH COMPOUNDS. II. THE EFFECT OF LANTHANUM ON MICE BEARING EHRLICH ASCITES TUMOR. Ruth Lewin, Kurt G. Stern, Daniel M. Ekstein, Leonard Woldowsky, and Daniel Laszlo (Montefiore Hospital, New York and Polytechnic Inst. of Brooklyn). J. Natl. Cancer Inst. 14, 45-56 (1953) Aug.

NSA 10-552

10687

Tennessee Univ.

QUARTERLY PROGRESS AND WORK ACCOMPLISHMENT REPORT FOR QUARTER ENDING JUNE 30, 1951, AGRICULTURAL RESEARCH PROGRAM. June 30, 1951. 13p. (ORO-43)

Administrative information and brief summaries of progress during this period are presented. No activity was detected in tissues of sheep given Ta^{182} labeled K tantalate orally, indicating less than $0.18 \times 10^{-1}\%$ of the dose per gram of tissue. Data on fecal excretion of orally administered La^{140} by a cow in the third month of lactation are given, no activity was detectable in blood or milk. Changes in serum and milk activity with time in a cow injected intravenously with 15 mc of Ca^{45} 3 weeks previous to parturition are listed. NSA 5-5460

10688

THE EFFECT OF MEGAPHEN ON THE SURVIVAL TIME OF THE X-IRRADIATED RAT. G. Klein. Radiol. Clin., 25, 65-72 (1956).

10689

THE USE OF SMALL LABORATORY ANIMALS IN MEDICAL RADIATION BIOLOGY. IV. CORRELATION OF PHYSICAL FACTORS WITH THE BIOLOGICAL EFFECT PRODUCED BY TOTAL-BODY IRRADIATION OF GUINEA PIGS. F. Ellinger, J. E. Morgan, and E. S. Cook. Cancer, 9, 768-72 (1956).

10690

Tennessee Univ.

QUARTERLY PROGRESS AND WORK ACCOMPLISHMENT REPORT FOR QUARTER ENDING DECEMBER 31, 1951. nd. 23p. (ORO-59)

Preliminary data are presented from studies on the long term retention of Sr^{90} in cattle and the secretion of Sr in milk. Total Ca and Ca^{45} balance studies of the absorption, metabolism, tissue distribution, exchange reactions in bone, and excretion of orally and intravenously administered Ca in cattle are reported. Preliminary data are included from an investigation of the biosynthesis of vitamin B_{12} in sheep. NSA 6-2287

10691

Naval Radiological Defense Lab.

A QUANTITATIVE STUDY OF PERCUTANEOUS ABSORPTION. III. EFFECT OF CONCENTRATION AND SOLUBILITY ON TRACER ABSORPTION OF Sr^{89} FROM INTACT AND ABRADED SKIN AND FROM MUSCLE IN THE RAT, VALIDITY OF SURFACE COUNTER TECHNIQUES. R. Kenneth Loeffler. Feb. 12, 1951. 18p. (AD-290(B))

Absorption into the body of $Sr^{89}Cl_2$ in isotonic and saturated solutions of carrier $SrCl_2$ from intact and abraded rat skin was shown to be essentially independent of the concentration of the applied solution. Very little radiostrontium was found in the body 1 hr after poorly soluble $Sr^{89}SO_4$ was applied to intact skin, abraded skin, and intramuscular lacerations. However, an appreciable amount was found to have been absorbed ten days after intramuscular application. Values for percutaneous absorption obtained by surface-counting technique were shown to correlate closely with those obtained by direct analysis of ashed tissues. NSA 5-3633

10692

Tennessee Univ., Knoxville

AGRICULTURAL RESEARCH PROGRAM. SEMI-ANNUAL PROGRESS REPORT FOR JULY 1, 1955 TO DECEMBER 31, 1955. May 1956. 129p. Contract AT-40-1-GEN-242. (ORO-150). NSA 10-3769

10693

A QUANTITATIVE STUDY OF PERCUTANEOUS ABSORPTION. II. TOXICITY AND EFFECT UPON ABSORPTION OF TWO DECONTAMINATING SOLUTIONS. R. Kenneth Loeffler and V. Thomas. (Naval Radiological Defense Laboratory). Oct. 2, 1950. 16p. (Technical Objective AW-06). (AD-254(B))

Two solutions which have previously been proposed for skin decontamination, each consisting of a complexing agent, a wetting agent, and a disinfectant, are investigated for toxicity in rats. Some systemic toxicity is demonstrated, even from local applications. The solutions are shown to be good skin decontaminants, but it is also shown that they tend to increase the percutaneous absorption of $Sr^{89}Cl_2$ under several conditions. Data are presented which are interpreted as showing that, immediately upon contact with normal intact rat skin, some material is irreversibly bound in a manner which causes it to be eventually absorbed into the system. NSA 5-316

10694

PHYSICO-CHEMICAL EFFECT OF ROENTGEN RAYS ON LIVING ORGANISMS. G. D. Lieber. Strahlentherapie 29, 139-151 (1928) (In German).

Author believes primary effect of x-rays on rat skin is on K and Ca balance in the tissues.

10695

ANNUAL REVIEW OF PHYSIOLOGY. V. E. Hall. Stanford, Calif., Annual Review, Inc., 1948.

The chapter on "Physiological Effects of Radiant Energy," by R. L. Dobson and J. W. Lawrence brings out the highlights of recent developments in this field. Emphasis is placed on short wave length electromagnetic radiations - X-rays and gamma rays, and on particulate radiations - alpha rays, beta rays, neutrons and fission fragments. NSA 1-17

10696

THE TOLERANCE OF LARGE DOSES OF SODIUM BORATE INTRAVENOUSLY BY PATIENTS RECEIVING NEUTRON CAPTURE THERAPY. Herbert B. Locksley and Lee E. Farr (Brookhaven National Lab., Upton, N. Y.). J. Pharmacol. Exptl. Therap. 114, 484-9 (1955) Aug.

Clinical observations of the effects of intravenously administered borax in doses up to 20 grams (2.12 gm. boron) are reported. NSA 10-49

10697

TREATMENT OF MURINE LEUKAEMIA WITH X-RAYS AND HOMOLOGOUS BONE MARROW. D. W. H. Barnes, M. J. Corp, J. F. Loutit, and F. E. Neal. Brit. Med. J. 2, 626-30 (1956).

10698

TISSUE DISTRIBUTION OF BORON COMPOUNDS IN RELATION TO NEUTRON CAPTURE THERAPY OF CANCER.

Herbert B. Locksley and William H. Sweet. *Proc. Soc. Exptl. Biol. Med.* 86, 56-63(1954) May.

Recent application of the atomic pile to the neutron-capture therapy of human brain tumors has focussed attention on the biological behavior of boron compounds. Studies reported in mice and man indicate that borax and boric acid are rapidly absorbed and distributed throughout the body. Uptake by the various organs and tumor describes a family of similar curves such that the faster the rise in concentration, the higher and earlier is the peak. All tissues studied, except brain, reach a peak by 30 minutes. Borate is rapidly excreted by the kidneys as a "low-threshold substance" in a class with urea and sulfate, and clearance from the blood in mice proceeds with an exponential half time of approximately 65 minutes. Concentrations of borate in the tissues of normal mice are directly proportional to dosage for at least 2 hours after injection over a range of 18 to 700 $\mu\text{g/g}$ body weight. At equilibrium distribution, studied in nephrectomized mice, borate is uniformly distributed throughout the body water, with a 10 to 20% excess bound in the intracellular compartment. This excess is bound more tenaciously in brain than in other tissues and appears to be responsible for the toxicity of these compounds. Study of the factors determining the concentration ratio between neoplasm and surrounding normal tissues indicates that boron-neutron treatment offers little promise for malignant tumors other than those of the brain. NSA 8-5113

10699

CONTRIBUTIONS TO THE STUDY OF THE METABOLISM OF CAESIUM, STRONTIUM AND A MIXTURE OF BETA-EMITTERS IN COWS. A. V. Lebedinski (Lebedinsky), ed. Translated from a publication of the Scientific Committee on Medical Radiology of the Ministry of Health, U.S.S.R., Moscow, 1956, 18p. (NP-tr-206)

The tissue distribution and excretion were measured for cows following the ingestion of strontium-89-90, cesium-137, and a mixture of beta-emitting radioisotopes containing niobium-95, zirconium-95, ruthenium-106, cesium-137, strontium-89-90, and an aggregate of rare-earth elements. Data are tabulated. Results of the investigation serve to emphasize the hazards of any large-scale use of radioactive fertilizers containing cesium, strontium, or other easily absorbed isotopes, and the danger of keeping animals on pastures or waters which are contaminated with radioactive substances.

NSA 13-5231

10700

WHOLE BODY IRRADIATION-RADIOBIOLOGY OR MEDICINE? R. H. Mole. *Brit. J. Radiol.* 26, 234-41 (1953).

Dose-mortality relation for mammals killed by radiation shows less variability than does response to other toxic agents. Cell death occurs in 2 ways: interference with cell division, and another mechanism that causes early death of cells not normally dividing.

10701

Univ. of Rochester Atomic Energy Project
ACUTE TOXICITY OF INHALED THORIUM COMPOUNDS. Robert H. Hall, Catherine A. Stroud, James K. Scott, Robert E. Root, Lucille T. Steadman, and Herbert E. Stokinger. Nov. 13, 1951. 25p. (UR-190)

The low toxicities of $\text{Th}(\text{NO}_3)_4 \cdot 4\text{H}_2\text{O}$, ThO_2 , ThF_4 , and Th oxalate have been demonstrated by a series of tests in which animals breathed atmospheres containing these as dusts. The species exposed were dogs, rabbits, guinea pigs, rats, mice, and hamsters. Negative findings were reported for mortality, urinary protein, blood NPN and urea, plasma fibrinogen, and serum protein. Growth depression was observed in rats exposed to ThO_2 .

Occasional vomiting was observed in the dogs exposed to the nitrate. A thorough histological examination revealed practically no pathological changes attributed to the treatment, the exceptions were minor lesions of uncertain etiology in the lungs. The only positive findings were changes in the hematological picture, especially in the white cells, and somewhat abnormal bone marrow. Spectrographic analyses of the Th content of lung, femur, liver, and spleen showed a tendency for increased Th content with increased exposure. NSA 6-528

10702

RADIOBIOLOGICAL STUDY ON THE LYSOGENIC SYSTEM OF *E. COLI* K_{12} II. INDUCTION BY WEAK X-RAY DOSES. H. Marcovich. *Ann. l'Inst. Pasteur*, 90, 458-81(1956).

Induction of prophage to vegetative phage is a single-hit, dose rate independent process that is insensitive to oxygen. (Lysogenic bacterium and phage system).

10703

ANNUAL REVIEW OF BIOCHEMISTRY, VOL. XVIII. J. Murray Luck, Hubert S. Loring, and Gordon MacKinney, eds. Stanford, Calif., Annual Reviews, Inc., 1949. 739p.

The progress made in the various fields of biochemistry during the last few years is reviewed. Those fields in which tracer techniques have been used are abstracted separately. Extensive bibliographies are included. NSA 4-4781

10704

A MODEL OF THE EFFECT OF IRRADIATION ON BACTERIAL ABILITY TO SUPPORT PHAGE GROWTH. H. T. Epstein. *Bull. Math. Biophys.*, 18, 265-70(1956).

10705

THE NERVOUS SYSTEM AND IONIZING RADIATIONS. N. N. Livshits. p.126-230 of REVIEWS ON RADIOBIOLOGY. Translated from a publication of the Institute of Biological Physics, Academy of Sciences, U.S.S.R., Moscow, 1956. 403p. (AEC-tr-3353)

The role of the nervous system in the reactions of the organism to the action of ionizing radiations, and the direct action of ionizing radiations on the nervous system are considered in detail. NSA 13-2641

10706

STUDIES ON PROTECTION BY TREATMENT BEFORE AND AFTER EXPOSURE TO X- AND GAMMA RADIATION. A. Hollaender and G. E. Stapleton. *Proc. Internat. Conf. on the Peaceful Uses of Atomic Energy*, 11, 311-14 (United Nations, New York, N. Y. 402p., 1956).

Cysteamine pretreatment, combined with post-treatment with yeast extract or spleen extract, gives highest protection so far established. (*E. coli* was biological system studied.)

10707

ANIMAL DISTRIBUTION OF COLLOIDS OF Au^{198} , P^{32} , AND Y^{90} . AN IMPROVED METHOD OF TISSUE ASSAY FOR RADIOACTIVITY. T. N. Lahr, Robert Olsen, G. I. Gleason, and D. L. Tabern (Abbott Labs., North Chicago, Ill. and Oak Ridge, Tenn.). *J. Lab. Clin. Med.* 45, 66-80(1955) Jan.

A quantitative comparison is presented of three types of chromic phosphate colloids, and of several colloids prepared from Au^{198} and Y^{90} . The data indicate excellent cavity retention in the case of Type G CrPO_4 , and excellent retention of Y^{90} , as the phosphate. In view of the established clinical safety of Au^{198} colloid (Aurcoloid), several of these others are undergoing clinical evaluation by groups with experience in this field. Data regarding cavity distribution and clinical effectiveness can be secured only on suitable clinical material. Also presented

is a much simplified method for tissue assays, involving homogenization of whole organs, solution of aliquots at room temperature in Formamide, and either beta counting at infinite thickness, or, where possible, gamma counting in a suitable well-type scintillation unit.

NSA 9-1459

10708

PRELIMINARY REPORT TO THE GENETICS PANEL OF THE NATIONAL ACADEMY OF SCIENCES STUDY OF THE BIOLOGICAL EFFECTS OF ATOMIC RADIATION. J. S. Laughlin and I. Pullman. Washington, National Academy of Sciences, U. S. 1956.

10709

Tennessee Univ.

AGRICULTURAL RESEARCH PROGRAM QUARTERLY RESEARCH PROGRESS REPORT FOR THE TWO QUARTERS ENDING MARCH 31, 1953 AND JUNE 30, 1953. July 20, 1953. 131p. (ORO-98)

The tissue distribution, excretion, and placental transfer of Y^{91} were studied after intravenous administration to cattle and intramuscular administration to rats. The "isotope-dilution" and "comparative-balance" methods for the determination of endogenous fecal Ca in cattle are compared. Irradiation of burros caused a decrease in body H_2O , but the significance of this is not fully determined. It was observed that a corn-cob meal ration red to chicks inhibited growth and caused the endocrine glands to remain infantile in size. The thyroid function in rats after total-body irradiation was studied by I^{131} tracer techniques. A case history is reported of an osteogenic sarcoma in a muskrat which fed on plants containing large amounts of radioactive Sr. The effects of total-body irradiation of burros on respiration and blood values are reported.

(For preceding period see ORO-90)

NSA 7-5462

10710

Oak Ridge Inst. of Nuclear Studies

QUARTERLY PROGRESS REPORT [FOR] OCTOBER 1 - DECEMBER 31, 1953. 36p. Contract AT-40-1-GEN-33. (ORO-116)

Administrative and educational activities and clinical studies involving the use of radioisotopes are summarized. Two patients with metastatic malignant melanoma were treated with I^{131} . Autopsy studies on one patient and biopsy studies on the other failed to show therapeutically significant concentration of radioactivity in the tumors. Data are included from tracer studies of the tissue distribution of Lu and Y in animals. Construction is reported of a standard-man-liquid phantom for radiation dosage studies. Design is reported of a remote control pipetter, a container to insure uniform irradiation of small diameter Au wire, a magnetic manipulator for loading radioactive Co wire, and a device for measuring and cutting radioactive Au seed.

NSA 8-3660

10711

New York Operations Office. Health and Safety Div., AEC PRELIMINARY STUDY OF Sr^{90} DISTRIBUTION AND UPTAKE FOLLOWING NUCLEAR DETONATIONS. Aug. 14, 1953. Decl. with deletions Apr. 28, 1959. 24p. (NYO-4528(Del.))

Samples of animal bone, soil, vegetation, and settled and airborne dust were analyzed for radioactive strontium. Because of the age of the majority of the material, Sr^{89} rather than Sr^{90} was the isotope found. The results showed widespread low-level activity and appreciable plant and animal uptake. Analyses of human bone for normal strontium content showed values in the range of 0.02% on the basis of bone ash. A critical evaluation of analytical methods for strontium showed that good recoveries were possible from bone ash, soil, and vege-

tation. The analysis of fall-out samples is not yet satisfactory, but the cause of the difficulty is known and can be eliminated. Determinations of Sr^{90} on human bone samples from victims of the Nagasaki burst were made. Sr^{90} was found, and the results are appended to this report.

NSA 13-11736

10712

Industrial Hygiene Foundation of America, Inc., Pittsburgh and Mellon Inst. of Industrial Research, Pittsburgh REVIEW OF LITERATURE ON TOXICITY, PHYSIOLOGICAL EFFECTS AND MEDICAL USES OF ZIRCONIUM AND ITS COMPOUNDS. July 1954. 15p. (NP-5667)

A summary is presented of data obtained from a review of the literature covering the toxicity, physiological effects, and medical uses of Zr and its compounds 62 references.

NSA 9-6171

10713

INVESTIGATION OF THE DISTRIBUTION AND ELIMINATION OF DECAY PRODUCTS OF THORIUM X PRODUCED IN VIVO. Eberhard Harbers. Z. Naturforsch. b7, 363-5 (1952) June. (In German).

The tissue distribution and excretion of decay products, even if short-lived, frequently differ greatly from those of the parent element and can constitute a hazardous complication in radioisotope therapy or tracer studies. Curves are drawn showing the variation with time of ThX (Ra^{224}), ThC (Bi^{212}), ThB (Pb^{212}), and total activity in blood cells, serum, liver, kidneys, spleen, and urine of rabbits injected with ThX. An initial increase in total activity in blood cells and liver is noted as the ThC concentration builds up.

NSA 6-6513

10714

DEGREE TO WHICH RECOVERY FROM ACUTE ALPHA-IRRADIATION IS POSSIBLE. V. P. Bond, E. P. Cronkite, and O. D. Easterday. Radiation Research, (Radiation Research Society Meeting, May 1957) 7, 304(1957).

Female CF1 mice received a second large dose to test degree of recovery from initial insult. The injury from either radiation is close to 100% recuperable in 5 weeks.

10715

ON THE STATISTICAL NATURE OF MORTALITY, WITH ESPECIAL REFERENCE TO CHRONIC RADIATION MORTALITY. G. A. Sacher. Radiology, 67, 250-57(1956).

10716

Univ. of California Radiation Lab.

MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT, JULY, AUGUST, AND SEPTEMBER 1950. (Excerpt UCRL-960 appeared in NSA 5-1786). Nov. 8, 1950. Decl. Apr. 24, 1951. 75p. (AECD-3141; UCRL-960)

The Metabolic Properties of Plutonium and Allied Materials. Rats which had been subjected to a smoke chamber containing Pu were sacrificed 64 days after exposure, and histologic sections of their lungs were prepared. Representative radioautographs made from these sections are presented and discussed. The fate of terbium has been studied in rats. Pile-produced Tb^{160} was used as a tracer. Metabolism studies in rats of carrier-free Sc^{45} , Ta^{182} , Mn^{52} , Cr^{51} , and At^{211} also are summarized. The effect of whole-body irradiation on the extra- and intra-cellular distributions of Na^{22} and K has been studied. The effects of chelating agents in vivo on the excretion of Pu^{239} and Ce^{144} , and in vitro experiments on the chelation of Be are reported. Results of a metabolism study of Ca^{45} in young, adult, and rachitic rats are given, this study, by D. M. Thomson and D. Harold Copp, has been excerpted from this report and has appeared in Nuclear Science Abstracts as NSA 5-1786. Radiochemistry. Methods of preparation of carrier-free Cr^{51} , Sc^{46} , Bi^{204} , 206 , and Mn^{52} from V, Ti, Pb, and Cr, respectively, are summarized.

Biological Studies of Radiation Effects. Evidence of a Combined Target-Intermediate Action Mechanism of Radiation Effects. A parallelism is demonstrated between the so-called indirect mechanism of radiation effect and the target theory. The apparent contradiction in the two theories may be eliminated by using the "diffusion model" of radiation effects, which assumes the formation of intermediates by the ions of the primary radiation. The formulation of the diffusion model allows for variation in radiation sensitivity with substrates, state of cell division, water content, etc., it furnishes clues for study of the quantitative effects of externally applied cell poisons. The mechanism of inhibition of cell division by radiation may be quantitatively accounted for in haploid, diploid, and tetraploid yeast cells. 13 figures. 19 references. **Health Chemistry and Physics.** Activities in monitoring, transportation, decontamination, dispersal, and storage of radioactive materials and surveys of the radiation field of the 60-in. cyclotron and of the fast-neutron field produced by the synchrotron are summarized. NSA 5-3286

10717

Mound Lab., Miamisburg, Ohio
BIOLOGICAL RESEARCH QUARTERLY REPORT [FOR] APRIL, MAY, [AND] JUNE 1950. July 1, 1950. Decl. Jan. 10, 1956. 95p. Contract AT-33-1-Gen-53. (MLM-471-1)

Studies are reported on the distribution of Po in the different tissues, fluids, and excretory products of laboratory animals, effects of Po on cell metabolism, hematological and pathological effects of Po on rats, rabbits, cats, and dogs. NSA 11-2245

10718

Univ. of Calif., Berkeley, Radiation Lab.
MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT [FOR] JULY, AUGUST, SEPTEMBER, 1954. Nov. 23, 1954. 53p. Contract W-7405-eng-48. (UCRL-2823)

Data are presented from tracer studies of the tissue distribution of Sm, Eu, Dy, Ho, and Yb in rats, pathological effects of At^{211} on rats and monkeys, and studies of the radiation chemistry of aqueous solutions of acetic acid, glycine, and formic acid. Routine health chemistry activities are summarized. (For preceding period see UCRL-2661.) NSA 9-2551

10719

METABOLISM OF IRON. Paul F. Hahn. Federation Proc. 7, 493-8(1948) Sept.

This is a review article on the use of Fe^{59} in determining presence, fate, and action of iron in the body, including reports of work on distribution, absorption, valence state, uptake (especially during gestation), transport, inflammation in influence on uptake and utilization, hemoglobin pathways, and iron deficiency in anemia. 35 references. NSA 4-2978

10720

ROENTGEN RAYS, ADRENALS AND CYSTEAMINE. Z. M. Bacq, P. Fischer, and M. Beaumariage. Bull. l'acad. roy. med. Belg. (VI) 19, 399(1954). (In French)

10721

THE DISTRIBUTION AND FUNCTION OF ZINC IN NORMAL AND MALIGNANT TISSUES. PART I. UPTAKE AND DISTRIBUTION OF RADIOACTIVE ZINC, ^{65}Zn . J. C. Heath and J. Liquer-Milward. Biochem. et Biophys. Acta 5, 404-15 (1950) June.

The uptake and distribution of Zn^{65} in normal and malignant mouse tissues and certain fractions derived from there have been studied following the injection of this element as chloride into tumor-bearing mice. In both the sarcoma and carcinoma studied the malignant tissue took up more of the Zn^{65} per unit weight of tissue in the given time of 18 hr than the normal tissue supporting tumor

growth. Nuclear desoxyribose nucleoprotein from the tumor cells showed an appreciable content of Zn^{65} and, provided a suitable method of preparation was used, so also did liver-cell nuclei. NSA 4-5598

10722

Univ. of Calif., Berkeley, Radiation Lab.
THE METABOLIC PROPERTIES OF VARIOUS MATERIALS. Joseph G. Hamilton. p.4-47 of MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT, JANUARY, FEBRUARY, AND MARCH, 1952. (AEC-3448; UCRL-1826)

Tissue distribution of fission products obtained from Oak Ridge were determined in rats and data are presented in tabular form. A decay curve and mass absorption curve for the fission products used are included. Studies on the effect of Ca ethylenediamine tetraacetic acid on the distribution of Pu in the rat indicate that the oral administration of CaEDTA is not a particularly efficient way of reducing the Pu content of the tissues, and large amounts of CaEDTA must be given parenterally during the time the Pu is in a relatively labile state in the body for increase of excretion to be marked. An ether extraction method is reported for the separation of U from mixed fission products. Studies on the products resulting from irradiation of aqueous solutions of acetic acid are reported. Design of a calorimeter for determination of the cyclotron He ion beam energy is described. A diagrammatic arrangement of the calorimeter assembly is included. Photographs and stripping-film radioautographs of rat lungs after exposure to a smoke containing Pu are presented. A technique is described for preparing radioautographs using a film similar to stripping film but consisting of emulsion and an inert layer of gelatin which allows staining of the tissue through the wet gelatin. This film, supplied for experimentation by Eastman Kodak Company, gave improved radioautographs. Possible applications of the method to additional studies of the fate of inhaled particulate matter are discussed. NSA 6-6291

10723

X-RAY IRRADIATION OF A SPECIFIC BACTERIOPHAGE INACTIVATING AGENT PRODUCED BY BACTERIA. C. Brinton. p.373-78 "Progress in Radiobiology." Springfield, Illinois. C. C. Thomas Pub. Co. 1956.

By means of radiation-inactivation techniques, the estimated molecular weight of an antiphage against T_4 is shown to be between 50,000 and 120,000.

10724

BIOPHYSICAL BASIS FOR THE APPLICATION OF X RADIATION AND RADIOACTIVE SUBSTANCES. Otto Hug (Max-Planck-Institut für Biophysik, Frankfurt am Main). Bundesarbeitsblatt No. 18, 826-31(1955). (In German).

In the consideration of basic principles of radiation biology which are valid for all types of radiation, the conception of radiation dose is clarified. The effects of single exposures and the duration of the exposure are discussed. The tolerance doses in professional radiation burden are then considered. Relative biological effectiveness of various types of radiation are discussed and tabulated. The radiation biological effects of radioisotopes are considered in some detail, and a tabulation is given of the maximum permissible dose and concentration in air and water.

NSA 14-3416

10725

Sloan-Kettering Inst. for Cancer Research, Memorial Center for Cancer and Allied Diseases, New York, N. Y.

PHYSICS AND BIOPHYSICS. J. S. Laughlin. p.4-70 of SEMI-ANNUAL REPORT TO THE ATOMIC ENERGY COMMISSION. Feb. 1, 1953. (AECU-2602)

Progress is reported in the use and development of procedures for determining the concentration of isotopes in both the solid and gas phase in biological systems. Methods were developed for measuring the mass of cells and their constituents as an aid in studies of tissue reaction to radiation. Studies reported in which radioactive isotopes were used as tracers include the tissue distribution of Ag, Cs, and Cu in normal and in tumor-bearing rats, and studies in humans of the site of absorption of Co⁶⁰-labeled B₁₂, the utilization of acetate and cholesterol in the synthesis of steroid hormones, the tissue distribution of dietary tritium-labeled cholesterol, the synthesis of fatty acids from acetate, the role of C in the biosyntheses of urea, the chromatographic separation of glutamic and aspartic acids in blood plasma, the tissue distribution of Zn in humans, and blood circulation in health and disease. NSA 7-5267

10726

A RADIOIRON STUDY TECHNIQUE FOR THE DIFFERENTIAL DIAGNOSIS OF HAEMATOLOGICAL DISORDERS. W. Horst and H. Villanueva-Meyer (University Hospital, Hamburg-Eppendorf). *Medicamundi* 2, No. 2, 70-82(1956).

The literature on the dynamics of iron metabolism is reviewed. The iron turnover of 13 healthy controls and 58 patients with various diseases, mainly hematological, was examined with Fe⁵⁹. Techniques are described and findings are tabulated. NSA 11-902

10727

Mound Lab., Miamisburg, Ohio
REPORT FOR BIOLOGICAL RESEARCH [FOR] NOVEMBER 27, 1950 TO MARCH 19, 1951. Apr. 23, 1951. Decl. with deletions Oct. 11, 1955. 60p. Contract AT-33-1-GEN-53. (AECD-3695)

Data are summarized from studies on the toxic and pathological effects of Po on laboratory animals. NSA 10-546

10728

MODIFICATION OF THE DISTRIBUTION AND EXCRETION OF RADIOISOTOPES BY CHELATING AGENTS. Hiram Hart and Daniel Laszlo. *Science* 118, 24-5(1953) July 3.

Modifications in the distribution and excretion of intravenously injected La¹⁴⁰ by the administration of Ca-ethylenediaminetetraacetate (EDTA) and La-EDTA are reported. Results are compared with results from previously reported decontamination studies using Fe⁵⁹ and Y⁹¹ and distribution studies using La-EDTA and La chloride. Since La removal by EDTA was found to decrease with time, it is suggested that EDTA may be used as an investigative tool as well as for removal of metals and radioisotopes from the body. NSA 7-5012

10729

Univ. of Calif. Radiation Lab.
MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT, OCTOBER, NOVEMBER, AND DECEMBER 1950. Feb. 27, 1951. Decl. July 16, 1951. 61p. (AECD-3200; UCRL-1143)

In the tracer program, difficulties associated with the assay of astatine in biological material were solved. At²¹¹ was intravenously injected into rats and was injected into the anterior chamber of the eye of monkeys. Radioautographs are shown. Other experiments were conducted with carrier-free Bi²⁰⁶, carrier-free Mn⁵², carrier-free Mo^{93, 99}, Np²³⁷, Ta¹⁸² of a fair degree of specific activity, carrier-free Sc⁴⁶, and high specific activity Tm¹⁷⁰. Detailed data (14 tables) are given on deposition of these tracers in various body organs after intravenous or intramuscular injection and at varying time intervals after injection. Detailed data are given on experiments on the movement of Na and K in the tissues of the rat following acute radiation injury using Na²² and K^{42, 43} as tracers. Experiments are in progress on administration of a chelating agent to rats

carrying a body burden of Pu²³⁹, which results in increases in the urinary excretion of the radioelement. Descriptions are given of preparation of carrier-free, Pd¹⁰³ from Rh, Mo^{93, 99} from Zr, W¹⁸¹ from Ta, Ta^{177, 178, 182} from Hf. Studies on the effect of specific liver irradiation on the chromic phosphate disappearance constant in rabbits and mice are reported. The observed lowering of the disappearance constant is apparently due in part to a decrease in the efficiency of the liver phagocytes and in part to a depression of the liver blood flow. In regard to survival, either the rate at which the irradiation is given or more probably, the degree of localization in the liver and spleen seems to be important. NSA 5-4306

10730

Univ. of Calif. Radiation Lab.
THE METABOLIC PROPERTIES OF VARIOUS MATERIALS. p. 4-31 Medical and Health Physics Quarterly Report; July, August, and September, 1951. Nov. 5, 1951. Decl. Apr. 25, 1952. 28p. (AECD-3354)

A study of radioautographs of liver from rats, injected with radiogold 1 day previously, showed 50% of the gold deposited; those injected 4 days previously showed 43% remaining. Careful dark-field examination at high magnification showed particulate matter of the order of 2 μ in size present in the Kupffer cells. These were of random distribution, and, wherever there was evidence of activity from the radiogold accumulated in the liver, there was present one of these small unidentified particles. However, only some of the particles were associated with the photographic evidence of the presence of radiogold, thus suggesting the radiogold was adsorbed on the particulate matter held by the reticulo-endothelial system. Tissue distribution studies are reported for rats administered W, Tl, Sc, Au, and Tm. Results are presented in tabular form. Preparation is reported of carrier-free Au^{196, 196, 198, 199}, W¹⁸¹, and Ir^{188, 190, 192}. Modifications are reported in the design of a centrifugal-pump target assembly for cyclotron irradiation of litter amounts of solution under controlled conditions. Irradiation-induced oxidation of the ferrous ammonium sulfate system was investigated using this assembly. Results are presented graphically. NSA 6-3156

10731

PROGRESS IN BIOCHEMISTRY. Felix Haurowitz. New York, Interscience Publishers 1950. 405p.

This book was written mainly to inform students and teachers of science, medicine, and pharmacy about the results of biochemical research since 1939. The first chapter briefly reviews the structure of stable and radioactive isotopes, and outlines the use of such isotopes as tracers in metabolism studies. Subsequent chapters deal in detail with various metabolism problems and discuss the use to which radioactive and stable isotopes have been put in this connection. NSA 4-4535

10732

Argonne National Lab.
BIOLOGICAL AND MEDICAL RESEARCH, RADIOLOGICAL PHYSICS, AND HEALTH SERVICES DIVISIONS MONTHLY PROGRESS REPORT [FOR] JUNE 1953. July 1953. 20p. (ANL-5086)

Brief statements are presented on the status of work in the above Divisions. NSA 7-4711

10733

Duke Univ. School of Medicine
THE USE OF RADIOPHOSPHORUS IN STUDIES OF THE GLOMERULAR PERMEABILITY OF PLASMA INORGANIC PHOSPHATE. Philip Handler and David V. Cohn. nd. 29p. (ORO-14)

When single tracer doses of P³² with or without carrier were intravenously injected into dogs, the specific activity of the urinary inorganic phosphate was found to be as much

as 32% above that of the specific activity of the corresponding plasma inorganic phosphate. This difference usually disappeared within 25 min. When the specific activity of the plasma inorganic phosphate was caused to rise, fall, or remain constant, the differences in specific activity between urine and plasma inorganic phosphate were markedly altered or entirely abolished. When a small amount of radioactive plasma from an apparently "equilibrated" dog was given to a second dog, differences in specific activity of urine and plasma inorganic phosphate were of the same order of magnitude as in animals receiving untreated P^{32} . It is concluded that the greatest part of these differences may be explained on the basis of a lag which exists between the time inorganic phosphate is filtered by the glomerulus and the time at which it reaches the bladder for collection. The evidence suggests that the majority of the inorganic phosphate of plasma exists in a simple, filterable state. 14 references. NSA 5-3332

10734

ACUTE X-RAY LETHALITY STUDIES WITH THE HAMSTER. THE LD_{50} , DEATH RATE, AND RECOVERY RATE. H. I. Kohn and R. F. Kallman. Radiation Research 6, 137-47(1957).

10735

DISTRIBUTION OF RADIOACTIVE COLLOIDAL GOLD IN THE ORGANISM. A. Herve and J. Closon. Schweiz. Med. Wochenschr. 82, 522-6(1952) May. (In French).

Intraperitoneal injection of 3 mc of colloidal Au^{198} , the particles of which had a diameter of ~ 70 A, was closely equivalent in the rabbit to intravenous injection and led to a very similar tissue distribution. Addition to the standard solution of an equal volume of a 10% gelatinous serum retarded absorption of the intraperitoneally injected colloid and diminished fixation in the organs. Elimination was negligible in all cases. The suspension tended to disseminate throughout the organism. Radiotherapy with this substance should be undertaken only in exceptional cases. NSA 6-4379

10736

THE INFLUENCE OF EXPOSURE GEOMETRY ON THE PATTERN OF RADIATION DOSE DELIVERED TO LARGE ANIMAL PHANTOMS. V. P. Bond, E. P. Cronkite, C. A. Sondhaus, G. Imirie, J. S. Robertson, and D. C. Borg. Radiation Res. 6, 554-72(1957).

10737

New England Deaconess Hospital, Boston, Cancer Research Inst.

MICROSCOPIC DISTRIBUTION OF RADIOISOTOPES IN TISSUES. Margaret W. Holt and Shields Warren. 1953. 34p. (AECU-2515)

Autoradiographic techniques were used to demonstrate the distribution of injected P^{32} and S^{35} in mouse or rat ovary, placenta, and intestine. The techniques used were demonstrated to retain water-soluble diffusible substances *in situ*. P^{32} and S^{35} were shown to be distributed quite differently in these organs, apparently reflecting a difference in chemical metabolism of the two elements. Photographs of the radioautograms are included. NSA 7-2981

10738

PROCEEDINGS OF THE SECOND ANNUAL MEETING ON BIO-ASSAY AND ANALYTICAL CHEMISTRY, OCTOBER 11 AND 12, 1956. (Los Alamos Scientific Lab., N. Mex.). Sept. 27, 1957. 163p. (WASH-736)

Topics discussed include procedures for the determination of Po in urine, feces, and blood, the determination of Be in biological materials, application of statistical methods to bio-assay, techniques for low-level α counting and pulse-height analysis, the toxicology of plutonium, the metabolism and toxic effects of fission products, methods for the radiometric determination of I^{131} and Sr^{90} in urine,

procedures for the radiochemical analysis of Sr and Ba in human urine, and the design and performance of a whole-body γ counter. NSA 12-94

10739

Oak Ridge Inst. of Nuclear Studies
QUARTERLY PROGRESS REPORT, APRIL 1-JUNE 30, (1953). 11p. (AECU-2684)

Progress is reported in an investigation of the use of paper chromatography to characterize the various forms of I in blood plasma or urine after the administration of radioiodine as Na iodide or as thyroxine. Data are presented on the tissue distribution of intrapleurally injected colloidal P^{32} -chromic phosphate in rats and dogs and the tissue distribution of intrapleurally injected Y^{90} in rats. Clinical studies reported to be in progress are briefly summarized. (For preceding period see ORO-97.) NSA 7-5913

10740

ACTION OF IONIZING RADIATION ON LIPIDS. A. Chevallier and C. Burg. p.1-25 of PROCEEDINGS OF THE RADIOBIOLOGY SYMPOSIUM HELD AT LIEGE, BELGIUM ON AUGUST-SEPTEMBER, 1954. Z. B. Bacq and Peter Alexander, eds. London, Butterworth and Co., Ltd. 1955. 362p.

Authors present a summary of effect of irradiation on fats and lipides *in vivo* and *in vitro*. (Cited by Holmes, B. E., Annual Review of Nuclear Science, 1957, Ann. Rev. Inc., Palo Alto, Cal.).

10741

Union Carbide Nuclear Co. Y-12 Plant, Oak Ridge, Tenn. A URANIUM INHALATION EXPOSURE CASE HISTORY. nd. 4p. (AECU-4089)

Condensed version of Y-B94-54. A machinist in a U shop was found to have inhaled dust from his work. The exposure resulted from the worker's keeping his face close to the work thereby interfering with the exhaust provided. Also, at some time during the period some cleansing tissues were drawn into the exhaust duct and lodged there. An initial lung burden of 3 to 5 mg was found with no evidence of kidney loading. Excretion was primarily in the urine, 2.33 mg being detected in urinalyses for 2.54 mg being eliminated from the deposit. The employee suffered no deleterious effects, felt well, and had no complaints. NSA 13-11708

10742

ATOMIC-BOMB RADIATION. Mechanical Engineering 70, 546(1948) June.

The radiation effects produced by an atom bomb are considered. The known kinds of penetrating radiation which can be expected within the immediate area of a blast are: gamma radiation, neutron beams, beta rays and alpha rays. The types of burns, physical damage to persons and food and water are also considered. NSA 1-18

10743

Hiroshima Communications Hospital (Japan)
SYMPOSIUM OF EXPOSED SURVIVORS HELD (IN) HIROSHIMA [ON] MARCH 28, 1952. 25p. (NP-4562)

The experiences of 19 staff members of the Hiroshima Communications Hospital at the time of the atomic explosion, and during the period following the explosion, are summarized. Personal experiences and professional observations are included. NSA 7-3685

10744

California Univ., Berkeley, Radiation Lab.
MEDICAL AND HEALTH PHYSICS SECTION PROGRESS REPORT FOR MAY 1947. Decl. Dec. 13, 1955. 19p. Contract W-7405-eng-48. (BP-97)

Data are summarized on the deposition of radiolanthanum and promethium in tissues of the rat. The effects of 2,3-dithioglycerol and zirconium citrate on the metabolism of intramuscular Pu were also studied. Some data are given on the bone metabolism of Ra. A study was made of

U distribution in mice. Progress in health physics and radiation field studies is discussed. NSA 10-5084

10745

ON THE PASSAGE OF HEAVY PARTICLES THROUGH TISSUE. W. S. Snyder and J. Neufeld. *Radiation Research*, **6**, 67-78(1957).

10746

EXPERIMENTAL AND CLINICAL STUDIES WITH RADIO-ACTIVE COLLOIDAL GOLD IN THE THERAPY OF SEROUS EFFUSIONS ARISING FROM CANCER. Campbell Moses, Edward Kent, Joseph B. Boatman, R. D. Cole, Joseph H. Sunder, R. S. George, Clem Russ, W. B. Ford, and E. R. Kutz. (Univ. of Pittsburgh School of Medicine, Penna.). *Cancer* **8**, 417-23(1955) Mar.-Apr.

The distribution and toxicity of colloidal radiogold (Au^{198}) after its intrapleural and intraperitoneal instillation in rats have been studied. No significant complications were encountered with doses comparable to those used clinically. The Au^{198} , intrapleural, fifteen-day LD_{50} for rats was approximately 20 microcuries per gram body weight. The intrapleural administration of Au^{198} to mice with spontaneous lung tumors failed to produce any but the most superficial surface effects. In dogs the administration of a single dose of 5 mc per kg intrapleurally produced a mild leukopenia and local pleural reaction, but no sharply deleterious effects. The subcutaneous injection of 10 to 40 mc of Au^{198} about fresh surgical wounds increased the induration in the area but no wound separation occurred nor was there any delayed healing. Complete cessation or marked retardation of fluid formation followed the intracavitary injection of Au^{198} in approximately one half of 163 patients with metastatic carcinoma and pleural effusion or ascites. This response, together with the absence of serious toxic reactions, indicates that radiogold is a useful, but far from ideal, therapeutic weapon in the management of this problem.

10747

FIRST DEMONSTRATION OF BACTERICIDAL PROPERTIES OF X-RAYS. Rieder. *Muench. Med. Wochschr.* **41**, (1898). Also in *Arch. of Roent. Ray (Brit. J. Radiol.)* **4**, 57 (1898).

10748

TRANSLOCATIONS IN MAIZE INVOLVING CHROMOSOME 4. E. G. Anderson, H. H. Kramer and A. E. Longley. *Genetics* **40**, 500-510(1955).

Gives data on the linkage relationships of Ts_5 (tassel seed-5), sv (sugary endosperm - 1), Tv (tunicate ear) and gl_3 (glossy seedling - 3) with 23 translocations involving chromosome 4 and the approximate order of the translocations on the chromosome being indicated. (from abstract). PBA 26-1257

10749

A BRIEF SURVEY OF THE PHYSICAL PROCESSES INVOLVED IN THE ABSORPTION OF RADIATION BY LIVING CELLS. L. H. Clark. *Brit. J. Radiol. Suppl* **1-3**, 6(1947-50).

10750

MEDICAL RESEARCH AND CANCER THERAPY IN A MODERN RADIOISOTOPE HOSPITAL. R. J. Hasterlik. (Univ. of Chicago, Ill.). *Mmerva Nucleare* **1**, 208-13 (1957) Oct. NSA 10-5868

10751

Knolls Atomic Power Lab., Schenectady, N. Y. RADIATION EXPOSURE AUDITING. M. R. Kennedy, G. W. Gasper. Dec. 15, 1957. 47p. Contract W-31-109-Eng-52. (KAPL-1832)

The methods in use at the Knolls Atomic Power Laboratory by the Health Physics group to complete a radiation exposure audit are discussed. This report includes discussions of personnel monitoring equipment,

calibration procedure, methods of evaluating a possible exposure to external radiation, and the manner in which a potential exposure to air-borne radioactive materials is estimated and evaluated. NSA 10-10321

10752

Argonne National Laboratory. THE MECHANISM OF CYSTEINE PROTECTION AGAINST X-IRRADIATION. H. M. Patt, D. E. Smith, E. B. Tyree, and R. Straub. p.74-83 of QUARTERLY REPORT OF BIOLOGICAL AND MEDICAL RESEARCH DIVISION (MAY, JUNE, JULY 1949). (ANL-4333)

Report studies on mice.

10753

Argonne National Laboratory. THE BLOOD PICTURE OF CHRONICALLY IRRADIATED LAF, MICE. BLOOD PICTURE IS DESCRIBED FOR A PERIOD OF 69 WEEKS. E. Lorenz and L. O. Jacobson. p.37-51 of QUARTERLY REPORT OF BIOLOGICAL AND MEDICAL DIVISIONS (MAY, JUNE, JULY, 1949). 1949. (ANL-4333)

10754

Argonne National Laboratory. COMPARISON OF THE BIOLOGICAL EFFECTS OF 186 kv AND 11.4 mEv X-RAYS ON THE WEIGHT OF THE MOUSE TESTES. A. B. Eschenbrenner and T. Wang. p.66-70 of QUARTERLY REPORT OF BIOLOGICAL AND MEDICAL RESEARCH DIVISION (MAY, JUNE, JULY, 1949). (ANL-4333)

10755

Argonne National Laboratory. EFFECT OF IRRADIATION ON A TRANSPLANTABLE MOUSE LYMPHOMA. J. W. Hollcroft and E. Lorenz. p.52-56 of QUARTERLY REPORT OF BIOLOGICAL AND MEDICAL RESEARCH DIVISION (MAY, JUNE, JULY, 1949). (ANL-4333)

10756

Argonne National Laboratory. THE EFFECT OF TOTAL TIME OF TREATMENT UPON SURVIVAL OF YOUNG CHICKS FOLLOWING X-IRRADIATION. S. P. Stearners. p.97-102 of QUARTERLY REPORT OF THE BIOL. AND MED. RESEARCH DIV. (MAY, JUNE, JULY, 1949). (ANL-4333)

Studies in which newly hatched chicks received fractionated doses indicate that total treatment time is more important than dose rate.

10757

DELAYED DAMAGES OF THOROTRAST JUDGED BY THE OLDEST KNOWN CASE OF INJURY. Rudolf Birkner. *Strahlentherapie* **78**, 587-608(1949). (In German). NSA 4-1934

10758

SHOE-FITTING FLUOROSCOPES. Anonymous. Editorial, *J. Amer. Med. Assoc.* **139**, 1004-1005(1949).

10759

STERILITY AND THE X-RAY. Anonymous. Editorial, *N. Y. Med. Jour.* Feb. 18, 1905.

10760

CASTRATION OF EXPERIMENTAL ANIMALS BY X-RAYS. Albers - Schonberg. *Muench. Med. Wochschr.* **45**, 1859-60 (1903). (In German).

10761

PRIMEX WHITE MUSTARD - A MARKET VARIETY SELECTED IN X-RAY TREATED MATERIAL. G. Andersson and G. Olsson. *Acta Agr. Scand.* **4**, 574-577(1954).

Reasons are given for regarding Primex as the result of induced mutation of the genes for yield and oil content in the irradiated mother plant rather than merely as the outcome of selection. (from abstract).

10762

EFFECT OF X-RAYS ON THE GROWTH OF CERTAIN TREES. Anonymous. *Foret Quebecoise* 13, 389-390(1948).

Reference is made to the experiments being carried out in Sweden to combine the characteristics of Norrland pine variety with the rapid development of the varieties of southern Sweden. Two methods being used are hybridization and treatment with X-Rays. (from abstract).

10763

ANNUAL REPORT ON THE WORK OF THE SWEDISH SEED ASSOCIATION DURING 1943. A. Akerman. *Sveriges Utsadesforen Tidskr.* 54, 115-172(1944).

Comparative trials and breeding operations at Svalof, on various agricultural products are reported. Cytological research included the study of polyploids comprising 7 series of tetraploid flax, 174 F4 families from crosses between tetraploid varieties and about 200 X₃ families. Other experiments also reported. (from abstract).

BA 15-531

10764

ANNUAL REPORT ON THE WORK OF THE SWEDISH SEED ASSOCIATION DURING 1945. A. Akerman. *Sveriges Utsadesforen. Tidskr.* 56, 411-483(1946).

Author discusses new varieties and elites released in 1945, also discusses cytological studies of timothy, and experiments on autumn wheat, spring wheat, oats, autumn rye, spring rye, maize, barley, herbage plants, lupino, root crops, textile plants, tobacco, poppy, hops, and others. (from abstract).

10765

EFFECT OF REPETITIVE EXPOSURES TO GAMMA-RAYS ON THE HEMATOPOIETIC SYSTEM OF THE RAT. S. J. Baum, D. J. Kimeldorf, and E. M. Jacobsen. *Blood*, 10, 926-32(1955).

Authors describe results of their studies demonstrating rapid recovery rate of hematopoiesis in rats exposed to 75r/week. PBA 18-1328

10766

X-RAY INDUCED BUD SPORTS IN APPLES. C. J. Bishop. *Fruit Variety and Hort. Dig.* 9 (2), 25-28(1954).

A brief account of results obtained using portable X-Ray equipment to induce somatic mutations in the varieties Bellflower, Cortland, Sandow, and Golden Russet is given (from abstract).

10767

PHYSIOLOGICAL EFFECTS OF X-RADIATION IN VARIOUS PERCENTAGES OF OXYGEN ON TRADE-SCANTIA MICRO-SPORES. A. V. Beatty and J. W. Beatty. *Am. J. Botany* 42, 288-292(1955).

Radiation effects (despralization of chromosomes, retarded division rate and chromosome clumping) were more pronounced following X-irradiation for 4 minutes at the rate of 50 r. per min. in 100% oxygen then following irradiation in air or 5% oxygen. Effects were least following irradiation in helium. (from abstract).

10768

RADIOBIOLOGY SYMPOSIUM (LIEGE, 1954). Z. M. Bacq and Peter Alexander, eds. New York, Academic Press, Inc., 1955.

10769

RADIATION EFFECTS ON TWO ENZYME SYSTEMS. S. Okada and G. L. Fletcher. *Radiation Research*, 5, 588(1956).

Authors' experiments were designed to elucidate the "delayed biochemical damage" in the cell as described by Gray. Minor initial effects may be amplified by cellular metabolism. Two enzyme systems were studied, one serving as a substrate for the other (aldolase and phosphoglyceraldehyde dehydrogenase). The enzyme systems were irradiated separately in some experiments, and together in company with substrate in others.

10770

THE EFFECTS OF X-RAYS AND SUNLIGHT ON SOME PATHOGENIC MICRO-ORGANISMS. P. W. Bassett-Smith. *Brit. J. Radiol.* 5, 47-48(1900-01).

10771

General Electric Co. Hanford Atomic Products Operation, Richland, Wash.

TOXICITY OF I¹³¹IN SHEEP. V. GENERAL (LOW-LEVEL CHRONIC EFFECTS. L. K. Bustad, D. E. Warner, and H. A. Kornberg. p.136-47 of BIOLOGY RESEARCH ANNUAL REPORT FOR 1952. July 7, 1953. (HW-28636). NSA 7-6331-2

10772

THE METHOD OF ACTION OF RADIUM AND X-RAYS ON LIVING TISSUES. H. Colwell. Oxford University Press 1935.

10773

EFFECT OF URANIUM - VANADIUM DEPOSITS ON THE VEGETATION OF THE COLORADO PLATEAU. H. L. Cannon. *Am. J. Sci.* 250, 735-770(1952).

Three Studies, effects of mineralized soil on growth habits, absorption of U and associated ore by plants, and ecological distribution of plants around ore deposits. Physiological ill health was observed on dumps and disturbed ground. Symptoms of U poisoning are masked by V, Se, and Mo in ore. (from abstract). CA 47-10638

10774

A SURVEY OF RADIATION PROTECTION IN HOSPITALS. Dean B. Cowie and Leonard A. Scheele. *J. Natl. Cancer Inst.* 1, 767-87(1941).

10775

THE RADIOSENSITIVITY OF THE BONE MARROW. T. Denstad. *Acta Radiol. Suppl.* 52(1943).

10776

BEAN BREEDING PROBLEMS LISTED BY PLANT EXPERT. E. E. Down. *Mich. Bean Bull.* 11, 16-17 (1948).

Bean variety Michelite equals variety Robust with respect to resistance to mosaic and wilt. Michelite has white seed coat and early maturity and has pods more uniform in size and shape than those of Robust. An early bean has been developed by treating Michelite with X-Rays.

10777

FACTORS INFLUENCING RADIATION INDUCED LETHALITY, STERILITY, AND MUTATIONS IN BARLEY. L. Ehrenberg. *Hereditas* 41, 123-146(1955).

Lethal effects, sterility and mitotic disturbances were found to decrease with increasing water content of the seeds, within the range of 8-18% water. Induced mutation was dependent on H₂O content up to 11.5 percent H₂O. (from abstract).

10778

THE MECHANISM OF THE ACTION OF RADIATION ON TISSUES AND ITS APPLICATION TO THE TREATMENT OF MALIGNANT DISEASE. F. Ellis. *Brit. J. Radiol.* 19, 153(1946).

10779

IONIZING RADIATIONS. MECHANISM OF ACTION AND DOSIMETRY. L. Ehrenberg. *Acta Agr. Scand.* 4, 365-395(1954).

The mechanism of biological action of ionizing radiations is reviewed from chemical and physical aspects. Sources and instruments available for the production of different types of ionizing particles in biological experiments are described. (from abstract).

10780

THE CENTRIOLE IN RADIATED TUMOR TISSUE. L. C. Fogg and Shields Warren. *Science* 91, 528-529(1940).

10781

INFLUENCE OF PHASE STATE AND OXYGEN CONCENTRA-

TION ON X-RAY SENSITIVITY OF YEAST. T. H. Wood. *Radiation Res.* **5**, 602(1956).

Yeast in the liquid state is more radiosensitive than in the solid, but not dry, state. Author believes the decrease in sensitivity is due to disappearance of free water from the system.

10782

POSSIBILITIES AND PRACTICAL EXPERIMENTATION IN MUTATION BREEDING. R. Freisleben and A. Lein. *Kuhn-Arch.* **60**, 211-225(1943). (In German).

Choice of suitable species and varieties and the technique of irradiation and selection for mutation breeding are discussed. Biological and chemical tests should be applied in determining mutants not visible to the naked eye. (from abstract).

10783

THERAPY OF METAL POISONING. Harry Foreman. *Arch. Indust. Hygiene* **10**, 226(1954).

Internally deposited radioactive elements may be removed by the exchange resin, ethylenediamine-tetraacetic acid. Authors report that the calcium chelate of EDTA, used to prevent depletion of body calcium, effectively increase plutonium excretion in 2 patients with asymptomatic plutonium poisoning, although 1 of the patients had been exposed seven years before treatment. By forming stable readily excreted, water-soluble chelates with heavy metals, EDTA may remove harmful elements already deposited in bone.

10784

PRELIMINARY OBSERVATIONS ON THE QUANTITATIVE EXAMINATION OF HUMAN BIOPSY MATERIAL TAKEN FROM IRRADIATED CARCINOMATA. A. Glucksmann. *Brit. J. Radiol.* **14**, 187(1941).

A method is described by which the effects of gamma radiation on malignant cells *in vivo* are measured quantitatively. The method has so far been applied in man only to squamous and basal cell carcinomata and observations have been restricted to the primary growth. Method is based on changes in numbers of cells that are (1) dividing, (2) degenerated, (3) resting and (4) differentiating.

10785

EXPERIMENTS WITH CHRONIC GAMMA IRRADIATION ON GROWING PLANTS. I. Granhall, L. Ehrenberg and S. Borenus. *Botan. Notiser* **(2)**, 155-162(1953).

Preliminary experiments are reported on the mutagenic effectivity of Co^{60} radiation produced under field conditions. Mutants were induced in barley, *Vicia faba*, apples and hops but not in grasses and weeds in the neighborhood. (from abstract).

10786

THE RADIATION CHEMISTRY OF ORGANIC SUBSTANCES. E. Collinson and A. J. Swallow. *Chem. Revs.* **56**, 471 (1956).

10787

THE HISTOLOGICAL CHANGES IN ULCERATION CAUSED BY THE ROENTGEN RAYS. W. A. Gassman. *Fortschritte Auf den Gebieteder Rontgenstrahlen D⁶* (1900). Abstracted in *Brit. J. Radiol.* **5**, 50(1900-01). (In German).

10788

ROENTGEN RAY EFFECT ON EPITHELIAL REPAIR. H. F. D. Haberland. *Klin. Wchnschr.* **2**, 353(1923). (In German).

Author irradiated Thiersch skin grafts in dogs and found delay in healing in 1st 10 days, no difference between irradiated and controls after 10 days. Maximum dose is 400 r.

10789

RATE OF REMOVAL OF THORIUM DIOXIDE FROM THE

BLOOD STREAM. H. L. Harrington and C. Huggins. *Arch. Int. Med.* **63**, 445(1939).

10790

THE EFFECTS OF ATOMIC WEAPONS. J. O. Hirschfelder, D. B. Parker, A. Kramish, R. C. Smith and S. Glasstone. (Prepared at Los Alamos Scientific Laboratory, New Mexico in cooperation with the U. S. Department of Defense and the U. S. Atomic Energy Commission) Washington U. S. Government Printing Office. June, 1950. 456p.

10791

"SPLEEN PROTECTION" IN GAMMA- AND NEUTRON-IRRADIATED MICE. H. H. Vogel, Jr., J. W. Clark, D. L. Jordan, N. Bink, and R. R. Barhorst. *Proc. Soc. Exptl. Biol. and Med.* **95**(2), 409-12(1957).

Young adult female CF1 mice were irradiated with fission neutrons sufficient to kill 20-90% in 30 days. Spleens from 2-week old mice were implanted in half the group. No obvious protection was afforded by spleens. BA 57-34063

10792

MICRORADIOGRAPHS AND AUTORADIOGRAPHS OF CORTICAL BONES FROM MONKEYS INJECTED WITH Sr^{90} . J. Jowsey, M. Owen and J. Vaughan. *Amer. Journ. Exptl. Path.* **34**, 661-667(1953).

10793

EFFECTS OF ROENTGEN RAYS ON THE SKIN. R. Kienbock. *Wiener Klin. Woch.* Dec. 13, **13**, 1153-66 (1900). Cited and abstracted in *Brit. J. Radiol.* **5**, (1901). 103p.

Author believes cutaneous lesions following exposure are due to roentgen rays themselves and not to electric discharges. He agrees with others in thinking softer rays alone cause dermatitis and alopecia.

10794

ABNORMAL MITOSIS IN TUMORS. P. C. Koller. *Brit. J. Cancer* **1**, 38(1947).

This article describes various cytological types of abnormal cells which are commonly encountered in tumors and analyses the causes underlying them in view of the fact that abnormalities in dividing tumor cells are also induced by various therapeutic agencies (X-rays and gamma rays).

10795

RESULTS OF X-IRRADIATION OF GULZOWER, SWEET YELLOW LUPINE. H. Kress. *Zuchter* **23**, 168-172(1953).

The most successful dose of x-irradiation was between 12 and 16 Kr. In the first experiment, hairless pods, floral pigmentation and chlorophyll mutants were produced, in the second, short-haired pods, pigmentation mutations and a mutant with smaller pods and seeds than the parent but giving the same yield. (from abstract). PBA 23-2771

10796

THE QUESTION OF A "SPECIFIC" EFFECT OF CATHODE RAYS ON THE CELL. R. Glocker and H. and M. Langendorff. *Naturwissensch.* **19**, 251(1931). (In German).

10797

SUMMARY OF PAPERS ON ECOLOGICAL EFFECTS OF RADIOACTIVE EFFLUENTS. L. A. Krumholtz and C. S. Shoup. p. 481-483, "The Role of Atomic Energy in Agricultural Research. Proc. Oak Ridge Summer Symposium-4th Ann. Symposium Oak Ridge, Tenn. 1953. (TID-5115)

Subject: effects of radioactive effluent materials on environment of plants and animals. In the Ottawa River, organisms varied in accumulation of β and gamma emitting isotopes. In the Columbia River, studies show greatest concentrations of activity in feces, then scales and bones, then soft tissues (fish).

10798

CLINICAL STUDIES WITH THE AID OF RADIOPHOSPHORUS. EARLY EFFECTS OF SMALL AMOUNTS OF RADIOPHOSPHORUS ON BLOOD AT ALL LEVELS OF UPTAKE AND EXCRETION. B. V. A. Low-Bauer and A. de G. Treadwell. *Journ. Lab. and Clin. Med.* **27**, 1294 (1942).

10799

A NEW AND POSSIBLY IMPROVED METHOD OF USING RADIUM. Hugo Lieber. *Brit. J. Radiology* **9**, 253-5 (1904-05). Read at Meeting of the N. Y. Section of the Society of Chemical Industry, Dec. 16, 1904.

10800

REACTION OF THE BLOOD AND PATHOLOGICAL TISSUES UNDER THE INFLUENCE OF X-RAYS. C. Minouflet and P. Schrupf-Pierron. *Arch. Elect. Med.* **33**, 193-213 (1923). (In French).

Histological findings in heavily x-irradiated tissues included inflammation in first few post-exposure days, connective tissue proliferation and destruction of neoplastic cells after 2 weeks, followed by atrophy and changes in connective tissue. Radium produces primary necrosis of surface cells; less effect at 2 cm, no effect at 3 cm. Roentgen sickness is attributed to electrical change in patient, remediable by grounding, biological effects to altered cellular osmotic pressure and electrical potential.

10801

ARCHIVES OF THE ROENTGEN RAY. C. Mansell Morelline. *Brit. J. Radiol.* **4**, 28 (1899).

Discusses harmful effects observed and whether or not they are due to rays.

10802

BASIC MECHANISMS IN RADIOBIOLOGY. II. PHYSICAL AND CHEMICAL ASPECTS. J. L. Magel, M. D. Kamen and R. L. Platzman, eds. National Academy of Sciences - National Research Council Publication 305, Washington, D. C. (1953).

10803

IONIZING RADIATION AND THE CELL. Roy Waldo Miner, ed. *Ann. N. Y. Acad. Sci.* Vol. 59, Part 4, 467-664 (1955).

10804

EXPERIMENTAL STUDIES WITH RADIOACTIVE IRON. E. H. Belcher, I. G. F. Gilbert and L. F. Lamerton. *Brit. J. Radiol.*, **27**, 387-92 (1954).

10805

EFFECT OF X-RAY IRRADIATION ON STREPTOMYCES GRISEUS. S. Matsumura and T. Ito. *Ann. Rept. Natl. Inst. Genet.*, Mishima, Japan, **2**, 42-43 (1952).

Various mutants have been obtained by doses of 5000 - 150,000 r. A strain with streptomycin potency 10-20% above normal was obtained by low-dose irradiation. (from abstract).

10806

ISOTOPES IN MEDICINE. Grace Medes. *Amer. Jour. Clin. Path.* **18**(5), 354-63 (1948).

Applications for the 2 general uses of isotopes as tracers and in therapy are given for H^2 , H^3 , C^{11} , C^{14} , C^{13} , P^{32} , Na^{24} , Sr^{89} , I^{131} , I^{132} , Fe^{55} , Fe^{59} , K^{42} , O^{18} , N^{15} , S^{34} and S^{35} . BA 22-23210

10807

STUDIES ON CHANGES PRODUCED BY ROENTGEN RAYS IN INFLAMED CONNECTIVE TISSUES. Maximow, J. *Exp. Med.* **319**, 37 (1923).

Celldoin was administered subcutaneously to produce inflammation after X-Ray (~450 r). Excessive fibrin, malformed fibroblasts, lack of ability to form collagenous tissue were observed. Final scars, however, were identical with control scars.

10808

SYMPOSIUM ON RADIOBIOLOGY (OBERLIN COLLEGE,

1950). J. J. Nickson, ed. New York, John Wiley and Sons, Inc. 1952).

Symposium is concerned with basic aspects of radiation effects on living cells and fundamental concepts in radiobiology. Papers are abstracted individually. BA 26-30181

10809

CONCENTRATION OF RED BLOOD CORPUSCLES CONTAINING LABELLED PHOSPHORUS COMPOUNDS IN THE ARTERIAL BLOOD AFTER THE INTRAVENOUS INJECTION. G. Nylin and M. Malm. *Amer. Jour. Med. Sci.* **207**, 743 (1944).

10810

EFFECT OF REPEATED ZIRCONIUM CITRATE INJECTIONS ON DISTRIBUTION OF PLUTONIUM IN THE RAT. Patricia L. Hackett. *Proc. Soc. Exptl. Biol. Med.* **83**, (4), 710-712 (1953). BA 28-5977

10811

A COMPARATIVE INTRAVENOUS LETHAL DOSAGE STUDY OF RADIUM, PLUTONIUM AND POLONIUM IN RATS WITH CLINICAL PATHOLOGICAL AND HEMATOLOGICAL OBSERVATIONS. George A. Boyd and Robert M. Fink. 1946. NNS Div. VI, Vol. 3. McGraw-Hill Book Co., London. (M-1902)

10812

THE RETENTION AND ELIMINATION OF COLLOIDAL THORIUM DIOXIDE IN THE ALBINO RAT FOLLOWING PROTRACTED ADMINISTRATION. A. R. Hale and R. N. Baillif. *Anat. Rec.* **117**(2), 163-174 (1953).

10813

THE DISTRIBUTION OF RADIOACTIVE ARSENIC IN THE NORMAL AND TUMOR-BEARING (BROWN-PEARCE) RABBIT. Octavia Dupont, Irving Ariel and Strafford L. Warren. *American Journal of Syphilis, Gonorrhea and Venereal Diseases* **26**, 96-118 (1942).

10814

MAXIMUM PERMISSIBLE RADIATION EXPOSURE TO MAN. L. S. Taylor. *Radiation Research*, **6**, 513-16 (1957).

10815

METABOLISM OF FISSION PRODUCTS. Joseph G. Hamilton. 1944. 49p. (CH-1659, A-2270). (ADD-1; MDDC-1001)

10816

PERMISSIBLE DOSE PROBLEMS WITH SPECIAL REFERENCE TO DIAGNOSTIC PROCEDURES. M. H. Poppel, H. G. Jacobson, J. Stein, and G. H. Jerry. *Am. J. Roentgenol. Radium Therapy Nuclear Med.*, **77**, 138-43 (1957).

10817

TECHNICAL PROGRESS REPORT ON THE METABOLIC STUDIES OF FISSION PRODUCTS. J. G. Hamilton. April 1944. 2p. (CH-1572; A-2240; MDDC-1061)

Incomplete tracer studies with plutonium indicate that less than 0.05 per cent of this element is absorbed from the digestive tract in any of the three valence states. The behavior of plus 4 plutonium following intramuscular and intrapulmonary administration is very similar to that of zirconium. The metabolic properties of plus 3 and plus 6 plutonium are very similar to those of yttrium and plus 3 uranium.

10818

SUMMARY OF METABOLISM OF CARRIER-FREE FISSION PRODUCTS IN THE RAT. J. G. Hamilton. 1947. 1p. (CH-775). ADD-1; MDDC-1002.

The following carrier-free fission products were studied to determine their effect upon the metabolism of the rat: Sr^{85} , Y^{86} , Zr^{89} , Cb^{93} , Ru^{105} , I^{131} , Xe^{127} , Ba^{133} , La^{140} , Ce^{140} , and a raw fission mixture. The results are presented in chart form.

10819

METABOLISM OF FISSION PRODUCTS. J. G. Hamilton. *Radiology* **49**, 325-43 (1947).

All radioactive elements that accumulate in bone, with the exception of Sr, are not deposited in mineral structure of bone, but are localized in and adjacent to the osteoid matrix. The large fraction of La, Ce, Pr, Am and Cm deposited in liver was an unexpected finding and similar findings may be predicted for Nd, Sm and Eu.

10820

THE METABOLIC PROPERTIES OF THE FISSION PRODUCTS AND ACTINIDE ELEMENTS. J. G. Hamilton. *Rev. Med. Phys.* **20**, 718-28(1948). (ADD-1; AECD-2012)

An investigation of the assimilation, distribution, retention, and excretion of the fission products and actinide elements in the rat has been conducted at the Crocker Radiation Laboratory, University of California, Berkeley, California. These studies were initiated October 15, 1942, and are continuing at the present time. An extensive survey has been made of the metabolism of twenty-two different radioelements in the rat. Radioactive materials were administered by mouth and by injection. The fission products studied included the carrier-free radioactive isotopes of strontium, yttrium, zirconium, columbium, ruthenium, tellurium, iodine, xenon, cesium, barium, lanthanum, cerium, praseodymium, and element 61. In addition, the eight members of the actinide series which were subjected to metabolic experiments included actinium, thorium, protactinium, uranium, neptunium, plutonium, americium, and curium. The results of these studies indicated that most of the fission products and all of the heaviest elements are absorbed to a very small degree by way of the digestive tract, deposited primarily in the skeleton following parenteral administration, and eliminated very slowly from that organ. The fission products studied which are accumulated in the skeleton include strontium, barium, yttrium, lanthanum, cerium, praseodymium, element 61, zirconium, and columbium.

10821

STUDIES OF SYSTEMIC EFFECT OF ROENTGEN RAYS. I. BLOOD CHEMICAL CHANGES IN DOGS FOLLOWING EXPOSURE TO FILTERED ROENTGEN RAYS OF SHORT WAVE LENGTH. E. A. Pohle and E. L. Sevringhaus. *Am. J. Roentg.* **23**, 291-298(1930).

Authors observed trends in NPN, uric acid, NaCl, cholesterol and hemoglobin in blood of 14 dogs exposed to short wave length X-rays, 500 r in air, to anterior and posterior lower body, posterior part only, or posterior upper chest. 26 references.

10822

TRACER STUDIES ON FISSION PRODUCT METABOLISM. J. G. Hamilton. 1945. 7p. (CH-2673) ADD-1; MDDC-1062.

Radioactive isotopes, free from inert carrier, of Sr, Y, Zr, Nb, Ru, Te, Cs, Ba, La, Pr, Ce, and Np were administered to rats as chlorides in isotonic solutions of NaCl at pH ranging from 2.3 to 3.5. Iodine was given as NaI, and Xe was given by inhalation in an oxygen-gas mixture. Unseparated fission products, free from inert carrier and uranium, after 90 days cooling were administered in an isotonic solution of NaCl at pH 2.5. Adult rats received the various radioactive preparations in solution by oral, parenteral, and intrapulmonary administration. The most significant conclusions that can be derived in the survey of all of the work done with the long life fission products can be summarized in the following manner: the alkaline earths, rare earths, Zr, Nb, and Nb when introduced into the body are deposited primarily in the skeleton, where the

average degree of retention of the absorbed radioelement is approximately 50 per cent of the initial absorbed quantity. The retained fractions of these radioelements are eliminated at rates which are less than their rates of radioactive decay with the exception of the 340 day Ce and possibly Sr⁹⁰. The remaining five long-lived radioelements, Ru, Te, Xe, I, Cs do not show any significant degree of localization in the skeleton and in addition there is no very striking deposition in any other of the tissues with the exception of deposition of I in the thyroid. The rates of elimination for all of these four radioelements are much greater than their rates of radioactive decay, with the exception of I accumulated in the thyroid. In this particular case the release of accumulated I in the thyroid is many times slower than its rate of radioactive decay. The members of the long-lived fission product group which are absorbed by way of the digestive tract include the alkaline earths, tellurium, iodine, and cesium. A high degree of retention by the lungs has been observed following direct intrapulmonary administration of the rare earths, Zr, Nb, Ru and Np. The pulmonary retention observed for the alkaline earths, Te, I, and Cs is negligible under the conditions of the experiment.

10823

AZOOSPERMIA IN TWO TREATED CASES. (X-RAY). Philipp. *Fortschr. d. Geb. d. Roentgenst.* **8**, 114-119(1904). (In German).

10824

DEPOSITION OF RADIOACTIVE IODINE IN HUMAN THYROID TISSUE. J. G. Hamilton, M. H. Soley and K. B. Eichorn. *University of California Pubs. in Pharm.* **1**, (28), 339-367(1940).

Five patients with nontoxic goiters, 2 with thyroid carcinoma, and 2 with hyperthyroidism were treated with 100-1,000 μC I₂¹³¹. Hyperplastic areas concentrated radioiodine, while cancerous tissues had no demonstrable ability to store I₂¹³¹. The authors suggest use of radioiodine in therapy of hyperthyroidism.

10825

THE ACCUMULATION, METABOLISM AND BIOLOGICAL EFFECTS OF ASTATINE IN RATS AND MONKEYS. J. G. Hamilton, C. W. Asling, W. M. Garrison, and K. G. Scott. *Univ. California Pub. Pharm.* **2**(21), 283-312(1953).

10826

PRELIMINARY REPORT OF THE X-RAY AND RADIUM PROTECTION COMMITTEE. Sir Humphrey Rolleston and K. C. B. Chairman. *Archives of Radiology and Electrotherapy* **26**, 5(1921).

10827

DESTRUCTIVE ACTION OF ASTATINE-211 (ELEMENT 85) ON THE THYROID GLAND OF THE RAT. Joseph G. Hamilton, C. W. Asling, W. M. Garrison, K. G. Scott and D. A. Heller. *Proc. Soc. Exptl. Biol. Med.* **73**, 51-53(1950).

10828

STUDIES IN IODINE METABOLISM OF THE THYROID GLAND IN SITU BY THE USE OF RADIO-IODINE IN NORMAL SUBJECTS AND IN PATIENTS WITH VARIOUS TYPES OF GOITER. Joseph G. Hamilton and Mayo H. Soley. *Amer. J. of Physiology* **131**, 135-143(1940).

10829

THE THERAPEUTIC VALUE OF THE ROENTGEN RAY IN THE TREATMENT OF PSEUDOLEUKAEMIA. N. Senn. *New York Med. J.* **77**, 665-68(1903).

10830

PHYSIOLOGICAL AND BIOCHEMICAL STUDIES OF ASTATINE-211. (EDA-IODINE). Joseph G. Hamilton, Patricia W. Durbin, C. W. Asling, and M. E. Johnston. p.175-81 of "International Conf. on the Peaceful Uses of

Atomic Energy" Held at Geneva, Switzerland. New York, United Nations. 1955. Paper No. P/206.

10831

STUDIES IN IODINE METABOLISM BY THE USE OF A NEW RADIOACTIVE ISOTOPE OF IODINE. Joseph G. Hamilton and Mayo H. Soley. *Amer. J. of Physiol.* 127, 557-572(1939).

10832

SOME HIGH LIGHTS OF THE FIRST HALF CENTURY OF GENETICS. W. R. Singleton. *Sci. Monthly* 71, 401-407 (1950).

Reference is made to the breeding of disease-resistant grains and hybrid corn. (from abstract).

BA 25-9801

10833

CYTOLOGY AND GENETICS OF BARLEY. Luther Smith. *Botan. Rev.* 17, 1-51, 133-201, 285-355(1951).

BA 25-35597

10834

ON THE EFFECTS OF ROENTGEN AND RADIUM RAYS ON INTERNAL ORGANS OF EXPERIMENTAL ANIMALS. CASTRATION IN RABBITS AND GUINEA PIGS EXPOSED TO RADIATION IS DESCRIBED. Seldin. *Fortschritte A. d. Geb. d. Roentgenstr.* 7, 323-338(1903-04). Abstract in *Brit. J. Radiol.* 9, 296(1904-05).

10835

AZOSPERMIA IN TEN MEN DOING X-RAY WORK WITH PROPER PRECAUTIONS. F. Tilden-Brown. *Medical News* 86, 175-76(1905).

10836

A COMPARISON OF THE METABOLISM OF IODINE AND OF ELEMENT 85 (EKA-IODINE). J. G. Hamilton and M. H. Soley. *Proc. Nat. Acad. Sci. U. S.* 26, 483-489 (1940).

10837

RADIATIONS AND LIVING CELLS. F. G. Spear. New York, J. Wiley and Sons, Inc. 1953. 222p.

This is an introduction to Radiation Biology emphasizing the action of penetrating radiations on the cell, with special reference to effects on cell division in human tissues. The treatise includes a detailed account of effects on cutaneous, hematopoietic and germinal tissues, reviews of sequellae of atomic explosions and applications of radioisotopes as well as an introduction to the origins of cancer. There is a final chapter on basic mechanisms of radiation effects on biological systems.

10838

ANIMAL EXPERIMENTS ON PETEOSTHOR THERAPY; DETERMINATION OF THE DISTRIBUTION OF RADIOACTIVITY FOLLOWING PARENTERAL ADMINISTRATION OF THORIUM X. E. Harbers. *Strahlentherapie* 82, 569-88(1950). (In German).

10839

PRODUCTION OF MALIGNANT TUMORS (HEPATOMAS AND OTHERS) BY INTRAPERITONEAL INJECTIONS OF RADIOACTIVE GOLD IN THE WHITE RAT. J. Harel, M. Guerin, M. Tubiana and J. Abbaticci. *Bull. Ass. fr. Cancer* 43(4), 423-44(1956).

10840

OBSERVATIONS ON THE ABSORPTION OF RADIOACTIVE STRONTIUM AND YTTRIUM BY MARINE ALGAE. G. M. Spooner. *J. Marine Biol. Assoc. United Kingdom* 28, 587-625(1949).

Marine algae were treated with sea water containing carrier-free radioactive Sr and Y. Sr was extracted by brown algae, Y by red algae. (from abstract). CA 44-5967

10841

STUDIES WITH RADIOCALCIUM; THE INTESTINAL ABSORPTION OF CALCIUM. H. E. Harrison and H. C. Harrison. *J. Biol. Chem.* 188 (1), 83-90(1951).

10842

PULMONARY DISTRIBUTION OF RADIOACTIVE PARTICLES IN RABBITS AFTER INHALATION AND INTRAVENOUS INJECTION. G. V. Taplin, J. S. Grevior M. L. Gautschi, C. Finnegan and A. Dunn. *Ann. Allergy* 9, 703(1951).

10843

FURTHER STUDIES ON THE MECHANISM OF PULMONARY CLEARANCE OF PRODIGIOSIN IN NORMAL AND X-IRRADIATED RABBITS. G. V. Taplin, J. J. Grevior, C. Finnegan, A. Dunn and P. Noyes. *Annals of Allergy* 11, 1-11(1953).

In rabbits 820 r whole body X-irradiation appears to accelerate the rate and increase the efficiency of major mechanisms by which lungs clear insoluble foreign particles following acute inhalation exposure. Ciliary action and/or increased mucous secretion play a greater role than phagocytosis. Both mechanisms are more effective in X-irradiated animals than in non-irradiated controls. Indirect indices of phagocytic function of R-E system indicate LD₅₀ X-Ray doses (or larger) produce an initial depression (0-14 days) of phagocytosis by relatively resistant macrophages.

10844

THE EFFECTS PRODUCED IN CULTURES OF MICRO-ORGANISMS AND OF TUBERCLE BACILLI BY EXPOSURE TO THE INFLUENCE OF AN X-RAY TUBE. R. Norris Wolfenden and W. F. Forbes-Ross. *Brit. J. Radiol.* 5, 4-9(1900-01).

10845

RADIOCALCIUM UPTAKE BY THE SKELETON. H. E. Harrison and H. C. Harrison. *J. Biol. Chem.* 185, 857-867(1950).

The specific activity of serum and skeletal Ca was calculated by determining the radioactivity and total percent of calcium of the blood serum and skeleton. Exchange of Ca between bone and body fluids was much slower in older than in younger rats, but rapid enough to invalidate using uptake of Ca⁴⁵ as a measure of new bone salt deposition.

10846

THE DELAYED TOXICITY OF RADIUM DEPOSITED IN THE SKELETON OF HUMAN BEINGS. Robert J. Hasterlik, William B. Looney, Leonidas D. Marinelli and Austin M. Brues. *Jour. Lab. and Clin. Med.* 40(5), 807-808(1952). BA 27-16533

10847

THE DELAYED TOXICITY OF RADIUM DEPOSITED IN THE SKELETON. R. J. Hasterlik. International Conference on Peaceful Uses of Atomic Energy held at Geneva, Switzerland, August, Vol. II, 149-155(1955).

10848

DISTRIBUTION IN THE SOFT TISSUE OF THE RAT OF RADIOACTIVE FLUORIDE ADMINISTERED AS SODIUM FLUORIDE. John W. Hein, John F. Bonner, Finn Brudevold, Frank A. Smith and Harold C. Hodge. *Nature* 178, 1295-1296(1955).

10849

COMMENTS ON "RADIUM PAINTING" BY MORSE AND KRONENBERG IN INDUSTRIAL MEDICINE, DECEMBER 1943. W. C. L. Hemeon. *Indust. Med.* 13(4), 360-361 (1944). BA 20-10347

10850

EFFECT OF MUSCULAR EXERCISE AND OF URETHANE ADMINISTRATION ON THE INCORPORATION OF CARBON-14 INTO ANIMAL TISSUES. G. Hevesy (U. Stockholm). *Nature (London)* 164(4180), 1007-1008(1949).

BA 24-32046

10851

APPLICATION OF "THORIUM B" LABELED RED

CORPUSCLES IN BLOOD VOLUME STUDIES. H. Hevesy and G. Nylin. *Circulation Research* 1, 602(1953).

10852

THE ACCUMULATION OF RADIOACTIVE IODINE BY HUMAN FETAL THYROIDS. R. E. Hodges, T. C. Evans, J. T. Bradbury, W. C. Keettel. *J. Clin. Endocr. Metab.* 15(6), 661-6(1955). NSA 9-4694

10853

DISTRIBUTION OF RADIOIODINE IN NORMAL RABBITS. Harold C. Hodge, W. Mann and I. Ariel. *J. of Applied Physics* 12, 314(1941).

10854

DIRECT AND INDIRECT EFFECTS OF ROENTGEN RADIATION ON CELLS. T. C. Evans. *Acta Radiol., Suppl.*, 116, 441-47(1954).

Irradiation of sea urchin eggs results in loss of jelly.

10855

THE ABSORPTION OF STRONTIUM AT FORTY DEGREES BY ENAMEL, DENTIN BONE AND HYDROXAPATITE AS SHOWN BY THE RADIOACTIVE ISOTOPE. Harold Carpenter Hodge, Elizabeth Gavett and Isabel Thomas (Univ. of Rochester School of Medicine and Dentistry., N. Y.). *J. Biol. Chem.* 163(1), 1-6(1946). BA 20-15470

10856

THE STRONTIUM CONTENT OF HUMAN BONE. R. M. Hodges, N. S. MacDonald and R. Nusbaum, et al. *J. Biol. Chem.* 185, 519-524(1950).

Sr is a constant though not essential component of bone.

10857

THE RADON/CARBON DIOXIDE RATIO AS AN INDEX TO EXCESSIVE RADIUM ABSORPTION. F. E. Hoecker. *J. Indus. Hygiene and Toxicol.* 26, 281-288(1944).

Discussion on effect of physiological conditions effecting Rn exhalation contends that the Rn/CO₂ ratio is the best means of determining Ra body content. The total Rn/day is corrected by the CO₂ per day/CO₂ per sample ratio. Author suggests sampling over longer periods of time and collecting expired air in meteorological balloons (20 litre size) to avoid resistance to air flow. Author presents some comparative Rn values obtained from the same individual by various labs.

10858

THE SIGNIFICANCE OF ABSORBED RADIUM AS INDICATED BY THE COEFFICIENT OF ELIMINATION. F. E. Hoecker. *J. Indus. Hygiene and Toxicol.* 26, 289-295(1944).

Author discusses Ra retention and excretion and shows the effect of time on the "coefficient of elimination." The curve (compounded from all sources) is essentially exponential (i. e. straight line on log-log plot).

10859

METABOLISM AND DISTRIBUTION OF RADIUM IN BONE. F. E. Hoecker and P. G. Roefe. *Research Reviews* published by the Navy Department. (1949).

10860

URANIUM IN THE HUMAN THYROID GLAND AND DOG TESTICLE AND PANCREAS. Josef Hoffmann. *Naturwissenschaften* 30, 279-280(1942). CA 37-5464

10861

SOME AUTORADIOGRAPHIC STUDIES OF THE DISTRIBUTION OF P³² AND S³⁵ IN MAMMALIAN TISSUES. Margaret W. Holt and Shields Warren. *Amer. Jour. Pathol.* 28(3), 556(1952). BA 27-5859

10862

P³² AUTORADIOGRAPHS OF MOUSE TESTES. A. Howard and S. R. Pelc. *Heredity* 3(3), 383(1949). BA 24-1255

10863

THE ROENTGEN RAYS IN MEDICAL WORK. David Walsh Balliere, Tindall and Cox, London (1897). *Introduc-*

tory Section on Electrical Apparatus and Methods by J. E. Greenhill.

10864

Rochester. Univ., New York.

COMPREHENSIVE SUMMARY OF THE PHARMACOLOGY AND TOXICOLOGY OF URANIUM COMPOUNDS. CHAPTER XVI. STUDY ON HUMAN EXPOSURE TO URANIUM COMPOUNDS. J. W. Howland. 1946. 42p. (MDDC-260; M-3493)

This chapter is divided into five major parts: (1) A review of the literature is presented in which the clinical use of uranium as a drug in the treatment of disease in the years 1874 to 1930 is described, (2) An historical description is included next of the selection of 150 ugU/m³ as a temporary maximum allowable concentration, (3) Some of the factors known to be important in exposures to dusts are presented and their influence indicated, (4) Reports are made in considerable detail of two accidents in which workers were exposed to flood concentrations of uranium hexafluoride. Case reports are included, both of fatal and of non-fatal cases, (5) A careful outline is presented of the program of medical observations conducted by the medical branch on workers in laboratories and plants in which chronic exposures to uranium compounds were possible. The description included pre-employment examinations, periodic health check-ups with laboratory procedures. A special program of industrial hygiene was set up at four selected sites: (a) a large laboratory, (b) a small uranium processing plant, (c) a large ore and uranium processing plant, and (d) a large uranium processing plant. In addition, two programs of special examinations were carried out; one on 10 men working in a U₂F₆ plant, and the other on 31 men with possible exposures to UO₃, UO₄, and UCl₄.

10865

PENETRATION OF THE RADIOISOTOPES NA²⁴ AND P³² INTO THE SKELETAL MUSCLE IN PAIN STIMULUS. O. Hrdlicka, Z. Vodicka, and A. Bass. *Cekosl. Fysiol.* 5, (1), 50-55(1956).

10866

AN EXPERIMENTAL STUDY OF THE EFFECTS OF ROENTGEN RAYS UPON THE BLOOD FORMING ORGANS, WITH SPECIAL REFERENCE TO THE TREATMENT OF LEUKAEMIA. A. S. Warthin. *Internat. Clin.* 4, 243(1906).

10867

THE EFFECT OF DOSE RATE ON THE LD₅₀ OF MICE EXPOSED TO GAMMA RADIATION FROM COBALT 60 SOURCES. J. F. Thomson and W. W. Tourtellotte. *Am. J. Roentgenol. Radium Therapy, Nuclear Med.*, 69, 826-29(1953).

10868

THE EFFECTS OF RADIUM RADIATIONS UPON ANIMAL TISSUES AND THE ROLE OF LECITHIN IN THE REACTION. Warner. *Zentralkl. fur Chir.* 43, (1904). (In German). Good abstract in *Brit. J. Radiol.* 9, 234, (1904-05).

10869

SOME EFFECTS OF RADIOACTIVE IODINE ON THE MOUSE OVARY. E. M. Humphreys. *J. Endocr.*, Lond. 12(3), 8-9(1955).

10870

THE SOLUBILITY OF VARIOUS LEAD COMPOUNDS IN BLOOD SERUM. L. T. Fairhall. *J. Biol. Chem.* 60, 485(1924).

10871

METABOLISM OF RADIUM FIXED ON BONY TISSUE. Henri Fajerman, Pascaline Daudel and Roland Muxart. *Compt. Rend.* 222, 1255-1527(1946).

10872

PHOSPHATE EXCHANGE AS THE MECHANISM FOR ABSORPTION OF THE RADIOACTIVE ISOTOPE BY THE CALCIFIED TISSUES. M. Falkenheim, W. F. Neuman and H. C. Hodge. *J. Biol. Chem.* **169**, 713-722(1947).

The absorption by bone (I), dentine (II), enamel (III) and synthetic hydroxyapatite (IV) of Na_2HPO_4 containing P^{32} has been studied at 2×10^{-1} , 2×10^{-3} and 2×10^{-5} M Na_2HPO_4 up to 240 hours. Interpretation of the data indicates a diffusion process. I and IV absorb P more rapidly and to a greater extent than do II and III. Particle surface does not control the extent or rate of absorption. The specific surfaces of I, IV, II and III are respectively. 99.3, 51.1, 2.4 and 1.8 sq. m/g.

10873

TRACER STUDIES WITH INHALED 1.0 YEAR RUTHENIUM. M. Dailey, I. Wender, and R. Abrams. 23p. (MDDC-420)

This paper deals primarily with the fate of tracer quantities of airborne ruthenium after inhalation by rats. 1. In the course of the work it was necessary to have a simple, quantitative test for Ru, and a colorimetric test was developed which depends on the blue color formed with rubeanic acid. It was possible to detect 2 ug of Ru with 10 per cent accuracy. 2. In order to expose animals to RuO_4 vapor, a generator was needed which would supply RuO_4 at a continuous and more or less uniform rate. Of a number of oxidizing agents investigated for this purpose, potassium permanganate in sulfuric acid was best suited. 3. A rough determination was made of the chemical toxicity of Ru for mice. By intracardiac injection, doses in the range of 3 ug/g were acutely toxic. 4. Methods have been developed for assaying tissues for radioactive ruthenium. The hard β of the 1.0 year Ru - 30 sec Rh system was counted. To avoid volatility losses, small tissues were minced, dried at 110° , and counted. Larger tissues were muffled and a correction made for losses due to volatility. 5. Three types of Ru exposure were carried out--to RuO_4 vapor, dry " RuCl_3 " (in) aerosol, and " RuCl_3 " solution. In all cases the Ru was rapidly passed from the lungs and rapidly excreted via the urine and feces. The kidney tends to retain a considerably higher concentration than other tissues. The rapid excretion, approximately 90 per cent in 30 days, minimizes the hazard resulting from internally deposited Ru.

10874

ABSORPTION AND TISSUE DISTRIBUTION OF RADIO-ZINC IN STEERS FED HIGH-ZINC RATIONS. J. P. Feaster, Sam L. Hansard, J. T. McCall, F. H. Skipper and G. K. Davis. *J. Animal Science* **13**, 781-88(1954).

10875

ABSORPTION, DEPOSITION AND PLACENTAL TRANSFER OF ZINC-65 IN THE RAT. J. P. Feaster, Sam L. Hansard, J. T. McCall, and G. K. Davis. *Am. J. Physiol.* **181**, 287-90(1955).

10876

DISTRIBUTION AND ABSORPTION OF RADIOACTIVE COLLOIDAL GOLD. O. Ferrini, et al. *Arch. E. Maragliano Patol. Clin.* **12**, 403-18(1956).

10877

STUDIES ON DISTRIBUTION AND ABSORPTION OF RADIOACTIVE GOLD. O. Ferrini, G. L. Perroni, P. Romano, G. M. Ghgliotti and P. Biassoni. *Arch. Maragliano Pat. Clin.* **12**(3), 403-14(1956).

10878

TOXICITY AND CARCINOGENICITY OF RADIUM IN COMPARISON WITH OTHER ALPHA EMITTERS. (ABSTRACT). Miriam P. Finkel. *Proc. of the Amer. Assoc. for Cancer Res.* **1**, 16-17(1953).

10879

MALIGNANT BONE TUMORS IN MICE INDUCED BY RADIO-STRONTIUM. Miriam P. Finkel, Hermann Lisco and Austin M. Brues. *Proc. of the Amer. Assoc. for Cancer Res.* **2**, 16(1955).

10880

SEQUELAE OF RADIOSTRONTIUM ADMINISTRATION TO DOGS. Miriam P. Finkel and Austin M. Brues. *Radiation Research* **3**, 224-225(1955).

10881

Argonne National Lab., Ill.
PRELIMINARY REPORT: TOXICITY OF CARBON-14. Miriam P. Finkel and Gertrude M. Hirsch. p.51-52 of BIOLOGICAL AND MEDICAL DIVISION QUARTERLY REPORT. 1952. (ANL-4745)

10882

Argonne National Lab., Ill.
RADIOSTRONTIUM AT OPTIMUM CARCINOGENIC LEVEL IN THE DOG: EFFECT UPON MORBIDITY OF TOTAL BLOOD EXCHANGE SHORTLY AFTER INJECTION. M. P. Finkel, R. J. Flynn, J. Lestina, and D. M. Czajka. p.15-20 of BIOLOGICAL AND MEDICAL RESEARCH DIVISION SEMI-ANNUAL REPORT, JANUARY THROUGH JUNE 1957. (ANL-5732)

10883

Argonne National Lab., Ill.
THE INFLUENCE OF DOSAGE PATTERN UPON THE TOXICITY OF Sr^{90} IN MICE. I. PRELIMINARY EXPERIMENT AND 212-DAY SURVEY OF THE LONG-TERM STUDY. M. P. Finkel, B. J. Tellekson, J. Lestina, and B. O. Biskis. p.21-31 of BIOLOGICAL AND MEDICAL RESEARCH DIVISION SEMI-ANNUAL REPORT, JANUARY THROUGH JUNE 1957. (ANL-5732)

10884

Argonne National Lab., Ill.
ACUTE RADIOTOXICITY OF $(\text{Ba-La})^{140}$ IN RATS AND MICE. PART I. PREPARATION AND ADMINISTRATION OF THE EMITTERS. R. Finkle, R. Snyder, and P. Tompkins. (1946). 11p. (MDDC-1248; CH-3828)

Barium¹⁴⁰ and its daughter, lanthanum¹⁴⁰, were obtained from uranium fission. The radiochemical composition of the different samples, as measured under absorption equivalent to 8 mg/cm² Al, fell within the following ranges: Ba¹⁴⁰ - 43 to 49 per cent, La¹⁴⁰ - 44 to 50 per cent, Sr(⁸⁸-⁹⁰) - 2 to 8 per cent, all others 1 per cent or less. The radioactive solutions were administered by intraperitoneal injection. The bottles were mounted behind lead shields and the personnel was rotated to reduce each individual's exposure to gamma rays. Three series of experiments were made using mice, and two series, using rats. One ml was the largest volume injected into a mouse, and six ml or less were injected into the rats. At intervals after the experiment was begun, samples of excreta were collected. Urine and feces were collected together from each group of mice, while the rats were kept in individual cages over funnels with glass bulb-type separators so that separate analyses of urine and feces were possible. An mg of inactive barium and lanthanum each was added to the collection containers to reduce loss by adsorption on the glass walls. Urine was diluted to a known volume and the radioactivity measured. This was untreated except for the addition of formalin as a preservative. Feces were digested with HNO_3 to dryness and then ashed. The ash was dissolved in dilute HCl and diluted to a known volume for measurement of radioactivity. After digestion and ashing, fairly large amounts of the fecal ash were insoluble in HCl. About half of the radioactivity was carried on this insoluble matter. For analyses, this material was sus-

pended and the activity of an aliquot of the suspension was measured. Tissues were dried and ashed at 700°, and the ash was dissolved in dilute acid. As a check on the accuracy of the analytical procedure, the total excreta and carcasses of several groups of mice and rats were measured. When results were corrected for decay from the time of injection, the over-all recovery in mice was found to be between 80 and 120 per cent with an average of 101 per cent. In the rats the average total recovery was 96 per cent.

10885

RADIUM TOXICITY. M. Fishbein. Postgrad. Med. 11(1), 81(1952).

10886

Naval Radiological Defense Lab.

YOUR GUIDE TO RADIOLOGICAL SAFETY. Paul C. Tompkins, Director. 16p. (NP-3332)

This is a pocket-size pamphlet giving safety rules for the scientist who is working with radioactive materials.

10887

INJURIOUS EFFECTS ON THE SKIN. L. G. Stevens. (subdivision of report by Rowland, S. entitled "Report of the Application of the New Photography to Medicine and Surgery."). Brit. Med. J., 998(1896).

10888

ELIMINATION OF RADIUM SALTS FROM THE HUMAN BODY. F. B. Flinn, J.A.M.A. 96, 1763-65(1931).

10889

University of Rochester Atomic Energy Project
EXCRETION OF RADIUM BY DOGS AFTER A SINGLE INTRAVENOUS INJECTION. J. B. Hursh. p.6-10 of UNIVERSITY OF ROCHESTER ATOMIC ENERGY PROJECT QUARTERLY TECHNICAL REPORT, 1952. (UR-205)

10890

LATE FINDINGS IN PATIENTS WITH RETAINED THOROTRAST. II. EXCRETION AND DISTRIBUTION OF THORIUM-232 AND ITS RADIUM-224 DAUGHTER (ABSTRACT). John B. Hursh and L. T. Steadman. Radiation Res. 3, 235-36(1955).

10891

THE RADIUM CONTENT OF THE BODY FOR INDIVIDUALS WITH NO KNOWN OCCUPATIONAL EXPOSURE. J. B. Hursh and A. A. Gates (University of Rochester). Nucleonics 7, 46(1950).

Authors analyzed the total cremated ash of 25 adult humans with no known exposure to Ra. Most had been in the N. Y. area for some years and averaged 67 years of age. Average value was 1.18×10^{-10} gm Ra/body with 0.50×10^{-13} gm. Ra/gm. ash. Six stillborn infants had 0.32×10^{-13} gm Ra/gm ash. Analyses of Rochester water gave 6.2×10^{-17} gm Ra/ml which indicates about a 5%-7% retention of Ra. This is calculated for a 70 year old man drinking 2.5 liters of water/day at the above Ra conc. Authors conclude that Ra is not an etiological factor in osteogenic sarcoma at this level. The value for body content is $\sim 1/100$ that reported by Krebs for a corresponding study in Germany

10892

A CASE OF ANTRAL SINUSITIS COMPLICATED BY RADIUM POISONING. F. B. Flinn. The Laryngoscope, 3-11(1927).

Author describes case of Ra poisoning in a dial painter with severe necrosis of the jaw. Woman painted dials for 14 mo. in 1921-1922. She was examined by Flinn in June, 1926. Tests for Ra content were made using both emanation and gamma-ray techniques. The gamma-ray method gave a value of 100 μ g. (The details of measurement are not given.) Patient was given 5 gm. NH_4Cl /day and Flinn states her Ra burden was reduced to 86 μ g. A third

test in late October gave a value of 75 μ g. She died in January 1927.

10893

RELEASE OF RADON FROM SKELETAL RADIUM DEPOSITS (ABSTRACT). R. L. Floyd, D. H. Taysum and M. A. VanDulla. Radiation Res. 3, 225(1955).

10894

BONE CHANGES RESULTING FROM PARENTERAL STRONTIUM ADMINISTRATION. R. H. Follis. Federation Proc. 14, 403(1955).

Author describes effects produced in rats when diets contain 2-4% strontium carbonate.

10895

UPTAKE AND DISTRIBUTION OF RADIOACTIVE PHOSPHATE IN ANIMALS. E. Freerkson and J. Meissner. Z. Ges. Exptl. Med. 120, 190-214(1953). C. A. 47, 7075a. (In German).

10896

DISTRIBUTION OF RADIOACTIVE PHOSPHATE IN HEALTHY AND TUBERCULOUS ANIMALS. E. Freerksen and J. Meissner. Z. Ges. Expt. Med. 121, 443-52 (1953). (In German).

10897

Calif. Univ., Radiation Lab., Berkeley.
TECHNICAL PROGRESS REPORT ON THE METABOLIC PROPERTIES OF PLUTONIUM AND ALLIED MATERIALS. Joseph G. Hamilton. p.1-5 of PROGRESS REPORT FOR JUNE 1947, MEDICAL AND HEALTH PHYSICS SECTION, Aug. 18, 1947. (BP-109)

10898

Calif. Univ., Radiation Lab., Berkeley.
METABOLIC PROPERTIES OF PLUTONIUM AND ALLIED MATERIALS. Joseph G. Hamilton. p.26-30 of PROGRESS REPORT FOR JULY 1947 MEDICAL AND HEALTH PHYSICS SECTION, July 1947. (BP-115)

10899

Calif. Univ., Radiation Lab., Berkeley.
METABOLIC PROPERTIES OF PLUTONIUM AND ALLIED MATERIALS. Joseph G. Hamilton. p.4-23 of MEDICAL AND HEALTH PHYSICS DIVISIONS QUARTERLY REPORT OCTOBER 1947 TO JAN. 1948, Feb. 4, 1948. (UCRL-41)

10900

Calif. Univ., Radiation Lab., Berkeley.
METABOLIC PROPERTIES OF PLUTONIUM AND ALLIED MATERIALS. Joseph G. Hamilton. p.4-20 of MEDICAL AND HEALTH PHYSICS DIVISION; QUARTERLY REPORT; JANUARY, FEBRUARY, MARCH, 1948, May 24, 1948, 78p. (UCRL-98)

10901

California, Univ., Berkeley. Radiation Lab.
METABOLIC PROPERTIES OF PLUTONIUM AND ALLIED MATERIALS. Joseph G. Hamilton. p.4-27 of MEDICAL AND HEALTH DIVISIONS QUARTERLY REPORT FOR JULY, AUGUST, AND SEPTEMBER, 1948. (UCRL-193)

10902

California, Univ., Berkeley. Radiation Lab.
METABOLIC PROPERTIES OF PLUTONIUM AND ALLIED MATERIALS. Joseph G. Hamilton. p.4-16 of MEDICAL AND HEALTH DIVISIONS QUARTERLY REPORT FOR OCTOBER, NOVEMBER, AND DECEMBER, 1948. (UCRL-270)

10903

California, Univ., Berkeley. Radiation Lab.
METABOLIC PROPERTIES OF PLUTONIUM AND ALLIED MATERIALS. Joseph G. Hamilton. p.4-24 of MEDICAL AND HEALTH DIVISIONS QUARTERLY REPORT FOR JANUARY, FEBRUARY, AND MARCH, 1949. (UCRL-332)

10904

California, Univ., Berkeley. Radiation Lab.
 METABOLIC PROPERTIES OF PLUTONIUM AND ALLIED MATERIALS. Joseph G. Hamilton. p.4-24 of MEDICAL AND HEALTH DIVISIONS QUARTERLY REPORT FOR APRIL, MAY, AND JUNE, 1949. Aug. 10, 1949. (AECU-592; UCRL-414)

10905

California, Univ., Berkeley. Radiation Lab.
 METABOLIC PROPERTIES OF PLUTONIUM AND ALLIED MATERIALS. Joseph G. Hamilton. p.4-36 of MEDICAL AND HEALTH DIVISIONS QUARTERLY REPORT FOR JULY, AUGUST, AND SEPTEMBER, 1949. Nov. 16, 1949. (UCRL-480)

10906

California, Univ., Berkeley. Radiation Lab.
 METABOLIC PROPERTIES OF PLUTONIUM AND ALLIED MATERIALS. Joseph G. Hamilton. p.4-22 of MEDICAL AND HEALTH DIVISIONS QUARTERLY REPORT FOR OCTOBER, NOVEMBER, AND DECEMBER, 1949. Jan. 26, 1950. (UCRL-587)

10907

California, Univ., Berkeley. Radiation Lab.
 METABOLIC PROPERTIES OF PLUTONIUM AND ALLIED MATERIALS. Joseph G. Hamilton. p.4-42 of MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT FOR JULY, AUGUST, AND SEPTEMBER, 1950. Nov. 8, 1950. (AECU-3141; UCRL-960)

10908

California, Univ., Berkeley. Radiation Lab.
 THE METABOLIC PROPERTIES OF VARIOUS MATERIALS. Joseph G. Hamilton. p.3-59 of MEDICAL AND HEALTH PHYSICS DIVISIONS QUARTERLY REPORT FOR JANUARY, FEBRUARY, AND MARCH, 1953. June 11, 1953. (UCRL-2243)

10909

California, Univ., Berkeley. Radiation Lab.
 STUDIES OF RADIOACTIVITY AND IRRADIATION. Joseph G. Hamilton. p.3-37 of MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT FOR OCTOBER, NOVEMBER, AND DECEMBER, 1955. Jan. 24, 1956. (UCRL-3268)

10910

INVESTIGATION OF Zn^{65} METABOLISM IN ALLOXAN DIABETES OF RATS. Arie Yamade and Khirase Yanadzume. Med. A. Biol. 36 (2), 67-70(1955).

10911

ON THE BEHAVIOR OF SOME RADIOISOTOPES IN THE HUMAN BODY. Daisel Yamamoto. Kumamoto Jour. Sci. Scr. B. 2 (1), 87-88(1955).

10912

THE METABOLISM OF RADIOACTIVE BROMIDES (Br^{82}). Y. R. Yagi, R. Michel and J. Roche. Bull. Soc. Chim. Biol. Par. 35 (3-4), 289-98(1953). CLML 25-15306

10913

Argonne National Lab., Ill.
 APPLICATION OF LEUKOCYTE ANTISERUM TO STUDY OF RADIATION INDUCED LEUKOPENIA. H. M. Patt, M. A. Maloney, and E. M. Jackson. p.167 of REPORT ON BIOLOGICAL, MEDICAL AND BIOPHYSICAL PROGRAMS. PART I. SEMI-ANNUAL REPORT ON RADIOLOGICAL PHYSICS DIVISION. PART II. QUARTERLY REPORT ON BIOLOGICAL AND MEDICAL RESEARCH. Jan. 1955. (ANL-5378)

The experiment was done to determine the effect of an abrupt decrease in circulating white blood cells resulting from repeated injections of antiserum during the first day after exposure to radiation. It was reasoned that severe leucopenia induced in this way might activate primitive precursor cells that were still capable of responding to a physiological signal to blood formation,

but it might also enhance radiation injury by placing additional stress on the system. Results indicated that antiserum injections during the first hours after x-irradiation with 300 r diminished the magnitude and duration of radiation leucopenia and favored survival. Similar treatment after exposure to 400 r has been comparatively ineffective. (From authors' summary).

10914

DISTRIBUTION AND TURNOVER OF ADMINISTERED RUBIDIUM (Rb^{86}) CARBONATE IN BLOOD AND URINE OF MAN. Albert Zipser, H. B. Pinto and A. S. Freedberg. J. Appl. Physiol. 5, 317-22(1953).

10915

EFFECT OF HEAVY PARTICLES FROM THE $B^{10}(n, \alpha) Li^7$ REACTION ON ACUTE MORTALITY IN THE MOUSE. B. P. Bond and O. D. Easterday. Federation Proc. 15, 21(1956).

10916

TURNOVER OF Ca^{45} IN YOUNG AND OLD ANIMALS. Lucas V. Freyberg and F. Verzar. p.88-95 of EXPERIMENTELLE ALTERNFORSCHUNG. Birkhauser Verlage, Basel and Stuttgart, 1956.

10917

CHANGES IN THE SKELETAL MUSCULATURE IN RADIATION DISEASE. V. B. Zairt'yants. Vestnik Rentgenol. i. Radiol. 1955 (6), 32-42(1955). BA 32-29808

10918

UPTAKE OF INJECTED RADIOIRON IN SOME DIGESTIVE ORGANS OF MICE. D. Zillhote, et al. Acta Med. Patavina 15, 207-72(1955).

10919

Argonne National Laboratory.
 RADIATION EFFECTS ON TUMOR NUCLEI. A. M. Brues and A. N. Stroud. p.72-73 of ARGONNE NATIONAL LABORATORY REPORT ON BIOLOGICAL, MEDICAL, AND BIOPHYSICS PROGRAMS. PT. 2, QUARTERLY REPORT OF BIOLOGICAL AND MEDICAL RESEARCH DIVISION FOR OCTOBER, NOVEMBER, DECEMBER, 1954. (ANL-5378) NSA 9-2538

10920

DELAYED INJURIOUS EFFECTS OF RADIOTHORIUM. I. Zadek. Strahlentherapie 83, 59-66(1950).

10921

DISTRIBUTION OF RADIOPHOSPHORUS IN INTRA-PERITONEAL AND ORAL ADMINISTRATION AND METABOLIC CHANGES IN RELATION TO THE RADIATION DOSE. E. Zambelli and L. Campi. Arch. Sc. Med. 96 (6), 770-97(1953).

10922

Western Reserve University, Cleveland
 LD₅₀ STUDY OF $Sr^{89, 90}$. Hymer L. Friedell, John P. Storaasli, Marvin Berg, and Marvin Rollins. p.20-22 of PROGRESS REPORT. 1948. (WRU-1)

10923

DESCRIPTION OF AN Sr^{90} BETA-RAY APPLICATOR AND ITS USE ON THE EYE. H. L. Friedell, C. I. Thomas and J. S. Krohmer. Am. J. Roentgenol. Radium Therap. 65 (2), 232-44(1951). BA 25-26554

10924

FURTHER STUDIES ON THE FATE OF SELENIUM IN THE ORGANISM. Benton B. Westfall and M. I. Smith. J. of Pharmac. and Exp. Therap. 72, 245-251(1941).

10925

UPTAKE OF RADIOACTIVE PHOSPHORUS BY THE SKIN OF THE RABBIT. H. J. Whitely, H. B. Stoner and C. J. Threlfall. Brit. J. of Exp. Path. 34, 73-80(1953).

10926

DISTRIBUTION OF LARGE DOSES OF RADIOACTIVE PHOSPHORUS IN RATS. S. Warren and R. F. Cowing. Arch. of Path. 29, 730(1940).

10927

BILATERAL ALVEOLAR LUNG CARCINOMA, ASSOCIATED WITH THE INJECTION OF THOROTRAST. L. Abrahamson, M. H. O' Connor and M. L. Abrahamson. Irish Journal of Medical Science 6, 229-235(1950).

10928

ENAMEL PENETRATION BY RADIOACTIVE SALTS OF ZINC, CALCIUM, SILVER, PLUTONIUM, PALLADIUM, AND COPPER. W. W. Wainwright. J. Amer. Dental Assoc. 43 (6), 664-684(1951). BA 26-8813

10929

Argonne National Lab., Ill.
THE PRODUCTION OF RADIOACTIVE XENON FOR ANIMAL EXPOSURES. R. Abrams, C. E. Beilman and L. D. Norris. Nov. 26, 1945. 44p. (MDDC-1325; CH-3354)

Large amounts of Xe^{133} were needed to study the biological effects resulting from inhalation of radioactive gases. This paper deals with the problems of collecting and concentrating Xe^{133} and with the problem of separating it from the uranium matrix after fission.

10930

RADIO-IODINE EXCRETION IN THE AGED. P. G. Ackermann and Kurt Iversen. Journal Gerontol. 8 (4), 458-464(1953). BA 28-6136

10931

PERIVASCULAR INJECTION OF THOROTRAST AND ITS SEQUELAE. H. E. Amory and R. F. Bunch. Radiology 51, 831-839(1948).

10932

ON THE INCORPORATION OF RADIOSULFATE IN THE CARTILAGE. Radolfo Amprino. Experientia 11, 65-67(1955).

10933

FURTHER EXPERIMENTS ON THE FIXATION IN VITRO OF RADIOCALCIUM TO SECTIONS OF BONE. R. Amprino. Experientia 8, 380(1952).

Autographs show that Ca^{45} uptake in 50 μ bone sections is greatest around the central canals of newly formed systems. Various ashing techniques modify the uptake.

10934

PRELIMINARY REPORT ON HUMAN EXCRETION OF TRITIUM. Ernest C. Anderson and Ernest A. Pinson. April, 1950. 8p. (LAMS-1099)

10935

DEPOSITION OF RADIOACTIVE IODINE IN TEETH OF PERSONS TREATED FOR DISEASE OF THE THYROID GLAND. W. W. Wainwright and B. Butt, et al. J. Amer. Dent. Assoc. 47, 649-55(1953).

10936

A THEORETICAL CONSIDERATION OF THE HAZARDS ASSOCIATED WITH ACUTE EXPOSURE TO HIGH CONCENTRATIONS OF TRITIUM GAS. E. C. Anderson and W. Langham. Feb. 1954. 12p. (LA-1646)

10937

EXCRETION OF Ca^{45} INTO THE GASTROINTESTINAL TRACT OF YOUNG AND MATURE RATS. Harold D. Wallace, R. L. Shirley and G. K. Davis. J. Nutr. 43, 469-75(1951).

10938

CARCINOGENIC EFFECTS OF CALCIUM-45 AND STRONTIUM-89 ON BONE OF CF-1 MICE. W. A. D. Anderson, Gloria E. Zander, and Joseph F. Kuzma. A.M.A. Archives of Pathology 62, 262-71(1956).

10939

A STUDY OF TOXIC DOSES OF STRONTIUM-90 (Sr^{90}) IN THE ADULT RAT. W. A. D. Anderson, Gloria E. Zander and Joseph F. Kuzma. A. M. A. Archives of Pathology 62, 433-440(1956).

10940

CALCIUM METABOLISM IN DOGS WITH RESPECT TO

AGE AND EXERCISE. Robert Louis Wanner. Ph. D. Thesis, Cornell University, Ithaca, N. Y. (1955).

10941

SPECIES DIFFERENCES IN EXCRETION OF INTRA-VEINUS INJECTED Ca^{45} . Robert L. Wanner, J. R. Moor, F. Bronner, N. S. Pearson and R. S. Harris. Fed. Proc. 15, 575-6(1956).

10942

THE EFFECT OF DOSE ON THE MOBILIZATION OF RARE EARTH ISOTOPES. II. PRELIMINARY CLINICAL STUDIES. G. A. Andrews. p.241-62 of RARE EARTHS IN BIOCHEMICAL AND MEDICAL RESEARCH: A CONFERENCE SPONSORED BY THE MEDICAL DIVISION, OAK RIDGE INSTITUTE OF NUCLEAR STUDIES, OCTOBER 1955. Granvil C. Kyker and Elizabeth B. Anderson, eds. 476p. 1956. (ORINS-12)

10943

THE INFLUENCE OF AMINO ACIDS AND OTHER ORGANIC COMPOUNDS ON THE GASTROINTESTINAL ABSORPTION OF CALCIUM-45 AND STRONTIUM-89 IN THE RAT. R. H. Wasserman, C. L. Comar and M. M. Nold. J. Nutr. 59, 371-383(1956).

10944

THE RATE OF REMOVAL OF RADIOACTIVE IRON FROM THE PLASMA, AN INDEX OF ERYTHROPOIESIS. L. R. Wasserman, I. A. Radhoff, D. Leavitt, J. Mayer and S. Port. J. Clin. Invest. 31, (1), 32-39(1952).

10945

EFFECT OF POLONIUM AND SELENIUM IN EXPERIMENTAL SCHISTOSOMA MANSONI INFECTION IN MICE. N. P. Watts and K. P. McConnell. Amer. Jour. Hyg. 53 (1), 11-16(1951). BA 25-32285

10946

INFLUENCE OF PLUTONIUM CONCENTRATION ON EFFECTIVENESS OF THERAPEUTIC AGENTS. M. H. Weeks, W. D. Oakley and R. C. Thompson. Radiation Res. 2 (3), 237-239(1955). BA 30-3986

10947

METABOLISM AND DISTRIBUTION OF COLLOIDAL Au^{198} INJECTED INTO SEROUS CAVITIES FROM TREATMENT OF EFFUSIONS ASSOCIATED WITH MALIGNANT NEOPLASMS. Gould A. Andrews, Samuel W. Root and Ralph M. Kmseley. Cancer 6 (2), 294-302(1953). BA 27-24511

10948

Univ. of Chicago Metallurgical Lab.
RADIOTOXICITY OF INJECTED Sr^{87} FOR RATS, MICE, AND RABBITS. PART I. INTRODUCTION; METHODS. D. Anthony, K. Lanthrop and R. Finkle. June 1, 1946. Decl. Oct. 9, 1947. 16p. Inclusion in the NNES (MPTS) for Part II see MDDC-1363, CH-3846. (MDDC-1363) 1540).

The toxic effects and metabolism of radiostrontium (Sr^{88} - Sr^{90}) were studied. Determinations were made of the acute lethal doses for rats, mice, and rabbits, and of the comparative toxicity and metabolism following intraperitoneal and intravenous administration. Distribution studies of radiostrontium in various organs were made. A method is described for handling and preparing radioactive strontium for administration to experimental animals. Procedures are given for preparing tissues and excreta for measurement of Sr^{88} - Sr^{90} with a Geiger-Muller counter, and for correcting these measurements for radioactive decay back to the time of injection.

10949

Univ. of Chicago Metallurgical Lab.
RADIOTOXICITY OF INJECTED Sr^{89} FOR RATS, MICE, AND RABBITS. PART II. METABOLISM AND ORGAN

DISTRIBUTION. D. Anthony, K. Lathrop and R. Finkle. June 1, 1946. Decl. Oct. 9, 1947. 36p. (MDDC-1363) 1363).

Mice, rats, and rabbits excreted Sr^{89} - Sr^{90} very rapidly following intraperitoneal or intravenous administration. The greatest part of the excretion took place during the first three days, and by 10-15 days virtually no more of the retained strontium was excreted. Average total excretion values were 54 per cent of the injected dose for the mouse, 40 per cent for the rat, and about 70 per cent for the rabbit. Average total retention values were 45 per cent of the injected dose for the mouse, 59 per cent for the rat, and 21 per cent for the rabbit. After three days almost all of the retained Sr^{89} - Sr^{90} was found in the skeleton. The concentration in bone was more than 100 times that in soft tissue. There does not appear to be any significant variation in retention of Sr^{89} on a per gram basis between different types of bone. The logarithm of the retention, the rate of excretion, and the blood concentration of radioactive strontium in each case was found to be a straight-line function of time.

10950

EXPERIMENTAL DATA USEFUL IN ESTABLISHING MAXIMUM PERMISSIBLE SINGLE AND MULTIPLE EXPOSURES TO POLONIUM. David S. Anthony, R. K. Davis, R. N. Cowden and W. P. Jolley. International Conference on the Peaceful Uses of Atomic Energy in Geneva, Switzerland, 13, p. 215-218(1955).

10951

INSTITUTE OF GENETICS AND BIOPHYSICS SYMPOSIUM ON RADIOBIOLOGY, MOSCOW. (Academy of Sciences of the USSR). Consultants Bureau Translation, Consultants Bureau Enterprises, Inc., 227 W. 17th St., N. Y. 11, N. Y. (1955). 134p.

10952

Mound Laboratory, Miamisburg, Ohio
STUDIES OF THE PHYSIOLOGICAL EFFECTS OF POLONIUM UPON THE METABOLISM OF LABORATORY ANIMALS. D. S. Anthony. Report for Biological Research (Sept. 5-Nov. 27, 1950). Contract AT-33-1-GEN-53. (MLM-527)

10953

TOPICAL LOCALIZATION IN MOUSE OF RADIOACTIVE SILVER OXIDE (Ag^{111}O) INTRODUCED BY VARIOUS ROUTES. H. D. West and H. Goldie. Proc. Soc. Exp. Bio. 92 (1), 116-120(1956).

10954

THE BILIARY EXCRETION OF GALLIUM 72, GOLD 198, AND HAFNIUM 181 IN THE RAT. J. W. Archdeacon, J. B. Nash and G. C. Wilson. Texas Repts. Biol. and Med. 10 (2), 281-285(1952). BA 27-6073

10955

California. Univ., Berkeley. Radiation Lab.
URANIUM POISONING. S. Wexler and G. E. Boyd. July 9, 1942. 5p. (MDDC-1054; CC-16)

Poisoning from uranium may come about either through inhalation of uranium oxide dust (U_3O_8 , UO_2 , or UO_3) or through contact with the soluble salts. The pathological manifestation of uranium poisoning is nephritis, an inflammation of the kidney. The intensity of the anatomical and functional lesion is the result of the accumulation of the metal in the organ as a result of attempts at excretion. Protection of the body against uranium involves protection of the hands and care to avoid inhalation or ingestion. In the synthesis of uranyl nitrate, rubber gloves are recommended. Protection against ingestion depends solely upon the worker; care must be exercised to prevent the taking of any uranium by mouth during such operations as pipetting. A bibliography is included.

10956

THE DISTRIBUTION OF RADIOACTIVE ISOTOPES OF IODINE IN NORMAL RABBITS. I. Ariel, W. F. Bale, V. Downing, H. C. Hodge, W. Mann, S. VanVoorhis, S. L. Warren, and H. J. Wilson. Am. J. Physiol. 132, 346-350(1941).

In relative percentages, I_2 -content of lung and kidney were high, liver, spleen, heart, bile and submaxillary gland intermediate, muscle, skin, diaphragm and testicle, low.

10957

RADIOACTIVE CALCIUM AND PHOSPHORUS UPTAKE BY CALCIFIED TISSUES. W. D. Armstrong (Univ. Minnesota, Minneapolis). J. Dental Res. 24 (3/4), 192(1945). BA 20-2837

10958

California. Univ., Berkeley. Radiation Lab.
COBALT DISTRIBUTION. P. P. Weymouth, L. R. Wasserman, N. Berlin, and R. Rosenthal. PART A OF PROGRESS REPORT FOR AUGUST, 1947. 5p. (MDDC-1597; BP-127)

10959

DISTRIBUTION OF RADIOACTIVE CARBON ADMINISTERED AS CARBONATE IN THE BODY AND EXCRETA OF THE MATURE RAT Wallace D. Armstrong, Jack Schubert and A. Lindenbaum. Proc. Soc. Exptl. Biol. Med. 68, 233-240(1948).

10960

THE ACTION OF SALTS OF ZIRCONIUM AND OTHER METALS ON PLUTONIUM AND YTTRIUM DISTRIBUTION. Marcia R. White and Jack Schubert. J. Pharmac. Exptl. Therap. 104(3), 317-24(1952).

10961

STUDIES ON THE EXCRETION AND DISTRIBUTION OF RADIOACTIVE CALCIUM. D. Wallace Armstrong, R. I. Lienke and George Cullen. p.72-78 of METABOLIC INTERRELATIONS, TRANSLATIONS OF THE FIRST CONFERENCE, FEB. 7-8, 1949. E. C. Reibenstein, ed. New York, Sloan-Kettering Inst. 1949.

10962

THE ABSORPTION AND EXCRETION OF IRON BEFORE, DURING AND AFTER A PERIOD OF VERY HIGH INTAKE. Elsie M. Widdowson and Robert A. McCance. Biochem. J. 31, 2029-2034(1937).

10963

THE CHEMICAL COMPOSITION OF THE HUMAN BODY. E. M. Widdowson, R. A. McCance and C. M. Spray. Clinical Sci. 10, 113-125(1951).

10964

SEXUAL DIFFERENCES IN THE STORAGE AND METABOLISM OF IRON. Elsie M. Widdowson and Robert A. McCance. Biochem. J. 42, 577-81(1948).

10965

OBSERVATIONS AND QUANTITATIVE RADIOAUTOGRAPHIC STUDIES OF CALCIUM-45 DEPOSITED *IN VIVO* IN FORMING HAVERSIAN SYSTEMS AND OLD BONE OF RABBIT. James S. Arnold, W. S. S. Jee and K. Johnson. Am. J. Anat. 99, 291-313(1956).

10966

CONCEPTS OF ULTRA STRUCTURE OF BONE THROUGH RADIOACTIVE DAUGHTER PRODUCTS BEHAVIOR OF Sr^{90} AND Ra^{226} . J. S. Arnold. Federation Proc. 14, 398(1955).

When Ra^{226} is skeletally fixed *in vivo*, the gas Rn^{222} readily escapes from areas of bone which were mature prior to Ra administration. Rn escape is much less from bone formed during or after Ra administration. The limiting path of diffusion within crystalline material is shorter in "old" bone, mother radium is deposited closer to the crystal surfaces in old than in newly forming bone. Sr^{90} was given to a 5 mo. old pup, which was killed 4 mo. later. At death the Y^{90} daughter was at complete radioactive

equilibrium (demonstrated by serial radioautographs and energy discriminatory beta ray counting). Since Rn escapes but the Y does not, these alkaline earths are close to the crystal surfaces but not at the surface.

10967

Rochester Univ.

THE RELATION OF PARTICLE SIZE OF URANIUM DIOXIDE DUST TO TOXICITY FOLLOWING INHALATION BY ANIMALS. H. B. Wilson. 1948. 29p. (AECD-1963; UR-6)

10968

DOUBLE TRACER RADIOAUTOGRAPHIC STUDIES OF Ca^{45} AND Ra^{226} BONE DEPOSITION. J. S. Arnold and W. S. S. Jee. *Radiation Res.* 1(5), (1954).

10969

RELATION OF PARTICLE SIZE OF U-308 DUST TO TOXICITY FOLLOWING INHALATION BY ANIMALS. H. B. Wilson, G. E. Sylvester, S. Laskin, C. W. LaBelle, J. Scott, and H. E. Stokinger. A. M. A. *Arch Indust Health* 11(1), 11-16(1955).

10970

ION EXCHANGE AND RECRYSTALLIZATION IN FIXATION OF Ca^{45} IN THE RABBIT'S SKELETON. J. S. Arnold and W. S. S. Jee. *Proc. Soc. Exper. Bio. and Med.* 85, 658-663(1954).

Undecalcified bone sections (rabbits) sacrificed at intervals between one hour and three weeks following calcium administration were treated in CaAc solutions to determine what portion of Ca^{45} remains on crystal surface of bone as a function of time following administration. Data presented indicate that recrystallization and crystallization remove Ca to non-exchangeable positions at extremely rapid rates. One hour following Ca^{45} administration, half of the isotope fixed in bone is no longer available to removal by ion exchange.

10971

Argonne National Laboratory, Lemont, Illinois
PLUTONIUM AND RADIUM IN BONE. J. S. Arnold. p. 131-43 "Therapy of Radioelement Poisoning." Transcription of a Meeting on Experimental and Clinical Approaches to the Treatment of Poisoning by Radioactive Substances. Oct. 20-21, 1955. M. W. Rosenthal, Ed. 1956. (ANL-5584)

10972

THE DISTRIBUTION OF NATURALLY RADIOACTIVE SUBSTANCES IN THE ORGANISM AFTER PARENTERAL ADMINISTRATION. P. M. Wolf and H. J. Born. *Strahlentherapie* 70, 342-348(1941).

10973

THE USE OF RADIOISOTOPES IN IMMUNOLOGY. A. Wormald. *Brit. J. Radiol.* 28, 33-38(1955).

10974

METABOLISM OF PHOSPHORUS-32 AND MOLYBDENUM-99 IN RATS RECEIVING HIGH CALCIUM DIETS. L. R. Arrington and G. K. Davis. *J. Nutr.* 55, 185-192(1955).

10975

A RADIUM INDUCED CEREBELLAR DYSGENESIS IN AN INFANT. L. Van Bogaert and M. Radermecker. *Rev. Neurol.* 93(1), 65-82(1955). BA 31-23631

10976

DISTRIBUTION AND RETENTION OF CARRIER-FREE RADIO BERYLLIUM IN THE RAT. C. D. Van Cleave and C. T. Kaylor. *Archives of Industrial Hygiene and Occupational Medicine* 7, 367-375(1953).

10977

AUTORADIOGRAPHICALLY DETERMINED IN VIVO TRANSLLOCATION OF Ra^{224} FROM SKELETAL DEPOSITS OF Th^{228} . James S. Arnold. Presented at Rad. Res. Soc., N. Y., May 16-18, 1955. *Radiation Res.* 3, 211-212(1952)

10978

THE RADIOACTIVITY OF THE HUMAN BODY Isaac Asimov (Boston U. Sch. Med.). *J. Chem. Educ.* 32(2), 84-85(1955).

Natural Radioactive Nuclides Occurring in Human Body.

	Fractional occurrence in element	Half-life (sec.)
K^{40}	1.19×10^{-4}	4.4×10^{16}
C^{14}	1.85×10^{-12}	1.8×10^{11}
H^3	10	3.9×10^8
Radioactivity in 70-kg Body		Disintegrations/sec.
gm. present		
K^{40}	8.3×10^{-2}	1.9×10^4
C^{14}	1.9×10^{-8}	3.1×10^3
H^3	8.4×10^{-15}	3.0
BA 29-28049		

10979

THE LOCALIZATION OF CERTAIN ALKALINE AND RARE EARTH ELEMENTS IN THE COSTOCHONDRAL JUNCTION OF THE RAT. C. W. Asling and J. G. Hamilton. *Anat. Rec.* 113, 285-300(1952).

Radioactive isotopes of calcium and strontium possessing a high degree of specific activity were administered by parenteral injection to adult rats. Radioautography showed that both elements localized in varying degrees both in the bony and the cartilaginous segment of the rib.

10980

LATE EFFECTS OF RADIUM AND PLUTONIUM ON BONE. M. A. Bloom and W. Bloom (Argonne National Labs., Division of Biological and Medical Research) *Quarterly Report.* (1948). (ANL-4227)

Effects on mice: (1) overgrowth of bone in femurs and vertebrae. In femur the overgrowth begins in distal metaphysis and is more extensive than in the epiphysis or shaft. (2) After exposure to Ra the bone is atypical, fibrous, much of it becomes devitalized. Cortical bone of shaft contained many empty lacunae (3) After Pu injection, newest bone is fibrous, but greatly thickened trabeculae of spongy bone become progressively more compact. Extremely irregular arrangement of lamellae and osteocytes distinguishes them from normal bone. Empty lacunae are fewer than with Ra. (4) Changes in vertebrae are essentially the same as those in femur.

10981

DEPOSITION OF RADIOACTIVE STRONTIUM AND THE RARE EARTH PROMETHIUM IN SKELETAL TISSUES OF THE RAT. C. W. Asling, D. A. Heller, D. H. Copp and J. G. Hamilton. *Anat. Record* 103, 420(1949).

10982

EFFECT OF I^{131} ON THE TESTICLES AND OVARIES OF MICE, HISTOMORPHOLOGICAL STUDY. S. Avanzini. *Gior. Med. mil.* 106(2), 243(1956).

10983

EFFECT OF RADIOACTIVE PHOSPHORUS ON PHOSPHORUS METABOLISM IN TUMOR-BEARING ANIMALS. G. Avata. *Japan J. Cancer Res.* 47(3-4), 281-284(1956).

10984

Calif. Univ., Berkeley. Radiation Lab.
STUDY OF PLUTONIUM METABOLISM IN BONE. L. Van Middlesworth, (nd). Decl. June 6, 1947. 100p. (MDDC-1022; BP-69)

A method is described whereby Pu^{239} , Sr^{89} and Y^{88} may all be distinguished in the same animal by differences in their radiations. The chronic excretion of Pu^{239} , Sr^{89} and Y^{88} was followed for 11 weeks in rats injected simultaneously with these three elements. The very low rate of elimination of all three after the first month emphasizes the danger of chronic toxicity. Radioautographs of the tibia show radioactive strontium deposited throughout

the bone with a heavy concentration in the region of new bone growth and active calcification beneath the epiphysis. Plutonium was shown to localize superficially in the endosteal and periosteal surfaces of the bone with no apparent concentration in the zone of bone growth and calcification.

10985

Argonne National Lab.

PROGRESS REPORT BIOMETRICS, S. A. Tyler, p.61-69 of QUARTERLY REPORT NOV. 1948 TO FEB. 1949. BIOLOGY AND MEDICAL DIVISIONS. Feb. 1, 1949. 183p. (ANL-4253)

10986

THE BIOLOGICAL HAZARD OF RADIOACTIVE STRONTIUM. Janet Vaughan, Margaret Tutt and Barbara Kidman. Biological Hazards of Atomic Energy, Edited by A. Haddow. Oxford, Oxford University Press, Amen House, London. (1952).

10987

THE RESPONSE OF THE ANIMAL ORGANISM TO REPEATED INJECTIONS OF AN ACTIVE DEPOSIT OF RADIUM EMANATION. INTRAVENOUS INJECTIONS IN DOGS. Halsey J. Bagg. J. Cancer Res. 5, 301-19(1920).

Large intravenous doses of active deposits of Radium administered to dogs produced a considerable reduction in the number of WBC (up to 80% of their total following an initial dose) while the RBC showed a simultaneous reduction of 25%. Repeated doses produced a marked decrease in circulating lymphocytes. Digestive disturbances after large doses were associated with a considerable reduction in body weight. Metabolic changes included a decided increase in the total N of urine. The organs showed considerable congestion of the principal viscera on histological examination.

10988

THE EFFECTS OF RADIATION ON BONE. Janet M. Vaughan, p.729-65 of THE BIOCHEMISTRY AND PHYSIOLOGY OF BONE. Geoffrey H. Bourne, ed. New York, Academic Press, Inc. 1956.

10989

POLONIUM STORAGE IN RAT ORGANS AND TUMORS. L. Vekerd, A. Haraszti, G. Gerece and A. Simonyi. Kiserletes Orvostud. 6 (2), 97-104(1954).

10990

EXPERIMENTAL STUDIES ON INTERSTITIAL INJECTION OF RADIOACTIVE COLLOIDAL GOLD. Andrew H. Veidhus, L. A. Swinehart, L. E. Preuss and C. P. Hodgkinson. Surg., Gynecol. and Obstet. 103 (5), 539-551(1956). BA 32-7812

10991

COAGULATION DISORDERS FOLLOWING THERAPEUTIC DOSES OF RADIOACTIVE ISOTOPES. H. Vetter and H. Vinazzer. Wien. Zschr. Inn. Med. 33 (11), 455-7(1952)

10992

METABOLISM OF Cr^{51} BY ANIMALS AS INFLUENCED BY CHEMICAL STATE. W. J. Visek, I. B. Whitney, U. S. G. Kuhn and C. L. Comar. Proc. Soc. Exptl. Bio. Med. 84, 610-615(1953).

10993

TENTATIVE ANALYSIS OF RADIOPHOSPHORUS DISTRIBUTION IN MICE DURING THE EQUILIBRATION PERIOD, PRELIMINARY REPORT. T. Baglioni, C. Garavaglia, P. Lado, A. Perussia and C. Polvani. Radiol. Clin., Basel 24 (1), 45-59(1955).

10994

ACQUIRED RADIORESISTANCE OF THE CRYPT EPITHELIUM OF THE DUODENUM. M. A. Bloom. (Argonne National Lab.). (nd). 28p. (AECU-531; UAC-106)

Duodenal crypt cells in mice showed mild damage at time of sacrifice 3 hours after 6-9 daily exposures of 60r/day. Recovery was complete in mice autopsied 24 hours after final exposure. After 10 or more exposures, mice became resistant to this daily dosage but resistance was lost when 600-1200 r was given subsequently in a single dose.

10995

SPLENIC REACTIONS TO COLLOIDAL THORIUM DIOXIDE IN THE ALBINO RAT. R. N. Baillif. Am. J. Anat. 92 (1), 55-115(1953).

10996

METABOLISM OF RADIOACTIVE SUBSTANCES AND POSSIBILITY OF AFFECTING IT. Vladimir Volf. Pracovni Lekar. 8 (5), 351-365, (6), 435-449(1956).

10997

SYMPOSIUM ON PHYSIOLOGICAL EFFECTS OF RADIATION AT THE CELLULAR LEVEL. David Nachmansohn (The Biology Division, Oak Ridge National Lab.). p.137-77 of NERVE FUNCTION AND IRRADIATION EFFECTS. J. Cellular and Comparative Physiol. 39 (Suppl. 2), July 1952.

10998

A PROTAMINE TITRATION WHICH REFLECTS A CLOTTING DEFECT IN THE IRRADIATED DOG AND IN CERTAIN TYPES OF HUMAN HEMORRHAGIC DISEASE. J. G. Allen, K. Lathrop, and M. Sanderson. (Argonne National Lab.). p.122-129 of BIOLOGY AND MEDICAL DIVISIONS, QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1948. Nov. 1, 1948. (ANL-4227)

10999

STUDIES ON THE DISTRIBUTION OF RADIOACTIVE FLUORIDE IN THE BONES AND TEETH OF EXPERIMENTAL ANIMALS. J. F. Volker, R. F. Sognnaes and B. G. Bibby. Amer. J. of Physiol., 707-712(1941).

11000

DISTRIBUTION AND EXCRETION OF RADIOACTIVE THALLIUM IN THE CHICK EMBRYO, RAT AND MAN. Ralph K. Barclay, W. C. Peacock, and D. Karnofsky. J. Pharmacol. Exptl. Therap. 107, 178-187(1953).

11001

DISTRIBUTION OF RADIOACTIVE COBALT IN ORGANS OF NORMAL AND ANEMIC ANIMALS. A. Volta and U. Marinoni. Biol. Latina 8, 942-952(1955). CA 50-14073

11002

DISTRIBUTION OF RADIOACTIVE THALLIUM IN CHICKEN EMBRYOS AND RATS. R. K. Barclay, W. C. Peacock, and D. Karnofsky. Fed. Proc. 10 (1), 159-60 (1951). BA 25-26551

11003

THE OXYGEN EFFECT ON RADIATION INDUCED CHROMOSOME ABERRATIONS. BREAKAGE VS. RECOMBINATION HYPOTHESIS. Norman H. Giles. p.271 of SEVENTH ANNUAL RESEARCH CONFERENCE OF THE BIOLOGY DIVISION, OAK RIDGE NATIONAL LABORATORY AND THE DIVISION OF BIOLOGY AND MEDICINE, AEC, ON GENETIC RECOMBINATION HELD AT OAK RIDGE, TENNESSEE ON APRIL 19-21, 1954. J. Cellular Comp. Physiol. 35, Suppl. 2 (1951) May.

Oxygen affects aberration yield only when the oxygen is present during irradiation (Tradescantia). Treatment with oxygen before irradiation does not sensitize chromosomes to subsequent x-irradiation, but does sensitize them to subsequent infrared exposure. Oxygen itself did not affect the aberration yield or the recombination process. Temperature during irradiation has a marked effect on aberration yield.

11004

THE DETECTION, ESTIMATION AND ELIMINATION OF RADIUM IN LIVING PERSONS GIVEN RADIUM CHLORIDE

INTERNALLY. H. H. Barker and H. Schlundt. *Am. J. Roentgenol. Radium Therap. Nucl. Med.* **24**, 418-423(1930).

11005

RADIOIODINE PENETRATION THROUGH INTACT ENAMEL, WITH UPTAKE BY BLOODSTREAM AND THYROID GLAND. H. J. Bartelstone (Columbia Univ., NYC). *J. Dental Res.* **30**(5), 728-733(1951).

BA 26-6115

11006

EFFECTS OF HARD RAYS ON AQUEOUS SOLUTIONS.

K. Patau. *Naturwissenschaften* **33**, 61-2(1946).

When water is irradiated by x rays, energy can be absorbed at points called energy points. These energy points orbit about in solution and can transfer the absorbed energy to receptor molecules such as tobacco mosaic virus. Orbit values are presented. CA 41-7238h

11007

EFFECTS OF X-RAYS ON COLLOIDAL SYSTEMS. K.

Mull. *Strahlentherapie* **52**, 512(1935).

Protein solutions treated with x rays showed considerable acid development and flocculation. CA 29-3119^g

11008

A COMPARATIVE STUDY OF THE METABOLISM OF Sr^{90} AND Ca^{45} . A. C. H. Bauer, A. Carlsson, and B. Linquist. *Acta Physiol. Scandinav.* **35**, 56(1955).

Calcium has been shown to be preferentially absorbed from the digestive tract, Sr to be excreted to a greater extent than Ca by the kidney.

11009

THE IMPORTANCE OF BONE GROWTH AS A FACTOR IN THE REDISTRIBUTION OF BONE SALT. I. REDISTRIBUTION OF RADIO-ACTIVE CALCIUM IN THE SKELETON OF RATS. Goran C. H. Bauer. *Journal of Bone and Joint Surgery* **36A**, 375-86(1954).

11010

EVALUATION OF ACCRETION RESORPTION AND EXCHANGE REACTIONS IN THE SKELETON. G. C. H. Bauer, A. Carlsson and B. Lindquist. *K. Fysiogr. Sällskapet i Lund Forhandl.* **25**, 318(1955).

11011

A COMPARATIVE STUDY ON THE METABOLISM OF Ba^{140} AND Ca^{45} IN RATS. G. C. H. Bauer, A. Carlsson, and B. Linquist. *Biochem. J.* **64**, 535-542(1956).

11012

THE ROLE OF MACROPHAGE MOVEMENTS IN THE TRANSPORT AND ELIMINATION OF INTRAVENOUS THORIUM DIOXIDE IN MICE. Thomas W. Easton. *Am. J. Anat.* **90**(1), 1-28(1952). BA 27-13156

11013

BEHAVIOR OF THE THYROID TOWARD ELEMENTS OF THE SEVENTH PERIODIC GROUP. Emil J. Baumann, Norma Z. Searle, A. Aaron Yalow, Edward Siegel, and S. M. Seidlin. *Am. J. Physiol.* **185**(1), 71-76(1956).

BA 31-4464

11014

RELATIVE AFFINITY OF THYROID FOR Br, I, AND Re. Emil Baumann, Norma Z. Searle, A. Aaron Yalow, Edward Siegel, and S. M. Seidlin. *Fed. Proc.* **10**(1), 160-161(1951). BA 25-27312

11015

THE ACUTE LETHAL EFFECTS IN MONKEYS OF RADIOSTRONTIUM. G. M. Edington, A. H. Ward, J. M. Judd, and R. H. Mole. *J. Pathol. Bacteriol.* **71**, 277-293(1956).

11016

LOCALIZATION OF URANIUM IN TISSUES. P. M. Bazerque, C. M. Meroni, and D. E. Pujo. *Sem. Med. B. Air.* **104**(25), 839-40(1954).

11017

RADIUM POISONING (EDITORIAL). Anonymous. *Am. Public Health* **23**, 350-51(1933).

11018

HISTOCHEMICAL DISTRIBUTION OF GOLD AFTER ADMINISTRATION OF GOLD CHLORIDE. Herbert Elftman, Alice G. Elftman and Raymond L. Zwemer. *Anat. Record* **96**, 341-354(1946).

11019

THE LOCALIZATION OF RADIOSULFATE IN BONE TISSUE. B. Engfeldt, A. Engstrom and H. Bostrom. *Exptl. Cell. Res.* **6**, 251-53(1954).

11020

A PRELIMINARY STUDY OF THE *IN VIVO* AND *IN VITRO* UPTAKE OF Sr^{90} IN BONE TISSUE AND THE OSSEOUS LOCALIZATION OF RADIOACTIVE FISSION PRODUCTS FROM ATOMIC EXPLOSIONS. B. Engfeldt, R. Bjornstedt, C. J. Clemenson and A. Engstrom. *Acta Orthopaedica Scandinavia* **24**, 101-114(1954).

11021

STUDIES ON MINERALIZED DENTAL GERMS OF NORMAL DOGS. A MICRORADIOGRAPHIC INVESTIGATION OF TEETH AND TOOTH GERMS OF NORMAL DOGS. B. Engfeldt, Bengt, Gunnar, Bergman. *Exptl. Cell. Res.* **1**, 381-392(1954).

The mineralization and uptake of Ca^{45} and Sr^{35} was studied microradiographically and autoradiographically on ground sections of the jaws of normal dogs.

11022

PATHO-ANATOMICAL CHANGES IN THE ORGANS OF ANIMALS FOLLOWING INTERNAL ACTION OF POLONIUM. E. V. Erleksova. *Byull. Radiat. Med. (Moscow)*, **1**, 33-48(1958).

11023

RADIUM POISONING II. THE QUANTITATIVE DETERMINATION OF THE RADIUM CONTENT AND RADIUM ELIMINATION RATE OF LIVING PERSONS. R. D. Evans. *Amer. J. Roentgenol. and Radium Ther.* **37**, 368-378(1937).

Author describes gamma ray method for detn. of non-emanating Ra in humans. States (but does not show derivation) that 45% of the total Rn in chronic Ra poisoning is exhaled and that the rate of excretion (chronic) of Ra = 0.005% of total body Ra/day, 91% in feces, 9% in urine.

11024

THE RADIOBIOLOGICAL IMPORTANCE OF THE ACTIVATION OF O_2 . J. Loiseleur. *Compt. Rend.* **213**, 730-2(1941).

X-ray irradiation of aqueous solutions having a pH range of 2.2 to 9.0 showed considerable quantities of H_2O_2 when dissolved oxygen was present in the solution. It is thought that the hydrogen ions react with an activated oxygen which has been produced. CA 37-4080

11025

RADIOAUTOGRAPHIC DETECTION OF RADIOSULFATE. INCORPORATION BY THE GROWING ENAMEL OF RATS AND HAMSTERS. L. F. Belanger. *J. Dent. Res.* **34**, 20-27(1955).

11026

RECENT ADVANCES IN THE USE OF BAL. E. L. Belknap. *Wisconsin Med. J.*, Mar. 1951.

11027

ENZYME ACTIVITY OF GRANULES ELABORATED IN MOUSE LIVER AND SPLEEN FOLLOWING INTRAVENOUS INJECTION OF ThO_2 . E. Bell. *Jour. Natl. Cancer Inst.* **13**(1), 240-241(1952). BA 27-11740

11028

METABOLISM AND REMOVAL OF CALCIUM-45 IN MAN. J. Bellin and D. Laszlo. *Science* **117**, 331-334(1953).

11029

INTRACAROTID INJECTION OF RADIOACTIVE COLLOIDAL

GOLD (30 μ PARTICLES) IN THE DOG. P. Benda, J. Constans, and M. David. C. Rend. Soc. Biol., 149 (3-4), 273-5(1955).

Most radioactivity is found in the lateral ventricle on the side of the injection, next most is in the diencephalon. Radioactivity tends to remain mostly unilateral. It is not significantly precipitated in blood vessels. Distribution also varies according to the circulatory system of the brain, being higher on the external surface of cortex. White matter has 10 times less radioactivity than grey matter. Author believes patterns of localization justify trials of colloidal gold as a therapeutic agent.

11030

X-RAYS ON DEHYDROGENASES, MECHANISM OF BIOLOGICAL EFFECTS. W. Seitz. Radiologica 2, 4-14(1938).

Irradiation with x-rays (in vitro) produced an increase in the activity of xanthine dehydrogenases, citric dehydrogenase, glutamic dehydrogenase and palmitic dehydrogenase. Observations are considered relative to their significance in biological effects of x-rays.

11031

AN EXPERIMENTAL STUDY OF INTRAMAMMARY INJECTION OF Au198. H. F. Berg and W. M. Christophersen. Ann. Surg., 143(1), 92-7(1956).

11032

LOCALIZATION OF RADIOACTIVITY OF COLLOIDAL GOLD 198, A PRELIMINARY REPORT. H. F. Berg. A. M. A. Arch. Surg. 63(4), 545-53(1951).

11033

TRACER STUDIES WITH INHALED 1.0 YEAR RUTHENIUM. Mary Dailey, Irving Wender and Richard Abrams (Metalurgical Lab., Univ. of Chicago). (1945). (CH-3325).

Authors report progress on studies of the chemical toxicity of Ruthenium (mice) and the inhalation of tracer amounts of Ruthenium (rats).

11034

SELECTIVE IRRADIATION OF LYMPH NODES BY INTERSTITIAL INJECTION OF RADIOACTIVE COLLOIDAL GOLD. H. F. Berg and W. M. Christophersen. Am. Surgeon 22(2), 172-8(1956).

11035

FETAL INJURY FROM RADIUM AND ROENTGEN RAYS. B. S. Berge. Geneesk. gids. 32, 315-20(1954).

11036

SOME OBSERVATIONS ON THE DISTRIBUTION OF RADIOACTIVE ZINC IN PROSTATIC AND OTHER HUMAN TISSUES. O. Daniel, F. Haddad, G. Prout, and W. F. Whitmore. Brit. J. Surg. 44(183), 271-8(1956).

11037

RADIOACTIVE PHOSPHATE ABSORPTION BY DENTIN AND ENAMEL. Gerrit Bevelander and Melvin H. Amler. J. Dent. Res. 24(1), 45-51(1945). BA 19-18747

11038

COMPARATIVE STUDIES ON THE UPTAKE OF PHOSPHORUS BY TISSUES UNDER DIFFERENT DOSES OF INJECTED RADIOACTIVE PHOSPHORUS P³². K. L. Bhattacharya, K. P. Chakraborty, A. Bose, and N. N. Das Gupta. Science 118(3074), 651-2(1953).

11039

THE ABSORPTION OF RADIOACTIVE IRON BY CHILDREN 7-10 YEARS OF AGE. W. J. Darby, P. F. Hahn, M. M. Kaser, R. C. Steinkamp, P. M. Densen, and M. B. Cook. J. Nutr. 33(1), 107-119(1947). BA 21-16767

11040

EXPERIMENTAL PRODUCTION OF MALIGNANT TUMORS BY RADIOACTIVE SUBSTANCES. R. Biltris. Vehand. Koninkl. Vlaam. Acad. Geneesk. Belg. 1, 76-89(1939-40).

11041

THE DISTRIBUTION OF RADIOACTIVE SULPHUR (35S) IN THE FIBROUS TISSUES, CARTILAGES AND BONES

OF THE RAT FOLLOWING ITS ADMINISTRATION IN THE FORM OF INORGANIC SULPHATE. D. V. Davies and L. Young. Jour. Anat. 88(2), 174-183(1954). BA 29-5967

11042

CHANGES IN TEETH AND JAWS OF RATS ACCOMPANYING RADIUM POISONING. S. N. Blackberg and F. B. Flinn. J. Dent. Res. 14, 211(1934).

11043

EVIDENCE ON THE MECHANISM OF THE OXYGEN EFFECT BY USE OF A RING CHROMOSOME. W. K. Baker and E. VonHalles. p.299-307 of 7TH ANNUAL RESEARCH CONFERENCE OF THE BIOLOGY DIVISION, OAK RIDGE NATIONAL LABORATORY AND THE DIVISION OF BIOLOGY AND MEDICINE, AEC, ON GENETIC RECOMBINATION HELD AT OAK RIDGE, TENNESSEE ON APRIL 19-21, 1954. J. Cellular Comp. Physiol. 35, Suppl. 2(1955) May.

Results of experiments using *D. melanogaster* favored the reunion hypothesis. The apparent oxygen effect with a ring chromosome observed by using the criterion of the x-o male frequency is not caused by loss of the ring, but by loss of the y+ marker at high doses.

11044

BIOLOGICAL EFFECTS OF RADIOACTIVE MATERIALS. SUMMARY OF RESEARCH AND SERVICE PROGRAMS JAN. 1, 1948 TO DEC. 31, 1948. H. A. Blair, ed. p.102-5 of UNIVERSITY OF ROCHESTER ATOMIC ENERGY PROJECT REPORT. 1948. (UR-60)

11045

EVIDENCE OF RECOVERY FROM X-RAY DAMAGE IN CHLAMYDOMONAS. Baruch S. Jacobson. Radiation Res. 7, 394-406(1957).

When exposure of *Chlamydomonas reinhardtii*, and algal flagellate, to the x-ray beam is interrupted for about 15 min., survival after a given dose is increased, provided the cells are at a suitable temperature during treatment. Below 10°C. little or no increase occurs even after interrupting exposure for an hour. Under favorable conditions, the 2nd dose kills fewer cells than it would if given immediately after the first dose. When the number of cells killed by the first dose is accounted for, however, the fraction killed by the 2nd dose is at least as great as would be expected if the first dose had not been given. Two or three interruptions of the dose result in higher survival than a single interruption, but not enough to suggest that an irradiated cell population can tolerate more irradiation than a previously unirradiated population. NSA 12-2672

11046

TELLURIUM: IV. EXCRETION AND DISTRIBUTION IN TISSUE STUDIES WITH A RADIOACTIVE ISOTOPE. R. H. DeMeio and F. C. Henriques, Jr. J. of Biol. Chem. 169 609-23(1947).

11047

Rochester. Univ., New York. RELATION OF PARTICLE SIZE OF HYDRATED URANIUM TRIOXIDE DUST TO TOXICITY FOLLOWING INHALATION BY RABBITS AND RATS. K. E. Lauterback. pp-29-35 in: QUARTERLY TECHNICAL REPORT. H. A. Blair. Oct. 1, 1949-Dec. 31, 1949. (UR-103)

11048

FORMATION OF REDUCING SUBSTANCE FROM PEPTONE BY X-RAYS. W. Seitz. Z. Ges. Exptl. Med. 101, 641-7(1937).

A study was made to determine whether reducing substances can be produced by subjecting peptone to the x-ray. Sterile Witte peptone prepared in ampoules for inj. was used. Ampoules were subjected to radiation 2 times a wk. for 2 hrs. in darkness. No felt was used, and the tube was focused on the ampoules at 17 cm. Thus the min. exposure was

400 R. No reducing substances were demonstrated under 100,000 R. Above this level the radiated peptone decolorized methylene blue in vacuo. Exposure to air caused loss of this effect, so that no effect was shown, as was also the case in control ampoules not radiated. This reducing substance also reduced indicators with negative potentials such as indigo-disulphate, Janus green and cresyl-violet, but did not affect strong negative dyes such as phenol-safrann, rosindulin, or neutral red. This reducing body had the character of a sulph-hydril substance as shown by a strong vitro prusside reaction and its delayed effect caused by iodomon-acetate. Rapid oxidation of the substance on exposure to air was similar to that seen in other sulph-hydril substances. CA 32-4614

11049

ABSORPTION OF MANGANESE BY THE THYROID GLAND OF THE GUINEA PIG. L. J. Deysach and T. W. Roy. Proc. Soc. Exp. Biol. and Med., 71, 188-189(1949).

Subcutaneous injection of manganese chloride caused accumulation in all organs tested, but particularly in thyroid where it began to appear within 30 minutes after injection. Absorption was particularly rapid during first few hours (70% of total amount deposited in thyroid accumulated during first 6 hours) but continued for 24 hours. Elimination from the thyroid was likewise rapid - 70% of the 24 hrs. value disappeared within 48 hours after injection, 85% in 96 hours.

11050

UPTAKE OF RADIOACTIVE CALCIUM BY THE DENTAL TISSUES OF THE YOUNG RAT. A. D' Iorio and J. P. Lussier. Rev. Canad. Biol. 10(2), 175-80(1951).

11051

OSTEOMYELITIS OF THE MANDIBLE AND MAXILLA. T. Blum. Jour. Amer. Dental Assoc. 11, 802-805(1924)

During the fall of 1923, there came under my observation a case of osteomyelitis of the mandible and maxilla, somewhat similar to phosphorus necrosis, which however, was caused by some radioactive substance used in the manufacture of luminous dials for watches. The condition has been termed "radium jaw".

11052

DURATION OF SPERMATOGENESIS IN THE MOUSE. RELATION OF MATURATION TIME OF SPERM TO X-RADIATION OF SPERMATOGENIC EPITHELIUM. E. F. Oakberg. Nature 180, 1137-8(1957).

Doses as high as 1000 r had no retarding effect on meiosis or on spermiogenesis of cells irradiated as spermatids. Maturation of spermatids arising from cells irradiated as spermatocytes probably is retarded at high doses, but not by 100 r. Timing of maturation, based on observations after irradiation with 100 r, agreed with maturation time observed in experiments where doses were as low as 5 r of γ rays from Co^{60} . Author concludes that the estimated duration, 34.5 days, for spermatogenesis is not seriously biased. NSA 12-2623

11053

METABOLISM AND TOXICITY OF RADIOACTIVE METALS ZIRCONIUM-95-COLUMBIUM-95, YTTRIUM-91 AND BARIUM-140. John Doull and K. P. DuBois. p.1-16 of UNIVERSITY OF CHICAGO TOXICITY LABORATORY QUARTERLY PROGRESS REPORT NUMBER 8. 1951. (COO-35)

11054

Rochester. Univ., New York.
THE INFLUENCE OF AGE ON THE UPTAKE OF P^{32} IN THE SKELETON. J. F. Bonner, Jr. March 26, 1948. 40p. (UR-15)

11055

METABOLISM AND TOXICITY OF RADIOACTIVE

METALS. V. COLUMBIUM 95, YTTRIUM-91 AND TANTALUM-182. John Doull, M. F. Sullivan and K. P. DuBois. p.1-13 of UNIVERSITY OF CHICAGO TOXICITY LABORATORY QUARTERLY PROGRESS REPORT NUMBER 7. 1950. (COO-22)

11056

STORAGE OF ELEMENTS IN THE SKELETON. J. Duckworth and R. Hill. Nutrition Abstracts and Reviews 23, 1-17(1953).

11057

THE URINARY EXCRETION OF INGESTED RADIOACTIVE SULFUR. Henry Borsook, G. Keighley, D. M. Yost, and E. McMillan. Science 86, 525(1937).

11058

THE EFFECT OF X-RAYS ON THE METABOLISM OF CORYNEBACTERIUM CREATINOVORANS. E. S. Guzman Barron and Jeanne Gasvoda. p.146-58 of ARGONNE NATIONAL LAB. BIOLOGICAL AND MEDICAL DIVISIONS, QUARTERLY REPORT, FEBRUARY, MARCH, APRIL, 1949. (ANL-4291)

11059

UPTAKE OF RADIOIODINE BY THE THYROID GLAND OF THE RABBIT. K. Brown-Grant and J. G. Gibson. J. Physiol. 127, 328-340(1955).

11060

A STUDY OF GALLIUM - SUMMARY AND CONCLUSIONS. I. PHYSICS AND RADIATION CHARACTERISTICS OF GALLIUM. II. GALLIUM CHEMISTRY OF BIOLOGICAL INTEREST. III. EFFECT OF INTERNAL IRRADIATION ON RESPIRATION OF RAT LIVER SLICES. IV. TOXICITY OF GALLIUM CITRATE IN DOGS AND RATS. V. DISTRIBUTION OF STUDIES ON GALLIUM¹² IN RATS. Marshall Brucer, G. A. Andrews and H. D. Bruner. Radiology 61, 534-613(1953).

11061

STUDIES OF THE LOCALIZATION OF RADIOACTIVE GALLIUM (Ga^{72}) IN BONE LESIONS. H. C. Dudley, H. A. Markowitz, and T. G. Mitchell Jour. Bone and Joint Surg. 38A(3), 627-637(1956). BA 30-34574

11062

PHARMACOLOGICAL STUDIES OF RADIOGERMANIUM (Ge^{71}). II. INHALATION OF DUSTS. H. C. Dudley Archives of Industrial Hygiene and Occupational Med. 8, 528-530(1953).

11063

THE UPTAKE OF COLLOIDAL THORIUM DIOXIDE BY THE ARTERIAL LESIONS OF CHOLESTEROL ATHEROSCLEROSIS IN THE RABBIT. ITS SIGNIFICANCE IN RELATION TO PATHOGENESIS. G. Lyman Duff, G. C. McMillan, and E. V. Lautsch. Am. J. Pathol. 30(5), 941-55(1954). BA 29-10843

11064

CARCINOGENIC ACTION OF SOME SUBSTANCES WHICH MAY BE A PROBLEM IN CERTAIN FUTURE INDUSTRIES. A. M. Brues, H. Lisco and M. Finkel. 18p. (MDDC-145).

Experiments were set up to observe the effects of radioactive Sr^{89} , Ce^{144} - Pr^{144} , Y^{91} , and plutonium. Radium was also studied for comparison with earlier human and animal work. Sprague-Dawley rats, Carworth CF-1 and ABC hybrid mice, and a few C58 mice as well as rabbits and dogs were used. All animals received complete autopsy terminal blood study, and roentgenograms.

11065

CARBON¹⁴ TOXICITY. A. M. Brues, D. R. Buchanan, A. Noranjo, and L. Reitz. p.113-17 of QUARTERLY REPORT, BIOLOGY AND MEDICAL QUARTERLY, MAY, JUNE, JULY 1946. 1946. (ANL-4205)

11066

PROGRAMS IN TOXICITY AND METABOLISM OF COMMONLY USED ISOTOPES. A. M. Brues. March 5, 1947. 1p. (MDDC-1601; ANL-AMB-33)

^{P32}. Since little difference is found between the chronic effects of radium and strontium, a comparable toxicity experiment as described in a declassified monograph was set up using ^{P32}. This is tremendously important since many patients are receiving relatively large doses of ^{P32} and not all of them may be suffering from a malignant disease, ^{C14}. Following the brief note published by Drs. Bloom, Curtis and McLean in *Science* (Feb., 1947), Drs. Bloom and McLean, in conjunction with Dr. Morris, are preparing an experiment along the same lines from which more quantitative information can be obtained on retention of ^{C14} by animals given the isotope. Dr. Morris is also in process of setting up an experiment to determine the overall carbon metabolism of animals breathing active CO₂ vapor. It is also planned to investigate the metabolism and toxicity of organic molecules containing ^{C14}. An experiment is being set up to determine retention by growing tissue. (The entire text of the report is reproduced here.)

11067
EFFECT OF QUANTITY OF CARRIER GALLIUM ON DISTRIBUTION OF METAL IN RATS. H. D. Bruner, J. D. Perkinson, Jr., and R. L. Hayes. *Fed. Proc.* 11(1), 328(1952). BA 26-23924

11068
RADIOIODINE THERAPY IN GRAVES' DISEASE. Mayo H. Soley and N. Foreman. *J. Clin. Invest.* 28, 1367-74 (1949).

11069
X. PRELIMINARY DATA ON GALLIUM. H. D. Bruner, R. L. Hayes, and J. D. Perkinson, Jr. *Radiology* 61(4), 602-13(1953).

The quantity of Ga administered influenced the manner in which the metal was distributed and excreted in studies using rats.

11070
VII. STUDIES OF THE URINARY EXCRETION OF GALLIUM IN MAN. H. D. Bruner, J. Gray, S. W. Root, and M. Brucer. *Radiology* 61(4), 588-90(1953).

11071
DISTRIBUTION STUDIES ON GALLIUM IN RATS. H. D. Bruner, J. D. Perkinson, Jr., E. R. King, G. A. Andrews, J. B. Nash, and M. V. Brucer. *Radiology* 61(4), 555-70(1953).

11072
EFFECT OF BAL ON DISTRIBUTION OF INTRAVENOUSLY ADMINISTERED ZINC USING Zn⁶⁵. H. D. Bruner. *Fed. Proc.* 9(1), 260(1950). BA 25-1414

11073
AUTOHISTORADIOGRAPHIC DETERMINATION OF RADIOACTIVE SUBSTANCES IN THE ORGANISM, STUDY OF U INTRODUCED EXPERIMENTALLY. A. Brusa. *Boll. Soc. Ital. Biol. Sper., Nap.* 26(5), 673-5(1950).

11074
AUTOHISTORADIOGRAPHIC STUDIES OF THE ORGANS OF ANIMALS TREATED WITH URANIUM SALTS. A. Brusa. *Bull. de. Microsc. Appl.* 1/4, 81-85(1951).

11075
I. THE ACUTE TOXICITY OF THE STABLE COMPOUNDS TO RATS. II. METABOLISM AND TOXICITY OF RADIOACTIVE TANTALUM. K. P. DuBois, K. W. Cochran, M. Mazur, and J. Doull. UNIVERSITY OF CHICAGO TOXICITY LABORATORY QUARTERLY PROGRESS REPORT NO. 2 ON RADIOBIOLOGY. July 15, 1949. (M-4439)

11076
CHRONIC EXPOSURES OF ADULT MICE TO C¹⁴O₂. D. L. Buchanan. *Fed. Proc.* 9, 156(1950).

11077
CARBON ISOTOPE EFFECTS IN BIOLOGICAL SYSTEMS.

D. L. Buchanan, A. Nakao, and G. Edwards. *Science* 117(3047), 541-5(1953).

Authors report observations on uptake and retention of ^{C14} by algae, guppies and planorbid snails exposed to ^{C14} in an aquarium. Plants tended to reject ^{C14} in favor of ^{C12}, organic matter of snails appeared to reject ^{C14}, snail shell carbonate tended to concentrate ^{C14} slightly.

11078
TURNOVER OF S³⁵ SULFATE IN THE MUCOSA OF THE GASTROINTESTINAL TRACT OF RATS AS SEEN IN AUTORADIOGRAMS. D. D. Dziewiatkowski. *Jour. Biophys. Biochem. Cytol.* 2(1), 29-32(1956). BA 30-23218

11079
CHRONIC EXPOSURE TO C¹⁴O₂. Donald L. Buchanan and A. DiVittorio. p.99-106 of BIOLOGY AND MEDICINE DIVISIONS QUARTERLY REPORT FOR FEBRUARY, MARCH, AND APRIL 1949. (ANL-4291)

11080
RADIOAUTOGRAPHIC STUDIES OF SULFATE SULFUR (S³⁵) METABOLISM IN THE ARTICULAR CARTILAGE AND BONE OF SUCKLING RATS. D. D. Dziewiatkowski. *Jour. Exper. Med.* 95, 489-495(1952).

11081
RADIOAUTOGRAPHIC VISUALIZATION OF SULFUR-35 DISPOSITION IN THE ARTICULAR CARTILAGE AND BONE OF SUCKLING RATS FOLLOWING ADMINISTRATION OF LABELED SODIUM SULFATE. D. D. Dziewiatkowski. *Jour. Exptl. Med.* 93(5), 451-458 illus. (1951). BA 25-26553

11082
PASSAGE OF RADIUM SALTS FROM THE BLOOD TO THE LABYRINTHINE FLUID. M. Buonsanto, F. Pinto, and G. Pennetta. *Arch. Ital. Otol.* 66(6), 811-5(1955).

11083
ESTIMATION OF THE TIME OF EQUILIBRIUM OF DISTRIBUTION OF LONG-LIFE RADIOCHLORIDE AND RADIOSODIUM IN MAN WITH AND WITHOUT CHRONIC CONGESTIVE HEART FAILURE. G. E. Burch, C. T. Ray, and S. A. Threefoot. *Acta Med. Scand. Suppl.* 266, 329-40(1952).

11084
PERMEABILITY OF THE (DOG) URINARY BLADDER TO RADIOACTIVE MERCURY, CALCIUM AND SULFUR. L. E. Burgess, D. T. Rolfe, P. F. Hahn, Holmes, and E. L. Carothers. *Fed. Proc.* 10(1), 21-22(1951). BA 25-23481

11085
HISTOLOGICAL CHANGES IN THE ORAL TISSUES IN RESPONSE TO CONTINUOUS IRRADIATION. M. D. Burstone. *Jour. Exptl. Zool.* 115(2), 341-349 illus. (1950). BA 25-22463

11086
Texas. Univ., Austin, Radiobiological Lab. EFFECTS OF RADIATION ON THE HILL REACTION. Donald R. Anderson, Jan. 18, 1957. 33p. (AF-SAM-57-83). NSA 12-2626

11087
DISTRIBUTION OF COLLOIDAL RADIOACTIVE GOLD IN TISSUES OF THE WHITE MOUSE ON INTRAVENOUS ADMINISTRATION. C. Garavaglia, et al. *Radiologia* 10, 895-900(1954).

11088
THE PHYSIOLOGICAL RETENTION OF INGESTED RADIOACTIVE FALLOUT MATERIALS BY LABORATORY ANIMALS. James C. Watson, Rhoda Devick, and Walter B. McKibben. (Univ. of Calif., Los Angeles). p.103-6 of QUARTERLY PROGRESS FOR PERIOD ENDING DEC. 31, 1955. Jan. 1, 1956. 115p. (UCLA-357)

11089

A STUDY OF GALLIUM-72. IX. AUTORADIOGRAPHIC STUDIES. J. C. Gallimore, Jr., G. A. Boyd, G. A. Andrews, and M. Brucer. *Radiology* 6(1/4), 595-602 (1953).

11090

AGENTS TO DIMINISH GASTROINTESTINAL ABSORPTION OF CATIONS. N. S. MacDonald, P. C. Spain, and P. Noyes. (Univ. of Calif., Los Angeles). QUARTERLY REPORT. 49p. 1955. (UCLA-357)

11091

THE MECHANISMS OF SKELETAL DEPOSITION OF METAL IONS. N. S. MacDonald, P. C. Spain, and P. Noyes. (Univ. of Calif., Los Angeles). p.45-48 of QUARTERLY PROGRESS REPORT. 1955. (UCLA-357)

11092

EFFECTS OF RADIATION ON NORMAL TISSUES. XII. EFFECTS ON BONE, CARTILAGE AND TEETH. O. Gates. *Arch. Path.* 35, 323-340(1943).

11093

MECHANISMS IN SKELETAL ACCUMULATION OF IONS. N. S. MacDonald, R. E. Nusbaum, F. Ezmirlan, R. C. Barbera, R. Spain and D. E. Rounds. *Arch. Biochem. and Biophys.* 43, 118-126(1953)

11094

EFFECT OF SURGICAL TRAUMA ON SURVIVAL FOLLOWING LOW-RATE X-IRRADIATION. S. P. Stearner, M. Sanderson and E. Christian (Argonne National Lab.). (1955). (ANL-5378)

11095

THE SKELETAL DEPOSITION OF YTTRIUM. N. S. MacDonald, R. E. Nusbaum, G. V. Alexander, F. Ezmirlan, P. Spain, and D. E. Rounds. *J. Biol. Chem.* 195, 837-41(1952). NSA 6-70

11096

STUDIES ON CYSTEINE PROTECTION AGAINST X-IRRADIATION, PERIPHERAL VASCULAR REACTIONS INDUCED BY X-IRRADIATION OF A PORTION OF THE WING OF THE BAT. Harvey M. Patt, Douglas E. Smith, Robert L. Straube, and Ella B. Tyree. p.44-53 in ARGONNE NATIONAL LABORATORY, BIOLOGICAL AND MEDICAL DIVISIONS, QUARTERLY REPORT, FEBRUARY, MARCH, APRIL 1949. (ANL-4291)

11097

INDUCTION OF THYROID CANCER IN THE RAT BY RADIOACTIVE IODINE. R. C. Goldberg and I. L. Chaikoff. *Arch. Path.* 53/1, 22-28(1952).

11098

COMPARATIVE UPTAKE OF Br^{82} BY THE HYPOPHYSIS AND BY OTHER TISSUES. J. F. Mack and R. A. Shipley. *Proc. Soc. Exptl. Biol. and Med.* 80(1), 18-20(1952). BA 27-413

11099

STUDIES ON THE UPTAKE OF Fe^{59} IN RAT EMBRYO, PLACENTA, UTERUS AND MAMMARY GLAND. G. Magnusson, I. Bergstrom and E. Odeblad. *Acta. Radio.* 43(3), 227-232(1955).

11100

THE EFFECTS OF VARIOUS DOSES OF RADIOACTIVE IODINE ON THE FUNCTION AND STRUCTURE OF THE THYROID OF THE RAT. F. Maloff, B. M. Dobyns, and A. L. Vickery. *Endocrinology* 50, 612-38(1952).

11101

AUTORADIOGRAPHIC INVESTIGATION OF THE FIXATION OF RADIOACTIVE SULFUR-35 BY CONNECTIVE TISSUE. R. E. Mancini and E. Sacerdote de Lustig. *Rev. Soc. Argentina Bio.* 39, 67-76(1954).

11102

THE FIXATION OF S^{35} BY CONNECTIVE TISSUE. R. E. Mancini and E. Sacerdote de Lustig. *Compts. Rend. Soc. Biol.* 148, 1649-1650(1954).

11103

CHRONIC EFFECT OF RADIUM SALTS ON AN ANIMAL ORGANISM. S. E. Manoilov, B. M. Graevskaia and K. B. Shimanovskaia. *Vest. rentg. No. 6*, 43-49(1955).

Parenteral administration of 10^{-4} c of RaBr_2 to rats caused radiation sickness and 100% mortality. A dose of 2×10^{-3} c caused no mortality. Sublethal and intermediate doses of RaBr_2 produced increased levels of glycogen in the liver and an initial decline in proteolytic activity of liver followed by an increase (to 150% of normal) 44 days after administration. Introduction of RaBr_2 (2×10^{-6} c) into the bone cavity of a rat gave inconclusive results, but in a rabbit, induced bone sarcoma with metastases in approximately 15 months. Administration of P^{32} to rats in doses of 1.75×10^6 c or greater caused 100% mortality in 9-15 days. Very high doses of P^{32} depressed liver proteolytic activity severely and abruptly, low doses of P^{32} had little effect. CA 50-51646

11104

DISTRIBUTION OF RADIOACTIVE GOLD INJECTED INTO THE PERITONEUM IN DOGS. P. Marques and A. Bru. *J. Radio. Electr.* 35(3/4), 250-2(1954).

11105

METABOLISM OF RADIOIODINE BY THE NEAR-TERM BOVINE FETUS. A. Gorbman, S. Lissitzky, O. Michel, R. Michel and J. Roche. *Endocrinology* 51(6), 546-61 (1952).

11106

COMPARATIVE STUDY ON REPARTITION OF P^{32} AND S^{35} IN THE RABBIT, WITH SPECIAL REFERENCE TO THE OVARY. S. Gothie. *C. Rend. Soc. Biol.* 148(13-14), 1210-3(1954).

11107

EXCRETION OF RADIOACTIVE CARBON DIOXIDE BY RATS AFTER ADMINISTRATION OF ISOTOPIC BICARBONATE, ACETATE AND SUCCINATE. R. G. Gould, F. M. Sinex, I. N. Rosenberg, A. K. Solomon and A. B. Hastings. *J. of Biol. Chem.* 177, 295-301(1949).

11108

Argonne National Lab., Ill. A PRELIMINARY STUDY OF THE REMOVAL OF RADIO STRONTIUM Sr^{85} FROM THE BODY. D. M. Greenberg and N. Kaplan. 1947. 5p. (MDDC-1142E)

Preliminary experiments on removal of Sr^{85} from rats has indicated that sodium citrate, parathyroid hormone, ammonium chloride, and strontium chloride all apparently slightly enhance the removal of Sr^{85} . Massive doses of irradiated ergosterol has no such effect. This study must be repeated upon a much larger group of animals at varying periods after Sr^{85} administration before any quantitative appraisals as to the relative effect of these different agents may be made.

11109

RADIOAUTOGRAPHIC VISUALIZATION OF RADIO-CARBON IN THE ORGANS AND TISSUES OF NEW BORN RATS FOLLOWING ADMINISTRATION OF C^{14} - LABELED BICARBONATE. Richard C. Greulich and C. P. Leblond. *Anat. Record* 115, 559-580(1953).

11110

SPECIFIC ACTIVITY OF P^{32} IN CELL CONSTITUENTS OF RABBIT LIVER. Alfred Marshak and Fernando Calvet. *Jour. Cell. and Comp. Physiol.* 34(3), 451-455(1949). BA 24-31632

11111

SKELETAL LESIONS FOLLOWING INTERNALLY ADMINISTERED RADIUM. Richard H. Marshak, Robert A. Newburger and J. Eliasoph. *J. Am. Med. Assoc.* 160, 41-44(1956).

11112

Sr^{90} CONCENTRATION DATA FOR BIOLOGICAL MATERIALS, SOILS, WATERS, AND AIR FILTERS E A

Martell. Chicago University, Enrico Fermi Inst. for Nuclear Studies Project Sunshine Bulletin No. 11. (1955). 62p. (AECD-3763)

11113

BEHAVIOR OF IODIDE 131 IN GUINEA PIGS AND OF 131 RABBIT GLOBULIN IN GUINEA PIGS AND RABBITS. S. P. Masouredis, L. R. Melcher and Patricia Miller. *Am. J. Physiol.* 172(3), 565-574(1953). BA 27-24522

11114

THE LYMPHATIC DRAINAGE OF SILVER-COATED RADIOACTIVE GOLD COLLOID FOLLOWING INTRA-THORACIC ADMINISTRATION TO PNEUMONECTOMIZED DOGS. R. A. Matuska, P. F. Hahn, R. I. Carlson, S. H. Auerbach and G. R. Meneely. *J. Thorac. Surg.* 30(5), 525-30(1955).

11115

PERMEABILITY OF THE RAT PLACENTA FOR THORIUM IONS DURING VARIOUS PREGNANCY PERIODS. W. Maurer, A. Niklas and A. Engels. *Z. Ges. Exptl. Med.* 115, 510-524(1950). (In German).

11116

DETERMINATION OF PLUTONIUM IN HUMAN FECES. E. Maxwell, R. Fryxell, and W. H. Langham. *J. Biol. Chem.* 172, 185-90(1943).

11117

THE BEHAVIOR OF RADIO-POTASSIUM IN MAN. B. McArdle and P. A. Merton. *J. Physiol.* 116(4), 51-52 (1952).

11118

FATE OF STRONTIUM AFTER INTRAVENOUS ADMINISTRATION TO NORMAL PERSONS. Robert A. McCance and Elsie M. Widdowson. *Biochem. J.* 33, 1822-25 (1939).

11119

RESPIRATORY EXCRETION OF SELENIUM, STUDIES WITH THE RADIOACTIVE ISOTOPE. Kenneth P. McConnell. *J. of Biol. Chem.* 146, 55-60(1942).

11120

TISSUE DISTRIBUTION OF RADIOACTIVE COLLOIDAL CHROMIC PHOSPHATE $\text{CrP}^{32}\text{O}_4$. J. B. McCormick, G. Miller, B. Jaffe and L. Seed. *A. M. A. Arch. Path.* 58, 187-201(1954).

11121

EFFECT PRODUCED IN DOGS BY INTRAVENOUS INJECTION OF THE DISINTEGRATION PRODUCTS OF RADON. E. C. McCracken, H. E. Essex and Charles Sheard. *Proc. of the Staff Meeting of Mayo Clinic* 12, 157-159(1937).

Each dog became extremely emaciated and died after a period of anorexia. Death occurred from 4-6 months after initial ingestion.

11122

THE RATE OF REMOVAL OF RADIOACTIVE SODIUM FOLLOWING ITS INJECTION INTO MUSCLE AND SKIN. E. M. McGirr. *Clin. Sc., Lond.* 11(2), 91-99(1952).

11123

THE CLEARANCE OF RADIOSODIUM FROM THE SUBCUTANEOUS TISSUE OF THE LEG. M. McNally, J. A. Campbell, D. J. Robertson, D. M. Douglas. *Clin. Sc., Lond.*, 11(2), 183-90(1952).

11124

THE DISTRIBUTION OF ZINC 65 IN THE RAT PANCREAS. Robert J. McIsaac. *Endocrinology* 57(5), 571-579(1955). BA 30-25894

11125

LOCALIZATION OF ZINC 65 IN THE RAT PANCREAS. Robert J. McIsaac. *Dissertation Absts.* 14(4), 686-687 (1954). BA 29-5018

11126

AUTORADIOGRAPHIC LOCALIZATION OF INJECTED

ISOTOPIC ZINC IN THE ISLETS OF THE RAT PANCREAS.

Robert McIsaac and Edward Bridge. *J. of Pharm. and Exptl. Therap.* 110, 38(1954).

11127

ELECTRON MICROSCOPY OF IRRADIATED CELLS OF FOLLICULAR EPITHELIUM OF RAT THYROID. Henry A. McQuade, William B. Seaman, Arthur A. Porporis. *Radiation Res.* 4(6), 532-40(1956). BA 31-3844

11128

EFFECT OF RADIUM ON GROWING HUMAN BONE. A. L. Meier. *Strahlentherapie* 84(4), 587-600(1951).

11129

TRANSBRONCHIAL INSTILLATION OF RADIOACTIVE GOLD COLLOID IN THE LUNG OF THE DOG; DISTRIBUTION STUDIES, SURVIVAL AND PATHOLOGY. George R. Meneely, S. H. Auerbach, C. C. Woodcock, R. C. Kory and P. F. Hahn. *Amer. J. Med. Sci.* 225(2), 172-177 (1953). BA 28-5304

11130

DISTRIBUTION OF RADIOACTIVE COLLOIDAL GOLD FOLLOWING INTRAPULMONARY ADMINISTRATION. George R. Meneely, R. C. Kory, S. H. Auerbach, and P. F. Hahn. *Fed. Proc.* 10(1), 365(1951). BA 25-33221

11131

PRACTICAL PHYSICAL ASPECTS IN THE USE OF RADIOACTIVE COBALT 60 AS A RADIUM SUBSTITUTE. I. Meschan, R. R. Edwards and P. J. Rosenbaum. *Amer. J. Roentgenol. and Radium Therap.* 65(2), 255-264(1951). BA 25-26557

11132

DISTRIBUTION OF RADIOCOBALT IN VARIOUS ORGANS, PRELIMINARY REPORT. L. Meurman and E. Odebal. *Nord. Med.* 54(42), 1600-1(1955).

11133

PRELIMINARY REPORT: EFFECT OF X-IRRADIATION ON ENZYMOGENESIS. T. N. Tahmisian and D. M. Adamson. (Argonne National Laboratory). 1951. 87p. (ANL-4713)

Grasshopper eggs were irradiated with x-ray doses of 2500, 25,000 or 50,000 r (200 KV, 15 ma, 1400r/min.) immediately after diapause, prior to secondary differentiation. Acetylcholine content of eggs was determined at 2 day intervals from the 6th day post-diapause to the day of hatching. The increment of acetylcholine in control eggs followed a sigmoid curve during embryonic development. After 25,000 - 50,000 r the acetylcholine remained constant, after 2500 r it was slightly increased above the control level.

11134

STUDIES WITH RADIOIODINE. I. FUNCTION AND RATE OF 131 UPTAKE OF THYROID. E. R. Miller, M. E. Dailey, A. V. Holmes, G. L. Alexander and G. E. Sheline. *Radiology* 57, 37-46(1951).

11135

DEVELOPMENT OF OSTEOGENIC SARCOMAS IN ST/EH MICE AFTER RADIOPHOSPHORUS ADMINISTERED IN QUANTITIES SIMILAR TO THERAPEUTIC DOSES. Bent Moller. *Acta Path. et Microbiol. Scand.* 35(6), 549-558 (1954). BA 29-23944

11136

CONTINUOUS EXPOSURE OF ANIMALS TO GAMMA RADIATION. John F. Thomson, W. W. Tourtellotte and M. S. Carttar. p.1 of UNIV. of CHICAGO TOXICITY LABORATORY, QUARTERLY PROGRESS REPORT NO. 4 ON RADIOBIOLOGY. 1950. (TID-364). NSA 4-3842

11137

THE TOXICITY OF GAMMA RADIATION TO MICE EXPOSED AT VARYING DOSE RATES. J. F. Thomson, W. W. Tourtellotte, M. S. Carttar, and J. Neff, p.9 of UNIV. OF CHICAGO TOXICITY LABORATORY,

11138

ELIMINATION OF ADMINISTERED ZINC IN PANCREATIC JUICE, DUODENAL JUICE AND BILE OF THE DOG AS MEASURED BY ITS RADIOACTIVE ISOTOPE (Zn^{65}). M. Laurence Montgomery, G. E. Sheline and L. L. Chaikoff. *J. Exptl. Med.* **78**, 151-59(1943).

11139

DISTRIBUTION OF P^{32} IN THE BLOOD IN NORMAL HUMANS. M. P. Morassutti and F. Gobbato. *Minerva Med.* **45**(38), 1353-6(1954).

11140

INVESTIGATIONS WITH RADIOACTIVE Ni^{57} INTO THE RESORPTION OF NICKEL THROUGH THE SKIN IN NORMAL AND IN NICKEL - HYPERSENSITIVE PERSONS. C. Morgaard. *Acta Derm. Venerol.* **35**(2), 111-17(1955).

11141

EXCRETION OF P^{32} IN THE BILE OF RABBITS FOLLOWING INTRAVENOUS ADMINISTRATION. F. B. Moreland, J. H. Gast and B. Halpert. *Am. J. Clin. Path.* **21**(9), 828-30(1954).

11142

EXPERIMENTAL STUDIES ON POLONIUM INTRODUCED INTO THE HUMAN ORGANISM. Alfredo Moscarello. *La Radiologia Medica* **14**, 317-325(1927).

11143

THE PROBLEM OF THE BIOLOGICAL EFFECTS OF Ba^{140} . Yu. I. Moskalev. (U. S. Joint Publications Research Service, N. Y. 17, N. Y. p.85-92 of MEDICAL RADIOLOGY IV, No. 4, 1956. (JPRS-2592)

11144

ABSORPTION OF POLONIUM FROM THE GASTRO-INTESTINAL TRACT OF THE CAT. P. E. Marrow, F. A. Smith, L. J. Casarett and R. J. Della Rosa. *J. of Pharm. and Exptl. Therap.* **110**, 40(1954)

11145

EXPERIMENTAL MYOCARDIAL INFRACTION PRODUCED BY LOCAL BETA RADIATION. P. V. Moulder, R. W. Harrison, W. E. Adams, and P. V. Harper. (Argonne Cancer Research Hospital, Chicago). p.404-14 of RARE EARTHS IN BIOCHEMICAL AND MEDICAL RESEARCH: A CONFERENCE SPONSORED BY THE MEDICAL DIVISION, OAK RIDGE INSTITUTE OF NUCLEAR STUDIES, OCT. 1955. Granvil C. Kyker and Elizabeth B. Anderson, eds. (ORINS-12)

11146

BIOCHEMICAL RESEARCH ON THE OSTEOLYSIS IN RACHITIS PRODUCED BY STRONTIUM. M. Mourgue. *Jour. Physiol. et Path. Gen.* **37**(4), 1358(1939-1940). BA 21-3431

11147

EFFECT OF PRETREATMENT UPON THE RESPONSE OF *PARAMECIUM AURELIA* TO X-IRRADIATION. E. L. Powers and D. S. Shefner (Argonne National Lab.). p.96 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1951. 1951. (ANL-4713)

Suppression of fission and preautogamous death were selected as criteria of radiation effects in paramecia treated as follows: 1. irradiated in lettuce medium in which they had been grown, 2. transferred into salt solution (from lettuce medium) immediately before irradiation, 3. held in salt solution 14 hours prior to irradiation, and 4. treated as in 3, but transferred to fresh salt solution immediately before irradiation. Suppression of fission and preautogamous death increased immediately after 2, but radiosensitivity fell subsequently to that of 1. Pre-irradiation treatments caused no difference in rate of exautogamous death. NSA 6-2555

11148

INFLUENCE OF POTASSIUM AND SODIUM ON UPTAKE AND RETENTION OF CESIUM-134 IN RATS. F. R. Mraz, M. Lenoir, J. J. Pinajian and H. Patrick. *Arch. Biochem.* **65**(2), 177-182(1956).

11149

RADIATION HAZARDS IN URANIUM MINES. A. J. Cipriani. *Can. Mining J.* **76**, 59-60(1955) Sept.

11150

THE EFFECT OF ROENTGEN RADIATION ON CELLS ALONG WITH A CONTRIBUTION OF THE NUCLEAR REACTION AND MITOSIS. W. Scholtz. *Deut. Med. Wochensh.* **53**, 643-646(1927). (In German).

11151

RADIOAUTOGRAPHIC VISUALIZATION OF THE DEPOSITION OF RADIOBERYLLIUM IN THE RAT. C. T. Kaylor and C. D. VanCleave. *Anat. Rec.* **117**, 467-482 (1953).

11152

URINARY EXCRETION OF RADIOIODINE IN VARIOUS THYROID STATES. F. R. Keating, Jr., M. H. Power, J. Berkson and S. F. Haines. *Jour. Clin. Invest.* **26**, 1138-1151(1947).

11153

BLOOD CHOLESTEROL, ALBUMINURIA AND HISTOLOGICAL CHANGES IN CHRONIC POISONING WITH URANIUM NITRATE IN RABBITS. A CONTRIBUTION TO THE EXPERIMENTAL KIDNEY DISEASES. H. Keller (U. Bern, Switzerland). *Helvetica Med. Acta* **20**(3), 157-205(1953). BA 28-3266

11154

DISSEMINATION OF RADIOACTIVITY IN THE ORGANISM FOLLOWING INTRATUMORAL INJECTION OF COLLOIDAL RADIOACTIVE GOLD Au^{198} . J. H. Muller. *Gynaecologia, Basel* **131**, 389-94(1951).

11155

PRELIMINARY STUDIES OF YTTRIUM-90 IN MAN. Gould A. Andrews, Granvil C. Kyker, Ralph M. Kniseley, and Ethel L. Palmer. *Proc. Am. Assoc. Cancer Res.* **2**, 1(1955).

11156

ELIMINATION OF MINERAL AND ORGANIC TIN BY THE SKIN, NAILS AND HORNY MATTER IN THE RAT AND IN THE RABBIT DURING ACUTE AND CHRONIC INTOXICATION. Kien L. Van-Khau and Thai-Tuong. *Compt. rend. soc. biol.* **149**(23-24), 2196-8(1955).

11157

DISTRIBUTION OF COLLOIDAL RADIOGOLD Au^{198} IN THE ORGANISM AFTER INTRAPERITONEAL INJECTION. J. H. Muller. *Zentr. Gyn.* **78**(1), 40-1(1956).

11158

RETENTION AND EXCRETION OF RADIOACTIVE STRONTIUM AND YTTRIUM (Sr^{89} , Sr^{90} AND Y^{90}) IN THE HEALTHY RABBIT. Barbara Kidman, M. L. Tutt and J. M. Baughan. *Jour. Path. and Bacteriol.* **62**, 209-227 (1950).

11159

THE BIOLOGICAL EFFECT OF ROENTGEN RADIATION ON SINGLE CELLED ORGANISMS. *PARAMECIA* STUDIES. E. Schneider. *Strahlentherapie*, **22**, 92-106(1926). (In German)

11160

THE RETENTION OF RADIOACTIVE STRONTIUM AND YTTRIUM (Sr^{89} , Sr^{90} AND Y^{90}) IN PREGNANT AND LACTATING RABBITS AND THEIR OFFSPRING. Barbara Kidman, Margaret L. Tutt, and Janet M. Vaughan. *Jour. Path. and Bact.* **63**(2), 253-268(1951).

Retention of strontium is increased in animals receiving a diet low in calcium. Retention of yttrium appeared to be roughly proportional to that of Sr. Pregnancy did not cause marked mobilization of Sr from the

mother's bones. Sr injected into lactating rabbits passed through the milk to the sucklings. BA 25-32971

11161

Argonne National Lab., Ill.

COMBINATION OF PLUTONIUM WITH PLASMA PROTEINS (ELECTROPHORETIC AND CHEMICAL ANALYSIS). J. A. Muntz and E. S. G. Barron, Jan. 19, 1947. 23p. (MDDC-1268; CH-3757)

When the metal is injected into dogs either in the form of the nitrate or citrate it is carried with proteins present in the β globulin fraction. This was demonstrated by electrophoretic fractionation of dog sera and analysis of the fractions obtained. Plutonium poisoning in dogs results in an altered plasma protein pattern. Many of the changes are similar to those seen in dogs dying of X-ray injury and the alterations become most profound in the terminal period. Certain differences between the plasma protein pattern of plutonium poisoned dogs and X-ray injured dogs are pointed out.

11162

AUTORADIOGRAPHIC STUDIES OF THE DEPOSITION OF Sr^{89} IN BONE (RABBIT). B. Kidman, M. Tutt, B. Rayner, and J. Vaughan. Jour. Path. and Bact. 64, 453-59(1952).

Young animals concentrate Sr^{89} in areas of active bone growth; there is more diffuse distribution throughout mineralized bone as in older rats. Ionic surface exchange alone will not account for the uptake of these isotopes. As time goes on, localized areas of concentrated Sr are displaced by newly formed non-radiated bone and may be removed by normal process of resorption.

11163

STUDIES ON THE METABOLISM OF FISSION PRODUCTS. III. RADIOAUTOGRAPHIC STUDIES ON THE LOCALIZATION OF RADIOSTRONTIUM AND RADIOCALCIUM IN THE BONES. T. Kikuchi, G. Wakisaka, M. Suenage, T. Kono, H. Akagi, H. Goto, T. Matsuki, and Y. YosNimine. Bulletin of the Institute from Chemical Research. Kyoto University, Kyoto, Japan. Supplementary Issue 99-105 (1954).

11164

Argonne National Lab., Ill.

ACUTE RADIOTOXICITY OF INJECTED YTTRIUM⁹¹. D. S. Anthony. 1946. 14p. (MDDC-1240; CH-3838)

Male rats in groups consisting of five animals each were given intracardial injections of Y^{91} at dose levels of 1, 3, 5, 7 and 10 μ c/g of body weight. A control group of five animals was given isotonic saline. The excretion, retention, and distribution of the yttrium was measured, and its effect on survival and growth was observed.

11165

STUDIES ON THE INFLUENCE OF RADIOSTRONTIUM UPON THE BLOOD AND BONE MARROW PICTURE OF RABBITS. Takehiko Kikuchi, G. Wakisaka, and T. Matsuki. Bulletin of the Institute for Chemical Research. Kyoto University, Kyoto, Japan. Supplementary Issue. 112-119(1954).

11166

PROGRESS REPORT: EFFECT OF CYSTEINE ON RADIATION TOXICITY IN YOUNG CHICKS. S. P. Stearner and E. J. B. Christian. p.81 of ARGONNE NATIONAL LAB. DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1951. 1951. (ANL-4713)

11167

PROTECTION OF IRRADIATED MICE BY INJECTIONS OF DOG PLASMA AND SPLEEN PERFUSATES. A. Stroud and A. M. Brues. p.84 of ARGONNE NATIONAL LAB., DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1951. 1951. (ANL-4713)

11168

STUDIES ON IRON METABOLISM WITH AID OF ITS ARTIFICIAL RADIOACTIVE ISOTOPE. ABSORPTION, EXCRETION AND DISTRIBUTION OF IRON IN THE RAT ON NORMAL AND IRON DEFICIENT DIETS. M. E. Austoni and D. M. Greenberg. J. Biol. Chem. 134, 27-41(1940).

11169

PROBLEM OF RADIUM POISONING. H. Muth and B. Rajewsky. Strahlentherapie 88, 261-275(1952).

In connection with two cases of radium poisoning the author investigated the excretion of radioactive substance from the human body. He presents curves representing the quantities of radium excreted through the human organism in stool and in urine during the first week of intoxication.

11170

INHALATION OF VOLATILIZED POLONIUM BY RATS. C. P. Kimball and R. M. Fink (U. of Rochester, Rochester, New York). (1945). (M-1811)

11171

AUTORADIOGRAPHIC STUDIES ON IRON-59 TURNOVER BY ERYTHROID CELLS IN RAT BONE MARROW. M. E. Austoni. Proc. Soc. Exptl. Biol. and Med., 85, 48-51 (1954).

11172

NORMAL RADIUM CONTENT OF THE HUMAN BODY. H. Muth, A. Schraub and K. Ourand. Strahlentherapie 35, 227-37(1956).

11173

THE UPTAKE OF RADIO-IODINE BY THE RABBIT'S THYROID MEASURED IN VIVO. N. B. Myant. Jour. Physiol. 120(3), 278-287(1953) BA 28-397

11174

THE LONG TERM RETENTION OF CESIUM IN THE RAT FOLLOWING A SINGLE INTRAPERITONEAL INJECTION. J. E. Ballou and R. C. Thomson (General Electric Co. Hanford Atomic Products Operation, Richland, Wash.). Apr. 1, 1957. 16p. Contract W-31-109-Eng-52. (HW-46150)

Cesium¹³⁷ is absorbed rapidly and completely by the rat after intraperitoneal injection and is deposited almost entirely in the soft tissues. The largest total quantity and the highest concentration (subsequent to the first day) is found in muscle. Its retention in muscle over a period of 200 days, during which time its concentration is reduced by a factor of nearly 10^6 , may be most adequately described as a sum of two exponential components with biological half-lives of 8 and 16 days. In addition to these two components, most other tissues also exhibit a substantial shorter lived component with a half life of approximately two days. Thirty days after exposure about 10% of the injected Cs remains in the animal with 90% of this being present in muscle. For purposes of calculating permissible exposure limits, the rate of loss of Cs from muscle can be quite closely approximated by a single exponential function with a half life of 13 days. Consistent with this half life, the fraction of ingested Cs¹³⁷ deposited in muscle is 0.57. The maximum permissible concentration for Cs¹³⁷ in water, calculated from these parameters is 1.8×10^{-3} μ c/ml, which differs insignificantly from the presently accepted value of 2×10^{-3} μ c/ml. Attention is called to recent studies indicating a much longer biological half life in man than that observed in the rat.

NSA 11-12660

11175

LOCATION OF RADIOCALCIUM IN THE MANDIBULAR INCISOR AND ADJACENT STRUCTURES OF THE RAT. Howard M. Myers. J. Dental Res. 34, 217-224(1955).

11176

PRELIMINARY DISTRIBUTION STUDIES OF GALLIUM-72 IN THE WISTAR RAT. E. R. King and J. D. Perkinson, Jr. Texas Reports on Biology and Med. 8, 491-497(1950).

11177

COMPARATIVE TURNOVER RATE OF P^{32} IN NORMAL AND DEFICIENT RATS' TEETH AND BONES DURING RECOVERY FROM PHOSPHORUS DEFICIENCY. Howard M. Myers. J. of Dental Res. 34, 225-229(1955).

11178

A STUDY OF THE RATE OF DEPOSITION AND PATHS OF ABSORPTION OF STRONTIUM IN RAT. Ethel May Kinney and E. V. McCollum. J. Pharmacol. Exptl. Therap. 21, 165-76(1923).

11179

THE EFFECT OF INFLAMMATION AND OTHER FACTORS ON THE MOVEMENT OF RADIOACTIVE GLASS PARTICLES FROM THE PERITONEAL CAVITY. A. D. Bangham, P. N. Magee and S. B. Osborn. Brit. J. Exptl. Pathol. 34(1), 1-11(1953).

11180

BIOLOGICAL ACTIVITY OF RADIOACTIVE PHOSPHORUS. P. N. Kiselev. Vestnik Rentgenol. i Radiol. 1955(1), 3-9(1955). BA 32-669

11181

SECRETION IN COW'S MILK OF INTRAVENOUSLY INJECTED RADIOACTIVE PHOSPHORUS P^{32} . M. Kleiber, A. H. Smith and N. P. Ralston. Proc. Soc. Exp. Biol. and Med. 62, 354-56(1948).

Two lactating Jersey cows were injected intravenously with 15 mc and 30 mc of P^{32} respectively. The cows secreted 9.5 and 8.7 liters of milk/day respectively. Maximum concentration of P^{32} in milk was reached 3-8 hours after injection (1.22% of injected dose/liter of milk). Average daily secretion of P^{32} in milk from 1-7 days after injection was 7.4, 4.9, 2.8, 2.1, 1.6 and 1.4% respectively. Organic P^{32} never exceeded 20% of the total. P appeared to be more labile than Ca, i.e. to have a faster exchange rate.

11182

CARBON-14 DISTRIBUTION IN A COW FOLLOWING INTRAVENOUS INJECTION OF $NaH^{14}CO_3$. Max Kleiber. (University of California College of Agriculture Inst.). p.17 of QUARTERLY REPORT, JULY-SEPT. 1949, 1949. (M-4458)

11183

COMPARISON OF THE INTRAVASCULAR MIXING AND DISAPPEARANCE OF RADIOSODIUM, RADIOPOTASSIUM AND T-1824. George Barlow, H. P. K. Agersborg, Jr. and R. R. Overman. Circulation Res. 5(4), 419-25(1957). BA 32-4096

11184

IODINE METABOLISM IN RELATION TO AGE. Erich Klein. Z. Alterforsch. 8, 119-128(1954) also; Excerpta Med., 9, VI, 991-992(1955). CA 50-14070

11185

EFFECTS OF RADIOACTIVE GOLD (Au^{198}) ON THE RAT LIVER. Simon Koletsky (Western Res. U. Cleveland, Ohio). Amer. Jour. Pathol. 28(3), 549(1952). BA 27-5750

11186

ACUTE RADIOTOXICITY OF $(Ba-La)^{140}$ ON THE HEMATOLOGICAL CONSTITUENTS OF THE PERIPHERAL BLOOD OF RATS AND MICE. L. O. Jacobson. 1948. 12p. (MDDC-1261; CH-3829)

In the $(Ba-La)^{140}$ experiments, mice and rats were injected intraperitoneally with toxic doses of radio-barium. Hematological data indicated that in mice the threshold for effects on hemoglobin and red blood cell count must be above 1.9 uc/g; that at 1.9 uc/g the heterophil and lymphocyte counts diminished, and that a dose of 0.2 uc/g appeared to be just below threshold. In rats, a dose of 0.5 uc/g decreased the white cell count by about 30 per cent 8 days after injection.

11187

THE TREATMENT OF POSTIRRADIATION INFECTION WITH ANTIBIOTICS: AN EXPERIMENTAL STUDY ON MICE. II. BIOMETRIC ANALYSIS OF THE MORTALITY AND TIME SURVIVAL DATA. G. A. Sacher, S. A. Tyler and J. M. Gurian. p.124 of ARGONNE NATIONAL LAB. DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1951. 1951. (ANL-4713)

11188

NOTES BY A. LACASSAGNE AND J. LATTES ON THE FIXATION OF POLONIUM BY THE ORGANISM AND ON AUTORADIOGRAPHY OF ORGANS. A. Kotzareff. C. Rend. Soc. Biol. 93, 404-405(1925).

11189

BEHAVIOR OF THYROID TOWARD ELEMENTS OF SEVENTH PERIODIC GROUP. III. TECHNETIUM. Emil J. Baumann, N. Z. Searle, A. A. Yalow, E. Siegel and S. M. Seidlin. Fed. Proc. 11(1), 184(1952). BA 26-24656

11190

THE DISTRIBUTION IN NORMAL TISSUES OF RADIOACTIVE SULFUR FED AS LABELED METHIONINE. Alfred R. Maass, F. C. Larson and E. S. Gordon. J. Biol. Chem. 177(1), 209-216(1949). BA 23-20682

11191

NOTES BY A. LACASSAGNE AND J. LATTES ON THE ELECTIVE FIXATION AND INJURIOUS NATURE OF POLONIUM. A. Kotzareff. C. Rend. Soc. Biol. 93, 471-472(1925).

11192

BEHAVIOR OF THE THYROID TOWARD ELEMENTS OF THE SEVENTH PERIODIC GROUP II. RHENIUM. Emil J. Bauman, N. Zizmer, E. Oshry and S. M. Seidlin. Proc. Soc. Exp. Bio. and Med. 72, 502-506(1949).

11193

DISTRIBUTION OF RADIOACTIVITY FOLLOWING INTRAVENOUS ADMINISTRATION OF TRIVALENT CHROMIUM-51 IN THE RAT AND RABBIT. Leon Kramtitz and Roy V. Talmage. Proc. Soc. Exptl. Biol. Med. 81, 490-92(1952).

11194

EFFECTS OF VARIOUS METALS IN THE FORM OF COLLOIDAL COMPLEXES. E. M. Bastisse. Compt. Rend. Acad. Sci. (Paris) 224(3), 212-14(1947).

11195

FURTHER EVIDENCE FOR A ROLE OF THE R-E SYSTEM IN THE DISTRIBUTION OF POLONIUM-210 IN RAT TISSUES. L. J. Casarett and J. N. Stannard. J. Pharmacol. Exptl. Therap. 113(1), 9-10(1955).

11196

CONCERNING THE TOXICOLOGY OF THORIUM EMANATION. Adolf Krebs. Naturwissenschaften 28, 766-767(1940).

11197

THE EFFECTS OF TOTAL AND PARTIAL BODY IRRADIATION UPON THE BODY WEIGHT AND INTAKE OF FOOD AND WATER OF THE RAT. THE EFFECTS OF VARIOUS FEEDING PROCEDURES AND CYSTEINE UPON THE POST-IRRADIATION CHANGES IN BODY WEIGHT OF THE RAT. D. E. Smith, E. B. Tyree, H. M. Patt and N. Bink. (Argonne National Lab.). p.53-8 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1951. (nd). 133p. (ANL-4713)

11198

INVESTIGATIONS ON THE PROBLEM OF RADIUM POISONING. Adolf Krebs. Strahlentherapie 72, 164-169(1942).

11199

COMPARATIVE EVOLUTION OF EXCRETION OF RADIUM

AND OF RADIOACTIVE COBALT IN RATS. P. G. Krivkov. Vest. Rentg. 4, 58-60(1954).

11200

METABOLISM OF RADIOCALCIUM IN RELATION TO CALCIUM INTAKE IN YOUNG RATS. A. Carlsson. Acta Pharmacology et Toxicol. 7, Suppl. 1(1951).

11201

EXPERIENCE IN USING RADIOACTIVE ISOTOPES IN MEDICINE. EFFECT OF ASCORBIC ACID ON THE INCORPORATION RATE OF RADIOIRON (Fe^{59}) IN THE FRACTION OF MINERAL IRON OF THE GUINEA PIG TISSUES. F. A. Kruchakova. Kiev. Gosmedizdat USSR (Fed. Med. Publ. House of Ukr. SSR) 51(1955).

11202

OSTEOGENIC SARCOMA IN A MUSKRAT FROM AN AREA OF HIGH ENVIRONMENTAL RADIOSTRONTIUM. Louis A. Krumholz and John H. Rust. Arch. Path. 57, 270(1954).

11203

A STUDY OF THE EXCRETION OF Rb^{86} , K^{42} , AND K^{39} IN THERMAL SWEATING. G. S. Berenson and G. E. Burch. J. Lab. Clin. Med. 49(3), 401-9(1957).

11204

DISTRIBUTION AND EXCRETION OF PLUTONIUM ADMINISTERED INTRAVENOUSLY TO THE RAT. Jeanne Carritt, R. Fryxell, J. Klemschmidt, R. Klemschmidt, W. Langham, A. San Pietro, R. Shaffer and B. Schnap. J. Biol. Chem. 171(1), 273-283(1947). BA 22-8455

11205

THE DISTRIBUTION AND THE PATHOLOGIC EFFECTS OF I^{131} IN MAN. G. S. Kurland, D. L. Chamovitz and A. S. Freedberg. J. Clin. Invest. 29(6), 829(1950).

11206

ON THE EFFECTS OF EXTENDED X-IRRADIATION OF THE ABDOMEN AND ON LESIONS OF THE ALIMENTARY TUBE. C. Regaud, T. Nogier and A. Lacassagne. Arch. Electricite Medical 20, 321(1912). (In French).

Lesions are found in the peritoneum, intestine and stomach of dogs exposed to x-rays for long periods.

11207

VARIATIONS IN UPTAKE OF RADIOIODINE IN THE RAT FOLLOWING DIFFERENT MODES OF ADMINISTRATION. K. P. Chakroborty. Journal of Endocrinology 13, 354-359 (1956).

11208

BIOLOGICAL STUDIES ON THE HARMFUL EFFECTS OF X-RAYS. von F. Gudzent. Deutsche Med. Wchnschr. 46, 732(1920). (In German).

Studies were carried out on patients, mice and rabbits to evaluate relative importance of primary and secondary rays. Patients included those with argeria to determine the effect of the metal (and secondary rays) on skin response.

11209

Argonne National Lab., III. RADIOSTRONTIUM (Sr^{90}). I. L. Chaikoff, M. C. Fishler, and C. Entnman. (nd). Decl. July 14, 1947. 1p. (MDDC-1142-D)

Tracer Studies-- A continuation of this work with more complete data indicates that the retention of Sr^{90} by the skeleton was essentially as has been described in a previous report. The uptake of this material in the bones of the animals which received it by mouth was found to rise by almost a factor of two between the fourth and sixteenth days. Otherwise, there were no significant differences to be observed between the present more complete information and that which was given previously. The rate of excretion of Sr^{90} has now been followed for a period of thirty days, and after the fifteenth day its excretion is apparently

less than the rate of decay of that which is retained in the body.

11210

SOME OBSERVATIONS ON THE DEVELOPMENT OF PUPPIES BORN OF IRRADIATED DOGS. M. Ya. Chaikovskaya. Vestnik Rentgenol. i Radiol. 1955(4), 34-38 (1955).

Only one of the full-term puppies from mothers irradiated on the 28th day of pregnancy with 500 r developed normally. Signs of rickets and of disturbed cardiac function were observed in all puppies. Cardiac abnormalities included systolic and diastolic murmurs, asthma, changes in heart sounds and combined congenital cardiac defects. BA 32-15257

11211

TOXICITY OF Sr^{90} IN MICE. MALIGNANT BONE TUMORS. M. P. Finkel, H. Lisco, and A. M. Brues. p.106-117 of REPORT ON BIOLOGICAL, MEDICAL, AND BIOPHYSICS PROGRAMS, ARGONNE NATIONAL LABORATORY. January 1955. (ANL-5378)

11212

THE EFFECT OF X-IRRADIATION ON THE DRY WEIGHT AND PROTEIN CONTENT OF REGRESSING EMBRYOS. T. N. Tahmisian, B. J. Wright and R. L. Devine. p.81-83 of REPORT ON BIOLOGICAL, MEDICAL, AND BIOPHYSICS PROGRAMS, ARGONNE NATIONAL LABORATORY. January 1955. (ANL-5378)

11213

UREA FORMATION IN IRRADIATED NEPHRECTOMIZED RATS. II. J. F. Thomson and E. M. Moss. p.79-80 of REPORT ON BIOLOGICAL, MEDICAL, AND BIOPHYSICS PROGRAMS, ARGONNE NATIONAL LABORATORY. January 1955. (ANL-5378)

11214

AUTORADIOGRAPHIC STUDIES ON UPTAKE OF Fe^{59} . I. Bergstrom and G. Magnusson. Nord med. 50(51), 1763-68(1953) Dec. 17.

11215

A STUDY ON THE UPTAKE OF INJECTED RADIOIRON IN THE MOUSE KIDNEY. I. Bergstrom, G. Magnusson, E. Odeblad, and D. Zihotto. Acta physiol. Scand. 34 (Suppl. 120), 36-9(1955).

11216

RENAL HANDLING OF RADIOACTIVE POTASSIUM IN MAN. D. A. K. Black, H. E. F. Davies, E. W. Emery and E. G. Wade. Clin Sci. London 15(2), 277-283(1956).

11217

BIOCHEMICAL BASIS OF BIOLOGICAL ACTION OF IONIZING RADIATIONS. A. M. Kuzin. p.69-84 in MEETINGS OF THE DIVISION OF BIOLOGICAL SCIENCES, SESSION OF THE ACADEMY OF SCIENCES OF THE U.S.S.R. ON THE PEACEFUL USE OF ATOMIC ENERGY. JULY 1-5, 1955. Moscow, Publishing House of the Academy of Sciences of the U.S.S.R., 1955. 339p. (In Russian)

11218

Argonne National Lab. STUDIES ON THE PHYSIOLOGICAL STATUS OF BONE CARBONATE. A. Nahao and D. L. Buchanan. p.95 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, NOVEMBER, DECEMBER, 1951, JANUARY, 1952. (nd). 132p. (ANL-4745)

Carbonate recently exchanged *in vivo* is more susceptible to removal by physical and chemical methods than is older carbonate.

11219

DISTRIBUTION AND DOSAGE OF RADIOCARBON IN THE TISSUES. George L. Nardi. Amer. J. of Roentgenology, Radium Therapy and Nuc. Med. 67, 989-990(1952).

11220

ON THE MECHANISM OF SKELETAL FIXATION OF RADIUM. W. F. Neuman, J. B. Hursh, J. Boyd and H. C. Hodge. *Ann. New York Acad. Sci.* 62(6), 123-136(1955). BA 31-27471

11221

PARAMETRIAL INJECTION OF COLLOIDAL GOLD (Au198) IN THE MONKEY. J. F. Nolan, E. G. Jones and R. H. Neil. *Am. J. Roentg.* 69(5), 805-12(1953).

Limitations imposed by necrosis of local tissues rather than liver injury is the major factor governing choice of dose for treatment of humans by the technique described. It appears likely that 25-50 millicuries in 50cc of solution would be injected into each parametrium of humans without difficulty. This amount should diffuse uniformly throughout the parametria with enough fixing in local lymphatics and lymph nodes to cause sclerosis without extensive necrosis, and enough radiation to be cancericidal.

11222

Argonne National Lab., Ill.
STUDIES ON METABOLISM AND TOXIC ACTION OF INJECTED Ra. W. P. Norris and H. B. Evans. 1948. 28p. (AECD-1965; CH-3852)

The most important period in defining the fate of radium in the animal body is that closely following administration, providing the material is readily available to the body fluids. This period is demonstrated in rats by the rapid disappearance of radium from the blood after intravenous injection and by the rapid uptake of radium from the peritoneal cavity as indicated by blood concentration curves following intraperitoneal administration. The excretion of intraperitoneally administered radium in rats and mice was very rapid and reached such a low value within 10 days that further excretion had a negligible function in determining the final retention. There exists a linear logarithmic dependence of per cent injected dose excreted per day (log E) on time (log T). More of the excreted radium was present in the feces than in the urine. The retention of radium, administered intraperitoneally to rats, mice, and rabbits, increased concomitantly with dose level. There exists a linear logarithmic dependence of per cent retention (log R) on dose level (log I).

11223

SIMULTANEOUS ADMINISTRATION OF Ra²²⁶ AND Ca⁴⁴ TO DOGS. W. P. Norris, T. W. Speckman, and B. J. Holloway. (Argonne National Lab.), p.74-5 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT, 1955. (ANL-5378)

11224

THE THERAPEUTIC USE OF SINGLE DOSES OF TOTAL BODY RADIATION. V. P. Collins, R. K. Loeffler. *Am. J. Roentgenol. Radium Therapy, Nuclear Med.*, 75, 542-47(1956).

11225

EXPERIMENTS OF THE EFFECT OF RADIOACTIVE GOLD (Au198) ON THE TRACHEAL TISSUES OF ANIMALS. P. E. A. Nylander, et al. *Ann. Med. Exp. Bio. Fenn.* 34, (4), 362-368(1956).

11226

AUTORADIOGRAPHIC OBSERVATIONS WITH S-35 ON THE CORPUS LUTEUM OF THE RABBIT. E. Odeblad. *Acta Endocr.* 11(4), 311-6(1952)

Autoradiographic studies were performed to determine effect on P³² uptake of: castration, estradiol and progesterone in anoestrous animals.

11227

DISTRIBUTION OF CALCIUM 45 IN PLATELETS AND

BONE MARROW OF RATS. T. T. Odell and A. C. Upton. *Acta Haemat.* 14, 291(1955).

Neither platelets nor any cells of bone marrow were found to accumulate radioactive calcium. Results indicated free movement of Ca into and out of platelets.

11228

METABOLISM AND ENHANCEMENT OF RADIOSTRONTIUM EXCRETION IN MAN. M. L. Charles, H. Spencer, A. Goldman, S. Kornman and D. Laszlo. *Federation Proceedings* 15, 407-408(1956).

11229

SOME BIOLOGICAL ASPECTS OF THE STRONTIUM CYCLE. Howard T. Odum. *Bull. Ecol. Soc.* 30(4), 58 (1949). BSA 24-8613

11230

AN ATTEMPT TO ASSESS THE DOSAGE OF STRONTIUM-90 RECEIVED BY YOUNG RABBIT BONE. R. Oliver and J. Vaughan. *British Journal of Radiol.* 29, 668-672(1956)

11231

DISTRIBUTION OF PHOSPHORUS-32 IN CHICK EMBRYOS. J. B. O'Neil, J. R. Jowsey, C. C. Lee and J. W. T. Sprinks. *Canadian Journal of Research* 27, 223-232(1949).

11232

CLEAVAGE TIME IN X-IRRADIATED ASCARIS EGGS T. N. Tahmisian, R. L. Devine, and B. J. Wright. (Argonne National Lab.), p.154 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT, 1955. (ANL-5378)

11233

STUDY OF EFFECT OF STRONTIUM DIOSIDE SOL INJECTED IN RABBITS C. R. Orr, G. D. Popoff, R. S. Rosedale and B. R. Stephenson. *Radiology* 30, 370-381 (1938).

Thorium is more or less permanently retained by the R-E system and may interfere with immune function. Histological changes in the reticulo-endothelial system of bone marrow, lungs and adrenals are described. "undoubtedly has cumulative radio-active effects."

11234

DISTRIBUTION OF RADIOACTIVE PHOSPHORUS IN ORGANISM UNDER EFFECT OF PAIN STIMULUS. Cherkezian. *Bulletin of Ac. Sc. Armen. SSR, Biolog. Agricul. Sc.* 9(12), 3-12(1956).

11235

THE UPTAKE OF RADIOSULFUR IN THE FRACTURED HUMERUS IN THE RAT J. C. Osborne and K. Kowalewski. *Surg. Gynecol. and Obstet.* 103(1), 38-40(1956). BA 31-31525

11236

REMOVAL OF INTRAVENOUSLY INJECTED IRON FROM THE CIRCULATION. H. Overkamp. *Z. Ges. Exptl. Med.* 120, 86-95(1952). (In German). CA 47-7073g

11237

METABOLISM OF FISSION PRODUCTS. Roy Overstreet, L. Jacobson, K. Scott and J. G. Hamilton. (nd). Decl. 1952. (CH-379)

Procedures for the preparation of carrier-free Ba¹⁴⁰, Sr⁸⁹, La¹⁴⁰, Ce¹⁴⁰, Pr¹⁴³, Zr⁹³, Nb⁹³, Ru¹⁰⁵, Te¹²⁷, Te¹²⁹, Cs¹³⁴, and Cs¹³⁵ are discussed in detail. NSA 6-1422

11238

Argonne National Lab., Ill.
METABOLISM OF FISSION PRODUCTS. A Progress Report. Roy Overstreet, L. O. Jacobson, H. Fisher and K. Scott. 1943. 49p. (MDDC-1011; CH-1049; A-1441)

Unseparated Fission Products. Unseparated fission products have been isolated from 18 pounds of neutron bombarded UO₂(NO₃)₂·6H₂O free from carrier and containing less than .03 micrograms of uranium per microcurie of activity. The final solution was assayed

for its content of strontium, yttrium, praseodymium, zirconium, columbium, ruthenium, tellurium, cesium, barium, cerium, and UX_1 . Tracer studies were done on a large group of rats which received the prepared solution by intramuscular, intraperitoneal, intrapulmonary, and oral routes of administration.

Radio-Ruthenium ($Ru >^{105}$). A carrier-free purified preparation of $Ru >^{105}$ (includes some other activities) has been isolated as a solution of $RuCl_4$ and tracer studies comparable to those for the fission mixture completed. $Ru >^{105}$ was found to be rather widely distributed throughout the body and the greatest degree of selective localization took place in the kidney which was considerably less than the degree of deposition and retention in bone for alkaline earths, zirconium, columbium, and the fission mixture. **Neptunium ($Np^{238}, ^{239}$).** A mixture of Np^{238} and Np^{239} , free from radioactive contaminants and inert hold-back carriers, was isolated from a uranium metal target which had been bombarded by 16 Mev deuterons. Tracer studies, which included the intraperitoneal, intrapulmonary, and oral routes of administration, were carried out over a period of 8 days. The metabolic behavior of neptunium was found to resemble that of yttrium more closely than any of the other fission products studied thus far. **Radio-Autographic Studies.** A large series of radio-autographs have been prepared from the lungs of the rats which had received the fission mixture, ruthenium, and neptunium by intrapulmonary administration. Photomicrographs of representative lung sections and their corresponding radio-autographs prepared no significant deposition was noted in the bronchi, lymphoid tissue, and blood vessels. In all of the radio-autographs it was found that the radioactivity was distributed widely throughout the alveolar structure of the lungs. Frequently a tendency for the alveolar pattern of the sections to be duplicated on the radio-autograph was observed.

11239

THE DISTRIBUTION OF RADIOACTIVITY IN THE ORGANS OF THE FETUS OR OF YOUNG RATS BORN OF MOTHERS INJECTED WITH VITAMIN B_{12} CONTAINING Co^{60} . B. E. Chow, L. Barrows and C. T. Ling. Arch. Biochem. 34 (1), 151-157(1951).

11240

RADIOBIOLOGICAL PROBLEMS, URANIUM TOXICOLOGY. F. Passalacqua. Med. Lavcro 45(5), 405-10(1954).

11241

Division of Biology and Medicine, AEC.
METABOLISM OF STRONTIUM, CESIUM AND YTTRIUM BY ANIMALS. Paul B. Pearson. June 24, 1955, 17p. (M-7120)

11242

BIOLOGICAL INVESTIGATIONS WITH RADIOACTIVE CALCIUM AND STRONTIUM. C. Pecher. Proc. Soc. Exp. Biol. and Med. 46, 86-91(1941).

11243

BIOLOGICAL INVESTIGATIONS WITH RADIOACTIVE CALCIUM AND STRONTIUM: PRELIMINARY REPORT ON USE OF RADIOACTIVE Sr IN TREATMENT OF METASTATIC BONE CANCER. C. Pecher. Univ. Calif. Publ. Pharmacol. 11(2), 117-149(1942).

11244

THE SELECTIVE UPTAKE OF BROMINE BY THE THYROID GLAND WITH RADIOACTIVE BROMINE AS INDICATOR. I. Perlman, M. E. Morton, and I. L. Chankoff. Am. J. Physiol. 134, 107-113(1941).

Br^{82} ($T_{1/2} = 34$ hrs.) was injected intraperitoneally into rats and guinea pigs. I_2 , Br_2 and eka-iodine (Element 85) were selectively retained by thyroid.

11245

OUR FIRST EXPERIMENTS IN INDUCTION OF NEOPLASMS WITH RADIOACTIVE SILVER. N. N. Petrov, A. V. Vadova, E. I. Smolovskaia, and E. M. Barabadze. Eksp. khir. 1(4), 3-8(1956).

11246

THEORETICAL CONSIDERATION OF ACUTE EXPOSURE OF MAN TO HTO OR T_2O ACTIVITY IN THE ATMOSPHERIC ENVIRONMENT. Ernest A. Pinson (Los Alamos Scientific Laboratory). Oct. 1952. 7p. (LA-1469)

11247

LUNG ABSORPTION OF HTO BY MAN UPON INSPIRATION OF HTO WATER VAPOR. Ernest A. Pinson (Los Alamos Scientific Laboratory). June 1952. 17p. (LA-1465)

11248

THE SPECIFIC ACTIVITY OF TRITIUM IN THE ORGANIC COMPONENTS OF THE SKIN AND FAT OF MAN FOLLOWING EIGHT MONTHS' CHRONIC EXPOSURE TO HTO IN BODY FLUIDS. Ernest A. Pinson, E. C. Anderson and V. Lotz. (Los Alamos Scientific Laboratory). Oct. 1952. 8p. (LA-1468)

11249

EFFECTS OF RADIOACTIVE P^{32} ON NORMAL TISSUES. W. R. Platt. Archives of Pathology 43, 1-14(1947)

Radioactive P produces changes, similar to those produced by other ionizing radiation, in many tissues. Types of changes include: cell death, abnormal mitoses resulting in giant, irregular nuclei, fibrosis, hyalinization of collagen and a vascular change characterized by thickening and hyalinization of small vessels. There is selective localization of P^{32} in tissues most often invaded by neoplastic cells of lymphomatosis and myelomatosis, i. e. marrow, spleen, liver, lymph nodes. Changes were also observed in lung, kidney, GI tract, ovaries and testes.

11250

PROGRESS REPORT: I. INTERIM REPORT ON STUDY OF SURVIVAL OF MICE TREATED WITH FRACTIONATED AND DURATION-OF-LIFE EXPOSURES TO X-RAY. II. PRELIMINARY REPORT ON AN EXPERIMENT INVESTIGATING THE EFFECT OF SUB-LETHAL AND FRACTIONALLY-LETHAL CONDITIONING DOSAGES OF X-RAY ON SURVIVAL TIME UNDER DURATION-OF-LIFE EXPOSURE TO X-RAY. III. PRELIMINARY REPORT ON AN EXPERIMENT TO DETERMINE THE DOSAGE-MORTALITY RELATION FOR SINGLE DOSAGES OF X-RADIATION ADMINISTERED TO YOUNG MICE. S. A. Tyler and G. Sacher. (Argonne National Lab.), p.36-45 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1948. 1948. (ANL-4227)

11251

THE UPTAKE OF P^{32} IN THE FEMUR OF GROWING RACHITIC AND NORMAL RATS AS COMPARED WITH UPTAKE OF THE TOTAL SKELETON V. Claassen and B. S. Wostmann. Biochim. Biophys. Acta 10(4), 625-6(1953).

11252

THE SPEED OF IODINE METABOLISM. E. E. Pochin. International Conference on Peaceful Uses of Atomic Energy 10, Paper No. P/769(1955). (United Nations, N. Y.).

11253

THORIUM: A BIBLIOGRAPHY OF PUBLISHED LITERATURE. W. D. Prater, E. F. Joy, and E. G. Esterbrook, comps. (Mound Lab., Miamisburg, Ohio). Robert E. Allen, ed. (Division of Technical Information Extension)

sion, Oak Ridge, Tenn.). June 1955. 299p. (TID-3044(Suppl.1))

11254

LATE EFFECTS OF THOROTRAST IN TISSUES. A. P. Prezyrna, W. W. Ayres and W. C. Multry. *Radiology* **60**, 573-578(1953).

The authors present a case of thorotrast injury (man). Radioactive material was retained mostly in cells of the reticulo-endothelial system. Commonest complications were those due to accidental perivascular deposition, leading to destruction and scarring of surrounding tissues.

11255

Argonne National Lab., Ill.
HEMOLYSIN PRODUCTION IN X-IRRADIATED RABBITS. B. N. Jaroslow and W. H. Taliaferro, p.152-54 of REPORT ON BIOLOGICAL, MEDICAL AND BIOPHYSICS PROGRAMS. PART I. SEMI-ANNUAL REPORT OF RADIOLOGICAL PHYSICS DIVISION. PART II. QUARTERLY REPORT ON BIOLOGICAL AND MEDICAL RESEARCH DIVISION. Jan. 1955. (ANL-5378)

The injection of homogenized mouse spleen, mouse ascites tumor or *Hela* cell cultures, mixed with antigen, into rabbits (later x-irradiated with 400r) caused rabbits to have a marked increase in hemolysin production.

11256

EFFECT OF CHEMICAL AGENTS ON SKELETAL CONTENT AND EXCRETION OF INJECTED STRONTIUM⁸⁹. S. H. Cohn and J. K. Gong. *Proc. Soc. Exptl. Biol. and Med.* **83**(3), 550-554(1953).

11257

Tennessee. Univ.
AGRICULTURAL RESEARCH PROGRAM. QUARTERLY PROGRESS AND WORK ACCOMPLISHMENT REPORT FOR QUARTER ENDING JUNE 30, 1952. 156p. (ORO-77)

Observations reported include: 1. radiocesium may accumulate in relatively large amounts in milk and meat products from domestic animals ingesting Cs¹³⁷ and this may be a significant source of whole body irradiation, 2. data showing effects of whole body irradiation on blood clotting in burros and, 3. blood chemistry values for normal and irradiated burros demonstrating that irradiation produced slight changes in NPN, protein, glucose and cholesterol levels. NSA 6-5940

11258

THE QUANTUM PROBLEM IN RADIOBIOLOGY. Holweck et Lacassagne. *Archives de l'Institut du Radium*. **III**, Fas. 2 (1934).

This work includes a very complete summary and detailed bibliography on irradiation of bacteria.

11259

URANIUM [TOXICITY], p. 38-54 of QUARTERLY TECHNICAL REPORT, JANUARY 1, 1951, THROUGH MARCH 31, 1951. Henry A. Blair, Director (Atomic Energy Project, Univ. of Rochester). May 9, 1951. 17p. (UR-164)

The effects of particle size and purity on the toxic response, as measured by urinary protein, to inhaled UO₂ have been studied by exposing rabbits to suspensions of 0.5-μ massmedian particle diameter. The pH range was kept at 5.0 to 7.5, where uranyl ion and other oxidation products are low in concentration. Comparison with the results of Wilson et al. (*J. Ind. Hyg. Toxicol.* **30**, 319 (1948)) indicates that UO₂ itself is nontoxic, the observed chemical toxicity being due to uranyl ion or some complex. The different rates of alveolar deposition and of elimination of insoluble particulates were determined for each of the lobes of the rat lung following inhalation of U₃O₈ or UO₂

of different mass-median particle sizes. The nasal filtration cutoff point in mass-median diameters (MMD) was about 0.7 μ for the rat. Alveolar deposition was calculated to be but 0.9% for U₃O₈ of 2.6 μ MMD based on respired atmospheric concentration of particles of all sizes of this distribution, for UO₂ at MMD 0.45 μ, alveolar deposition was 8.3%. NSA 5-5529

11260

APPLICATIONS OF ATOMIC ENERGY TO BIOLOGY AND MEDICINE. W. Edward Chamberlain. *Clin. Proc. Jewish Hosp.* **2**, 27-32(1949). NSA 4-1940

11261

Rochester. Univ., New York.
QUARTERLY REVIEW, OCTOBER 1 THROUGH DECEMBER 31, 1954. Henry A. Blair, Director. 76p. (M-5646)

11262

RADIOBIOLOGIC MECHANISMS IN THE SKIN M. H. Kulwin and H. M. Buley. *Arch. Dermatol. and Syphilis*, **70**, 417-25(1954).

The author discusses chemical aspects of skin radiosensitivity, particularly the role of hydrogen peroxide in producing radiation effects and the role of the radio-resistant enzyme, catalase. Various types of radio-protective agents are reviewed and certain important types of general cellular effects are discussed, especially the effects of radiation on the nucleus, on DNA synthesis and chromosomes and on membrane permeability.

11263

DERMATITIS AND ALOPECIA DUE TO ROENTGEN RAYS. Wilhelm Marceuse. *Deutsche Med. Wochenschr.* **22**, 481(1896). (In German).

Author describes skin reactions in a patient treated with x-rays.

11264

RADIOTHERAPY OF LARYNGEAL CANCER. M. Lenz. *Anales Med. Chirurgia* **23**, 448-9(1948). NSA 4-1888

11265

EFFECT OF IRRADIATION OF TESTES ON FERTILITY OF MICE AND VIABILITY OF OFFSPRING. P. Hertwig. *Arch. Exp. Zellforsch.* **22**, 68(1938). (In German).

Male mice were irradiated. Before onset of sterility they were mated with normal females and their offspring were studied. Offspring showed decreased viability. Offspring of matings after recovery from semisterility were normal. Effect of irradiation on ability of sperm to fertilize ova was studied by sectioning and staining ovaries after fertilization.

11266

Tennessee. Univ.
AGRICULTURAL RESEARCH PROGRAM. QUARTERLY PROGRESS REPORT FOR TWO QUARTERS ENDING MARCH 31, 1953 AND JUNE 30, 1953. July 20, 1953. 131p. (ORO-98)

Includes reports on: tissue distribution, excretion and placental transfer of Y⁹¹ after intravenous administration to cattle and intramuscular administration to rats, a case history of an osteogenic sarcoma in a muskrat fed on plants containing large amounts of radioactive Sr, effects of total body irradiation of burros on their respiration and on their blood chemistry. NSA 7-5462

11267

LOCALIZATION OF POLONIUM IN THE ORGANISM AS A FUNCTION OF THE NATURE OF THE SOLUTION INJECTED. A. Lacassagne and M. Servigne. *Journal de Pharmacologie et de Chimie*, **21**(8), 145-151(1935). (In French).

11268

RADIOCALCIUM STUDIES IN PREGNANCY. C. L. Comar. *Ann. New York Academy Science* **64**, 281-98(1956).

11269

ROLE OF EXTERNALLY PRODUCED HYDROGEN PEROXIDE IN DAMAGE TO PARAMECIUM AURELIA BY X-RAYS. R. F. Kimball and N. Gaither. *Proc. Soc. Exptl. Biol. Med.*, **80**, 525(1952).

The production of non-genetic death and division delay is greatly enhanced if paramecia are irradiated in dilute medium with very few bacteria.

11270

ANIMAL DISTRIBUTION OF COLLOIDS OF Au^{198} , P^{32} , Y^{90} , AN IMPROVED METHOD OF TISSUE ASSAY FOR RADIOACTIVITY. M. S. Lahr, R. Olsen, G. I. Gleason and D. L. Tabern. *J. Lab. and Clin. Med.* **45**, 66-80 (1955).

11271

SOME AUTORADIOGRAPHIC STUDIES OF NON-UNIFORM DISTRIBUTION OF RADIOACTIVE PHOSPHORUS IN TISSUES. L. F. Lamerton and E. B. Harriss (Roy Cancer Hospital, London). *Brit. Med. Jour.*, **1951**(4737), 932-936(1951). BA 26-8130

11272

A QUANTITATIVE AUTORADIOGRAPHIC STUDY OF THE INCORPORATION OF S-35 IN TRACHEAL CARTILAGE. H. Bostrom, E. Odeblad and U. Friberg. *Arch Biochem.* Vol. 38, 283-6(1952).

11273

METABOLISM OF PLUTONIUM IN THE RAT. W. H. Langham, May 1, 1946. 40p. (AECD-1914; LADC-472).

This report gives a comprehensive summary of the project literature dealing with the absorption, excretion, and body deposition of plutonium when administered in various forms and by various routes to the rat.

11274

Los Alamos Scientific Lab.

REPORT ON HARWELL CONFERENCE ON HUMAN MONITORING IN THE CONTROL OF OCCUPATIONAL HEALTH HAZARDS IN ATOMIC ENERGY, SEPT. 8-9, 1954. W. H. Langham. (WASH-490)

Summaries of human data on Pu, Po, Sr.

11275

METABOLIZING OF PLUTONIUM. W. Langham, J. Biol. Chem. **171**, 273-83(1947). (MDDC-719; LADC-222)

Effects of citrate ion concentration, valence state and various other factors on the distribution and excretion of Pu following its intravenous administration to the rat are discussed.

11276

MEDICAL AND BIOLOGICAL RESEARCH ACTIVITIES OF THE LOS ALAMOS LABORATORY. W. Langham. (nd). Decl. Oct. 29, 1947. 20p. (MDDC-1439; LADC-449)

Emphasis is being placed on using carbon-14 to trace physiological processes in animals and to trace the activities of cells and their relation to their substrate or environment. A number of important compounds have been tagged with carbon-14, namely nicotinic and p-amino-benzoic acids. Tracer studies with these tagged vitamins may help to explain why body cells occasionally become cancerous when exposed to atomic radiations. Other growth promoting substances to be studied or in the process of study with carbon-14 are the hormones. A major part of the research is directed to the study of direct biological effects of atomic radiations. Radioactive phosphorus is being used to study the rate of breakdown of nucleoproteins and nucleic acids as a result of large doses of ionization radiations. The effects of the radiations on the weight and gross appearance of the spleen, kidneys, ovary, adrenal gland, intestinal tract, bone marrow and

peripheral blood are being studied. The effects of the radiations on the mitotic index (an indication of the rate of growth and replacement) of the various organs and tissues are being studied also. Other research activities include further studies of the effects of plutonium on the animal system and of health hazards created by this material and other materials peculiar to the Los Alamos Laboratory.

11277

DISTRIBUTION AND EXCRETION OF PLUTONIUM ADMINISTERED INTRAVENOUSLY TO MAN. W. H. Langham, S. H. Bassett, P. S. Harris and R. E. Carter (Los Alamos Scientific Laboratory). (1950). (LA-1151)

11278

CHANGES IN THE DISTRIBUTION OF PHOSPHORUS IN IRRADIATED RABBIT BONE MARROW. J. F. Thomson, W. W. Tourtellotte, M. S. Carter, and J. B. Storer. p.13-21 of UNIVERSITY OF CHICAGO TOXICITY LABORATORY QUARTERLY PROGRESS REPORT NO. 4 ON RADIOBIOLOGY. Jan. 15, 1950. (TID-364)

11279

ELIMINATION OF POLONIUM FOLLOWING INJECTION. J. S. Lattes and A. Lacassagne. *Journal de Radiologie* **12**, 16-19(1928).

11280

RELATIVE RESISTANCES OF MICROORGANISMS TO CATHODE RAYS. II. YEASTS AND MOLDS. A. E. Bridges, J. P. Olivo and V. L. Chandler. *Appl. Microbiol.*, **4**, 147-49(1956).

Yeast appears to be more resistant than molds to irradiation.

11281

THE ANABOLIC METABOLISM OF RADIOACTIVE SULFATE BY ANIMAL TISSUES IN VITRO AND IN VIVO. L. L. Layton. *Cancer* **4**(1), 198-201(1951). BA 25-26795

11282

CHANGES IN THE PERIPHERAL NERVOUS SYSTEM OF DOGS POISONED WITH A MIXTURE OF RADIOACTIVE ISOTOPES AND POLONIUM. B. I. Lebedeva. *Byull. Radiat. Med.* **1**, 9-17(1956).

11283

UPTAKE AND DISTRIBUTION OF IODINE IN THE INTACT ANIMAL. C. P. Leblond. *Revue Canadienne de Biologie* **1**, 402-453(1942). (In French).

Author reviews the metabolism of iodine. It is rapidly eliminated via urine. In gastric secretion, I^- was present as the halogenated acid, HI, as is chloride. I^- was found in extracellular spaces of organs, as are other halides, and a small fraction was incorporated into cells, especially into liver cells. The thyroid fixed approximately 50% of physiologically available iodine as di- and tri-iodo-tyrosine. Excess I^- was stored as I^- or di-iodotyrosine in the follicular colloid.

11284

METABOLISM OF RADIOACTIVE IODINE IN THE THYROID OF RATS KEPT AT LOW TEMPERATURE. C. P. Leblond, J. Gross, W. C. Peacock, and R. D. Evans. *Fed. Proc.* **2**, 28-29(1943).

Metabolism of radioiodine in rat thyroids was 3 x normal after 26 days at 0°.

11285

BIOLOGICAL STUDIES ON THE DISTRIBUTION OF RADIOACTIVE METAL WITH SPECIAL REFERENCE TO DAMAGING LEVELS OF TISSUE CONCENTRATION. H. D. Bruner. (Emory Univ., Atlanta, Medical School). Fourth Quarterly Report. Dec. 15, 1953. 11p. (TID-22714)

11286

METABOLISM OF RADIOIODINE IN THE THYROIDS OF RATS EXPOSED TO HIGH OR LOW TEMPERATURE. C.

P. Leblond, J. Gross, W. Peacock, and R. D. Evans. *Am. J. Physiol.*, **140**, 671-676(1944).

11287

IODINE METABOLISM IN THE THYROID GLAND AFTER SINGLE INJECTIONS OF 5 OR 500 MICROGRAMS OF RADIOACTIVE IODINE TO ADULT RATS. C. P. Leblond, W. C. Peacock, J. Gross and R. D. Evans. *Fed. Proc.*, **2**, 29(1943).

Uptake of I_2 by the thyroid from the smaller dose was progressive, increasing markedly with time, while that from the larger dose showed only a relatively slight increase with time. After 15 min. or 2 hr. most I_2 was present as inorganic iodine. After 30 hours, radioactivity was predominantly in the D fractions. This distribution was comparable for the 2 doses.

11288

STUDIES ON THE FIXATION OF RADIOACTIVE IODINE BY THE RABBIT THYROID. A. Lein. *Endocrinology* **32**, 429-432(1943).

The iodide-combining mechanism of the rabbit thyroid was saturated within 10 min. after intravenous administration of radioactive iodine. Saturation was partly dependent on quantity of I^{131} administered. Organic iodine appeared within 5 min. The total quantity of iodine in the acetone-insoluble fraction at the end of 12 hours was 4 or 5x greater than that originally fixed by the thyroid.

11289

FATE OF RADIOACTIVE I^{131} IN ORGANS AND TISSUES OF RABBITS WITH EXPERIMENTAL HYPERCHOLESTEROL ANEMIA AND ATHEROMATOSIS. M. A. Levchenko, V. G. Spesivtseva and M. Shishova. *Therapeutic Records*, **28**(6), 71-75(1956).

11290

PATHOLOGIC AND CARCINOGENIC EFFECTS OF PLUTONIUM. H. Lisco and M. P. Finkel. *Acta International Union Against Cancer* **6**, 817(1949).

11291

EARLY CHANGES IN DOGS SKELETONS FOLLOWING Sr AND Y IRRADIATION. N. N. Litvinov (U. S. Joint Publications Research Service, New York 17, N. Y. or O. T. S. U. S. Dept. Commerce, Washington 25, D. C.). *Ark. Pathol* **21**, No. 5, 12-18(1959). *Trans List No.* 40 3638. (JPRS-L-901-N)

11292

DYNAMICS OF THE DEVELOPMENT OF BONE SARCOMAS ORIGINATING UNDER THE INFLUENCE OF RADIOACTIVE SUBSTANCES. N. N. Litvinov. Translated by Zelda D. Knowles from *Voprosy Onkologii* **3**, 285-294(1956). 20p. (AEC-tr-3077). NSA 12-1162

11293

THE OXYGEN EFFECT AND CHROMOSOME BREAKAGE. C. P. Swanson. (Biology Div. of Oak Ridge National Lab.). p.285-307 of SYMPOSIUM ON GENETIC RECOMBINATION. *J. Cellular Comp. Physiol.* **45**, Suppl. 2, (1955) May.

11294

THE MORPHOLOGIC CHANGES IN BONE TISSUE IN RATS IN ACUTE RADIOACTIVE STRONTIUM INTOXICATION. N. H. Litvinov. *Ark. Patol.* **18**(4), 81-88(1956).

11295

QUARTERLY PROGRESS REPORT OCTOBER 1- DECEMBER 31, 1953. (UNCLASSIFIED SECTION). (Brookhaven National Lab.). 66p. (BNL-270)

Abstracts of papers from the Physics, Chemistry, Biology, and Medical Depts. which have been submitted for journal publication are presented. Cosmotron operation and research studies are briefly summarized. The general layout of the electron analog for the proposed 25-bev alternating-gradient synchrotron is presented. Equipment is described for studying neutron-capture γ spectra, and

results are presented for V, Co, Cu, Ti, and Fe. The oblique attenuation of Na^{24} γ rays through lucite and steel was measured. Progress on radiation polymerization studies is reported. A polyethylene rod given 20,000,000-r γ irradiation showed improved corrosion resistance to $H_2O-NaNO_3$ solutions at 234°F. Heat-transfer data from the cross-flow of Hg in staggered-tube banks are presented. Degradation of γ radiation in a hole in the ground from a Co^{60} source suspended 100 ft above was measured. Time-of-flight circuits for the BNL fast chopper and the 18-in. cyclotron and a new high-speed linear amplifier are discussed. Ionization-chamber performance for monitoring complex radiation in the vicinity of the Cosmotron was evaluated. A summary of waste-disposal studies is presented. The maximum uptake of At^{210} or At^{211} in the rat thyroid takes place in 1 to 2 hr after administration compared to 18 hr for I^{131} . Triphenyltetrazolium chloride was shown to be a suitable indicator for dehydrogenase activity of irradiated bacteria cells. The use of A-CH₄ mixtures in the gas-phase counting of $C^{14}O_2$ is discussed. Equipment for the continuous sampling and counting of blood radioisotope activity has been built. Cardiac output, portal blood flow, pulmonary circulatory effects of hypoxemia, and the effects of inhalation of hypoxic mixtures has been studied in the dog. Effects of pulmonary embolism and small alterations in oxygen tensions on respiration in dogs was studied. Lithium chloride LD_{50} doses were determined for normal and anesthetized mice. The distribution of Mn^{50} in tissues and cells of rats was studied. NSA 8-3181

11296

QUARTERLY PROGRESS REPORT OCTOBER 1, - DECEMBER 31, 1955. (Brookhaven National Lab., Upton, N. Y.). 64p. Contract [AT-(30-2)-Gen-16]. (BNL-375).

Abstracts of papers submitted for journal publication are included. The operational efficiency of the Cosmotron continued high. Developmental work on accelerator design is reported. Services furnished to off-site users of the BNL reactor, irradiation facilities, and services are summarized. Isotope shipments made during the period are listed. Preliminary results in studies on solid-state radioinduced polymerization of styrene grafted to polyethylene and to teflon are reported. Heat-transfer and pressure-drop characteristics were determined for Hg flowing normal to a bank of staggered tubes. Calibration and minor design modifications in radiation detection and other instruments are reported. Brief summaries are presented of preliminary results from biochemical and physiological research studies in progress. Data are presented graphically from studies on B distribution among mouse brain, brain tumor, and muscle and the viability of mouse brain tumor following B^{10} -borax neutron capture irradiation.

11297

Argonne National Lab., Ill.

THE DAILY PROBABILITY OF DEATH IN FAST NEUTRON AND Co^{60} GAMMA-IRRADIATED CF NO. 1 FEMALE MICE. H. H. Vogel, J. W. Clark, and D. L. Jordon. p.118-20 of REPORT ON BIOLOGICAL, MEDICAL AND BIOPHYSICS PROGRAMS. PART II - QUARTERLY REPORT OF BIOLOGICAL AND MEDICAL RESEARCH DIVISION. Jan, 1955. (ANL-5378)

11298

CONCENTRATION OF IODINE I^{131} ACROSS THE PLACENTA OF THE GUINEA PIG AND THE RABBIT. J. Logothetopoulos, and R. F. Scott. *Nature, Lond.* **175**(4461), 775-6(1955).

11299

COMMENT ON THE DISTRIBUTION OF RADIOCALCIUM IN THE SKELETON FOLLOWING ADMINISTRATION TO

ADULT RABBITS. P. Lontie. Rev. Belge Pathol. et Med. Exper. 23, 118-125(1953). (In French).

11300

A SUMMARY OF RADIUM AND THORIUM EXCRETION IN HUMANS. W. B. Looney, J. B. Hursh, V. E. Archer, L. T. Steadman, M. Colodzin. (1st International Conference on the Peaceful Uses of Atomic Energy, Vol. 11, 55-64(1956).

11301

LATE EFFECTS (25 TO 40 YEARS) OF THE EARLY MEDICAL AND INDUSTRIAL USE OF RADIO-ACTIVE MATERIALS, THEIR RELATION TO THE MORE ACCURATE ESTABLISHMENT OF MAXIMUM PERMISSIBLE AMOUNTS OF RADIOACTIVE ELEMENTS IN THE BODY. W. B. Looney. J. Bone Surg. Am. Vol. 37A(6), 1169-87 (1955).

11302

EFFECTS OF RADIATION UPON A TRANSPLANTED MOUSE LYMPHOSARCOMA. Joanne Weikel and E. Lorenz. (Argonne National Lab.), p.17-20 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT. Nov. 1, 1948. (ANL-4227)

Tumor size at time of treatment effects the degree of regression after radon injection as it does after x-irradiation. Both regression and regrowth tend to be proportional to tumor size. Amount of tumor tissue destroyed does not affect the red cell or leukocyte count. Lymphocytes in the radon-injected animals studied appeared to return to normal levels more quickly than they did following x-irradiation.

11303

LATE EFFECTS (25 TO 40 YEARS) OF THE EARLY MEDICAL AND INDUSTRIAL USE OF RADIOACTIVE MATERIALS. W. B. Looney (Nat. Naval Med. Center, Bethesda, Md.). Jour. Bone and Joint Surg. 38A(2), 392-406(1956). BA 31-10250

11304

LATE EFFECTS (25-40 YEARS) OF EARLY MEDICAL AND INDUSTRIAL USE OF RADIOACTIVE MATERIALS. W. B. Looney. J. Bone Joint Surg. 38A, No. 2, 392-406(1956).

11305

LATE FOLLOW-UP STUDIES AFTER INTERNAL DEPOSITION OF RADIOACTIVE MATERIALS. W. B. Looney and M. Colodzin. Jour. A. M. A. 160, 1-3(1956).

11306

CHRONIC EFFECTS OF RADIUM SALTS ADMINISTERED ORALLY AND PARENTERALLY TO HUMAN SUBJECTS. W. B. Looney, R. J. Hasterlik, and A. M. Brues. Inst. Med. Chicago 19(5), 106(1952). BA 26-33921

11307

STRONTIUM-90 IN MAN. J. F. Loutit and Brian H. Kirman. Brit. Med. J. I, Suppl., 943-44(1957).

11308

A COMPARISON OF THE DISTRIBUTION OF POTASSIUM AND EXCHANGEABLE RUBIDIUM IN THE ORGANS OF THE DOG, USING RUBIDIUM-106. W. D. Love, R. B. Romney and G. E. Burch. Circulation Research 2, 112-122(1954).

11309

THE IN VITRO INCORPORATION OF RADIOACTIVE PHOSPHATE INTO RABBIT RETICULOCYTES. T. D. Lovegrove, H. A. DeLuca and R. J. Rossiter (U. W. Ontario, London, Ont.). Canadian Jour. Med. Sci. 30(2), 143-150(1952). BA 26-27309

11310

INACTIVATION OF ENZYME SUBSTRATE FILM BY SMALL DOSES OF X-RAYS. Daniel Mazia and Gertrude Blumenthal. J. Cellular and Comp. Physiol. 35, Suppl., 171-86(1950).

11311

UPTAKE OF RADIOZINC BY NORMAL AND DIABETIC RAT PANCREAS. J. R. Lowry, R. R. Baldwin and R. V. Harrington. Science 119, 219-220(1954).

11312

CALCIUM METABOLISM IN DAIRY COWS AS STUDIED WITH Ca^{45} . C. L. Comar. (Univ. of Tenn.-AEC). p.34-44 of AGRI. RES. PROGRAM, QUARTERLY PROGRESS AND WORK ACCOMPLISHMENT REPORT ENDING SEPT. 30, 1952. (nd). 91p. (ORO-84).

11313

A CORRELATION OF MORPHOLOGIC WITH METABOLIC CHANGES IN RAT SKIN FOLLOWING EXPOSURE TO BETA (Sr^{90}) RADIATION. C. C. Lushbaugh and D. B. Hale (Los Alamos Scientific Lab., Los Alamos, N. Mex.). Amer. Jour. Pathol. 28(3), 556(1952). BA 27-5752

11314

RADIOISOTOPES IN BIOLOGY AND AGRICULTURE. PRINCIPLES AND PRACTICE. C. L. Comar McGraw-Hill Book Company, Inc., New York City, N. Y. (1955).

11315

MORPHOLOGICAL CHANGES IN THE GASTRO-INTESTINAL TRACT OF DOGS FOLLOWING POLONIUM POISONING. G. Tagunova. Bull. Radiat. Med. 1, 59-66(1956).

11316

COMPARATIVE UTILIZATION OF DIETARY Sr^{90} AND Ca BY DEVELOPING RAT FOETUS AND GROWING RAT. C. L. Comar, L. B. Whitney and F. W. Lengeman. Proc. Soc. Exptl. Biol. Med. 88, 150-2(1955).

11317

COMPARATIVE UPTAKE OF CARRIER AND CARRIER-FREE Ca^{45} IN RATS. R. V. Talmadge, F. W. Krantz, L. K. Wang and L. Krantz. Fed. Proc. 11(1), 159(1952). BA 26-20539

11318

TOXICOLOGY OF URANIUM. Albert Tannenbaum, ed. McGraw-Hill Book Co., Inc., New York, New York(1951).

11319

AUTORADIOGRAPHIC STUDIES OF CALCIUM, PHOSPHORUS, AND STRONTIUM DISTRIBUTION. C. L. Comar, W. E. Lotz, and G. A. Boyd. Amer. Jour. Anat. 90, 113-129(1952).

11320

Michael Reese Hospital, Chicago.

DISTRIBUTION OF U^{233} IN TISSUES OF MICE FOLLOWING INJECTION OF U^{233} (+6) NITRATE. A. Tannenbaum. Sp. 1945. (MDDC-1280; MUC-RSS-563)

The purpose of this investigation was to study the distribution and excretion of U^{233} and to compare the results with those previously obtained with uranium (238) salts. The distribution of U^{233} is similar to that of uranium 238. U^{233} , therefore, may be used as a tracer for studies on uranium distribution and excretion. Both accumulate principally in the bone and kidneys, and it may be expected that chemical or radiation damage caused by ordinary uranium and the isotopes thereof would be mainly in these organs.

11321

THE EFFECTS OF RADIATION ON RESPIRATORY METABOLISM. E. J. Boell. Symposium on Physiol. Effects of Radiation at the Cellular Level. The Biol. Div. Oak Ridge National Lab. 19(1951) also; J. Cell and Comp. Physiol., 39(1). (1952).

Immediate effect of irradiation on the grasshopper embryo (*Melanoplus differentialis*) was a reduction of oxidase activity. Activity had returned to normal 2 days after exposure and subsequently exceeded the normal.

Irradiation *in vitro* had no effect on respiration. Other experiments demonstrated that certain enzymes are inactivated by irradiation *in vitro*. SH enzymes were found to be particularly radiosensitive. In general, however, *in vivo* and *in vitro* effects were markedly different. Authors suggest that in some cases, enzymes in the cell may be protected from radiation damage by the presence of non-enzymatic proteins.

11322

THE EFFECTS OF RADIATION ON THE CYTOLOGY OF THE EYE. Ludwig Von Sallmann. Symposium on Physiol. Effects of Radiation at the Cellular Level. Biol. Div. Oak Ridge Nat. Lab., 217(1951); also: J. Cellular and Comp. Physiol. 39(1). (1952).

11323

IONIZING RADIATIONS AND CANCER. Austin M. Brues (Academic Press Inc., N. Y., N. Y.). Advances in Cancer Research Volume II, (1954) pp. 177-195 Edited by Jesse P. Greenstein and Alexander Haddow. (1954).

11324

STUDY OF CAPILLARIES BY CAPILLARY MICROSCOPY IN ERYTHEMA FOLLOWING X-RAY. O. David and G. Gabriel. Strahlentherapie 16, 372-381(1924). (In German).

11325

Argonne National Lab., Ill.
AN INTRODUCTION TO THE TOXICOLOGY OF U. A. Tannenbaum, H. Silverstone, S. Schwartz and E. S. B. Barron. (1946). 77p. (AEC-1993; CH-3696)

This section is a brief review of the work on the pharmacology and toxicology of uranium carried out, in the main, by members of the Metallurgical Laboratory. It is intended as a concise summary for the general reader.

11326

Argonne National Lab., Ill.
F. Wassermann. p.69-71 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT AUGUST, SEPTEMBER, AND OCTOBER 1951. A. M. Brues, ed. (ANL-4713)

11327

METABOLISM OF S^{35} THIOPENTAL (PENTOTHAL). CHEMICAL AND PAPER CHROMATOGRAPHIC STUDIES OF S^{35} EXCRETION BY THE RAT AND MONKEY. J. D. Taylor, R. K. Richards and D. L. Tabern. J. Pharmac. and Exptl. Therap. 104(1), 93-102(1952).

Percent S^{35} excreted by irradiated rat and monkey per organ and per compound within 4 days and within 24 hours is reported. Authors found changing pattern of S^{35} metabolites with time in the direction of an increased proportion of inorganic sulfate. BA 26-14633

11328

THE OXIDATION OF THIOLS BY IONIZING RADIATIONS. E. S. Guzman Barron and Veronica Flood. (Argonne National Lab.). p.131-45 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT, FEBRUARY, MARCH, APRIL 1949. 1949. (ANL-4291)

11329

DISTRIBUTION OF RADIOIODINE IN HUMAN THYROID GLAND. Selwyn Taylor and Frank S. Stewart. Lancet 2, 232-235(1951).

11330

A TRACER STUDY OF IRON METABOLISM WITH RADIOACTIVE IRON. I. METHODS: ABSORPTION AND EXCRETION OF IRON. D. Harold Copp and David M. Greenberg. J. Biol. Chem. 164, 377-387(1946).

11331

EFFECTS OF X-RAY ON FERTILITY IN THE MOUSE. Biological and Medical Divisions Quarterly Report. M. Sanderson and S. P. Stearns. (Argonne National Lab.). p.156 of BIOLOGICAL AND MEDICAL

CAL DIVISIONS QUARTERLY REPORT. 1955. (ANL-5378)

11332

EFFECTS OF ACUTE EXPOSURE TO X-RADIATION ON THE PERIPHERAL BLOOD OF EXPERIMENTAL ANIMALS. M. Ingram and W. B. Mason. Biological Effects of External Radiation (NNES-VI-2) Henry A. Blair, ed. McGraw-Hill Book Co., Inc., New York(1954). p. 58-83.

Rats received doses ranging from 1500 to 5 r in single doses of x-radiation, monkeys doses from 2000-3000 r, dogs 300 r. Changes in routine blood studies after exposure to small doses can only be demonstrated by statistical methods. There was no consistent difference between leucocyte counts of survivors and non-survivors. There was an early depression of lymphocytes and reticulocytes. Depression of erythrocytes and hemoglobin occurred last. (from authors' summary.)

11333

THE EFFECTS OF INTRAPERITONEALLY INJECTED RADIUM CHLORIDE ON THE THYMUS OF THE ALBINO RAT. Ralph D. Comar and Paul G. Roefe. Kansas Acad. Sci. 56(2), 234-241(1953).

Authors observed a decrease in the number of small lymphocytes and found this to be the most sensitive index of effect. Reticular cells were least sensitive. Some animals in all the radium dosage groups showed involutional changes in the thymus. The affected lobules scarcely resembled thymic tissue. Mast cells and plasma cells invaded the sinusoids and small lymphocytes disappeared. No areas of ectopic myelopoiesis were observed, although eosinophils were present in all thymus tissues studied. BA 28-12880

11334

HEMANGIOENDOTHELIOMA OF LIVER FOLLOWING THORIUM DIOXIDE ADMINISTRATION. H. Tesluk and W. A. Nordin. A. M. A. Arch Path. 60(5), 493-501(1955).

11335

THE TOTAL DOSE RECEIVED BY A WORKER EXPOSED TO RADIATIONS. UTILIZATION OF FILM BADGES. J. Govaerts. J. Belge Radiol., 38, 387-93(1955).

Data obtained from film badges worn by African uranium miners, radiation therapy workers and diagnostic radiology workers are analyzed. Radiation therapy workers received the highest doses, exceeding "tolerance" dose by 10%.

11336

STUDIES ON POLONIUM IN THE BLOOD. Robert G. Thomas (University of Rochester, Rochester, N. Y.). PhD. Thesis (1955).

11337

IRRADIATION OF THE GASTROINTESTINAL TRACT OF THE RAT BY INGESTED RUTHENIUM-106. Roy C. Thompson and O. L. Hollis (Hanford Works, Biology Division, General Electric Co., Richland, Washington). (1956). (HW-45546)

11338

THE EFFECT OF BAL ON THE DISTRIBUTION AND METABOLISM OF P^{32} AND Sr^{90} . Walter E. Kiseleski and William P. Norris. (Argonne National Lab.). p.118-23 of BIOLOGY AND MEDICAL DIVISIONS, QUARTERLY REPORT, FEB., MAR., APR., 1949. (nd). 198p. (ANL-4291)

11339

THE SIMULTANEOUS ADMINISTRATION OF METHYL-CHOLANTHRENE AND A β EMITTER (P^{32} Y^{91}). Arthur M. Cloudman, Katherine Hamilton, and Ralph Clayton. (Argonne National Lab.). p.69-78 of BIOLOGICAL AND MEDICAL DIVISIONS, QUARTERLY REPORT, FEB., MAR., APR., 1949. (nd). 198p. (ANL-4291)

11340

SURVIVAL AND BLOOD PICTURE OF CHRONICALLY IRRADIATED RABBITS. Biological and Medical Divisions, Quarterly Report. Egon Lorenz and Leon O. Jacobson (Argonne National Lab.), p.35-43 of BIOLOGICAL AND MEDICAL DIVISIONS, QUARTERLY REPORT, FEB., MAR., APR., 1949. (nd). 198p. (ANL-4291)

11341

COMPARATIVE EFFECTS OF X-RAYS AND NEUTRONS IN INDUCING CHROMOSOMAL REARRANGEMENTS AND MUTATIONS, PRIMARILY IN *TRADESCANTIA*, MEASUREMENT OF NEUTRON DOSAGES AND INTENSITY OF NEUTRON RADIATION. N. H. Giles and R. F. Humphreys. Yearbook Am. Phil. Soc. 1942, 152-3(1943).

A linear relationship has been demonstrated between neutron dose and the frequencies of induced chromatid and chromosome aberrations.

11342

VIAL PLANTS FROM HYBRIDIZATION OF DEFECTIVE MUTANTS OF BARLEY. S. J. Kraevoi. Vestnik Gibrizatsii (Hybridization) No. 2, 103-5(1941).

Two x-ray mutants of *Hordeum sativum* var. *medicum* Korn were crossed. The F_1 plants were unlike either parent and practically normal, hardly different from the original variety which they equalled in stem length and productivity, although sterility up to 12.35% was observed.

11343

PATHOLOGIC HISTOLOGY OF RADIODERMATITIS. H. Montgomery. p.333-62 of X-RAYS AND RADIUM IN THE TREATMENT OF DISEASES OF THE SKIN. G. M. MacKee, ed. Philadelphia, Lea and Febiger. 1938.

11344

IMPLICATIONS FROM STUDIES WITH PHYSICAL CARCINOGENS. Paul S. Henshaw. J. Natl. Cancer Inst., 5, 419(1944).

11345

THE THERAPEUTIC USE OF BAL IN POLONIUM TOXICITY. I. THE EFFECT OF DITHIOL COMPOUNDS ON THE EXCRETION OF POLONIUM II. BLOOD AND TISSUE DISTRIBUTION OF POLONIUM AS AFFECTED BY BAL. III. SURVIVAL EXPERIMENTS ON POLONIUM INJECTED RATS AS AFFECTED BY BAL TREATMENT. John B. Hursh (University of Rochester, Rochester, N. Y.). 1949. 65p. (UR-83; AECD-2852)

11346

THE DISPERSION OF P^{32} AND OTHER TRACERS INJECTED INTO EMBRYONATED EGGS. R. M. Taylor and A. C. Saenz, J. Immunol. 63, 319-30(1949). NSA 4-366

11347

COMPARATIVE EXCHANGE OF CALCIUM, LEAD, AND RADIOACTIVE LEAD IN DOGS. J. A. Calhoun, R. McLean, J. C. Hudson and J. C. Aub. Arch. Indust. Hyg. Occup. Med. 9, 9-22(1954).

Radioactive Pb was toxic to dogs, and they developed uremia as a result of radioactivity since dogs poisoned with inert lead did not have these symptoms. Parathyroid hormone and high or low calcium diet had no effect on excretion of tagged lead.

11348

THE ACTION OF X-RAYS ON THE AMPHIBIAN EGG DEVELOPMENT. I. THE EFFECT OF OXYGEN ON THE RELATIVE SENSITIVITY OF EGGS AND SPERMATOZOA OF THE TOAD. Y. Nakao. Annot. Zool. Jap. 25, 187 (1952).

In the eggs of *Bufo vulgaris* irradiated with x-rays in air, H_2O_2 produced in the cytoplasm was an important factor in producing abnormalities. CA 48-47101

11349

CLARIFICATION OF DIFFERENCES IN RADIOSENSITIVITY OF TUMORS IRRADIATED *IN VITRO* AND *IN VIVO* ON BASIS OF EFFECT OF OXYGEN ON RADIOSENSITIVITY. B. V. Hall. Cancer Research, 12, 268(1952).

Radiosensitivity measurements of transplantable mouse carcinoma were made by measuring viability and growth of implants irradiated under standard conditions *in vitro* with x-rays. All observed radiosensitivities were consistent with assumed O_2 content of tumor fragments *in vitro* and intact tumors *in vivo*. Although other factors may be involved it appears possible to account for many of the peculiarities in radiosensitivity of tumors and tumor fragments on the basis of tissue O_2 .

11350

AUXIN BIOSYNTHESIS - A CYTOPLASMIC LOCUS OF RADIATION DAMAGE. S. A. Gordon. p.44 of PROGRESS IN RADIOBIOLOGY. Springfield, Ill., C. C. Thomas Co. 1956.

Auxin, by a still undefined mechanism, controls (as the limiting factor) cell division, expansion and individuation in plants. Low doses of ionizing radiation cause an immediate depression of free auxin levels. Data from the author's studies show: 1. auxin *per se* is not sensitive to irradiation *in vitro* or *in vivo*, 2. auxin has a rapid turnover rate in tissues, 3. auxin synthesis is highly radiosensitive, 4. sensitivity of auxin synthesis in a dynamic system is responsible for the immediate drop post-exposure. Sensitivity of auxin synthesis to radiation is mirrored by *in vivo* sensitivity of enzyme systems that degrade tryptophan to indoleacetic acid (IAA). Locus of radiation damage is the terminal enzyme of the enzyme sequence, i.e. the enzyme catalyzing IA aldehyde to IAA. In studies with mung beans, the author found that 10 r caused 20% inhibition of ability of cell-free extracts from irradiated plants to convert the aldehyde to acid. Inhibition was detectable immediately after irradiation. Site of effect in the cell was identified as being in the non-particulate fraction of cells, i.e. in solution in cytoplasm. Ultracentrifugation further showed the site to be in the heterogenous fraction of "soluble" protein.

11351

COMPARISON OF THE INACTIVATION OF THE ESTERASE AND PROTEASE ACTIVITIES OF α -CHYMOTRYPSIN SOLUTION WITH X-RAYS. D. L. Aronson, L. K. Mee, and C. L. Smith. p.61 of PROGRESS IN RADIOBIOLOGY. Springfield, Ill., C. C. Thomas Co. 1956.

Author studied the possibility that the radiosensitivity of enzymes with 2 or more modes of action might depend on the assay method used. If so, 2 modes of action might indicate 2 different target volumes. Solutions of crystalline α chymotrypsin (aqueous) were used in the experiments reported. It was found that for each enzyme concentration, esterase activity was more radiosensitive than protease activity of chymotrypsin. (The preparation used was shown not to be a mixture of 2 enzymes.)

11352

RECENT RESEARCH ON THE CHEMICAL PROTECTORS AND PARTICULARLY ON CYSTEAMINE-CYSTAMINE. Z. M. Bacq. p.160 of PROGRESS IN RADIOBIOLOGY. Springfield, Ill., C. C. Thomas Co. 1956.

Author presents a discussion, based on experiments and interpretations of various results obtained by a number of authorities, on the mechanism of the protective effect of cysteamine-cystamine and related agents against lethal and other effects of irradiation. Author feels that anoxia produced by the agents may be contributory, but that it is not an entirely satisfactory explanation of effect.

11353

A METHOD OF OXYGEN ASSAY APPLIED TO A STUDY OF THE REMOVAL OF DISSOLVED OXYGEN BY CYSTEINE AND CYSTEAMINE. L. H. Gray. p.267 of PROGRESS IN RADIOBIOLOGY. Springfield, Ill., C. C. Thomas Co. 1956.

Commercial cysteine added to water or buffer solution completely removed all dissolved oxygen in 10 minutes at pH 6.5.

11354

BENEFICIAL EFFECT OF QUINOXALINE 1, 4-DI-N-OXIDE IN RADIATION INJURY IN MICE. T. J. Haley, A. M. Flesher, R. Veomett and J. Vincent. Univ. Calif., Los Angeles, School of Med. Rept., (UCLA-384) (1956).

11355

PRIMARY BIOCHEMICAL EFFECTS IN THE X-IRRADIATED YOSHIDA ASCITES SARCOMA G. Hohne, H. A. Kunkel, H. Maass and G. H. Rathgen. Progress in Radiobiology (C. C. Thomas, Pub., Ill.). (1957).

In vitro x-irradiation of ascites tumor cells with x-ray doses of 25,000 r resulted in depression of glycolysis due to blockage of a link in the reaction chain which takes place beyond the triosephosphates. This cannot be attributed to inactivation of aldolase or to inhibition of lactic acid dehydrogenase. The most likely explanation appeared to be that x-irradiation inactivated phosphoglycerol dehydrogenase.

11356

ALKOXYGLYCEROL ESTERS IN IRRADIATION TREATMENT. A. Brohult. p.241 of PROGRESS IN RADIOBIOLOGY. Springfield, Ill., C. C. Thomas Co. 1957.

Compounds obtained from bone marrow and shark liver oil were studied as therapeutic agents in cases of radiation leukopenia and in thrombocytopenia. In one case, alkoglycerol esters were administered to a nurse who had been occupationally exposed to radium and had had a leukocyte count of about 2000/mm³ for more than one year. Three days of treatment (oral administration) increased the count to 3600 where it had been maintained for more than one year at the time of this report.

11357

DISTRIBUTION OF MANGANESE-54 IN THE RAT AFTER INTRAVENOUS INJECTION OF MnCl₂. H. D. Bruner. Am. J. Phys. 179, 622(1954) Dec.

11358

INFLUENCE OF WAVE LENGTH, INTENSITY AND DOSE ON THE BIOLOGICAL EFFECTS OF RADIATION. H. Holthusen. Strahlentherapie, 31, 509-517(1929). (In German).

11359

THE PROTECTIVE EFFECT OF THE REDUCTION OF THE BODY TEMPERATURE ON ADULT AND YOUNG MICE AFTER WHOLE-BODY IRRADIATION S. Hornsey. Progress in Radiobiology 248 (C. C. Thomas, Pub., Ill.). (1957). 557p.

Protection (young mice) against post-irradiation "intestinal death" (following 1800 r x-ray dose) conferred by anoxia (N₂ atmosphere) plus hypothermia was not greater than that from anoxia alone and was less than the protection against "hematopoietic death." Comparison of anoxic and cold young mice suggested that cold animals may simply tolerate greater anoxia than do those with higher temperatures.

11360

THE BIOLOGIC DECAY RATES AND EXCRETION OF RADIOCESIUM, Cs¹³⁴ WITH EVALUATION AS A TRACER OF POTASSIUM IN DOGS. S. A. Threefoot, G. E. Burch, and C. T. Ray. J. of Lab. and Clin. Med 45, 313-322 (1955)

11361

URANIUM POISONING - REVIEW OF LITERATURE TO 1942. S. T. Cantrell and J. J. Nickson. December 15, 1942. 6p. (MDDC-1199)

This review is divided into three headings: pathology, symptomology, and uranium poisoning in man. On the whole, very little was found in the literature on uranium poisoning in man and even less dealing with chronic poisoning with which the authors are most concerned. It is well established that the element is toxic, but the routes of absorption of uranium in various forms are not well established. It is known that the kidneys suffer damage when uranium is absorbed, and the signs of this toxicity can be seen in the urine. The central nervous system has also been seen to be damaged. It is likely that other organs also suffer but no definite information is available. Experiments are underway to study chemical toxicity in the mouse, but no results are given in this report. A bibliography is appended.

11362

Argonne National Lab., Ill.

SLOW NEUTRON STUDIES. N. J. Scully, J. W. Glattfeld, and W. Chorney. p.129-30 of BIOLOGICAL AND MEDICAL DIV. QUARTERLY REPORT (FOR) FEB., MAR., APRIL, 1949. A. M. Brues and Herman Lisco, eds. (ANL-4291)

Progress of studies on tulip, onion and hemp are reported.

11363

A PHYSIOPATHOLOGIC STUDY OF THE EFFECT OF RADIOACTIVE IODINE ON THE OVARY Frederick Tillotson, R. G. Rose and S. Warren. Amer. J. Roentgenol. and Radium Therapy 70(4), 599-604(1953). BA 28-22896

11364

EFFECTS ON FERTILITY AND OFFSPRING OF SMALL RADIATION DOSES ON OVARIES AND TESTES OF RODENTS. P. Hertwig. Erbarzt. 6, 41(1939). (In German)

11365

THE VALUE OF FUNCTIONING GRAFTS OF HOMOLOGOUS MARROW INJECTED INTRAPERITONEALLY IN THE IRRADIATED RAT. STUDIES WITH Fe⁵⁹. H. Maisin, J. Maisin, A. Dunjic and P. Mالدague. Compt. rend. soc. biol., 150, 582-86(1956). (In French).

11366

DISTRIBUTION OF RADIOACTIVE COBALT IN THE RAT. W. F. J. Culbertson, Audrey A. Free and Doreen M. Thornton. British Journal of Nutrition 4, 42-48(1950).

11367

ADSORPTION OF Na²⁴ IN VIVO. CORRELATION BETWEEN ITS CONCENTRATION AND ADSORPTION. Tsai-Sian' -min. Nitidai Igaku Dssassi, Nihon Univ. Med. J. 16(2), 340-345(1957).

11368

MOVEMENT OF RADIOBROMINE IN THE NERVOUS SYSTEM OF THE RABBIT, STUDY AFTER PERFUSION. M. Tubiana, J. Gruner, M. Olomucki and S. S. Sung. C. Rend. Soc. Biol. 145, 13-14(1951).

11369

THE EFFECT OF CLAY ON THE INTESTINAL ABSORPTION OF STRONTIUM. H. J. Curtis. (Oct. 29, 1946). 8p. (MDDC-419)

Rats have been fed active strontium which was adsorbed on clay, while their controls were fed the same amount of active strontium in aqueous solution. There was no significant difference in the amount deposited in the skeleton between the two groups, and it is concluded that if ions are adsorbed

on inert material, they will be eluted during their passage through the gastro-intestinal tract.

11370

PROBLEMS AND EFFECTS OF RADIATION ON CAPILLARY PERMEABILITY, WITH DISCUSSION BY JACOB FURTH. ENDOTHELIAL FRAGILITY BY IONIZING RADIATION. Morton McCutcheon. Symposium on Physiol. Effects of Rad. at the Cellular Level. The Biol.-Div. at Oak Ridge Nat. Lab., 113(1951). Also: J. Cellular and Comparative Physiol. 39, (1) (1952).

11371

STRONTIUM CONTENT OF HUMAN BONES. K. K. Turekian and J. L. Kulp. Science 124, 405-406(1956).

11372

THE EFFECT OF PARATHYROID EXTRACT UPON THE DISTRIBUTION, RETENTION AND EXCRETION OF LABELED STRONTIUM. Wilbur R. Tweedy. J. Biol. Chem. 161(1), 105-113(1945). BA 21-641

11373

LOCALIZATION OF RADIOACTIVITY IN THE LUNG AND LYMPH NODES. J. Ray Bryant, H. F. Berg and W. M. Christophersen (Univ. Louisville Sch. Med., Louisville.) Jour. Thoracic Surg. 26(3), 221-232(1953). BA 28-2884

11374

METABOLISM AND TOXICITY OF RADIOACTIVE METALS. YTTRIUM-91, ZIRCONIUM-95, COLUMBIUM-95, STRONTIUM-89 AND TANTALUM-182. J. M. Coon (University of Chicago Toxicity Laboratory Quarterly Progress Report Number 6 on Radiobiology (1950)). 102p (M-4505)

11375

RATE OF DISAPPEARANCE OF RUBIDIUM-86 FROM THE PLASMA, THE BIOLOGIC DECAY RATES OF RUBIDIUM-86 AND THE APPLICABILITY OF RUBIDIUM-86 AS A TRACER OF POTASSIUM WITH AND WITHOUT CONGESTIVE HEART FAILURE. G. E. Burch, S. A. Threefoot and C. T. Ray. J. of Lab. and Clin. Med. 45, 371-395(1955).

11376

INTRAPROSTATIC INJECTION OF RADIOACTIVE YTTRIUM CHLORIDE IN THE DOG. G. J. Bulkley, J. D. Cooper and V. J. O'Conor. Surg. Gynecol. Obstet. 100, 405-8(1955) Apr.

The excretion and distribution of radioactive yttrium chloride after intraprostatic injection in the dog have been studied. Approximately one-half of the injected radioactivity is excreted in the urine, the major portion during the first 48 hours. One-third of the radioactivity remaining in the body was found in the prostate with only small amounts in distant organs. Radiation effects observed in the prostate initially were characterized by hemorrhage and necrosis followed by healing with fibrous replacement of glandular tissue. Uniform distribution of the radioactive material through the parenchyma of the gland could not be achieved. High levels of radioactivity were found in the regional lymphatics and tissues of the pelvis in over half of the animals. NSA 9-3378

11377

PERMEABILITY OF THE URINARY BLADDER TO RADIOACTIVE PHOSPHORUS, MERCURY AND GOLD. L. E. Burgess, D. T. Rolfe, P. F. Hahn and E. L. Carothers (Meharry Med. Coll., Nashville, Tenn.). Fed. Proc. 9(1), 20(1950). BA 24-26736

11378

THE EXCRETION AND DISTRIBUTION OF LITHIUM IN THE DOG. R. W. Clarke, P. J. Talso, E. Moulden and I. Grahm. U. S. A. Med. Serv. Field Res. Lab., Proj. No. 6-64-12-06, 1-12(1950).

11379

TRANSPORT OF RADIOACTIVE Na⁺ AND K⁺ THROUGH GASTRIC MUCOSA. E. E. Crane and R. Davies. Biochem. J. 45, 23-24(1949).

11380

THE EXCRETION OF RADIORUBIDIUM, Rb⁸⁶, RADIO-POTASSIUM, K⁴², AND POTASSIUM, SODIUM AND CHLORIDE BY MAN WITH AND WITHOUT CONGESTIVE HEART FAILURE. C. T. Ray, S. A. Threefoot and G. E. Burch. J. of Lab. and Clin. Med. 45, 408-430(1955).

11381

DISTRIBUTION OF COBALT IN GUINEA PIG PARENCHYMA. E. DiStefano, L. Previtera and G. Albanese. Boll. Soc. Ital. Biol. Sper. 31, 198-199(1955).

11382

THE EXPERIMENTAL STUDIES ON BONE AND STRONTIUM METABOLISM. R. D. Ray. p.69-82 of THERAPY OF RADIOELEMENT POISONING. Transcript of a Meeting on Experimental and Clinical Approaches to the Treatment of Poisoning by Radioactive Substances, Oct. 20, 21, 1955. M. W. Rosenthal, ed. (Argonne National Laboratory). (1956). (ANL-5584)

11383

A COMPARISON OF THE RENAL EXCRETION OF RUBIDIUM AND POTASSIUM. Earl H. Dearborn, Arthur S. Kunin and Arnold S. Relman. J. of Pharmacol. and Exp. Therap. 116, 14-15(1956).

11384

HEPATIC DUCT CARCINOMA SEVENTEEN YEARS AFTER INJECTION OF THORIUM DIOXIDE. J. C. Roberts, Jr. and K. E. Carlson. A. M. A. Arch. Path. 62(1), 1-7(1956).

11385

DEPOSITION OF REPRESENTATIVE RADIOACTIVE ALKALINE EARTH AND RARE EARTH ELEMENTS IN THE SKELETAL TISSUES OF THE RAT. C. W. Asling, Mrs. D. A. Heller, D. H. Copp and J. G. Hamilton. nd. 1p. (AECU-254)

This document is in abstract form, it is reproduced below in its entirety. Radioautographs of sections through the costochondral junction of young normal and phosphorus deficient rats were compared with undecalcified silver-stained sections to determine any differences which might exist in deposition of carrier-free radiostrontium (Sr⁹⁰) in bone, osteoid, hyaline cartilage, and calcified cartilage. The rats were sacrificed 1 and 72 hours after intraperitoneal administration of the radioelement. Radiostrontium was found in the compact bone of both normal and deficient rats as well as in the spongy bone of normal controls but not in the osteoid of the deficient animals. The distribution and degree of deposition was comparable at 1 and 72 hours. In both control and deficient rats radiostrontium was demonstrated in the calcified cartilage but not in the hyaline cartilage. The degree of deposition approached that of the cortical bone of the same sections. The distribution of promethium (element 61) in normal adult rats at 96 hours differs remarkably from that of strontium. The promethium was observed in the region of periosteum, endosteum, and perichondrium and not in cortical bone, hyaline cartilage, or calcified cartilage. NSA 3-524

11386

RETENTION OF ENVIRONMENTAL RADIUM BY YOUNG HUMAN MALES. John E. Rose, A. F. Stehney, and H. F. Lucas, Jr. (Argonne National Lab.), p.95-98 of SEMI-ANNUAL REPORT OF RADIOLOGICAL PHYSICS DIVISION. July 1955. (ANL-5456)

11387

RADIOACTIVE ISOTOPES AND CARDIOVASCULAR SYSTEM. Jose de la Hoz Fabra and Carlos Blanco-Soler. Ros. Prensa Med. Argent. 43(47), 3453-60(1956).

11388

STUDIES OF THE METABOLISM OF GERMANIUM. G. Rosenfeld and E. J. Wallace. NMRI Bethesda Report,

Project NM006, Report 2 (1952). 16p. (NP-4044)
NSA 6-5724

11389

ELECTROENCEPHALOGRAPHIC RESEARCHES OF HIROSHIMA ATOMIC BOMB CASUALTY ON AFTER-EFFECTS NINE YEARS LATER. C Izumi and T. Hayakama. *Folia Psychiat. et Neurol. Japonica* 9(3), 226-241(1955). BA 32-4125

11390

STUDIES ON THE METABOLISM AND TOXICITY OF RADIOACTIVE METALS YTTRIUM-91 AND TANTALUM-182. John Doull, M. F. Sullivan, and K. P. DuBois. p.22-37 of UNIVERSITY OF CHICAGO TOXICITY LABORATORY QUARTERLY PROGRESS REPORT NUMBER 4 ON RADIOBIOLOGY. Jan. 15, 1950. (TID-364)

11391

PREVENTIVE MEASURES FOR ATOMIC EXPLOSION. A. J. Bauer. *Delaware State Med. J.* 20, 121-123(1948) June.

All of the health measures now taken in cases of widespread disaster will have to be put into effect in an atom bombing. In addition there will be the problems caused by radioactivity and the treatment of much larger numbers of people. Important preparatory procedures are psychological preparation, large quantities of whole blood for the fantastic number of required blood transfusions, and training of laymen in blood typing and making blood counts, and the transfusion operation. Treatment may be divided into two broad categories, (1) those which are of proved value: good nursing care, blood transfusion, antibacterials, Vitamin C, intravenous glucose and saline, and (2) those of questionable value: vitamin B₆, toluidine blue, protamine sulfate, rutin, and adrenal cortical hormones. It is important that cities plan to handle the emergencies of their neighboring cities. The director of the emergency plan for one city must be a resident in some other community. NSA 2-698

11392

INTERNAL RADIATION HAZARDS IN INDUSTRY FROM THE USE OF POLONIUM IN STATIC ELIMINATOR DEVICES. Fred A. Bryan and Louis B. Silverman. Apr. 11, 1949. 16p. (AECU-343)

The use of radioactive materials as static eliminators has been described. Although polonium is an energetic alpha particle emitter and, therefore, an excellent static eliminator, it has many serious disadvantages. Such devices produce industrial inhalation hazards by contamination of the air with fine particles containing radioactive polonium. Also the ingestion of minute quantities of polonium may cause serious injury. The hazard here is primarily by contamination of the hands. Impure polonium containing radiolead (Pb²¹⁰) is even more injurious. Therefore, it is recommended that all plants, companies and individuals engaged in the production, investigation, and use of such radioactive substances and devices be made cognizant of the dangers from internal radiation injury. NSA 3-536

11393

RADIATION HAZARDS IN INDUSTRY. T. H. J. Burnett. *Am. Ind. Hyg. Assoc. Quart.* 9, 94-7(1948) Dec.

A general discussion of the protective measures necessary to control exposure to radiation is presented. The difference in permissible exposure doses established in various countries is pointed out. The current maximal exposure dosage in the U S is 0.1 r/day. The following steps are useful in the control of radiation exposure: limiting the length of time of exposure; increasing the distance from the source of radiation; using radiation shielding materials; facilitating adequate disposal of radioactive waste products; studying the

radiation strength of the material being used; employing various detection devices, such as film badges, and pocket ionization chambers; and using frequent blood counts to determine the effects of large exposures to radiation. NSA 3-223

11394

RADIOGRAPHIC EXAMINATIONS AND RADIATION DANGERS. J. Camerman. *J. belge radiol.* 39, No. 2, 165-78(1956). (In French).

A chart is given of roentgen-ray dose rates (skin and depth doses) the patient and the radiologist may receive during the different procedures of roentgen diagnosis. It shows that these investigations offer no harm for the patient provided special care is given in cases of abnormally long exposure time and perhaps in roentgen diagnosis of the pelvis in young women. Radiologists and assistants should be warned against secondary radiation which is more important than generally admitted. Skin and depth doses to the patient as well as secondary radiation to the radiologist are largely reduced by the hard radiation technique (100 to 130 kv) which therefore justifies its use. NSA 10-9975

11395

HAZARDS TO PHYSICIANS, PATIENTS, NURSES, AND OTHERS FROM USE OF RADIOACTIVE ISOTOPES. W. Edward Chamberlain, R. R. Newell, Lauriston Taylor, and Harold Wyckoff. *Am. J. Roentgenol. Radium Therapy* 61, 726-8(1949) May.

A discussion of the problem of radiation injury is presented. The authors stress the fact that there is no antidote for radiation injury, so particular caution must be practiced on the part of the operator to prevent injury to the patient and to himself. The various types of external and internal irradiation are also mentioned. Patients' hazards mostly arise from errors by the physicians in calculation intensity doses. Wet and dry isotopic-containing wastes have to be disposed of by collection and isolation (deep burial, etc.) rather than dilution and distribution, because of the ability of some algae and other plant forms for re-concentrating these materials. A table is included which lists the hazards from radioactive isotopes, which may be used as a guide for the adequate control of these materials by physicians. NSA 3-540

11396

THE DEVELOPMENT OF LINEAR ACCELERATORS IN SYNCHROTRONS FOR RADIOTHERAPY AND FOR RESEARCH IN PHYSICS. John Cockcroft. *Proc. Inst. Elec. Eng.* 96, Part I, 296-303(1949) Nov.

The article contains a simplified explanation of the operation of the synchrotron and of the linear accelerator, and a short discussion of their applications to radiotherapy. Details of the operation of several of these machines are described. The author concludes with a paragraph on the proton synchrotron and the synchrocyclotron. NSA 4-649

11397

RADON AND RADON DAUGHTER HAZARDS IN MINE ATMOSPHERES. Richard D. Coleman, Howard L. Kuznetz, Paul F. Woolrich, and Duncan A. Holaday. (United States Dept. of Health, Salt Lake City). *Am. Ind. Hyg. Assoc. Quart.* 17, 405-10(1956) Dec. NSA 11-1753

11398

THERAPEUTIC USES OF THORIUM. H. Corsi. *Lancet*, 2, 346-48(1943).

Thorium X (Ra²²⁴) is a short-lived radioactive metal of atomic weight 224, 99% of its emanation consists of alpha rays. It can be applied to the skin either as a suspension in amyl acetate or dissolved in n-propyl alcohol. The use of the metal in the treatment of certain groups of skin diseases is described and it is concluded that thorium X is a valuable therapeutic agent in psoriasis and alopecia

areata, and sometimes superior to X rays for amelioration of subacute and chronic dermatitis, particularly of the lichenified type. Encouraging results are also reported in the treatment of onychomycosis, sycosis and naevi of the purely capillary type. NSA 1-561

11399

A SURVEY OF SCATTERED RADIATION FROM FLUOROSCOPIC UNITS IN FIFTEEN INSTITUTIONS. Russell F. Cowing and Charles K. Spalding. *Radiology* 53, 569-74 (1949) Oct.

Experiments determining the minimum room size in which a fluoroscopic unit could function and have a low wall-scattering factor are reported; the most efficient location of the unit within the room was also determined. Measurements of the scattered radiation were taken under actual diagnostic conditions and for many types of examination; all the measurements were made with a Beckman beta-gamma survey meter. It was found that several installations presented radiation hazards which could be overcome by using a movable barrier; technicians assisting with the examinations in nearly every instance received more irradiation than the roentgenologist. Upright units were the most dangerous. It is concluded that for units employing tilt and stationary horizontal tables the minimum room size should be 12 by 14 ft; there should be at least 6 ft between the roentgenologist and the closest wall, regardless of the type of examination. NSA 4-42

11400

THE EFFECT OF SERUM, PLASMA PROTEINS, AND OTHER SUBSTANCES ON THE SURVIVAL OF ASCITES TUMOR CELLS AFTER X-IRRADIATION. A. N. Stroud and A. M. Brues. (Argonne National Lab.). p.176-7 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT, 1955. (ANL-5378)

11401

CELL DIVISION IN THE GIANT AMOEBA, PELOMYXA CAROLINENSIS, FOLLOWING X-IRRADIATION. II. ANALYSIS OF THERAPEUTIC EFFECTS AFTER FUSION WITH NONIRRADIATED CELL PORTIONS. Edward W. Daniels (U. S. Air Force Radiation Lab. and Univ. of Chicago, Ill.). *J. Exptl. Zool.* 127, 427-61(1954) Dec. NSA 9-2112

11402

APPROXIMATE THEORETICAL SOLUTION OF A PROBLEM OF SCATTERING OF SOFT X-RAYS (λ BETWEEN 0.25 AND 0.56 Å) AND ITS CONSEQUENCES IN MEDICAL RADIOLOGY. R. H. de Waard. *Brit. J. Radiology* 21, 454-63(1948) Sept.

Approximate solutions of the problem of the scattering of soft x-rays are applied to the discussion of superficial x-ray therapy in skin diseases, and to the evaluation of densities and contrasts in radiographs. NSA 4-1323

11403

ADMINISTRATION OF NUCLEAR SAFETY AT HANFORD. R. L. Dickeman (Hanford Atomic Products Operation, Richland, Wash.). Apr. 10, 1956. 12p. Contract W-31-109-Eng-52. (HW-42331)

Nuclear safety considerations arise in the Hanford Atomic Products Operation in the areas of fuel element fabrication, high power reactor design and operation, chemical processing plant operation, research reactor operations, and on occasion, in critical experiments. The nuclear safety aspect of all production operations at Hanford is the joint responsibility of the Engineering and Manufacturing Departments. These responsibilities are clearly delegated within the respective departments to the appropriate levels in the line organizations. NSA 10-3980

11404

STATUS AND DEVELOPMENT OF PROTECTION AGAINST

RADIATION. M. Dorneich and R. Jaeger. *Strahlentherapie* 78, 569-86(1949). (In German).

According to the author biological damage through radiation can be almost completely avoided if the proper precautions are observed. A complete list is given of the protective measures used in Germany, as listed by the German Norm Committee for x-ray and radium work, as of October, 1948. Pertinent information is furthermore summarized in a number of tables and graphs dealing with the ion density produced in tissue by various kinds of radiation, characteristic advantages and disadvantages of various protective measures, and safe dosages for continued work in the vicinity of sources of radiation. Finally a brief discussion is given of damage caused by the penetration of radioactive substances into the body, which cannot be determined by direct ionization measurements. NSA 4-1858

11405

MAXIMUM ALLOWABLE CONCENTRATIONS OF ATMOSPHERIC IMPURITIES. Philip Drinker and Warren A. Cook. *J. Ind. Hyg. Toxicol.* 31, 51-4(1949) Jan.

In a discussion of maximum allowable concentrations of air contaminants, the author considered the use of a zone of response method for classifying vapor concentrations. Toxic substances are broken up into six arbitrary groups in terms of the effective range, radon gas and other radioactive gases are placed in the sixth and most toxic group, having maximum allowable concentrations of below 0.1 ppm. NSA 4-3297

11406

ON THE OCCURRENCE OF BERYLLIUM, BORON, COBALT AND MERCURY IN HUMAN TISSUES. R. M. Forbes, A. R. Cooper and H. H. Mitchell. *J. Biol. Chem.* 209, 857-865(1954).

11407

THE EFFECT OF POLYVINYLPIRROLIDONE (PVP) AND INSULIN ON THE TISSUE DISTRIBUTION AND EXCRETION OF Pu^{239} . J. Schubert and M. R. White. (Argonne National Lab.). p.123 of BIOLOGICAL AND MEDICAL RESEARCH DIVISIONS QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1951. (nd). 133p. (ANL-4713)

11408

PERSONNEL PROTECTION IN THE USE OF RADIOACTIVE ISOTOPES. G. Failla. *J. Clin. Invest.* 28, pt. 1, 1281-5(1949) Nov.

Some factors to be considered by personnel working with radioactive isotopes are presented. Among the factors stressed are the importance of maintaining constant and accurate monitoring of the possible areas of contamination; the mental attitude of the worker is important in that it determines the manner and method in which the worker makes use of the available precautionary measures and devices. The proper kind of measuring instrument known by actual test to be in good working order, and adequate isolation of the radioisotopes to prevent possible scattered radiation are essential, a β -ray source (such as P^{32}) is concluded to be especially dangerous because of greater possibility of radiation scattering. The long-range effects of overexposure from the radioisotopes are not in most cases immediately discernible, often manifesting themselves long after corrective measures can be taken, cancer, irreparable injury and death may occur. A table is included which presents the dosage rates at different perpendicular distances from the surfaces of two radioactive preparations. Other topics are briefly discussed and mention is made of the revised permissible limits of exposure to ionizing radiations; whole body exposure to x-rays or γ rays of up to 3,000,000 r is 0.3 r/week, measured in air; local exposure limited to the

hands is 1.5 r/week or 1.5 rep for β -ray exposure, measured at the basal layer of the epidermis. NSA 4-2147

11409

SEVENTH ANNUAL RESEARCH CONFERENCE OF THE BIOLOGY DIVISION, OAK RIDGE NATIONAL LABORATORY AND THE DIVISION OF BIOLOGY AND MEDICINE, AEC, ON GENETIC RECOMBINATION HELD AT OAK RIDGE, TENNESSEE, ON APRIL 19-21, 1954. *J. Cellular Comp. Physiol.* **35**, Suppl. 2 (1955) May.

Pertinent individual papers are included as separate references.

11410

DISTRIBUTION OF ADMINISTERED Rb^{86} CARBONATE IN MOUSE, GUINEA PIG, DOGS, AND MAN. A. Stone Freedberg, H. B. Pinto and A. Zipser. *Fed. Proc.* **11**(1), 49 (1952). BA 26-20526

11411

A SUMMARY OF ACCIDENTS AND INCIDENTS INVOLVING RADIATION IN ATOMIC ENERGY ACTIVITIES, JUNE 1945 THROUGH DECEMBER 1955. Daniel F. Hayes (Division of Organization and Personnel. Safety and Fire Protection Branch, AEC). Aug. 1956. 79p. (TID-5360).

Criticality incidents, reactor incidents, contamination incidents, fires and explosions involving radioactive material, and miscellaneous accidents involving radiation which occurred from June 1945 through Dec. 1955 are described. Safety measures resulting from review of the accidents are included. NSA 10-9967

11412

DISTRIBUTION KINETICS OF INTRAVENOUS RADIO-POTASSIUM. J. M. Ginsburg and W. S. Wilde. *Amer. J. Physiol.* **179**(1), 63-75 (1954).

11413

THE PROBLEM OF EXCESSIVE RADIATION DURING ROUTINE INVESTIGATIONS OF THE HEART T. H. Hills and R. W. Stanford. *Brit. Heart J.* **12**, 45-53 (1950) Jan.

An account of the types of measurements made during routine cases of angiocardiology and cardiac catheterization is given. Details are provided concerning the possible amounts of excess radiation to which the patient and the technical personnel may be exposed during the routine investigations, suggestions are made as to means whereby the excess exposure to radiations can be avoided or reduced to a safe level. Distance, lead and rubber aprons and gloves, and other protective devices and measures are discussed as close proximity to the patient. Accurate monitoring and calculations of the radiation exposure experienced by the patient are also mentioned as safeguards. NSA 4-2532

11414

ROENTGEN RAY PROTECTION AND IRRADIATION HAZARDS DUE TO OVER-EXPOSURE. Thomas J. Ho. *X-Ray Technician* **20**, 353-5 (1949) May.

A short review of the subject of roentgen ray protection and irradiation hazards is presented. Some of the more important of the injuries are: dermatitis and carcinoma, which may be acute or chronic, the former developing into the latter in cases where skin damage is extensive, sterility, which occurs for about 4 months with a dose of 168 r delivered to the ovaries, and permanently with a dose of 210 r or more, anemia and leukemia, mutation changes, which increase when either of the parents has been irradiated, and, shortening of the life span. The maximum daily doses for the technician and other persons near the irradiated area are discussed. Protective measures, involving the location of the equipment, the alignment of the x-ray tube, protective screens, the determination of the exposure condition, and a search for possible injury are all included and discussed. Mention is also made of the lengthening of the prothrombin time as a means of detecting overexposure to the rays. NSA 3-224

11415

STUDIES IN MINERAL METABOLISM WITH THE AID OF ARTIFICIAL RADIOACTIVE ISOTOPES. David M. Greenberg. *J. of Biol. Chem.* **136**, 35-46 (1940).

11416

THE PROTECTION OF PERSONNEL ENGAGED IN ROENTGENOLOGY AND RADIOLOGY. F. T. Hunter, O. E. Merrill, J. G. Trump, and L. L. Robbins. *New England J. Med.* **241**, 79-89 (1949) July 21.

An exposure film badge is described (which measures the exposure dose and the quality of the radiations) in connection with a preliminary report on the investigation of direct and indirect radiations to which radiologists are exposed. It was found that the scattered radiations during a fluoroscopic examination are much more penetrating than the direct beam, and, while greatly reduced in intensity, are still capable of penetrating the blood-forming organs of the examiner. The technique of manipulation of the film badge described here is presented, together with methods of processing the film and interpreting the exposure dose. The significance and importance of the physical data acquired from this investigation are discussed in detail, and graphs of the intensities of radiation under filtering conditions and voltage changes are included. A monitoring system for the x-ray personnel is also described, and consists of the uniform use of film badges and examination of the blood (hemoglobin determination, white-cell count, differential count and a description of the stained smear), the results of which are tabulated periodically and entered in individual health records. NSA 3-912

11417

DISTRIBUTION OF Co^{60} AND Cu^{64} AND Zn^{65} IN THE CYTOPLASM AND NUCLEI OF TISSUES, Irene Rosenfeld and C. A. Tobias. *Jour. Bio. Chem.* **191**(1), 339-349 (1951). BA 26-3105

11418

THE RATES OF ABSORPTION OF RADIO-SODIUM IN NORMAL HUMAN SUBJECTS. Joseph G. Hamilton. *Proc. of the National Acad. Sci. U. S.* **23**, 521-527 (1937).

11419

THE RADIOACTIVITY FROM THOROTRAST AND ITS RETENTION IN TISSUES J. Rotblat and Gillian Ward. *Phys. in Med. and Biol.* **1**(2), 125-137 (1956). BA 32-15283

11420

HYPOPHYSECTOMY WITH RADIOACTIVE CHROMIC PHOSPHATE IN TREATMENT OF CANCER. S. R. Rothenberg, H. L. Joffe, T. J. Putnam and B. Sienken. *A. M. A. Arch Neurol. and Psychiat.* **73**, 193-199 (1955).

11421

THE MOUSE THYROID AND RADIOACTIVE IODINE (^{131}I); II. THE EXCRETION RATE OF RADIOACTIVE IODINE FOLLOWING ITS INJECTION INTO THE ADULT NURSING AND NON-NURSING MOUSE, AND ITS RATE OF ABSORPTION BY THE SUCKLING YOUNG. Roberts Rugh. (Radiological Research Lab., Columbia Univ., N. Y.). Mar. 1, 1951. 27p. (NYO-1545)

11422

DISTRIBUTION AND EXCRETION OF PLUTONIUM IN TWO HUMAN SUBJECTS. E. R. Russell and J. J. Nickson. (Argonne National Lab.). Aug. 29, 1946. (CH-3607)

11423

RENAL UPTAKE OF RADIOACTIVE POTASSIUM. E. W. Emery, R. Holmes, H. E. F. Davies and D. A. K. Black. *Clinical Sci.* **14**, 241-244 (1955).

11424

RADIOACTIVE IODINE DURING PREGNANCY, EFFECTS ON MATERNAL AND FETAL FUNCTIONS K. P. Russell, H. Rose and P. Starr. *Trans. Pacific Coast Obst. Gyn. Soc.* **24**, 62-73 (1956).

11425

HISTOPATHOLOGICAL STUDIES ON THE EFFECT OF SOME RADIOACTIVE ISOTOPES ON RABBIT'S BRAIN. I. INTRACEREBRAL APPLICATION OF P^{32} . Yuju Sakuma. *Acta Med. et Biol.* 2(2), 505-516(1954). BA 33-12622

11426

ABSORPTION AND DISTRIBUTION OF THORIUM NITRATE. Paul R. Salerno and Paul A. Mattis. *J. of Pharm. and Exptl. Therap.* 101, 31-32(1951).

11427

DISTRIBUTION OF RADIOPHOSPHORUS AND RADIOGOLD AFTER ORAL, INTRAPERITONEAL AND SUBCUTANEOUS ADMINISTRATION. J. O. Ely. *Journal of the Franklin Institute* 230, 125-130(1940).

11428

CHANGES IN BLOOD IODINE FRACTIONS AND RADIOACTIVITY UNDER THERAPY. William T. Salter, M. DeVisscher, G. B. McAdams, and I. Rosenbaum. *J. Clin. Endocrinol.* 11(12), 1512-1523(1951). BA 26-14995

11429

ABSORPTION OF P^{32} BY ANIMAL TISSUES. 3. ABSORPTION OF P^{32} BY VAGINAL WALL. Sasaki, Karakhasi, and Saito. *Nihon Univ. Med. J.* 14(4), 15-19(1955).

11430

EFFECT OF RADIOACTIVE PHOSPHORUS ON PROTEIN METABOLISM. I. V. Savitskii and A. F. Leshchinskii. *Med. Radiology*, 1(6), 82-90(1956).

11431

A CONTRIBUTION TO THE PROBLEMS OF THE CEREBROSPINAL FLUID BARRIER FOR RADIOACTIVE SUBSTANCES. H. Schonenberg and K. Menzel. *Z. Kinderheilk.* 73(1), 17-22(1953). (In German).

11432

STRONTIUM IN CALCIUM FRACTIONATION IN MAN. Arthur Schubert, et al. *American Chemical Society 130th Meeting*(1956).

11433

THE EFFECT OF ZIRCONIUM AND SODIUM CITRATE ON THE DISTRIBUTION AND EXCRETION OF SIMULTANEOUSLY INJECTED THORIUM AND RADIO-STRONTIUM. Jack Schubert and Herschel Wallace, Jr. *J. Biol. Chem.* 183, 157-166(1950). BA 24-22817

11434

TREATMENT OF PLUTONIUM POISONING BY METAL DISPLACEMENT. J. Schubert. *Science* 105, 389-390(1947). (MDDC-595)

The effect of zirconium treatment on the urinary excretion of plutonium is tabulated. The administration of zirconium in those rats treated shortly after the injection of plutonium was followed by as much as a fifteen-fold increase in the amount of plutonium excreted in the urine over a 24 hour period. When the output of Pu had dropped, a re-injection of zirconium was followed by a second rise in the elimination rate. Actually, the re-injected rats excreted nearly as much plutonium on the fourth day following plutonium administration as the control rats eliminated during the first twenty four hours. Finally, the sustained therapeutic action was shown by the observation that the Pu excretion level remained about three times greater than that of the controls for several days after the cessation of zirconium therapy. From a study of the toxicity of zirconium and other metals, it was concluded that Zr was by far the safest metal to be used therapeutically.

11435

LIVER FUNCTION IN EXPERIMENTAL ANIMALS WITH REFERENCE TO RADIATION AND METAL EXPOSURE. S. Schwartz. 1956. 20p. (TID-5220)

11436

Argonne National Lab., Ill.
IV. EFFECT OF IRRADIATION ON COPROPORPHYRIN EXCRETION IN DOGS. S. Schwartz, et al. p.202-16 of BIOLOGICAL EFFECTS OF EXTERNAL X AND γ RADIATION. R. E. Zirkle, ed. 1956. (TID-5220)

11437

THE METABOLISM OF PLUTONIUM IN RATS FOLLOWING INTRAMUSCULAR INJECTION. K. G. Scott, D. J. Axelrod, H. Fisher, J. F. Crowley and J. G. Hamilton. *J. Biol. Chem.* 176, 283-293(1948).

Tri, tetra, and hexavalent Pu^{239} was not absorbed from the gastro-intestinal tract of the rat to any appreciable extent. No significant differences were observed in the metabolism after inj of the 3 valence states. Skeleton was the main site of deposition. Radioautographs demonstrated it in the region of the endosteum, periosteum, and the endosteal covering the trabecular bone.

11438

METABOLISM OF PLUTONIUM IN RATS. K. Scott, et al. 1944. 27p. (MDDC-1018)

The results of detailed metabolic studies of plutonium following oral, intramuscular, intravenous, subcutaneous, and intrapulmonary administration are presented. Plutonium is not adsorbed from the digestive tract. The skeleton is the chief organ of deposition for plutonium absorbed by the body following parenteral administration. The digestive tract is the principle channel of elimination and the degree of retention is very great. The rate of excretion is very slow and the half-period of retention of plutonium by the skeleton is estimated to exceed six months. No significant differences in the metabolic properties of plutonium absorbed by the body were observed for its three valence states. Considerable retention of plutonium by the lungs following intrapulmonary administration was observed and was found to be highest for the +4 state, less for +3 plutonium and least for +6 plutonium. A significant degree of absorption of plutonium from the lungs with subsequent deposition in the skeleton took place following the intrapulmonary administration of solutions of this element in its three valence states.

11439

California. Univ., Berkeley. Radiation Lab.
THE METABOLISM OF AM IN THE RAT. K. G. Scott, D. H. Copp, D. Axelrod and J. G. Hamilton. (1947) (AECD-1785; UCRL-22)

An investigation of the metabolism of americium (element 95) in the rat has been conducted following its administration by intramuscular injection and by stomach tube. Each animal received .3 micrograms of $AmCl_3$ in 1 cc of isotonic saline at pH 5. No appreciable absorption took place from the digestive tract. Within 24 hours after parenteral administration, 55 per cent of the total amount of americium absorbed from the site of injection was deposited in the liver and 20 per cent was accumulated by the skeleton. Excretion occurred primarily by way of the digestive tract and most of the americium eliminated appeared to come from the liver, which released this element at an almost exponential rate for 30 days with a half-time of 10 days. Thereafter, excretion became progressively slower. There was no significant change in the content of americium in the skeleton throughout the entire interval of the experiments, which extended for 256 days. The only other tissues studied that demonstrated any striking degree of accumulation of americium were the kidneys and spleen. The distribution of americium in the bone was studied by means of the radioautographic technique and it was observed that deposition of this element occurred in the region of the osteoid matrix and about the small blood vessels of the cortex.

11440

THE METABOLISM OF CURIUM IN THE RAT. K. G. Scott, D. J. Axelrod and J. G. Hamilton. *J. Biol. Chem.* **177**(1), 325-335 (1949). BA 23-14386

11441

California. Univ., Berkeley. Radiation Lab. THE METABOLISM OF Cm IN THE RAT. K. G. Scott, D. Axelrod, and J. G. Hamilton. January 15, 1948. 13p. (AEC-1805; UCRL-35).

The fate of curium has been studied in the rat 1, 4, 16, 64, and 256 days after intramuscular administration. About 5/6 of the curium is absorbed in the first 16 days after injection from the site of administration. Upon entrance into the animal, curium is primarily deposited in the liver and skeleton. The curium present in the soft tissues of the body is eliminated, primarily via the gastro-intestinal tract. Curium is not absorbed from the gastro-intestinal tract. Radioautographic studies showed that curium is deposited in the periosteum, endosteum, and trabeculae of the skeleton. Curium is retained by the skeleton for a long period of time. The metabolism of curium and americium in the rat are very similar.

11442

California. Univ., Berkeley. Radiation Lab. THE METABOLISM OF CARRIER-FREE FISSION PRODUCTS IN THE RAT. K. G. Scott, et al. (nd). Dec. Sept. 3, 1947. 207p. (MDDC-1275)

The alkaline earths, rare earths, zirconium, and columbium when introduced into the body are deposited primarily in the skeleton, where the average degree of retention of the absorbed radioelements is approximately 50 per cent of the initially absorbed quantity. The retained fractions of these radioelements are eliminated at rates which are less than their rates of radioactive decay with the exception of the 340 day cerium and possibly Sr⁹⁰. The remaining five longlived radioelements, ruthenium, tellurium, xenon, iodine and cesium do not show any significant degree of localization in the skeleton and in addition, there is no very striking deposition in any other of the tissues with the exception of deposition of iodine in the thyroid. The rates of elimination for all of these four radioelements are much greater than their rates of radioactive decay, with the exception of iodine accumulated in the thyroid. In this particular case, the release of accumulated iodine in the thyroid is many times slower than its rate of radioactive decay. The members of the long-lived fission product group which are absorbed by way of the digestive tract include the alkaline earths, tellurium, iodine, and cesium.

11443

California. Univ., Berkeley. Radiation Lab. THE METABOLISM OF CARRIER-FREE RADIOACTIVE Ag IN THE RAT. K. G. Scott. January 1, 1948. 46p. (MDDC-1778; UCRL-36)

Silver atoms in concentrations of about 10¹³ atoms per cc of blood are combined primarily on blood proteins although measureable amounts are found on the red cell membrane and in the hemoglobin. The silver was not dialyzable through cellophane. The primary carrier of silver in the blood is the blood globulin fraction although some is carried on the albumin fraction. The relative distribution of silver on the various fractions of the blood is regulated by the blood itself, since purified globulin containing silver redistributes the silver to the other protein fractions of the blood in vitro when it is added to whole blood. Silver combined with globulin is rapidly taken from the globulin in the intact animal and excreted by the liver.

11444

LOCALIZATION OF RADIATION EFFECTS IN RATS' TEETH. J. A. English. *Oral Surg. Oral Med. Oral Pathol.*, **9**, 1132-38 (1956).

11445

CHANGES IN RED BLOOD CELLS AFTER ROENTGEN RADIATION OBSERVED IN THE ULTRA MICROSCOPE. Ulrich. *Strahlentherapie*, **13**, 145-147 (1921). (In German).

11446

FAILURE OF RUTIN AND RELATED FLAVONOIDS TO INFLUENCE MORTALITY FOLLOWING ACUTE WHOLE BODY X-IRRADIATION. M. Dauer and J. M. Coon. *Proc. Soc. Exptl. Biol. Med.*, **79**, 702-7 (1952).

11447

Brookhaven National Lab., Upton, N. Y. STUDIES ON THE THYROIDAL ACCUMULATION OF RHENIUM IN THE RAT. C. J. Shellabarger. (1955). 25p. (BNL-2305)

11448

EXCRETION OF RADIOACTIVE PHOSPHORUS INTO ALIMENTARY TRACT OF RATS ON HIGH MOLYBDENUM AND COPPER DIETS. R. L. Shirley, R. D. Owens and G. K. Davis. *Fed. Proc.* **9**(1), 371 (1950). BA 25-13163

11449

MINERAL METABOLISM. A. T. Shohl Reinhold Publishing Corporation, New York, New York (1939).

11450

ABSORPTION OF I¹³¹ FROM VAGINA. Shibahara. *Nihon Univ. Med. J.* **15**(7), 12-19 (1956).

11451

THE DEMONSTRATION OF P³² IN BONE BY RADIOAUTOGRAPHY. R. S. Siffert. *Science* **108**(2868), 445-448 (1948). BA 23-6180

11452

OBLITERATING TRACHEITIS, A COMPLICATION FOLLOWING ADMINISTRATION OF RADIOACTIVE IODINE. R. Silberberg, M. Silberberg and F. J. Dixon. *J. Lab. and Clin. Med.* **39**(2), 256-259 (1952). BA 26-20538

11453

BASIC RESEARCH IN THE FIELD OF BLOOD DISORDERS. Roy R. Kracke. *Am. J. Pharm.* **121**, 56-63 (1949) Feb.

This is a general review of the state of present work in blood disorders, such as anemias and leukemias, mentioned are; P³² therapy for acute leukemia and polycythemia vera and the possible use of short-life radioisotopes for further therapy, protamine sulfate and toluidine blue therapy for hyperheparinemia from unknown causes and for thrombocytopenic purpura, and the use of BAL for heavy-metal poisoning. The author indicates that the use of radioisotopes is limited and gives doubtful or poor results. NSA 4-3610

11454

SOME ASPECTS OF RADIOIRON METABOLISM BY LEUKOCYTES. B. S. Simmons and N. B. Everett. *Biochim. Biophys. Acta* **12**(4), 102-10 (1953).

11455

DISTRIBUTION OF RADIOACTIVE SULFUR IN THE RAT. H. C. Singher and L. D. Marinelli. *Science* **101**, 414-415 (1945).

11456

EXPERIMENTAL INVESTIGATION OF P³² INCORPORATION INTO CENTRAL AND PERIPHERAL NERVOUS SYSTEM. Siraki, Yamamoto, Murofusi, Ando, and Okanwa. *Sympos. Soc. Cellular Chem.* **150**(4), 79-96 (1956).

11457

GENETIC RECOMBINATION AND REPLICATION IN BACTERIOPHAGE. Symposium on Genetic Recombination. A. H. Doermann, M. Chase and W. F. Stahl (Oak Ridge

National Lab.). J. Cellular Comp. Physiol. 45, Suppl. 2, 51-74(1955) May.

11458

EVALUATION OF RECOMBINATION THEORY. Symposium on Genetic Recombination. Karl Sax (Oak Ridge National Lab.). J. Cellular Comp. Physiol. 45, Suppl. 2, 243-47(1955) May.

11459

C¹⁴ STUDIES IN ANIMALS AND HEALTH HAZARDS Howard E. Skipper. p.241-52 of THE ROLE OF ATOMIC ENERGY IN AGRICULTURE RESEARCH. PROCEEDINGS OF THE FOURTH ANNUAL OAK RIDGE SUMMER SYMPOSIUM, AUGUST 25-30, 1952. C. L. Comar and S. L. Hood, comps. Oak Ridge National Lab. and Oak Ridge Institute of Nuclear Studies. Jan. 1953. 492p. (TID-5115)

11460

THE HAZARDS OF ATOMIC BOMB RADIATION. E. Kruse. Orion 5, 526-7(1950) July. (In German).

A short discussion is addressed to a general audience concerning the units used to measure the effects of radiation, the lethal doses for animals and men as contrasted to the tolerable doses, the presence of radioactivity and cosmic radiation in nature, and the dangers of atomic bomb radiation. NSA 4-6270

11461

Oak Ridge National Lab., Tenn.

CROSSOVER VARIABILITY AND INDUCED CROSSING OVER. Maurice Whittinghill. p.189-220 of SEVENTH ANNUAL RESEARCH CONFERENCE OF THE BIOLOGY DIVISION, OAK RIDGE NATIONAL LABORATORY AND THE DIVISION OF BIOLOGY AND MEDICINE, AEC, ON GENETIC RECOMBINATION HELD AT OAK RIDGE, TENNESSEE, ON APRIL 19-21, 1954. J. Cellular Comp. Physiol. 35, Suppl. 2 (1955) May.

11462

THE ELIMINATION OF SELENIUM AND ITS DISTRIBUTION IN TISSUES. M. E. Smith, B. B. Westfall and E. F. Stohiman. Public Health Reports 52, 1171-1177(1937).

11463

PERMEABILITY OF HUMAN ERYTHROCYTES TO RADIOACTIVE CHLORIDE AND TO BROMIDE AND IODIDE. P. K. Smith, A. J. Eisenman and A. W. Winkler. J. Biol. Chem. 141, 555-561(1941).

Iodine crossed the membrane from serum to cells with great rapidity, equilibrium being reached in 10 min. or less. At equilibrium, the halide of the cells contained a higher proportion I₂ than did the serum. Bromide, sulfanilamide and sulfapyridine likewise were regularly present in greater concentrations in cell water than in serum water.

11464

THE TISSUE DISTRIBUTION OF RADIOANTIMONY INHALED AS STIBINE. Robert E. Smith, J. Murray Steele, R. E. Eahn and D. B. Cowie. J. Lab. and Clin. Med. 33(5), 635-643(1948). BA 23-3897

11465

STUDIES ON THE BIOLOGICAL EXCHANGE OF RADIOANTIMONY IN ANIMALS AND MAN. Robert E. Smith. Federation Proc. 6(1), 205(1947). BA 21-21522

11466

MONITORING OF CERTAIN PERSONNEL FOR INTERNAL PLUTONIUM CONTAMINATION. W. H. Langham, A. Murray, III, A. M. Perley, and R. W. Mattison (Los Alamos Scientific Lab., N. Mex.). Aug. 17, 1945. Changed from OFFICIAL USE ONLY with deletions Dec. 10, 1955. 25p. Contract W-7405-eng-36. (AECD-4075)

A detailed report is given of the method of determining body internal contamination with plutonium. This method consists of wet-ashing a 24-hour urine sample, extracting

the plutonium with cupferron, plating and counting the plate in a proportional alpha counter. Results are presented which were obtained by assaying urine samples from 76 members of the chemistry personnel. These results show that, to date, only the recovery step in processing plutonium has presented a serious health hazard. The results also show a qualitative correlation between the number of high nose counts recorded for an individual and the degree of internal contamination indicated by urine assay. When the individuals were classified in zero- or low-exposure, moderate-exposure and high-exposure groups the difference between the urine counts of those with moderate and high exposure was definitely significant. The difference between the values for the moderate- and low-exposure groups was of doubtful significance. NSA 10-7108

11467

BIOPHYSICAL STUDIES ON BONE TISSUES. THE *IN VIVO* AND *IN VITRO* UPTAKE OF RADIOACTIVE ISOTOPES AND IONIC EXCHANGE REACTIONS IN BONE TISSUE. B. Engfeldt and O. Hjertquist. Acta. Path. et Microbiol. Scand. 35, 205-16(1954).

The *in vivo* and *in vitro* uptake of radioactive isotopes (P, Ca, S) in bone tissue, and the latter's capacity for ionic exchange reactions under varying conditions were studied. An autoradiographic procedure was employed for elucidating which structures in the bone tissue take up isotopes. The degree of mineralization of those areas was studied by means of microradiography. The *in vivo* and *in vitro* uptake of P³² Ca⁴⁵ and S³⁵ occurs in the same structures, namely, the newly laid down, poorly mineralized areas of bone tissue. P³² and Ca⁴⁵ both go to the inorganic phase of bone, while part of the S goes to the organic phase. All three show a capacity for ion exchange with the surrounding fluid. Ca⁴⁵ seems to be more fixed to the bone tissue than P³² and S³⁵. The hypothesis is propounded that certain structures take up isotopes *in vivo* and *in vitro* because of the smaller size of the crystallites in newly formed areas of bone tissue.

11468

THE PROBLEM OF THE EARLY DIAGNOSIS OF CHRONIC RADIATION DISEASE. M. N. Fateeva, V. S. Klimov, N. I. Gorbarenko, E. A. Denisova, E. V. Erna and V. E. Ostanpkovich. Vestnik Rentgenol. i. Radidol. 1955(2), 16-23(1955). (In Russian). BA 32-679

11469

EXCRETION OF POLONIUM FOLLOWING INTRAVENOUS ADMINISTRATION TO DOGS. Robert M. Fink. University of Rochester Progress Report for March 1947. Radiology and Biophysics. Part II. Rochester, New York. (M-1960).

11470

SAFE HANDLING OF RADIOISOTOPES. G. G. Manov and D. O. Lintz. Mech. Eng. 71, 991-8, 1030-31(1949) Dec.

The different types of radiation are discussed along with the various instruments used for detecting it. Several tables and graphs are given showing the following: the maximum permissible exposure used at Oak Ridge, permissible working distance in feet of unshielded sources, permissible working time in minutes within one foot of various quantities of Na²⁴ shielded or unshielded, and typical shielding requirements for 10 mc of various isotopes. Some typical manipulators are illustrated and described. The methods of surveying and detecting contamination are also presented. NSA 4-646

11471

RADIOACTIVE WASTE AND HEALTH PROTECTION PROBLEMS. A. N. Marei. Med. Radiol. 1, No. 4, 3-7 (1956) July-Aug. (In Russian). NSA 11-903

11472

INTERNAL EMITTERS AND TUMOR INDUCTION. Miriam P. Finkel. International Conference on the Peaceful Uses

of Atomic Energy 11, 160-164(August, 1955) Paper Number P/80. United Nations, New York.

11473

PHYSICAL METHODS OF ACHIEVING PROTECTION FOR HIGH ENERGY RADIATION AND RADIOACTIVE ISOTOPES. W. G. Marley. Proc. Roy. Soc. Med. 62, 927-34(1949). Nov.

In this summary of the physical methods necessary for the protection of personnel from ionizing radiations, the maximum permissible dose is defined, the methods of measuring the radiation intensity and dosage to the personnel, specific hazards, and the problems of waste disposal are all briefly covered. It is concluded that the more hazardous radiations encountered specifically in areas where the work is primarily on physics projects include hard γ rays, hard x-rays and fast neutrons, arising from cyclotrons, piles or Van de Graaf generators. The main problem in chemistry areas is the prevention of contamination of laboratory benches, fume hoods, floors, and the air, the provision of suitable monitors is essential to prevent the build-up of contamination. As far as is possible active material should be precipitated from solution and disposed of as an insoluble residue. Other measures are briefly outlined for the protection from radioactive compounds. NSA 4-1633

11474

MODERN RADIATION HAZARDS IN CLINICAL PRACTICE. W. V. Mayneord. Brit. J Radiology 24, 6-11(1951) Jan.

The quantities of β - and γ -ray emitters now used clinically present hospital organizations with the same radiation problems arising in atomic energy projects. Clinical treatment techniques now frequently involve hundreds of millicuries of high-energy γ -ray emitters, and the new telecurie sources may well reach thousands of curies. Design of laboratories, importance of technique, personnel dosimetry, waste disposal, and personnel exposure records are discussed. NSA 5-1756

11475

BACTERIOLOGICAL ASPECTS OF RADIATION SICKNESS. C. Miller and C. W. Hammond (Argonne National Laboratory), p.169-70 of BIOLOGICAL AND MEDICAL DIVISIONS, QUARTERLY REPORT, NOV. 1948-FEB. 1949. Feb. 1, 1949. (ANL-4253)

11476

RADIOACTIVE DECONTAMINATION OF SKIN BY IONTOPHORESIS. Georges Michon. Translated by K. S. Bevis from Compt. rend. 243, 976-8(1956). 3p. (AEC-tr-2679).

A technique is described for decontamination of skin based on the movement of ions in an electric field applied to the skin by means of two electrodes, one of which is placed at a random point on the body and the other on the contaminated area. NSA 11-2797

11477

PROTECTIVE PRECAUTIONS IN THE HANDLING OF RADIOACTIVE MATERIALS. G. William Morgan. in: "PROCEEDINGS OF THE AUBURN CONFERENCE ON THE USE OF RADIOACTIVE ISOTOPES IN AGRICULTURAL RESEARCH, DEC. 18-20, 1947," Auburn, The Alabama Polytechnic Institute, 54-69(1948).

This comprehensive and compact paper contains discussions of the following topics: medical examinations for prospective radioisotope workers, planning a radioisotope laboratory, shielding, personnel monitoring, safe practices, selection of experimental apparatus, planning and monitoring operations, surveying areas for contamination, decontamination, and disposal of radioactive materials. NSA 2-1075

11478

RADIOLOGICAL SAFETY REGULATIONS. Navy Department Bureau of Medicine and Surgery. Dec. 1947. 95p. (NP-622)

These regulations, established by the Bureau of Medicine and Surgery, are designed to meet the requirements of the overall Radiological Safety Program of the Navy, particularly in connection with the utilization of atomic energy. The following subjects are covered: radiological hazards, tolerances, personnel requirements, medical examinations, photographic dosimetry, protection of personnel, general radiological safety regulations, special regulations for ships and material contaminated by atomic bomb tests, storage, handling and shipment of radioactive materials, miscellaneous radiological reports required by the Bureau of Medicine and Surgery, first aid, and safety indoctrination. Appendices include AEC and ICC regulations. NSA 2-1794

11479

AUTORADIOGRAPHIC STUDIES WITH S^{35} ON THE DEVELOPMENT OF THE RAT EMBRYO. U. Friberg and N. R. Ringertz, Jr. Experientia 10(2), 67-68(1954). BA 28-21086

11480

RADIATION SAFETY GUIDE. J. R. Novak, ed (Argonne National Lab., Lemont, Ill.). June 1956. 74p. Contract W-31-109-eng-38. (ANL-5574)

Work with radioactive substances may involve some danger, and safety precautions must be taken before the work is started. This Guide includes suggested precautions to provide adequate protection, as well as some general information concerning possible radiation hazards and the effects of radiation on the body. It also contains procedural information which will be an aid in coping with radiation safety problems as they occur. NSA 10-9068

11481

General Electric Co. Hanford Atomic Products Operation, Richland, Wash.
TOLERABLE CONCENTRATION OF PRODUCT IN DRINKING WATER. H. M. Parker. (1945). Decl. June 28, 1950. 2p. (AEC-2906)

Permissible concentrations of polonium are calculated. NSA 4-5830

11482

General Electric Co. Hanford Atomic Products Operation, Richland, Wash.
TOLERABLE CONCENTRATION OF RADIOIODINE ON EDIBLE PLANTS. H. M. Parker. Jan. 14, 1946. Decl. June 28, 1950. 5p. (AEC-2907)

The limiting hazard of radioiodine deposition on the ground may be either direct radiation from the contaminated surface or the ingestion of contaminated vegetation by men or animals. Studies on the uptake of I^{131} are reviewed and tolerance concentrations of I^{131} in vegetation are set for men, horses, cattle, sheep, swine, and chickens. The values are well below those at which the external radiation hazard is significant. The tolerance concentrations in drinking water for farm animals is given, and proposals for further studies are made. NSA 4-5831

11483

THE POTENTIATED LETHAL ACTION OF RADIOISOTOPES USED IN COMBINATION. H. L. Friedell and P. R. Salerno. in: INTERNATIONAL CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY HELD AT GENEVA, SWITZERLAND, AUGUST, 1955, VOL. II: 165-168. Paper number P/75. United Nations, N. Y.

11484

THERAPEUTIC APPLICATIONS OF THE RADIOACTIVE ISOTOPES. C. B. Pierce. McGill Medical Journal 15, 371-87(1946).

This article is a review of the therapeutic uses of P^{32} , Na^{24} , Sr^{89} , Ca^{45} , radioactive iron and radioactive iodine, together with a brief survey of possible applications of S^{35} , Br^{82} , C^{14} , or P^{32} as an external source of beta radiation.

tion, and radiocobalt (Co^{60}) as an external gamma ray source. The therapeutic applications of high voltage X rays and fast and slow neutrons are also mentioned.

NSA 1-560

11485

MECHANISMS OF POTENTIATED LETHAL ACTION OF CERTAIN RADIOISOTOPES IN RATS AND MICE. H. L. Friedell, P. R. Salerno and S. A. Rosenberg (Atomic Energy Project, Western Reserve University). July 23, 1953. 22p. (NYO-4020)

11486

ACHIEVEMENT IN RADIATION DOSIMETRY, 1937-1950. Edith H. Quimby. Brit. J. Radiology 24, 2-5(1951) Jan.

The theoretical and practical lines along which developments in radiation dosimetry have been proceeding, the relation between energy-absorption and ionization methods, the question of a biological dose unit, the use of extrapolation chambers in phantoms, and necessary lines of research are discussed briefly. NSA 5-5813

11487

DISTRIBUTION OF RADIOACTIVE CHROMIUM PHOSPHATE IN TISSUES OF RODENTS FOLLOWING INTRAVENOUS INJECTIONS. E. R. Gabrieli. Acta Pathologica et Microbiologica Scandinavica 31, 195-204(1952).

11488

THE TRANSFER OF RADIOIODINE ACROSS PLACENTA AND BREAST. John Gersten (Ohio State Univ., Columbus). Ohio J. Sci. 54(3), 161-69(1954). BA 29-3233

11489

THE LATERAL DISTRIBUTION OF IONS ACROSS THE TRACK OF AN IONIZING PARTICLE. PART I. THE PRESENT PICTURE AND ITS IMPLICATIONS. John Read. Brit. J. Radiology 22, 366-74(1949) July.

If Lea's (Brit. J. Radiology (Supplement 1), 59(1947)) picture of the lateral distributions of positive and negative ions across the track of an ionizing particle is correct, then the separation of charge must lead to a radical electric field. Expressions are deduced for this field, the corresponding potential differences, and the energy per ion pair stored in the field. Numerical values are obtained for an ion density of 1,000 ions per micron in water, hexane, and a chromosome thread. The field is of the order of 10^5 v/cm at relatively large distances from the axis of the track. An approximate expression is derived for the distribution of the positive and negative ions when in thermal equilibrium. Small ion densities can be in equilibrium with quite large separation of charge, but in the case of ion densities of 1,000 ions per micron Lea's distributions are far from equilibrium, and the electrons would return to the positive core unless captured. If, when an ionizing particle passes radially across a chromosome, this separation of charge occurs, and the electrons become attached to the fabric of the chromosome, then tensions of the order 10^5 dynes/cm² would be produced normal to circles of radius comparable with that of the chromosome. A tension wave would travel in both directions away from the point of intersection of track and chromosome. If the chromosome has weak points, e.g., between genes, breaks might be produced here, and the minute deletions might be due to the two tension waves each producing a break. Reference is made to the work of Jaffe (Ann. Phys. 42, 303(1913)). NSA 4-1328

11490

I. MEASUREMENT OF RADON PARTITION BY GAMMA-RAY METHOD. P. F. Gustafson and L. D. Marinelli (Argonne National Lab.). Report on Biological, Medical and Biophysics Programs, Part I, Semiannual Report of Radiological Physics Division. Part II. Quarterly Report of Biological and Medical Research Division. (1955). (ANL-5378)

11491

THE BEHAVIOR OF ZINC AND RADIO-ZINC IN THE RAT. I. G. F. Gilbert and D. M. Taylor. Biochim. et Biophys. Acta 21(3), 545-551(1956). BA 31-10337

11492

PROLIFERATES, TUMOR GROWTHS AND TROPISM OF RADIOACTIVE ISOTOPES. I. S. Ginzburg. Treatise of the 1st Transcaucasian Confer. on Med. Radiology, Tiflis, Gruzmedgiz 245-252(1956).

11493

EFFECT OF NUCLEAR EXPLOSIONS ON FROZEN FOODS. H. P. Schmitt (Food and Drug Administration, Washington, D. C. and Federal Civil Defense Administration, Battle Creek, Mich.). Mar. 1956. 17p. Project 32.5 [of] OPERATION TEAPOT. (WT-1215)

Samples of frozen foods representing major pack items and container types currently in use were exposed to the effects of a nuclear explosion. Exposure was made at close-in positions and in freezers located in homes. Recovered samples were found to be free of physical and thermal damage. Kinesthetic evaluation proved the retention of flavor, color, appearance, and texture. Scientific tests indicated the retention of vitamins, minerals, and proximate composition at all exposures well within ranges observed during good commercial manufacture. Samples from exposures in homes were recovered free of induced radiation. It is concluded that, under emergency conditions similar to this exposure, frozen foods may be used for both military and civilian feeding. NSA 11-3275

11494

DISTRIBUTION OF RADIOMERCURY ADMINISTERED AS LABELLED CHLORMERODRIN IN THE KIDNEYS OF RATS AND DOGS. R. L. Grief, W. J. Sullivan, G. S. Jacobs and R. F. Pitts. Journal of Clinical Investigation 35, 38-43 (1956).

11495

DIFFERENCE BETWEEN DORSAL AND LATERAL COMPONENTS OF DORSOLATERAL PROSTATE OF RAT IN Zn^{65} UPTAKE. S. A. Gunn and T. C. Gould. Proc. Soc. Exptl. Biol. Med. 92, 17-20(1956).

11496

RADIOACTIVE WASTE DISPOSAL - HOW WILL IT AFFECT MAN'S ECONOMY? Kenneth G. Scott. Nucleonics 6, 18-25(1950) Jan.

The author describes the waste disposal problem faced by the growing number of public institutions, such as the University of California Medical Center for example, which use radioactive isotopes. Such wastes cannot be eliminated through sewage systems because of the high radioactive concentrations which would result in the sewage filter cake which is often used for fertilizer. The disposal methods recommended by the AEC are: dispersion in media such as air or water, confinement and dilution in materials such as concrete, or confinement in storage tanks after the volume of the waste has been reduced. These different methods are compared, and the disposal of wastes in the oceans is discussed in some detail. NSA 4-1857

11497

INVESTIGATIONS ON RADIOACTIVE COBALT BY THE PANCREAS IN RAT. C. Gros, P. Mandel and J. Weill. Ann. endocr., Par. 16(4), 667-9(1955). (In French).

11498

RADIATION PROTECTION FROM THE INDUSTRIAL HYGIENE STANDPOINT. John C. Soet. Ind. Med. Surg. 20, 227-33(1951) May.

Industrial hygiene and safety are discussed with reference to x rays from fluoroscopes in hospitals and shoe stores, industrial applications as in welding tests, in prisons for the detection of concealed weapons, etc. It is stated that use of natural radium is more widespread in industry than in pile-produced radioactive materials.

Lack of portability of x-ray machines versus easy transportation of radioisotopes with attendant radiation hazards is discussed. NSA 5-3620

11499

METABOLISM OF FISSION PRODUCTS. Joseph G. Hamilton (University of Chicago Metallurgical Lab.). (1943). Decl. May 19, 1947. (CH-848; MDDC-1000)

11500

U. S. Naval Radiological Defense Lab., San Francisco, Calif.

SOME ASPECTS OF RADIOLOGICAL DEFENSE. William H. Sullivan. July 24, 1950. 13p. (AD-239(1))

The relative hazards to be expected from the different types of atomic bomb explosions and the radiological defense measures to be taken for each type are discussed in this lecture presented at the Teachers' Training Course for Radiological Monitoring, at Portland, Oregon, July 20, 1950. NSA 4-6269

11501

RADIOISOTOPES IN PHARMACEUTICAL AND MEDICAL STUDIES. I. D. L. Tabern, J. D. Taylor, and G. I. Gleason. Nucleonics 7, No. 5, 3-23(1950) Nov.

Uses for radioisotopes in biology and medicine are indicated under three categories: tracer techniques, diagnosis assistance, and therapeutics. Uses of I^{131} in the therapy of thyroid diseases, P^{32} in the treatment of leukemia, polycythemia, and multiple myeloma, and uses of radioisotopes in tumor localization are outlined. Other diagnostic agents considered are radioactive iron-tagged red cells for determining red cell volume, I^{131} -tagged human serum albumin, Na^{24} for determining blood circulation time, S^{35} -tagged sodium sulfate, etc. Tumor therapy is discussed and cases and statistics of the use of radiotherapy are cited. NSA 5-2363

11502

VERTEBRATE RADIOBIOLOGY (LETHAL ACTIONS AND ASSOCIATED EFFECTS). John F. Thomson (Argonne National Lab., Lemont, Ill.). Ann. Rev. Nuclear Sci. 4, 377-400(1954).

Although the lethal actions of ionizing radiations on vertebrates have not heretofore been discussed under such a specific title in Ann. Rev. Nuclear Sci., various aspects of the subject have recently been surveyed by various authors. In addition, some 2100 abstracts of papers in radiobiology prior to 1952 were recently assembled in convenient form (ANL-5111(1953)). Hence, primary emphasis is placed here on recent work concerned with radiation toxicology, modification of lethal effects and mechanism of lethal action. NSA 9-3734

11503

PROGRESS REPORT, DETERMINATION OF THE LD_{50} BY USE OF PROBIT, ANGULAR, AND LOGIT TRANSFORMATIONS. S. A. Tyler and Joan Gurian. (Argonne National Lab.). p.15 of BIOLOGICAL AND MEDICAL DIVISIONS QUARTERLY REPORT, FEBRUARY, MARCH, APRIL, 1950. (nd). 1p. (ANL-4451)

This material appeared as report ANL-4486, which was abstracted in Nuclear Science Abstracts as NSA 4-6017. NSA 5-1710

11504

METABOLISM OF CESIUM-137 IN RATS AND FARM ANIMALS. Sam L. Hood and C. L. Comar. Arch. Biochem. and Biophys. 45(2), 423-33(1953). BA 28-3010

11505

LABORATORY HANDLING OF RADIOISOTOPES IN CANCER RESEARCH. Shields Warren and John Z. Bowers. Am. J. Pub. Health 39, 654-7(1949) May.

The dangers of some common radioisotopes which are used in the laboratory and hospitals for research and therapeutic work are pointed out. The amounts and types of radiation and the precautionary measures necessary for

each are discussed. The importance of detecting these radioactive substances at their laboratory instrument level is stressed. Pocket electroscopes, dental film badges, and frequent blood count tests are useful control measures. The role of radioisotopes in therapy is also covered. NSA 3-26

11506

ON THE EFFECT OF X RAYS ON THE EYES AND THE SKIN. H. Chaluppeky. Centralbl. f. p. Augenheilk 21, 267 (1897). (In German).

11507

PRACTICAL ASPECTS OF MEDICAL SUPERVISION. Katharine Williams. Proc. Roy. Soc. Med. 62, 923-7 (1949) Nov.

Some measures for the protection of personnel from irradiation from x-rays and radioactive isotopes are considered and discussed. Distance and proper shielding are noted as the two most general and effective protective factors, the importance of ventilation, area monitoring, individual monitoring and personnel education is also stressed. Laboratory tests by biochemical and counting methods are considered an essential part of any protection program. It is concluded that with careful control and monitoring the dosage of ionizing radiation can be kept to 0.1 r/week, such protection has been afforded at the Atomic Energy Research Establishment at Harwell, England. NSA 4-1634

11508

EXPERIMENT ON THE EFFICIENCY OF ROENTGEN RADIATION OF DIFFERENT WAVE LENGTHS ON THE SPLEEN OF THE MOUSE IN EQUAL DOSES, MEASURED IN ROENTGEN UNITS. J. Piepenborn. Strahlentherapie, 33, 322-337(1929) (In German).

11509

IONIZING RADIATIONS. Rex H. Wilson. Ohio State Med. J. 45, 579-81(1949) June.

A general discussion of the types and dangers of ionizing radiations encountered in industry is presented. Such precautionary measures as the employment of dental x-ray films to detect exposure and the use of frequent medical examinations to detect abnormal blood counts are mentioned. Lowered white blood cell counts, especially those of the lymphocytic elements, are good indicators of destructive ionization. In conclusion, it is noted that the use of ionizing radiations is a problem which requires close scrutiny on the part of safety, industrial hygiene, and medical personnel. NSA 3-221

11510

MODIFICATIONS OF STRIATED FIBERS BY PROLONGED IRRADIATION BY MEANS OF RADIUM CONTAINERS INTRODUCED INTO MUSCLES. N. Dobrovolskaia-Zavadskaja. J. Radiol. et l'Electrologie 8, 69(1924).

11511

ON THE HISTOLOGICAL PROCESSES IN THE DESTRUCTION OF EPITHELIOMATA CELLS BY ULTRA PENETRATING RADIATION. H. Dominici and R. Daval. Bull. et Memoires de La Soc. Med. des Hopitaux de Paris, 28, 274(1909).

Effects of x-rays on the skin tumors and skin are reported.

11512

NEW STUDIES ON CARBOHYDRATE, FAT AND PROTEIN METABOLISM WITH SPECIAL REFERENCE TO THE EFFECT OF RADIOACTIVE STABLE ISOTOPES. I. E. Muller and A. Niklas. Deut. Zschr. Verdauungskr. 12(6), 293-308(1952).

11513

ON THE EFFECT OF BECQUEREL RAYS ON THE SKIN. H. Halkin. Arch. f. Dermat. und Sypl 65, 201(1903).

11514

STUDIES ON RARE ELEMENTS II. THALLIUM, VANADIUM,

SILICON AND FLUORINE. O. Rygh. Bulletin de la Societe de Chimie Biologie 31, 1403-1407(1947).

11515

RADIUM DAMAGE IN ANIMAL GERM CELLS. O. Hertwig. Arch. f. Mikrosk. Anct. 77, 1(1911).

11516

PROGRESS REPORT: RETINAL DAMAGE FOLLOWING X-IRRADIATION OF THE HEADS OF NEWBORN MICE. H. H. Vogel, Jr. and D. L. Jordan (Argonne National Lab.). p.18 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1951. 1951. (ANL-4713)

11517

EFFECTS OF SOFT AND HARD RADIATION FROM RADIUM ON UTERINE CANCER. A. Lacassagne. Presse Medicale 30, 323(1922). (In French).

11518

FIBROSIS OF THE LUNG FOLLOWING X RAY TREATMENTS FOR TUMOR. L. E. Hires. Jour. Am. Med. Assoc. 79, 720(1922).

11519

RADIOYTTTRIUM (Y^{86}) in METABOLISM OF FISSION PRODUCTS; PROGRESS REPORT FOR PERIOD ENDING FEB. 15, 1943. Kenneth Scott. (Argonne National Lab.). Feb. 15, 1943. (decl. July 15, 1947). 5p. (MDDC-1143)

11520

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF BETA AND ROENTGEN RADIATION AS SHOWN BY THE RADIO-TOXICITY OF Na^{24} FOR MICE. R. H. Snyder and W. E. Kiseleski. Radiology 54(5), 743-9(1950).

11521

EFFECT OF IRRADIATION OF THE OOCYTES ON FERTILIZATION AND SUBSEQUENT GESTATION. A. Lacassagne and H. Coutard. Gynecologie et Obstet. 7, 1(1923).

Authors studied irradiated female rabbits and the offspring of such rabbits. Conclusion: irradiation produces a permanent lesion in irradiated oocytes even though they survive. The nature of the lesion is not known, is not visible microscopically but subsequent development of the ovum is faulty, resulting in faulty or non-viable offspring.

11522

REPOPULATION OF THE TESTICLES WITH FUNCTIONALLY INTACT SPERMATOZOA; PROOF OF RECOVERY FOLLOWING TEMPORARY STERILIZATION BY RADIATION. A. Lacassagne. Bull. d'Histol. Appliquee Physiol. Pathol. Technique Micros. 1, 5(1924). (In French).

11523

ATYPICAL KARYOKINESIS DUE TO X-IRRADIATION OF CANCER CELLS, ROLE IN REGRESSION OF TUMOR. A. Lacassagne and O. Monod. Arch. Franc. de Path. Gen. et Experiment. et D'Anat. Path. 1, 1(1922). (In French).

11524

ANOMALOUS DISTRIBUTION OF ANTIMONY IN WHITE RATS FOLLOWING ADMINISTRATION OF TARTAR EMETIC. A. T. Ness, Frederick J. Brady, D. B. Cowie and A. H. Lawton. J. of Pharmac. and Exp. Therap. 90, 174-180(1947).

11525

DISTRIBUTION OF ADMINISTERED RADIOACTIVE RUBIDIUM (Rb^{86}) IN NORMAL AND NEOPLASTIC TISSUES OF MICE AND HUMANS. Albert Zipser and A. Stone Freedberg. Cancer Research 12, 867-870(1952).

11526

THE USE OF CHELATING AGENTS FOR ACCELERATING EXCRETION OF RADIOELEMENTS. Harry Foreman and Joseph G. Hamilton (Radiation Lab., Univ. of Calif.). June 14, 1951. Decl. Sept. 21, 1951. 18p. (AECD-3247)

The chelating action of (ethylenediamine) tetraacetic acid (EDTA) was investigated as a means of accelerating the excretion of radioelements which have become fixed in the animal skeleton. Rats injected with Y^{91} followed by the administration of Ca EDTA showed excretion of Y^{91} greatly increased when compared with controls which received Y^{91} alone. Rats receiving both Ce^{144} and Pu^{239} , followed by Ca EDTA showed an increase in urinary excretion of Ce when given during the first 24 hr following injection of the isotope. Ca EDTA enhanced urinary excretion of Pu to levels which were approximately 10 times greater than that of control animals. The effect lasted for several days after the cessation of treatment. Fecal excretion of Pu was not affected by the chelating agent except when Ca EDTA was administered during the first 24 hr, at which time there was a marked rise in Pu excretion. NSA 5-6043

11527

THE MODIFICATION OF THE BLOOD OF PROFESSIONAL RADIOLOGISTS. Ch. Aubertin. Comptes. Rend. Soc. Biol. 72, 84(1912). (In French).

11528

RADIUM CAPSULES AND THEIR ASSOCIATED HAZARDS. Robert G. Gallagher and Eugene L. Saenger (Univ. of Cincinnati and the Children's Hospital, Ohio). Am. J. Roentgenol. Radium Therapy Nuclear Medicine 77, 511-23 (1957) March. NSA 11-4796

11529

SKIN CONTAMINATIONS BY RADIOACTIVE SUBSTANCES. MEANS OF PROTECTION AND DECONTAMINATION. P. Genaud. J. radiol. electrol. 32, No. 5-6, 498-503 (1951).

Some 20 different procedures for decontamination of the skin after handling of radioactive tools were tried out, none was found perfect, brushing with soap seemed to be most effective. Usage of certain protective coatings gives considerable protection. NSA 5-6986

11530

RADIUM TREATMENT OF EXOPHTHALMIC GOITRE. W. H. B. Arkins. Radium (Pittsburgh) 11, 81(1918-19).

Surface applications of radium were used in treating 45 cases of exophthalmic goitre. Screen for β rays was used and dose was fractionated. Improved therapeutic results are attributed to dose fractionation.

11531

INDOCTRINATION AND TRAINING OF RADIOLOGICAL DEFENSE PERSONNEL. Roscoe H. Goeke (Federal Civil Defense Administration, Battle Creek, Mich.). Nov. 1955. 22p. Project 38.2 [of] OPERATION TEAPOT. (WT-1165)

An on-site training project was conducted to provide field experience under actual nuclear-explosion conditions for personnel having responsibilities in radiological defense planning and operations in state and local civil defense organizations. A brief outline of the training program is presented. NSA 11-1750

11532

DESIGN OF A PORK-IRRADIATION FACILITY USING GAMMA RAYS TO BREAK THE TRICHINOSIS CYCLE. H. J. Gomberg, S. E. Gould, J. V. Nehemias, and L. E. Brownell (Univ. of Michigan, Ann Arbor). NUCLEAR ENGINEERING, PART III, Chem. Eng. Progr. Symposium Ser. No. 13, 89-104(1954).

The use of ionizing radiation to break the trichinosis cycle has been discussed previously. The technical feasibility has been well established; economic feasibility is thus the major outstanding problem. Presented here are the results of a cost study of a meat-processing plant designed to irradiate hog carcasses, using Cs^{137} or waste fission

products as the radiation source. A radiation dose of 15,000 r will sterilize trichinae encysted within a hog carcass so that they cannot reproduce and cause infection. The irradiation level used in the cost study is 30,000 r to the surfaces of the carcass. Tests and calculations have shown that this radiation could produce a dose of 25,000 r at the center of a 14-in-thick carcass, using techniques which minimize attenuation due to geometry. The thickest sections of carcasses (the hams) are rarely more than 10-in. thick. Flavor tests with ground pork show no detectable taste changes with doses up to 60,000 r. This radiation can also destroy microorganisms. The pasteurization achieved by 60,000 r increases the refrigerator shelf-life of the meat by approximately 100%, 30,000 r increases shelf-life by almost 30%. Pasteurization with gamma radiation will be discussed in more detail in a separate study covering this effect in a number of products. The plant design outlined in this paper was evolved. NSA 9-493

11533

THE QUESTION OF DAMAGE TO THE EYE FROM ROENTGEN IRRADIATION. Birch-Hirschfeld. *Strahlentherapie* 12, 565(1923). (In German).

Observations on patients are reported.

11534

ACTION OF X RAYS ON HUMAN SPERMATOZOA. J. Bergonie and L. Tribondeau. *C. R. Soc. Biol.* 56, 595 (1904). (In French).

Authors suggest that there is cause for concern about effects of repeated exposure of radiologists and technicians to x-rays. They studied human sperm exposed to hard and soft x-rays *in vitro* at 39°C, using motility as the criterion of effect.

11535

ACTION OF X RAYS ON THE TESTICLE OF THE WHITE RAT. J. Bergonie and L. Tribondeau. *C. R. Soc. Biol.*, 57, 155(1905). (4th note). (In French).

11536

THE ROENTGEN TREATMENT OF MENSTRUAL DYSFUNCTIONS AND STERILITY. S. Bruck and J. M. Fruchter. *Radiology* 32, 446(1939).

11537

THE PROBABILITY AND POSSIBILITY OF GERMINAL INJURY DUE TO OVARIAN IRRADIATION. J. Borak. *Strahlentherapie* 45, 751(1932). (In German).

11538

MULTIPLE ARSENICAL CANCERS OF SKIN AND INTERNAL ORGANS. ARSENIC AND RADIATION MAY ACT AS CO-CARCINOGENS. S. C. Sommers and R. G. McManus. *Cancer* 6(2), 347-359(1953). BA 27-22580

11539

SIGNIFICANT CELLULAR CHANGES OBSERVED IN IRRADIATED TISSUE, ESPECIALLY OF CANCER OF THE RECTUM. Harry H. Bowing. *Radium* 93, 3rd Series (1925) (Reprinted from *Radiology* 4, 378-383(1925))

11540

INJURIES TO THE ORGANISM DUE TO SMALL DOSES OF RADIOACTIVE PHOSPHORUS. V. A. Sondak. *Biofizika* 1, 211-220(1956). CA 50-16927

11541

NEW FINDINGS ABOUT CHANGES IN ALBUMIN UNDER ULTRAVIOLET, RADIUM, AND ROENTGEN RADIATION. Mona Spiegel-Adolf. *Ergeb. Physiol.* 27, 832-863(1928). (In German).

11542

ACTION OF X RAYS ON THE TESTICLE. J. Bergonie and L. Tribondeau. *Arch. D'Electrol. Med.* 14, 779(1906).

The authors present their observations in a series of four papers (2 chapters) in this volume. Observations are reported on: clinical changes and fertility in adult and aged male rats exposed to 1, 3 or 4 doses of x-rays, the

sterilizing dose of x-rays, histological changes in irradiated testes and changes in spermatozoa (rat and human) irradiated *in vitro*. The last part of the report summarizes and discusses the authors' observations and observations reported by other investigators.

11543

RADIOSTRONTIUM METABOLISM IN MAN. H. E. Spencer and D. Laszlo. *Federation Proc.* 15, 175(1956).

11544

THE "PENETRATING IRRADIATION SICKNESS." A. Beclere. *J. Roentgenol. Radium Ther.* 5, 499(1918).

11545

ON SOME FORMS OF EARLY REACTIONS FOLLOWING ROENTGEN IRRADIATION. J. Bergonie and E. Speder. *Arch. D'Electrol. Med.* 19, 241(1911). (In French).

The observations reported represent patients receiving radiation therapy. Superficial reactions include slight swelling, progressing within a few hours to redness and burning, the reaction subsiding in approximately 12 days. Deep reactions included headache deep within the head (persisting for a few hours or a few days), hyperesthesia at points of emergency of sensory nerves, and in areas supplied by intercostal nerves, torticollis, leg edema and paresthesias. Dryness of the mouth and painful salivary glands were noted after epilating doses, painful ovaries after pelvic irradiation and intestinal colic due to effects on intestinal mucus secreting glands.

11546

ABNORMAL DEVELOPMENT OF TOAD OVA FERTILIZED BY SPERMATOZOA EXPOSED TO ROENTGEN RAYS. C. R. Bardeen. *J. Exp. Zool.* 4, 1(1907).

11547

Rochester. Univ., New York. THE TOXICITY OF U HEXAFLUORIDE FUME IN ANIMALS, EXPOSED ONE YEAR TO 0.05 and 0.2 mg U/m³. C. J. Spiegl. (1948) 65p. (AECD-1918; UR-4)

Exposure to UF₆ at 0.2 mg U/m³ produced slight but definite changes in the prothrombin clotting time and blood fibrinogen levels of dogs, rats, and rabbits, although no pathologic changes were found in the liver. Mild renal tubular injury was produced in 12 of 14 dogs within 10 days, and in 55 per cent of the rabbits and 16 per cent of the rats, respectively. Fluoride, but not uranium was found deposited in the bones of rats. Alveolar bone changes were pathognomonic of fluorosis although dental studies of incisors showed only slight pigmentary changes. Except for 2 of 17 dogs and 1 of 141 rats, there was no evidence that 0.05 mg U/m³ produced any morphologic changes.

11548

THE EFFECTS OF X-RAYS ON PLANTS. H. Seckt. *Ber. Deut. Bot. Ges.*, 20, 87-93(1902). (In German).

11549

STUDIES ON METABOLISM OF POLONIUM IN EXPERIMENTAL ANIMALS AND LONG TERM CHRONIC EXPOSURE OF ANIMALS TO RADIOACTIVE MATERIALS. J. N. Stannard and John B. Hursh (University of Rochester, Rochester, N. Y.). (1948). (UR-39)

Authors report observations on rats that received intravenous injection of 0, 1, 5 or 10 µc of polonium/Kg. The animals were studied over a period of 1 1/2 years, representative animals being killed for hematological and histological studies at various times after injection. The report includes data showing the Po content of various tissues at 21, 42, 59 and 90 days after injection.

11550

RETENTION OF METABOLIC RADIOACTIVE CARBON. R. Steele. *Biochem. J.* 60, 447-453(1955).

The author attempts to show how measurements of the ratio of ¹⁴CO₂ expired to the total ¹⁴CO₂ of the body can

give information as to whether $^{14}\text{CO}_2$ is produced throughout the soft tissues or only in a small portion of them.

11551

RETENTION OF ENVIRONMENTAL RADIUM BY YOUNG HUMANS. A. F. Stehney and H. F. Lucas, Jr. *Radiation Res.* **3**, 351(1955).

11552

STUDIES ON THE RADIUM CONTENT OF HUMANS ARISING FROM THE NATURAL RADIUM OF THEIR ENVIRONMENT. A. F. Stehney and H. F. Lucas, Jr. p.49-54 of Vol. 11 of INTERNATIONAL CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY, 1955.

11553

METABOLISM OF THE LABYRINTHINE BONES; EXPERIMENTAL STUDIES ON METABOLISM OF RADIO-PHOSPHORUS AND RADIOCALCIUM. J. Steller. *Arch. Ohr. Sc. Heilk.* **164**(4), 320-7(1954).

11554

A DERIVED BIOLOGICAL HALF-LIFE OF POLONIUM IN HUMANS. E. S. Spoerl. Report for Biol. Res. 73-6(1951).

11555

THE EFFECTS OF RADIUM RADIATION, A PHYSIOLOGICAL-CHEMICAL STUDY ON CHICKEN EGGS G. Schwarz. *Ges. Physiol.* **100**, 532-546(1903) (In German)

11556

DISTRIBUTION OF RADIOACTIVE PHOSPHORUS IN NORMAL AND DISEASED BRAIN TISSUE, EXPERIMENTAL AND CLINICAL OBSERVATIONS. W. E. Stern and C. Marshall. *Proc. Soc. Exp. Biol. Med.* **78**(1), 16-20 (1951).

11557

IRON EXCRETION IN THE MOUSE Alexander R. Stevens, Jr., Philip L. White, D. Mark Hegsted and Clement A. Finch. *J. of Biol. Chem.* **203**, 161-165(1953).

11558

THE MECHANISM OF THE BIOLOGICAL EFFECT OF ROENTGEN RADIATION F. Pordes *Strahlentherapie* **19**, 307-324(1925). (In German).

11559

INFLUENCE OF RADIUM RAYS ON COLLOID PRODUCTION BY PROTOZOA. M. Zuelzer and E. Philipp. *Strahlentherapie* **20**, 737-770(1925) (In German).

11560

THE SECRETION OF RADIOACTIVE PHOSPHORUS IN SALIVA AND GASTRIC JUICE IN MAN. J. Stevens. *Clin. Sc.* **12**(4), 375-83(1953).

11561

METABOLIC EFFECTS OF MARKED SODIUM RESTRICTION IN HYPERTENSIVE PATIENTS. PART 2. EVIDENCE FOR A VARIABLE SODIUM POOL WITH CONSTANT DIETARY INTAKE. Lewis K. Dahl, Bernard G. Stall, III, and George C. Cotzias (Brookhaven National Lab. and Rockefeller Inst. for Medical Research Hospital, New York). (1954). 15p. (BNL-1843)

Measurements of total exchangeable Na (TENa) were made in a series of 16 patients with essential hypertension before and after marked sodium restriction. Changes in values for TENa have been compared with the net sodium balance according to estimates of intake and output of this ion. In 16 of the 44 periods included in this study, it was found that variation in TENa bore no apparent relationship to net balance calculations and, in fact, diverged significantly. It was suggested that changes in the availability of the reservoir of sodium in bone, and possibly in other tissues, accounted for the findings. NSA 8-4876

11562

PLUTONIUM, RADIUM AND MESOTHORIUM. C. N. Stover, Jr., ed. University of Utah College of Medicine, Radiobiology Lab, Second Annual Conference

(1954) on Plutonium, Radium and Mesothorium. Salt Lake City, Utah. June 17, 18, 19(1954).

11563

SCREW-WORM CONTROL THROUGH RELEASE OF STERILIZED FLIES. A. H. Baumhover, A. J. Graham, B. A. Bitter, D. E. Hopkins, W. D. New, F. H. Dudley and R. C. Bushland. *J. Econ. Entomol.*, **48**, 462-466 (1955).

11564

THE DISTRIBUTION AND EXCRETION OF HEXAVALENT URANIUM IN MAN. E. G. Struxness, A. J. Luessenhop, S. R. Bernard, and J. C. Gallimore. Vol. 10, p.186-96 of INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA IN AUGUST 1955. New York, United Nations. 1956.

11565

INFLUENCE OF CHELATES ON THE METABOLISM OF RADIOYTTTRIUM (Y^{90}). II. H. C. Dudley and Joseph Greenberg (U. S. Naval Hospital, St. Albans, N. Y.). *J. Lab. Clin. Med.* **47**, 891-7(1956) June. NSA 10-9112

11566

P³² ABSORPTION BY ERYTHROCYTES IN ANEMIA. II. CLINICAL INVESTIGATION. Sugiyama. *Nihon Univ. Med. J.* **14**(1), 39-43(1956).

11567

SMALL DOSES OF X RAY FOR AMENORRHEA AND STERILITY IN VIVO. L. Edeiken. *Amer. J. Obstet. and Gyn.* **25**, 511(1933).

Small doses of x ray directed to the pituitary gland and ovaries are of proved value in patients with functional amenorrhea. X-ray therapy is also of definite value in properly selected cases of female sterility. Before irradiation is undertaken all pathologic lesions in the pelvis which may be a possible cause of amenorrhea or sterility must be excluded by a competent gynecologic examination.

11568

POLONIUM IN THE URINE OF MINERS EXPOSED TO RADON. Mary Sultzer and John B. Hursh. *A. M. A. Arch. and Indust. Hygiene and Occup. Med.* **9**, 89-100(1954).

11569

QUARTERLY PROGRESS AND WORK ACCOMPLISHMENT REPORT FOR QUARTER ENDING DECEMBER 31, 1952, AGRICULTURAL RESEARCH PROGRAM. (Tennessee Univ.). (nd) 152p. (ORO-90)

The work reported on Pa^{233} includes the purification for biological use from neutron-irradiated Th nitrate; radiochemical properties of importance in biological measurements, absorption, tissue distribution, retention and fetal transfer in rats, adsorption, behavior in blood, secretion in milk, and tissue distribution in dairy cattle, sheep, and pigs, and a discussion of data from these studies from the standpoint of ingestion of food products from animals exposed to Pa^{233} . Preliminary results from a study of the effects of estrogen on Ca behavior in blood and bone, Ca and P blood levels, and bone histology in cattle show that moderate levels of α estradiol caused bone and urinary Ca changes, while high levels caused decreased serum Ca with concomitant serum P increases. Procedures and results are presented for the determination of endogenous fecal Ca in cattle by a simple isotope-dilution method which allows estimation of the true digestibility of Ca. Results are presented from a study of the availability for plant uptake and the leaching from soil of Ca incorporated therein as Ca^{45} -labeled Ca silicate. The LD_{50/30} value for burros exposed to whole-body irradiation was recalculated and was determined to be 651 r for γ radiation from Ta^{182} sources and 784 r for γ radiation from Co^{60} sources. The LD_{50/30} for swine exposed to total-body γ radiation from Co^{60} sources was determined as 618r. The LD_{50/30} for rabbits exposed to total-body irradiation from Co^{60} sources was determined to be 1094 r. Detailed blood value changes

in the burro following irradiation and a statistical analysis of the data are included. NSA 7-2731

11570

INVESTIGATIONS WITH ROENTGEN RAYS ON ANIMAL OVARIES AND DEMONSTRATION OF THE INHERITANCE OF ACQUIRED CHARACTERISTICS AND THEIR BEARING ON THE CANCER PROBLEM. M. Fraenkel. *Strahlentherapie* 12, 507(1921). (In German).

11571

ON THE GENERAL EFFECT OF ROENTGEN AND RADIUM RAYS. G. Fromme. *Z. Geburtsh. u. Gynak.* 79, 579 (1916-17). (In German).

Author reviews effects of x-rays and radium rays on blood, hematopoietic tissue, liver, skin and gastrointestinal tract. Observations on frogs following injection of mesothorium are described including blood flow in capillaries of foot webs, lethal effects, effect on general circulation and histological changes in the heart. Observations on histological changes in the nervous system and muscles are described for young axolotls. The histological changes observed in guinea pigs and mice after exposure to large doses included heavy deposition of blood pigment in reticuloendothelial cells, capillary damage, splenic atrophy, vacuolated epithelial cells in spleen, testes and skin and a high incidence of infection.

11572

HISTOLOGICAL LOCALIZATION OF RADIOACTIVE ELEMENTS. J. Gross and C. P. LeBland. *Canad. Med. Assoc. J.* 57, 102(1947).

11573

CHANGES IN PHOSPHATE EXCRETION UNDER THE INFLUENCE OF ROENTGEN RAYS. L. Lecerclé. *C. R. Acad. Sci. (Paris)* 123, 362(1896). (In French).

11574

ON THE HISTOLOGICAL AND OTHER CHANGES PRODUCED IN ANIMALS BY EXPOSURE TO GAMMA RAYS OF RADIUM. W. S. Lazarus-Barlow. Privy Council Medical Research Council of Great Britain, London. (1922). 21p.

11575

THE INFLUENCE OF RADIOACTIVITY ON THE DIVISION OF ANIMAL CELLS. W. S. Lazarus-Barlow and V. Bonney. *Arch. Middlesex Hospital* 15, 147(1909).

11576

CARDIOVASCULAR PROBLEMS DUE TO RADIATION IN COURSE OF TREATMENT OF NEOPLASMS. J. Lavedan and O. Monod. *C. R. Soc. Biol.* 86, 153(1922). (In French).

11577

PROGRESS REPORT: MODIFICATION OF ACUTE IRRADIATION INJURY BY BONE MARROW INJECTIONS. E. C. Lorenz, C. Congdon and D. Uphoff (Argonne National Lab.). p.9-12 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1951. A. M. Brues, ed. (ANL-4713)

11578

EFFECTS OF SMALL X RAY DOSES ON THE RAT TESTES. C. A. Joel and H. V. Wattenwyl. *Strahlentherapie* 71, 139 (1942). (In German).

Small doses delivered to rat testes caused temporary sterility. Pituitary changes were found during this period. Recovery occurred and rats sired normal progeny. Litter size was normal after doses less than 1800 r.

11579

A STUDY OF VARIATIONS IN SECRETION OF Ca^{45} BY THE MAMMARY GLANDS OF DAIRY COWS. E. W. Swanson, et al. *J. Dairy Sci.* 39(1954).

11580

EXAMINATION OF THE CHILDREN FROM IRRADIATED

WOMEN. E. Maurer. *Strahlentherapie* 45, 691(1932). (In German).

11581

DOSE CONTROL IN RADIOTHERAPY. B. Jolles. *Nature* 157, 552(1946).

11582

STUDIES ON THE DISTRIBUTION OF FIXED CARBON. R. W. Swick, D. L. Buchanan, and A. Nahao. p.94 of DIV. OF BIOLOGICAL AND MEDICAL RESEARCH QUARTERLY REPORT, NOV., DEC., 1951, JAN. 1952. Austin M. Brues, ed. (nd). 132p. (ANL-4745)

11583

EXPERIMENTAL PATHOLOGY. PROGRESS REPORT: URANIUM TOXICITY IN MICE. M. P. Finkel and G. M. Hirsch, (Argonne National Lab.), p.119 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1951. A. M. Brues, ed. (ANL-4713)

Radium 226 and Plutonium 239 toxicities in mice.

11584

THE ABSORPTION OF INGESTED PLUTONIUM. Miriam Finkel (Argonne National Lab.), p.44-50 of BIOLOGY DIVISION QUARTERLY REPORT FOR NOV. 1946 TO JANUARY 1947. Austin M. Brues, ed. February 1947. (CH-3782)

11585

HISTOLOGICAL EXAMINATION OF THE BRAINS OF ANIMALS EXPOSED TO THE GAMMA RAYS OF RADIUM. T. Morowaka and F. Mott. p.131 of MEDICAL USES OF RADIUM. (Privy Council Medical Research Council of Great Britain).

11586

X RAYING THE SPLEEN TO CONTROL UTERINE BLEEDING. L. Nurnberger. *Zentralbl. f. Gynak.* (1923). (In German).

Irradiation of the spleen stopped abnormal uterine bleeding in patients within 1/2 hr. 3 days after treatment.

11587

ABSORPTION OF PLUTONIUM FED CHRONICALLY TO RATS. Joseph Katz, Harry A. Kornberg and Herbert M. Parker. *Amer. J. Roentgenol. and Radium Therapy* 73 (2), 303-308(1955). BA 30-3929

11588

ON X RAY ACCIDENTS. Oudin. *Arch d'Electrol. Med.* 10, 153(1902). (In French).

11589

ACCIDENTAL CUTANEOUS AND VISCERAL CONSEQUENCES OF THE USE OF RADIUM. Oudin, Barthelemy and Darier. *Xth Congress de Dermatologie de Moscou* (1897). *France Medical* 45, 113, 129, 145, 162, 179(1898). (In French).

11590

ABSORPTION AND DEPOSITION IN THE SKELETON AND SOFT TISSUES OF THE RAT OF PLUTONIUM FED CHRONICALLY AS SOLUTIONS OF VERY LOW MASS CONCENTRATION. J. Katz and H. A. Kornberg (Hanford Works, General Electric Co., Richland, Wash.). 1953. 20p. Contract W-31-109-Eng-52. (HW-28991)

11591

IRRADIATION OF BRAIN TUMORS AT BELLVIEW HOSPITAL (1924-1939). I. I. Kaplan. *Radiology* 36, 588(1941).

Brain will tolerate radiation doses (from radium pack or x rays) greater than doses required for therapy. Many tumors are radiosensitive, i. e. can be treated successfully if radiation dose is adequate. Lower doses can be used to suppress or depress certain cells of the hypophysis.

11592

ABSORPTION AND DEPOSITION IN THE SKELETON AND SOFT TISSUE OF THE RAT OF PLUTONIUM FED CHRONICALLY AS SOLUTION OF VERY LOW MASS

CONCENTRATION. Joseph Katz and H. A. Kornberg. (Hanford Works, Richland, Wash.). p.78-84 of BIOLOGY RESEARCH. ANNUAL REPORT, 1952. July 7, 1953. 189p. (HW-28636). NSA 7-6331-2

11593

ON THE EFFECT OF ROENTGEN RAYS ON EPITHELIAL TISSUES; ESPECIALLY CARCINOMAS. G. Pethes. Archiv. f. Klin. Chirurgie 71, 955(1903).

11594

RADIOLOGICAL SCIENCES DEPARTMENT RESEARCH AND DEVELOPMENT ACTIVITIES QUARTERLY PROGRESS REPORT [FOR] JANUARY-MARCH 1956. H. M. Parker (Hanford Atomic Products Operation, Richland, Wash.). Apr. 13, 1956. Decl. Mar. 6, 1957. 33p. Contract W-31-109-Eng-52. (HW-42403)

Progress is reported in the following studies: a radio-biological-ecological survey of the Columbia River; the toxicity of sodium dichromate in effluent water for chinook salmon, the toxic effects of continuous low-level exposure to I^{131} in sheep, comparative effects of β irradiation on the skin of sheep, swine, and rabbits, fission product absorption and metabolism in rats, absorption and metabolism of reactor effluent radioisotopes in rats, gastro-intestinal radiation injury in rats, fission product uptake in plants, genetic effects of internally deposited radioelements in yeast, biological monitoring of waterfowl, development of a system for the quantitative measurement by γ counting of fission products in reactor effluent, the development of monitoring methods and instruments, counting techniques, soil chemistry; waste disposal, and meteorological studies. The status of the research program is reviewed.

NSA 11-11556

11595

THE COMBINATION OF RADIUM AND THE X RAY IN CERTAIN TYPES OF CARCINOMA OF THE BREAST.

D. Quick. Surg. Gynec. and Obstet. 32, 156(1921).

Changes in therapeutically irradiated breast carcinoma included hydropic degeneration, necrosis, shrinkage and nuclear pyknosis 49 days after radium was implanted.

11596

CONTRIBUTION TO THE STUDY OF GASTRIC STIMULATION BY X-RAYS Simonetti. Gaz. d. Osp. 4 (1923).

Weak doses stimulate, strong doses decrease acid secretion and pepsin secretion by the stomach.

11597

CORTISONE AND ROENTGEN RADIATION IN COMBINATION AS SYNERGISTIC AGENTS FOR THE PRODUCTION OF LETHAL INFECTIONS. J. T. Syvertson, A. A. Werner, J. Friedman, E. J. Roth, Jr., A. B. Graham and O. J. Mira. Proc. Soc. Exptl. Bio. and Med. 80, 123(1952).

11598

TECHNICAL PROGRESS REPORT ON THE METABOLIC STUDIES OF FISSION PRODUCTS. Joseph G. Hamilton, (Argonne National Lab.). May 2, 1949, Decl. June 25, 1947, 1944. (AECD-1061; CH-1572; A-2240; MDDC-1061)

11599

STUDIES OF RADIOACTIVITY AND IRRADIATION. Joseph G. Hamilton (University of California Radiation Laboratory). p.3-7 of MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT, JANUARY, FEBRUARY, MARCH, 1956. (UCRL-3386)

11600

METABOLISM OF FISSION PRODUCTS. Joseph G. Hamilton (University of California Radiation Laboratory). Progress Report for Month ending March 15, 1943. (MDDC-1142)

11601

UPTAKE AND STORAGE OF RADIOACTIVE IRON BY MOUSE LIVER. J. K. Hampton and J. B. Kahn, Jr. Am. J. Physiol. 174, 2 (August 1953)

11602

Oak Ridge Institute of Nuclear Studies, Tennessee. THE REACTION OF BRAIN TISSUE TO BETA RADIATION. P. V. Harper, T. B. Rasmussen, T. T. Kennedy, and A. Y. Gerol. (Argonne Cancer Research Hospital and The Department of Surgery, University of Chicago Clinics, Chicago, Illinois). p.365-76 of Rare Earths in Biochemical and Medical Research, a conference sponsored by the Medical Division, Oak Ridge Institute of Nuclear Studies, October, 1955. Granvil C. Kyker and Elizabeth B. Anderson, eds. September 1956. 476p. (ORINS-12)

11603

METABOLISM OF LANTHANUM AND YTTRIUM CHELATES. Hiram E. Hart, J. Greenberg, R. Lewin, H. Spencer, K. G. Stern, and D. Laszlo. J. Lab. Clin. Med. 46, 182-92(1953).

11604

THE METABOLISM OF TRITIUM GAS IN THE RAT. G. N. Smith, L. A. Temple, R. J. Emerson and T. W. Galbraith. p.43-51 of BIOLOGY RESEARCH, ANNUAL REPORT, 1952. July 7, 1953. 189p. (HW-28636)

NSA 7-6331-2

11605

DEPOSITION OF RADIOACTIVE SUBSTANCE IN BONE. Frank E. Hoecker. in: PEACEFUL USES OF ATOMIC ENERGY, INTERNATIONAL CONFERENCE HELD AT GENEVA, SWITZERLAND, AUGUST, 1955, VOLUME II: 138-145(1956). Paper Number P/88. United Nations Publication, United Nations, N. Y.

11606

DISTRIBUTION OF RADIOACTIVE ISOTOPES OF IODINE IN NORMAL RABBITS. Ariel Irving, W. F. Bale, V. Downing, H. C. Hodge, W. Mann, S. V. Voorhis, S. L. Warren, and H. J. Wilson. Am. J. Physiol. 132, 346-350 (1941).

11607

THE LOCALIZATION OF YTTRIUM IN BONE. J. Jowsey. (Univ. of Chicago). p.311-20 of RARE EARTHS IN BIOCHEMICAL AND MEDICAL RESEARCH: A CONFERENCE SPONSORED BY THE MEDICAL DIVISION, OAK RIDGE INSTITUTE OF NUCLEAR STUDIES, OCTOBER 1955. G. C. Kyker and E. B. Anderson, eds. Sept. 1956. (ORINS-12)

11608

THE SITE OF DEPOSITION OF Y^{91} IN THE BONES OF RABBITS AND DOGS. J. Jowsey, H. A. Sissons, and J. Vaughn. J. Nuclear Energy 2, 168-76(1956).

11609

THE EFFECTS OF CATHODE RADIATION ON LIVING TISSUE. W. Pauli and A. Hartman. Arch. Mik. Anat. 103, 95-167(1924). (In German)

11610

METABOLISM OF RADIOYTTRIUM. Bergene Kavin. Arch. Biochem. Biophys. 45, 230-231(1953).

11611

COMPARATIVE METABOLISM OF DEUTERIUM AND TRITIUM IN THE RAT. R. C. Thompson and J. E. Ballou. p.67-71 of BIOLOGY RESEARCH, ANNUAL REPORT, 1952. July 7, 1953. 189p. (HW-28636) NSA 7-6331-2

11612

RADIOACTIVE ISOTOPES, RADIATION SICKNESS, ITS THERAPY AND PREVENTION. Vakhtang Khubutiya and Revaz Vepkhvadze. Tiflis, Gruzmedgiz. 1956. 190p.

11613

NOTES ON THE ROENTGEN TREATMENT OF LEUKEMIA IN VIVO. SPLENIC LEUKEMIA. W. O. Upson. Am. J. Roentgenol. 7, 608(1920).

It would seem that the benefit desired from radiation in leukemia is due not alone to the destructive action on the

blood and blood forming organs, but to certain leukocytic substances that are in some manner produced by the treatment. By applying the treatment to the long bones first, there is a more gradual but more lasting reduction of the leukocytes with less toxic effect than when the treatment is applied to the spleen first. During the course of the x-ray treatment there is usually a slight initial rise of the leukocytes followed by a gradual reduction of the white count with an increase of red cells. Leukemia usually does not respond so readily to treatment after the first or second series.

11614

ON A PREVIOUSLY UNDESCRIBED EFFECT OF ROENTGEN RAYS ON ANIMALS. H. C. Albers-Schonberg. Munch. Med. Wochenschr. 50, 1859(1903).

Author reports his studies on effects of various doses of x-rays on the testes of male rabbits and guinea pigs. Fertility and histological changes in the testes were used as criteria of radiation effect.

11615

STUDIES ON THE METABOLISM OF FISSION PRODUCTS. II. STUDIES ON THE METABOLISM OF THE RADIO-ISOTOPES CONTAINED IN THE RADIOACTIVE ASHES OBTAINED FROM THE NO. 5 FUKURYA MARU. Takenhiko Kikuchi, Gyoichi Wakisaks, Tsuyoshi Kono, Hiroshi Goto Hiroaki Akagi, Tsunehisa Yamamsu and Isamu Sugawa. p.84-98 of BULLETIN OF THE INSTITUTE FOR CHEMICAL RESEARCH, KYOTO UNIVERSITY, KYOTO, JAPAN, SUPPLEMENTARY ISSUE, Nov. 1954.

11616

STUDIES ON THE METABOLISM OF FISSION PRODUCTS K. STUDIES ON THE METABOLISM OF FISSION PRODUCTS NO. 5 FUKURYU MARU. Takenhiko Kikuchi, Gyoichi Wakisaka, Tsuyoshi Kono, Hiroshi Goto, Hiroaki Akagi, Tsunehisa Yamamsu and Isamu Sugawa. p.75-83 of BULLETIN OF THE INSTITUTE FOR CHEMICAL RESEARCH, KYOTO UNIVERSITY, KYOTO, JAPAN, SUPPLEMENTARY ISSUE, Nov. 1954.

11617

RADIATION-INDUCED INJURIES. Jenő Kovacs. Magyar a' illatorv. lapja, 11, No. 10-12, 370-373(1956). Hungar

11618

THE EFFECT OF THE X-RAYS ON THE TESTIS OF THE RAT. H. V. Wattenwyl and C. A. Joel. Strahlentherapie 70, 588(1941). (In German).

Authors studied effects of small doses of x-rays delivered to testes and ovaries of rats.

11619

COMPARATIVE EVALUATION OF EXCRETION OF RADIUM AND OF RADIOACTIVE COBALT IN RATS. P. G. Kriukov. Vest. Rentg. No. 4, (July-Aug. 1954).

11620

THE EFFECT OF X-RAYS ON THE TESTES OF RATS. H. V. Wattenwyl and C. A. Joel. Strahlentherapie 70, 160(1941). (In German).

11621

EFFECTS OF SMALL X-RAY DOSES ON OVARIES AND TESTES OF RATS. H. V. Wattenwyl and C. A. Joel. Strahlentherapie 75, 296(1944). (In German)

11622

INFLUENCE OF ROENTGEN RAYS ON THE INTRACELLULAR DISTRIBUTION OF RADIOIRON IN RAT LIVER. H. A. Kunkel and H. Kenke. Strahlentherapie Sonderbd. 36, 1-4(1956). (In German).

11623

THE INFLUENCE OF ROENTGEN RAYS ON GASTRIC SECRETION. A. Wachter. Strahlentherapie 12, 556(1923). (In German)

11624

EFFECTS OF pH AND CARRIER ON THE DISTRIBUTION

OF RADIOYTRIUM. Granvil C. Kyker, Edgar A. Cress, and G. I. Gleason. p.19c-20c of Abstracts of Papers Presented at the American Chemical Society Meeting, March 24-April 1, 1954. Kansas City, Missouri. Paper 47.

11625

ROENTGEN RAY ACTION AND PROTOPLASMIC VISCOSITY. Friedl Weber. Arch. ges. Physiol. (Pfluger's) 198, 644-47(1923).

X-rays did not effect the viscosity of the cytoplasm of the algae *Spirogyra* or the bean *Phaseolus multiflorus*. CA 17-2891

11626

RADIATION REACTIONS. B. W. Windeyer. Brit. J. Radiol. 15, 236-7(1942).

Author summarizes the clinical and histological aspects of radiation reactions of epidermis and compares effects of x-ray with effects of thermal burns. He also discusses connective tissue reactions and the treatment of the radiation lesions.

11627

ORAL ADMINISTRATION OF VITAMIN B12 CONTAINING COBALT⁶⁰ TO RATS. C. A. Lang, B. F. Chow, C. Rosenblum, R. H. Silber, D. T. Woodbury and R. Yamamoto. Fed. Proc. 10(1), 212-213(1951). BA 25-23077

11628

TOXICOLOGY OF ACTINIUM EQUILIBRIUM MIXTURE. W. Langham and J. Storer (Los Alamos Scientific Laboratory). Feb. 20, 1952. 15p. (LA-1372)

11629

THE TEMPORARY EFFECT OF X RAYS IN THE MENO-PAUSE. H. Wintz. Strahlentherapie 45, 653(1932). (In German).

11630

DOSAGES DELIVERED TO VARIOUS ORGANS BY INJECTED POLONIUM. J. Samuel Lattes and M. Antoine Lacassagne. Compt. Rend. Acad. Sci. 178, 771-773 (1924) (In French).

11631

LATE SEQUELAE OF DIVERGENT BIOLOGIC SKIN EFFECTS PRODUCED BY ROENTGEN IRRADIATION WITH VARYING VOLTAGES IN VIVO. E. R. Witwer and T. Leucutia. Radiology 34, 24(1940).

11632

PROGRESS REPORT FOR AUGUST, 1947 - MEDICAL AND HEALTH PHYSICS SECTION. PART A. COBALT DISTRIBUTION. John H. Lawrence (Radiation Laboratory, University of California). 4p. (MDDC-1597)

11633

BIOLOGICAL STUDIES ON STABLE AND RADIOACTIVE RARE EARTH COMPOUNDS. III. DISTRIBUTION OF RADIOACTIVE YTTRIUM IN NORMAL AND ASCITES-TUMOR-BEARING MICE, AND IN CANCER PATIENTS WITH SEROUS EFFUSIONS. Ruth Lewin and Hiram E. Hart (Coll. of the City of New York), Joseph Greenberg (National Cancer Inst., Bethesda, Md.), Herta Spencer, Kurt G. Stern and Daniel Laszlo (Montefiore Hospital, New York). J. Natl. Cancer Inst. 15, 131-44(1954) Aug.

The distribution of radio-yttrium, Y⁹⁰, following intracavitary administration in ionized form, has been studied in normal and Ehrlich ascites-tumor-bearing mice and in terminal cancer patients. The retention of the radioisotope in the injected cavity was markedly enhanced by the addition of stable yttrium; at low carrier levels significant amounts of Y⁹⁰ were found in tissues distant from the injected cavity, whereas relatively high carrier levels greatly reduced the leakage from the cavity. In view of these observations and of the favorable radiation characteristics of Y⁹⁰ which reduce safety hazards to patient and personnel, the potential usefulness of this isotope in the

palliative therapy of carcinomatous effusions was discussed. NSA 9-511

11634

LATE CLINICAL CHANGES FOLLOWING THE INTERNAL DEPOSITION OF RADIOACTIVE MATERIALS. W. B. Looney. *Ann. Int. Med.* 42, 378(1955).

11635

INTERPRETATION OF SOME RESULTS OF RADIO-THERAPY AND ATTEMPTS TO DEVELOP A RATIONAL STANDARD TECHNIQUE. J. Bergonie and L. Tribondeau. *C. R. Acad. Sci. (Paris)* 143, 983-985(1906), *Trans-lation in Rad. Res.* 11, 587-588(1959). (In French).

Authors discuss selective action of x-rays on epithelial tumors and the induction of tumors by x-radiation. They conclude that x-rays have their greatest effect on rapidly dividing cells, on cells having longer reproductive futures and on cells that are most undifferentiated morphologically.

11636

RADIOACTIVITY AND LUNG CANCER; A CRITICAL REVIEW OF LUNG CANCER IN THE MINERS OF SCHNEEBERG AND JOACHIMSTHAL. Egon Lorenz. *Journal of the National Cancer Institute* 5, 1059-1069(1955).

11637

UNFAVORABLE REACTION TO USE OF STREPTOKINASE-STREPTODORNASE IN INDOLENT POSTROENTGEN IRRADIATION ULCERATION. S. G. Castigliano and C. J. Rominger. *Amer. J. Surgery* 85, 55-61(1953).

11638

THE DIFFERENTIAL ABSORPTION OF RADIOACTIVE ISOTOPES IN ARTIFICIALLY CONSTRUCTED AND NORMAL BLADDERS IN DOGS. H. D. Marucci. *Surg. Gyn. Obst.* 101(3), 285-9(1955) Sept.

11639

THE USE OF CORTISONE IN TREATMENT OF CHORIO-RETINAL DAMAGE RESULTING FROM OBSERVATION OF ATOMIC DETONATION. A. L. Chambers. *Military Med.* 117, (4), 338-42(1955).

11640

RADIUM AND MESOTHORIUM POISONING AND DOSIMETRY AND INSTRUMENTATION TECHNIQUES IN APPLIED RADIOACTIVITY. ANNUAL PROGRESS REPORT. (Massachusetts Inst. of Tech., Cambridge. Radioactivity Center). May 1956, 100p. Contract AT(30-1)-952. (AECU-3261) NSA 11-5179

11641

ADMINISTRATION OF RUTIN AS PROTECTIVE AGENT AGAINST RADIATION INJURY. L. Cohen. *Brit. J. Radiol.* 26, 271(1953).

11642

MAXIMUM PERMISSIBLE CONCENTRATION OF RADIO-ISOTOPES IN FOOD, WATER AND AIR AND MAXIMUM PERMISSIBLE EQUILIBRIUM AMOUNTS IN THE BODY. K. Z. Morgan. *Acta Radiol.* 40(6), 30-46(1953).

11643

PATHOLOGIC CHANGES PRODUCED IN THE THYROID BY I^{131} . G. A. Andrews and R. M. Kniseley. p.400-11 of RADIOISOTOPES IN MEDICINE. G. A. Andrews, M. Brucer, and Elizabeth B. Anderson, eds. Sept. 1953, 825p. (ORO-125)

Authors describe effects of large destructive doses of I^{131} on normal human thyroid. Single dose does not destroy the gland but leads to extensive necrosis of epithelium, infraction and fibrosis (72mc dose).

11644

OUR LOAD OF MUTATIONS. H. J. Muller (Indiana U., Bloomington.) *Amer. Jour. Human Genetics* 2(2), 111-176(1950). BA 25-7156

11645

A STUDY OF THE MORPHOLOGY OF THE LIVING CELLS OF BLOOD AND BONE MARROW IN VITAL FILMS WITH

PHASE CONTRAST MICROSCOPY. G. A. Ackerman, N. C. Bellios, R. A. Knouf, and W. J. Frajola. *J. Hematol.* 9, 795-803(1954).

Cytochemical changes were observed in rat lymphocytes within 2 hours after 600 r total body x-ray dose. BA 29-25874

11646

PROBLEMS OF RADIATION PROTECTION ASSOCIATED WITH THE USE OF RADIOACTIVE ISOTOPES. Hermann Muth. *Strahlentherapie* 97, 246-58(1955) June. (In German).

The introduction into therapy of artificial radioisotopes has increased the scope of problems relating to the protection against the damaging influence of radiations. Obligatory values for the admissible doses of the various radiations emitted by radioisotopes, serve as a basis for speculations and calculations with respect to the protective measures. The author consolidates in tables and discusses the figures set up on a provisional basis on the occasion of the 1953 International Conference of Radiologists in Copenhagen. Particular reference is made to the new unit of dose, the rad, introduced during that conference. The amount of radiant energy acting on the critical organ is decisive for the estimation of the admissible quantities of radioisotopes to be introduced into the body. The figures, presently binding with respect to the most important radioisotopes used for therapeutical purposes, are indicated. The second part of the paper deals with the problems of practical protection against radiations. NSA 9-6582

11647

REPAIR OF LARGE RADIATION ULCERS SITUATED OVER HEART AND BRAIN. J. M. Converse, et al. *Ann. Surg.* 133, 95-103(1951).

11648

PRESENT STATUS OF RESEARCH IN PREVENTION AND THERAPY OF RADIATION SYNDROME. A. Cozza. *Bull. Internat. Serv. San.* 27, 169-174(1954).

11649

RADIATION DOSE DISTRIBUTION AND ORGAN DAMAGE AFTER THORIUM X APPLICATION AND THEIR MODIFIABILITY BY DITHIOPROPANOL (BAL.). Karleheinz Neuman and Eberhard Harbers (U. Gottingen, Germany). *Arch. Exptl. Path. U. Pharmacol.* 217(1), 64-81(1953). (In German). BA 28-355

11650

RADIOACTIVITY, EFFECTS OF WHOLE BODY IRRADIATION. E. P. Cronkite and G. Brecher. *Ann. Rev. Med.* 3, 193-214(1952).

Major topics covered in this review: dose measurements and lethal dose, survival time and clinical syndromes, intestinal injury (early phase), bone marrow injury, anemia, hemorrhage, infection, late effects, modification of responses to irradiation, mechanisms of action of protective agents and atomic warfare.

11651

DISTRIBUTION AND EXCRETION OF URANIUM FOLLOWING INTRAVENOUS INJECTION. W. F. Neuman. *Federation Proceedings* 6, 360(1947).

11652

THE USE OF ISOTOPES IN THE STUDY OF SKELETAL PHYSIOLOGY AND METABOLISM. W. F. Neuman. p.134-37 of Vol. 11 of INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, GENEVA, SWITZERLAND, AUGUST, 1955. New York, United Nations.

11653

Dept. of Surgery and The Argonne Cancer Research Hospital, Univ. of Chicago, Chicago, Ill.
EFFECT OF YTTRIUM⁹⁰ UPON THE POSTERIOR

- OCULAR SEGMENT. Frank W. Newell, Paul V. Harper, and Aune Koistenen. p.397-403 of RARE EARTHS IN BIOCHEMICAL AND MEDICAL RESEARCH: A CONFERENCE SPONSORED BY THE MEDICAL DIVISION, OAK RIDGE INSTITUTE OF NUCLEAR STUDIES, OCTOBER 1955. September 1956. (ORINS-12)
- 11654**
UPTAKE OF RADIOSULFATE IN THE ISLETS OF LANGERHANS OF MICE. Ake Norhagen and Erik Odeblad. Arch. Biochem. Biophys. 54, 562-563(1954).
- 11655**
TRANSMISSION OF RADIOIODINE (I^{131}) TO INFANTS THROUGH HUMAN MATERNAL MILK. C. E. Nurnberger and A. Lipscomb. Jour. Amer. Med. Assoc. 150(14), 1398-1400(1952). BA 27-8857
- 11656**
TREATMENT OF RADIATION INJURIES E. P. Cronkite. Military Med. 118, (4), 328-34(1956).
- 11657**
CYSTEAMINE, SUBSTANCE WITH PROTECTIVE ACTION WITH REFERENCE TO IONIZING RADIATION AND THERAPY IN RADIATION SICKNESS. G. DeGuhl. Nuntius Radiol. 20, 231-234(1954).
- 11658**
NUCLEAR CHANGES IN THYROIDAL EPITHELIUM FOLLOWING RADIATION FROM RADIOIODINE. B. M. Dobyns and I. Didschenko. J. Clin. Endocrinol. and Metabol. 21, 699-720(1961).
- 11659**
PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON THE PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA. AUGUST 8-20, 1955. VOLUME 10. RADIOACTIVE ISOTOPES AND NUCLEAR RADIATIONS IN MEDICINE. New York, United Nations, 1956. 544p. NSA 11-63
- 11660**
THE DEPOSITION OF Y^{91} IN RABBIT BONES. B. Rayner, M. Tutt and J. Vaughan. Brit. J. Exptl. Path., 34, 138-45(1953). NSA 7-3346
- 11661**
COMPARATIVE HEMATOLOGIC STUDIES OF X-IRRADIATED MICE SUBJECTED TO SPLEEN SHIELDING AND RELATED EXPERIMENTAL PROCEDURES. L. O. Jacobson, E. K. Marks, E. L. Simmons and E. O. Gaston (Argonne National Lab.), p.23 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1951. A. M. Brues, ed. (ANL-4713)
- 11662**
INJURIES FROM IONIZING RADIATION. C. G. Foster. Surg. Clinics of N. Amer. 36, 1415-24(1956).
- 11663**
POST-IRRADIATION SEQUELAE IN 6- AND 12-DAY CHICK EMBRYOS. S. R. Glasser and F. T. Brayer. Fed. Proc. 14, 58(1955).
- 11664**
PLUTONIUM AND YTTRIUM CONTENT OF THE BLOOD, LIVER AND SKELETON OF THE RAT AT DIFFERENT TIMES AFTER INTRAVENOUS ADMINISTRATION. J. Schubert, M. P. Finkel, and M. R. White. J. Biol. Chem. 182(2), 635-42(1950). BA 24-17671
- 11665**
DEPOSITION OF RADIOACTIVE Y^{90} IN TISSUES FOR THE INTERSTITIAL APPLICATION OF β -RADIATION. C. Winkler. Klin. Wochschr. 34, 1038-40(1956). (In German).
- 11666**
HEMATOPOIETIC RESPONSES TO RADIATION INJURY. L. O. Jacobson. Ann. Rev. Med. 7, 345-52(1956).
- 11667**
HEMATOLOGIC RECOVERY FROM RADIATION INJURY. L. O. Jacobson. Prog. in Hematology 1, 311-317(1956).
- 11668**
HEMANGIOMA OF THE ELBOW SUCCESSFULLY TREATED WITH RADIUM AT AN EARLY AGE. Ira I. Kaplan. Amer. Jour. Dis. Children 65(5), 785-7(1943).
Fear of adversely affecting growing bones in children with Ra therapy is believed to be fallacious if irradiation is properly and expertly administered. BA 17-21663
- 11669**
NUCLEAR RADIATION PHYSICS. R. E. Lapp and H. L. Andrews. Prentice Hall, Inc., New York (1948).
- 11670**
INFLUENCE OF PREVIOUS ADMINISTRATION OF STABLE YTTRIUM UPON THE EXCRETION AND DISTRIBUTION OF YTTRIUM-91. R. A. Woodbury, E. Daigneault and G. C. Kyker. J. of Pharmacology and Exptl. Therapeutics 116, 63-4(1956).
- 11671**
RADIATION DAMAGES AND EFFECTS OF DRUGS. R. Koch and H. Langendorff. Fortsch. a. d. geb. der Roentgenstrahlen 86, (5), 616-22(1957). (In German).
- 11672**
RADIATION BURNS AND THEIR TREATMENT WITH SPECIAL REFERENCE TO BURNS FROM ATOMIC RADIATION. W. M. Levitt. Trans. Med. Soc. 71, 83-89(1955).
- 11673**
HEAVY AND RADIOACTIVE ISOTOPES IN CLINICAL AND EXPERIMENTAL MEDICINE. E. C. Dougherty and J. H. Lawrence. In: ADVANCES IN BIOLOGICAL AND MEDICAL PHYSICS, I. J. H. Lawrence and J. G. Hamilton, eds. New York, Academic Press, 1948. 484p.
Major topics in this review article are the medical significance of isotopes, clinical applications of isotopes and some applications of isotopes in experimental medicine.
- 11674**
THE TREATMENT OF NAUSEA FOLLOWING THERAPEUTIC IRRADIATION. J. E. Lofstrom, et al. West J. of Surg. 65(5), 306-307(1957).
- 11675**
TREATMENT OF RADIATION SYNDROME. J. F. Loutit. Brit. Med. Bull. 7, 64-68(1950).
- 11676**
RADIATION INJURIES RESULTING FROM NUCLEAR EXPLOSION AND FALLOUT. G. M. Lyon. Military Med. 118(4), 279-285(1956).
- 11677**
PLASTIC SURGERY IN RADIATION BURNS. E. F. Malbec and J. V. Quaife. Plastic and Reconstr. Surg. 20(3), 232-45(1957).
- 11678**
POSTRADIATION INFLAMMATION REDUCED BY PREDNISONE. J. B. Mathewson. N. Y. State J. Med. 56(23), 3903-6(1956).
- 11679**
Rochester. Univ., New York.
 I^{131} UPTAKE IN DOGS. S. Michaelson. p.40-1 of QUARTERLY REVIEW, OCTOBER 1 THROUGH DECEMBER 31, 1954. Henry A. Blair, Director. (M-5646)
- 11680**
THE HEMATOPOIETIC EFFECTS OF RADIATION INJURY. W. S. Middleton. Military Med. 118(4), 251-256(1956).
- 11681**
RISKS FROM CHRONIC IRRADIATION AND THEIR HEMATOLOGIC CONTROL. R. H. Mole. J. Clin. Path. 7, 267-74(1954).

11682

RADIATION BURNS DUE TO ATOMIC EXPLOSION. J. J. Morton. *Ann. Surg.* 146 (3), 314-321(1957).

11683

ACCIDENTAL SKIN ULCERATIONS FROM RADIOISOTOPES; RECOGNITION PREVENTION AND TREATMENT. H. S. Patton and R. G. Miller. *Jour. Am. Med. Assoc.* 143, 554-555(1950).

11684

CYSTAMINE BY ORAL ROUTE IN RADIATION SICKNESS. H. Ramioul. *J. Radiol. Electrol.* 36, 178-181(1955).

11685

THE OROPHARYNGEAL SYNDROME AND FATAL PULMONARY SYNDROME IN RATS EXPOSED TO LARGE X-RAY DOSES. A. Dunjic, J. Maisin, P. Maldague and H. Maisin. *Compt. rend. soc. biol.*, 150, 587-92(1956). (In French).

11686

DRUGS AND TECHNIQUES USED IN RADIATION DAMAGE. W. E. Smith. *Am. J. Pharmacy* 128, 410-420(1956).

11687

SURGICAL TREATMENT OF IRRADIATION BURNS. B. Sundell. *Annales Chirurgiae et Gynaecologia Fenniae* 46(1), 74-83(1957).

11688

REMARKABLE ACTION OF NEW POMADE WITH METHIONINE AND INOSITOL IN CICATRIZATION OF CUTANEOUS LESIONS FOLLOWING BURNS AND VARIOUS IRRADIATIONS. J. Surmont and S. Fajbisowicz. *J. Radiol. et Electrol.* 33, 577-79(1952). (In French).

11689

ACUTE RADIATION SYNDROME, REVIEW OF PATHOGENESIS, CLINICAL SYMPTOMS AND TREATMENT. J. E. Thygeson. *Ugesk, Laeger* 113, 655-664(1951).

11690

THERAPY OF RADIATION SICKNESS WITH PHENERGAN. G. Viehweger. *Arstl. Wochenschr.* 7, 364-7(1952). (In German).

11691

THE BIOLOGICAL EFFECT OF ROENTGEN RAYS. G. Rochlin and E. Gleichgewicht. *Fortsch. Geb. Roentgenstr.* 33, 971-980(1925). (In German).

The authors describe studies on effects of various doses of x-rays on plants. Observations on germination, growth and differentiation and on cytological changes are included.

11692

Argonne National Lab., Ill.
BIOCHEMICAL STUDIES RELATING TO THE EFFECTS OF RADIATION AND METALS. Samuel Schwartz. January 11, 1947. Dec. August 4, 1948. 77p. (AECD-2198; CH-3820)

The biochemical detection of incipient damage resulting from exposure to radiations or to toxic materials has become increasingly important in recent years. This was especially true on the Manhattan Project because of the well known development of late insidious and "irreversible" changes such as anemia and malignancy in individuals with chronic radiation exposure. Unfortunately, however, the successful solution of this problem has been hampered by lack of basic information on the early toxic effects of these materials. Various biochemical effects of radiation have therefore been studied in 10 patients given total body X-ray in total doses of 75 to 310 r (skin), in 5 patients given 20 to 36 mc P³², and in 5 project personnel accidentally exposed to excessive doses of external radiations. Similar studies have also been made of several hundred Plutonium Project personnel exposed in most instances to relatively small amounts of uranium, lead, and other metals, and to chemicals and radioactive sources. These studies included

the investigation of liver function, of white blood cell chemistry, and of various urinary constituents such as coproporphyrin, uroporphyrin and other pigments, urobilinogen, "corticosteroid-like" substances, catalase, and uranium. Definitely excessive exposures resulted in various abnormalities in the above tests. With the exception of urinary uranium analysis, none of them were specific in indicating overexposure to either radiation, metals, or chemicals. When interpreted in the light of the exposure and medical history, however, they may aid in the clinical interpretation of relatively marked overexposure. In addition, they may afford further insight into the nature of radiation effects. The literature on the biochemical effects of radiation is reviewed briefly, and certain suggestions are offered regarding future investigations in this field. NSA 1-892

11693

PARAMAGNETIC RESONANCE DETERMINATION OF FREE RADICALS IN IRRADIATED CELLS WITH AND WITHOUT A PROTECTIVE AGENT. A. J. Fairbanks, Jr. *Radiation Res.* 7, 314-15(1957).

11694

EFFECT OF THOROTRAST (COLLOIDAL THORIUM DIOXIDE) ON EPENDYMAL LINING AND RELATED PART OF THE BRAIN. David Beres. *Arch. Path.* 28, 49(1939).

This is an autopsy report of findings in a patient dying 27 days after introduction of thorotrast into ventricular system of brain. BA 13-16891

11695

FALLOUT DOSAGES AT WASHINGTON, D. C. I. H. Blifford, Jr. and H. B. Rosenstock. (Naval Research Lab., Washington, D. C.). Oct. 6, 1955. 9p. Project NR-612-130. (NRL-4654)

The total infinity dosage at Washington, D. C., due to fallout of fission product debris from all atomic tests which took place between January 1951 and May 1955 has been estimated from the measured air concentration at ground level. Within order of magnitude accuracy, this dosage was found to be about 0.2 r. The Nevada tests contributed about 60% of this amount, and the Russian tests about 33%, with the remainder due to tests in the Pacific. Evidence for stratospheric holdup of activity from the thermonuclear tests of the spring of 1954 has been found. Fallout of this high altitude activity corresponds to an infinity dosage of about 0.0002 r. NSA 10-1704

11696

TREATMENT AND PREVENTION OF LEUKOPENIA FROM ROENTGEN THERAPY WITH A NEW THYMONUCLEIC ACID EXTRACTED FROM FISH MILT, DESOXYRIBOSE TETRANUCLEOTIDE. R. Coliez, A. N. Loiseau and R. Sarfati. *Presse med.* 63, 1137-1139(1955). (In French).

11697

PREVENTION AND CONTROL OF HAZARDS IN THE RADIUM DIAL PAINTING INDUSTRY. L. F. Curtiss. *Jour. Indust. Hyg. and Toxicol.* 24(6), 131-41(1952).

An ionization chamber suitable for measuring ionization of radon in air of workrooms and expired air of workers is described. To test for γ radiation, a special Geiger-Muller counter was devised which gives readings directly in roentgens per 8 hr. day. BA17-11564

11698

VARIATIONS IN INTENSITY OF COSMIC RAYS AND THE ROLE OF METEOROLOGICAL FACTORS. L. I. Dorman, A. I. Kuz'min, G. V. Tuanutova, E. L. Feinberg, and Yu. G. Shafer. *Zhur. Eksptl'. i Teoret. Fiz.* 26, 537-44 (1954) May. (In Russian). NSA 9-5397

11699

SOME LATE AND DISTANT EFFECTS OF RADIUM. J. Ewing. *J. Cancer Research*, 4, 45-9(1919).

Efficacy of radium treatment depends on type of tumor. In tumors involving bone and cartilage it is practically useless; in advanced cases of carcinoma it is palliative and generally is most effective on operable tumors.

11700

EFFECTS OF RADIATION ON THE G. I. TRACT, INCLUDING THE SALIVARY GLANDS, LIVER, PANCREAS. N. B. Friedman. Arch. Path. 34, 749(1943).

11701

CONFIRMATION OF RADIOACTIVITY IN THYROIDS OF VARIOUS ANIMALS. [REPORT FOR THE PERIOD] JULY 15 TO SEPTEMBER 10, 1954. Ralph L. Gunther and Hardin B. Jones (California. Univ., Berkeley. Radiation Lab., and California. Univ., Berkeley. Donner Lab.). Sept. 1954. Decl. May 3, 1955. 12p. Contract W-7405-eng-48. (UCRL-2689)

Appreciable quantities of radioactivity were found in the thyroid glands of cattle obtained from the School of Veterinary Medicine on the Davis Campus of the University of California. This activity followed an 8-day decay and was attributed to I^{131} resulting from the respiration of air containing radioactive material. Preliminary *in vivo* tests on human subjects from the same area show no activity above background in the vicinity of the thyroid.

NSA 9-7249

11702

RADIOACTIVITY IN ANIMAL THYROIDS FROM VARIOUS AREAS. Lester Van Middlesworth (Univ. of Tennessee, Memphis). Nucleonics 12, No. 9, 56-7(1954) Sept.

The thyroid glands of cattle and sheep slaughtered in Memphis, San Francisco, and Boston were found to contain significant amounts of radioactivity with a half life of approximately 8 days suggesting the presence of I^{131} .

NSA 8-6380

11703

METABOLISM OF HYDROGEN ISOTOPES BY RAPIDLY GROWING *CHLORELLA PYRENOIDOSA* CELLS. Daniel Weinberger and John W. Porter (General Electric Company, Richland, Washington). Arch. Biochem. and Biophys. 50, 160-8(1954) May.

Chlorella pyrenoidosa cells have been grown in the presence of deuterium and tritium oxide, and the quantity of each of these isotopes incorporated into the whole cells, methanol-insoluble, ether-soluble, and methanol-soluble, ether-insoluble fractions has been determined. The quantity present has been recorded in terms of the per cent expected on the assumption of no isotope effect. It has been found that the cells incorporate deuterium approximately 50% as rapidly as hydrogen, and that they incorporate tritium 90% as rapidly as deuterium. Further, the extent of incorporation of tritium or deuterium by the enzymes involved in hydrogen transfer in the synthesis of lipides is significantly higher than the extent of incorporation by enzymes involved in the transfer of hydrogen in the synthesis of proteins, nucleic acids, and starch (methanolinsoluble fraction). NSA 8-4207

11704

A SPECTROMETRIC METHOD FOR THE STUDY OF RADON PARTITION IN RADIUM-BURDENED ANIMALS. P. F. Gustafson and L. D. Marinelli (Argonne National Lab., Lemont, Ill. and Univ. of Chicago Medical School) Radiology 65, 90-5(1955) July.

The fraction of radon retained in a radium-burdened animal can be determined experimentally *in vivo* by measuring with scintillation spectrometers the relative intensities of the Ra^{226} and RaB gamma rays emitted by the animal and by comparing them to those obtained with properly de-emanated Ra sources placed in suitable phantoms. The soundness of the technic has been proved by experiment on rabbits and dogs. The possibility of its use in other

fields of investigation has been briefly discussed.

NSA 9-6420

11705

DETERMINATION OF THE RADIATION HAZARDS FROM A 1.5 MEV HIGH VOLTAGE ACCELERATOR. Katarina Ahnund (Nobel Inst. of Physics, Stockholm). Arkiv Fysik 7, 149-53(1954).

Intensities of the electromagnetic radiation and neutrons in the neighborhood of the 1.5-Mev high voltage accelerator have been measured and results are presented

NSA 8-2751

11706

VETERINARIAN'S RESPONSIBILITY IN CIVIL DEFENSE. Daniel Bergsma. J. Public Health 42, 1095-98(1952) Sept.

11707

THE RELATIONSHIP BETWEEN Ca^{45} , TOTAL CALCIUM AND FISSION PRODUCT RADIO- ACTIVITY IN PLANTS OF *PORTULACA OLERACEA* GROWING IN THE VICINITY OF THE ATOM BOMB TEST SITES ON ENIWETOK ATOLL. O. Biddulph and Robert Cory (Applied Fisheries Lab., Univ. of Wash.). (nd) 20p. (UWFL-31).

Analyses were made for total radioactivity, radioactivity due to Ca^{45} , and for total Ca in plants of the species *Portulaca oleracea* collected approximately 15 months after the 1948 atom bomb tests at Eniwetok Atoll.

NSA 6-3159

11708

EMERGENCY CREW TRAINING AND MEDICAL DECONTAMINATION FACILITY AT THE LIVERMORE RESEARCH LABORATORY. G. A. Blane, W. A. Clark and G. T. Saunders (Livermore Research Lab., Calif. Research and Development Co.). June 1954. 17p. Contract AT(11-1)-74. (LRL-142).

The formation, training, and operation of the emergency crew, (disaster squad), of the Livermore Research Laboratory are described. In addition, the medical decontamination facilities, designed to adequately provide emergency care in the case of radiocontaminated injuries, are described. NSA 8-5104

11709

RADIATION PROTECTION PROBLEMS IN DIAGNOSTIC ROENTGENOLOGY. George C. Henny (Temple Univ. School of Medicine, Philadelphia). Am. J. Roentgenol. Radium Therapy Nuclear Med. 73, 649-54(1955) Apr.

Many of the protection problems that have to be solved in diagnostic roentgenology have been presented. These can be solved by attention to details of technique, by interposition of adequate protective barriers, and by increase of distance from the scattering object when possible. The principles have been discussed upon which changes of quality of the roentgen-ray beam may be used to protect both the patient and the roentgenologist. NSA 9-3372

11710

THE USE OF RADIOISOTOPES IN MEDICINE. Heinz Heuwieser. Strahlentherapie 97, 621-32(1955) Aug. (In German).

A report is presented on a series of conferences organized in Hamburg by the Norddeutsche Roentgen-gesellschaft from October 18 to 22, 1954, on the subject, "The Use of Radioisotopes in Medicine". NSA 9-7648

11711

STUDIES ON THE USE OF RADIOACTIVE ISOTOPES IN MEDICINE. A. Ignatyev, ed. Moscow, Medgiz, 1955. (2nd edition). (In Russian) (Book on display at Geneva Conference.)

The symposium comprises 28 papers on the use of radioactive isotopes in blood disease therapy, in determining the functional state of the thyroid gland, in microbiological, immunological, and virological investigations, in physiology, biochemistry, and toxicology. The book includes also a review on radiometry. NSA 9-7647

11712

THE MECHANISM OF THE EFFECT OF X RAYS AND ULTRAVIOLET RAYS ON AQUEOUS SOLUTION OF ALBUMIN AND THYMONUCLEIC ACID. N. Koyenuma. *Strahlen-therapie* 96, 599-617(1955) Apr. (In German).

The author used potentiometer and polarography for the purpose of investigating the reaction to roentgen and ultraviolet rays of watery solutions of protein, cystine and thymonucleic acid. He then compared the sensitivity of the different solutions to these radiations. The observed acidulation is due to the formation of H_2O_2 on the one side and the production of activated O_3 on the other. The ultraviolet light quanta are acting directly on the dissolved substance while the roentgen quanta are primarily and mainly attacking the dissolvent. NSA 9-5291

11713

VITAMINS AND ENZYMES IN MILK. EFFECT OF GAMMA-RADIATION ON ACTIVITY. Hung-Chun Kung, Elmer L. Gaden, Jr., and C. G. King (Columbia Univ., New York). *J. Agr. and Food Chem.* 1, 142-4(1953) Apr 15.

Interest in the use of radiations from fission products includes consideration of sterilizing biological products to accomplish stabilization. Tests were undertaken to measure vitamin and enzyme retention in milk and related products coincident with irradiation from cobalt-60. Vitamin A, tocopherols, and ascorbic acid were highly sensitive to destruction within the time period required for sterilization (at relatively low intensities). Carotenoids and riboflavin were moderately sensitive. The enzyme phosphatase, however, which is very sensitive to heat inactivation, was slightly changed during identical exposures. Tests with raw whole milk, pasteurized whole milk, evaporated milk, cream, margarine, Cheddar cheese, and cream cheese demonstrate that irradiation at 80,000 roentgen per hour induces severe losses in nutritive quality before sterilization is accomplished. Changes in enzyme activity, however, are sharply reversed in comparison with best effects on natural products. Protein denaturation apparently can be avoided, relatively, while accomplishing this type of sterilization. NSA 9-4919

11714

CHORIORETINITIS PRODUCED BY ATOMIC BOMB EXPLOSION. Jacques Landesberg (V. A. Regional Office, Brooklyn). *Arch. Ophthalmol.* 54, 539-40(1955) Oct.

The energy released from an atomic bomb blast has visible infrared and long ultraviolet rays, which are capable of producing thermal burns involving the choroid and retina. The pupillary diameter at the time of detonation is a very important factor. The pupillary and blink reflexes are too slow to prevent burning of the retina because sufficient energy for this arrives after the first 0.1 second. These reflexes take a longer time. The distance at which burns may be produced is much greater than that at which any other harmful effects of the atomic bomb occur, and at a given distance the burns on the retina are more severe than those of the skin. This is true because of the optical system of the eye. It seems apparent that in this case the right eye did not receive the rays because of the shielding effect of the bony structures of the nose. It is concluded that the necessity of covering the eyes during an atomic blast is of the utmost importance. NSA 9-7624

11715

A COMPARATIVE STUDY OF THE BIOLOGICAL ACTION OF ELECTROMAGNETIC RADIATION ON TISSUES PRODUCED AT POTENTIALS VARYING FROM 60 kv TO 1000 kv, INCLUDING GAMMA RADIATIONS FROM RADIUM. Rae. K. Manjunath. *Indian J Radiol.* 1, 10(1947).

11716

THE CUTANEOUS ABSORPTION OF RADON FROM

NATURALLY CARBONATED WATER BATHS. W. S. McClellan and C. R. Comstock, Jr. *Arch. Phys. Med.* 30 (1), 29-36(1949).

In two subjects, radon was absorbed through skin. Radon in water containing CO_2 was absorbed better than Ra combined with plain water. Absorption also occurs by inhalation of air above bathtub. Elimination of radon was nearly complete in 3 hours. BA 24-18763

11717

A COMPARISON OF THE DISTRIBUTION BETWEEN VARIOUS ORGANS OF ARSENICATED SERUM PROTEINS AND COLLOIDAL THORIUM DIOXIDE (THOROTRAST) FOLLOWING THEIR INTRAVENOUS INJECTION. W. E. Gaunt and G. Payling Wright. *Jour. Infect. Dis.* 67(3), 217-21(1940).

Distribution of A's in various organs following injection (as complex with serum proteins) into rabbits was similar to that of thorotrast. High concentrations were found in spleen, marrow, and liver, lower concentrations in lungs and scarce amts. in brain and skeletal muscles. Kidney was only site of divergent concentrations of A's and thorotrast due to rapid excretion of foreign proteins into urine. BA 15-4602

11718

INDUSTRIAL RADIATION HAZARDS. C. B. Braestrup. *Radiology* 43, 286-292(1944).

11719

MEDICAL DIVISION QUARTERLY PROGRESS REPORT [FOR] JANUARY 1 - MARCH 31, 1954, SUPPLEMENT. TELETHERAPY DESIGN PROBLEMS III. Constitutes the minutes of the PROCEEDINGS OF THE THIRD INDUSTRIAL CONFERENCE ON TELETHERAPY. Marshall Brucer, J. H. Harmon, and Elizabeth B. Anderson, eds. (Oak Ridge Inst. of Nuclear Studies). 71p. Contract AT-40-1-Gen-33. (ORO-127(suppl.))

Topics discussed at this conference included: the cost of radiation in hospitals, current problems of Co^{60} production, problems of source strength, calibration and loading, the AEC allocation policy for teletherapy source units, data a manufacturer must supply the radiologist, shipping containers, instrumentation, new sources for teleradiation, the development of the atomic energy industry, and design of an irradiator containing a Tm source. NSA 8-5482

11720

X-RAY EXPOSURE IN MANUFACTURE AND OPERATION OF CERTAIN ELECTRONIC TUBES. A. F. Bush, H. T. Castberg, and D. G. Macpherson. *Public Health Reports* 59, 1045-1047(1944).

11721

PERSONNEL EXPOSURES ASSOCIATED WITH THE THERAPEUTIC USE OF RADIUM, RADON, AND COBALT-60. Egilda DeAmicis and Russell F. Cowing (New England Deaconess Hosp., Boston, Mass.). *New Eng. J. Med.* 251, 1-4(1954) July 1.

Various methods are described which are employed in keeping the exposure of personnel handling therapeutic doses of Ra, Rn, and Co^{60} below permissible exposure levels as defined by the National Bureau of Standards. NSA 8-6393

11722

PERCUTANEOUS ABSORPTION OF TRITIUM OXIDE. Chester W. DeLong, Roy C. Thompson, and Harry A. Kornberg (General Electric Co., Richland, Washington). *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 71, 1038-45(1954) June.

The percutaneous absorption of tritium oxide-labeled water vapor was studied in mice, rats, and man. In terms of μg water absorbed/cm²/min from a saturated water vapor atmosphere, the rates found were: for mice (abdomen),

20 ± 5; rats (abdomen), 5.7 ± 1.1, man (forearm), 8.6 ± 1.7. A single total body exposure to a human at 70 per cent relative humidity gave a rate of 18 µg/cm²/min. The rate of water vapor absorption in the rat was found to be directly proportional to water vapor pressure. For a constant level of atmospheric tritium oxide, absorption of tritium oxide was independent of total water vapor pressure. It was shown that for humans the rate of percutaneous absorption of tritium from a tritium oxide-contaminated atmosphere is about the same as the rate of pulmonary absorption from the same atmosphere. NSA 8-5193

11723

TERATOGENIC ACTION OF X RAYS ON SEMINAL CELLS. C. Regaud and J. Blanc. C. R. Soc. de Biol. 158, 390 (1906). (In French).

The various maturation stages of spermatozoa vary in radiosensitivity. Moderate x-ray doses resulted in bizarre forms of sperm, abnormalities being observed in various parts of the cells, but especially in the nucleus. Changes included unequal distribution of chromatin in pre-spermatocytes, chromosomal aberrations and binucleate cells. Other changes are also described.

11724

EFFECTS OF X RAYS ON THE TESTICULAR EPITHELIAL ELEMENTS. C. Regaud and J. Blanc. C. R. Soc. de Biol. 158, 652(1906). (In French).

Authors' findings do not agree with those of other investigators who found syncytium of testes to be less radiosensitive than the rest of the tissue. These authors found the syncytium to be highly radiosensitive. Changes in various maturation stages of seminal epithelium are described. Cell stages vary in radiosensitivity. Mature sperm were found to be relatively radioresistant.

11725

EFFECT OF ROENTGEN IRRADIATION OF THE TESTES ON THE STRUCTURE OF THE SEMINAL EPITHELIUM AND EPIDIDYMES, ON FERTILITY AND SEXUAL VIGOR OF THE RABBIT. C. Regaud and G. Dubreuil. Lyon Medical 40, 457(1908). (In French).

11726

COMPENSATORY HYPERTROPHY OF THE INTESTINAL GLAND OF ANIMAL TESTICLES RESULTING FROM UNILATERAL CASTRATION FOLLOWING X RAY STERILIZATION. C. Regaud and Th. Nogier. C. R. Assoc. des Anat. 13, 293(1911). (In French).

11727

DISTURBANCES IN THE DEVELOPMENT OF RABBIT EGGS FERTILIZED BY SPERMATOZOA IN X IRRADIATED *IN VIVO*. C. Regaud and G. Dubreuil. C. R. Soc. de Biol. 64, 1014(1908). (In French).

11728

COMPLETE, DEFINITIVE STERILIZATION OF THE RAT TESTICLE WITHOUT SKIN LESIONS BY A SINGLE DOSE OF FILTERED X RAYS. C. Regaud and Th. Nogier. C. R. Acad. des Sciences 149, 1398(1909). (In French).

11729

STERILIZATION OF THE TESTICLE OF THE CAT BY X RAYS. X. TECHNIQUE. C. Regaud and Th. Nogier. C. R. Acad. des Sciences 70, 5(1911). (In French).

11730

EFFECT OF X RAYS ON THE DOG TESTES. CONDITIONS FOR COMPLETE STERILIZATION. C. Regaud and Th. Nogier. C. R. Soc. de Biol. 70, 50(1911). (In French).

11731

TOTAL, DEFINITIVE ROENTGEN STERILIZATION OF THE TESTES OF THE ADULT RAM. C. Regaud and Th. Nogier. C. R. Soc. de Biol. 70, 202(1911). (In French).

11732

EVOLUTION OF HASSAL BODIES IN THE THYMUS OF THE X-IRRADIATED CAT. MECHANISM ENLARGEMENT

OF THE BODIES. C. Regaud and R. Cremiere. C. R. Soc. de Biol. 71, 325(1911). (In French).

11733

EVOLUTION OF HASSAL BODIES IN THE IRRADIATED CAT THYMUS. II. REGRESSION INSTABILITY AND SIGNIFICANCE OF THESE BODIES. C. Regaud and R. Cremiere. C. R. Soc. de Biol. 71, 383(1911). (In French).

11734

EXPERIMENTAL RESULTS AND THERAPEUTIC IMPLICATIONS OF X RAY INDUCED INVOLUTION OF THE THYMUS. C. Regaud and R. Cremiere. Lyon Medical 118, 5(1912). (In French).

11735

ACTION OF X RAYS ON SEMINAL EPITHELIUM. C. Regaud. C. R. Assoc. des Anat. 9, 30(1907).

11736

VARIATIONS IN X RAY SENSITIVITY OF NURSE CELLS OF THE SEMINAL EPITHELIUM OF THE RAT. C. Regaud. C. R. Soc. de Biol. 74, 1256(1913). (In French).

11737

INFLUENCE OF THE DURATION OF IRRADIATION ON THE EFFECTS OF RADIUM ON THE TESTICLE. C. Regaud. C. R. Soc. de Biol. 86, 787(1922). (In French).

11738

EFFECT OF X RAYS ON VARIOUS STAGES OF SPERMATOGENESIS, EXTREME SENSITIVITY OF SPERMATOGONIA. C. Regaud. C. R. Soc. de Biol. 61, 163 (1906). (In French).

11739

KENTUCKY STUDY REVEALS MOST X-RAY SHOE-FITTING MACHINES ARE DEFECTIVE. W. E. Dillingham and W. W. Stalker. Industrial Health Monthly 11, (1951).

11740

RADIOPHYSIOLOGY AND RADIOTHERAPY; HISTOPHYSIOLOGICAL EFFECTS OF ROENTGEN RAYS AND OF BECQUEREL-CURIE RAYS ON THE TISSUES OF NORMAL ADULT HIGHER ANIMALS. C. Regaud and A. Lacassagne. Arch. de l'inst. du Radium 1, 1-132(1927). (In French).

11741

OCCUPATIONAL RADIATION HAZARDS. E. F. Edson. British Medical Bulletin 7, 57-63(1950).

11742

HEALTH PROBLEMS OF X-RAY SHOE-FITTING. W. G. Frederick and R. G. Smith. Amer. Industrial Hygiene Assoc. Quarterly 9, 89-93(1948).

11743

THE PREPARATION OF RADIO-GOLD FOR MEDICAL USE (¹⁹⁸Au). F. Hudswell, B. J. Miles, B. R. Payne, and K. J. Taylor (Atomic Energy Research Establishment, Harwell, Berks, England) Jan. 22, 1954. 14p. (AERE-I/R-1341)

This report contains a description of the apparatus and methods used for the handling and production of colloidal and particulate radiogold for injection into human patients. A brief discussion of particle size and stability of the colloid is included. NSA 8-3231

11744

THE INFLUENCE OF RADIUM RADIATION ON COLLOID OF THE CELL OF PROTOZOA. M. Zuelzer and E. Philipp. Biol. Zentralbl., 45, 557-572(1924). (In German).

11745

RADIOLOGICAL HEALTH HANDBOOK. Simon Kinsman, comp. and ed. (Sanitary Engineering Center, Public Health Service). Apr. 1954. 340p. (NP-5239)

This edition of the handbook contains a large amount of readily available information of interest to anyone working in the field of radiation. Sections are included on physical, chemical, and mathematical data; radioassay and decay data, radiation protection data, a table of isotopes

which includes decay schemes; and a glossary.
NSA 8-5105

11746

THE EFFECT OF X RAYS IN PRODUCING SOMATIC GENOVARIATION OF A DEFINITE LOCUS IN DIFFERENT DIRECTIONS IN *DROSOPHILA MELANOGASTER*. N. W. Timofeeff-Ressovsky. Roux' s Arch. 124, 654(1931)

Male flies were mated immediately after x-irradiation or 3 weeks after irradiation. Mutation rate was 50-80% less when 3 weeks elapsed before mating the irradiated flies. In *Drosophila*, sperm are not killed by doses lethal for all mouse and human sperm. Mutability of various sperm stages may vary.

11747

IRRADIATION OF THE TESTICLES AND HEREDITY IN THE MOUSE. Dobrovolskaia - Zavadskaia. Arch. Inst. du Radium de L' Univ. de Paris 1, 359-94(1929). (In French).

Doses of radiation heavy enough to effect complete sterilization (temporary) did not produce any hereditary defects among 3000 descendants. Long introduction and literature review are included in this report. Experiments included both partial body and whole body irradiation.

11748

Ca EDTA AND THE EXCRETION OF PLUTONIUM. H. Foreman, T. T. Trujillo, O. Johnson, and C. Finnegan (Los Alamos Scientific Lab., N. Mex.). Proc. Soc. Exptl. Biol. Med. 89, 339-42(1955) July.

A comparison of Ca EDTA and Zr citrate for the therapy of acute Pu poisoning was made in which it was found that Ca EDTA brought forth greater Pu excretion than did the Zr citrate. The use of the latter agent resulted in lower Pu skeletal content than occurred in the Ca EDTA treated animals. Combined Ca EDTA and Zr citrate treatment produced the same results as Zr citrate alone. Ca EDTA administered long after Pu was deposited in bone did remove Pu from the skeleton but this is a slow process. A comparison of the regimen of Na EDTA and Ca EDTA with one using Ca EDTA alone in acute Pu exposures showed no advantage to either. Ca EDTA did not influence passage of Pu across the lung alveolar membrane. Ca EDTA did not influence the rate of mobilization of Pu from an intramuscular site. Ca EDTA did not influence the rate of absorption of Pu from the gastrointestinal tract.
NSA 9-6172

11749

SELECTIVE RADIATION OBTAINED BY THE INTRAVENOUS ADMINISTRATION OF COLLOIDAL RADIOACTIVE ISOTOPES IN DISEASES OF THE LYMPHOID SYSTEM. P. F. Hahn and C. W. Sheppard. South. M. J. 39, 558-562(1946).

Use of radioactive manganese in selective interval radiation therapy of lymphoid system. (Used as colloidal sols.)

11750

DUAL MORPHOLOGICAL REACTIONS OF RABBIT LYMPHOCYTES TO X-RAYS. R. Shrek. Arch. Pathol. 63, 252-59(1957).

Stability with eosin and cessation of cytoplasmic Brownian movement are criteria used in identifying lymphocytes killed by irradiation.

11751

RADIOLOGICAL SAFETY IN CATHODE-RAY STERILIZATION. Samuel Levin (Massachusetts Inst. of Tech., Cambridge). Nucleonics 12, No. 6, 54-7(1954) June.

Factors necessary in establishing an adequate radiological safety program for installations engaged in the radiation sterilization of food and drugs are reviewed.
NSA 8-4487

11752

THE SHOE-FITTING FLUOROSCOPE AS A RADIATION

HAZARD. Leon Lewis and Paul E. Caplan. Calif. Med. 72, 26-30(1950) Jan.

A series of tests on shoe-fitting fluoroscopes was run to determine the amounts of radiation to which patrons and salesmen are constantly exposed. Estimations of weekly exposure were made by placing film badges strategically on the personnel in close contact with the machines, direct measurements were made within the shoe-fitting chamber on 40 machines through the use of a dosimeter r-meter, the exposures being timed for 30 seconds. The beam intensities of the machines tested were 10-109 r/min, in most cases far in excess of standards proposed for safe use of the apparatus. It is stated that the principal potential danger from the machines is interference with bone growth in children as a result of careless use or uncontrolled dosages, some possibility also exists of excessive exposure of shoe salesmen in exceptional circumstances. NSA 4-1338

11753

RADIOAKTIVITETEN I RISØ OMRADET (RADIOACTIVITY IN THE RISØ DISTRICT.) K. Heydern, J. Lippert, and P. Theodorsson (Atomenergikommissionen, Denmark) Apr. 1, 1957. 87p. (NP-6672)

Various methods of determining total beta activity in natural materials are discussed. With these methods the activity was determined for the water of the Roskilde fjord and the earth and plants of the Risø district. Daily measurements were made of the air and rainwater, and fewer measurements were made on the Roskilde fjord, fresh water, and milk. The activity found was from naturally occurring radioactive background or from fall-out. For plants and rainwater the fall-out activity was the strongest. The variation of activity with time was determined. NSA 12-8270

11754

RADIOACTIVE CONTAMINATION OF THE ATMOSPHERE BY THE FALL-OUT FROM NUCLEAR EXPLOSIONS. L. Jurkiewicz. Nucleonika 2, 657-66(1957). (In Polish).

Fresh traces of radioactive contamination from U^{235} and Pu^{239} have been found, and the effects from the nuclear and thermonuclear explosions are discussed. Tables showing the recent data on the dose of ionizing radiation received by man in various conditions are presented, and the extreme importance of systematic monitoring of radioactivity in the atmosphere is stressed. NSA 12-6411

11755

RADIATION EXPOSURE OF STAFF IN DIAGNOSTIC PROCEDURES. II. RADIATION DOSES RECEIVED BY DIAGNOSTIC X-RAY WORKERS. S. B. Osborn, (Univ. Coll. Hospital, London). Brit. J. Radiol. 28, 650-4(1955) Dec.

A review of measurements of the radiation dose received by diagnostic x-ray workers led to the conclusion that such workers receive radiation doses well below the maximum permissible levels, but that they often approach these levels and occasionally exceed them.

NSA 10-1708

11756

EFFECT OF IONIZING RADIATIONS ON SOLUTIONS OF PROTEIN AND OF PROTEIN COMPLEXES. A. G. Pasynskii. p. 85-105 in Meetings of the Division of Biological Sciences. Session of the Academy of Sciences of the U. S. S. R. on the Peaceful Use of Atomic Energy. July 1-5, 1955. Moscow, Publishing House of the Academy of Sciences of the U. S. S. R. 1955. 339p. (In Russian).

The following are the results obtained from a study of the effect produced by roentgen rays on crystalline human serum albumin, on lipoproteins of blood serum, nucleoproteins (of the thymus) and blood serum, as well as by gamma rays, and neutron radiation upon human serum albumin. The threshold of action was determined either by the common methods, such as absorption spectra in the

infrared and ultraviolet, electrophoresis, viscosity, etc., or by means of the isotope method developed in this laboratory which is based on the increased binding of labeled methionine- S^{35} by proteins as caused by irradiation. The principal results are summarized in a table from which it appears that by means of the isotope method it is possible to detect molecular changes in the proteins and their complexes upon irradiation with doses (in thousands of r) 20 to 100 times less than those practiced previously for proteins, in particular, with biological doses of 400 to 500 r. This result disproves the conception of strictly localized changes of nucleic acids and of nucleoproteins in the primary processes elicited by irradiation. In fact, these primary changes may occur throughout the protein substance of the cell even with biological doses. As regards the nature of the primary molecular changes of proteins elicited by irradiation, it may be assumed from the evidence obtained that the chemical changes in the molecules of proteins and of their complexes (viz., rupture of the peptide bonds, splitting off of the components of the complexes, rupture of cyclic groups, desemination, etc.) should have no significance for the biological irradiation doses, except probably for partial oxidation of SH- groups. The changes in the ultraviolet absorption spectra elicited by irradiation, often considered in published works as an indication of chemical changes, were shown to disappear almost entirely upon elimination of the secondary aggregative changes (through addition of formamide, sodium caprylate, cysteine, etc.). Obviously of principal importance is the transition of the protein molecules to the excited or active state at the expense of the absorbed radiation energy. This is accompanied (as e. g., also upon heating) by structural changes of the type of rearrangement of part of the polypeptide chains which results in a decrease of solubility, increased aggregation of particles, increased binding of labeled methionine, etc. Although with biological doses these denaturing changes are rather slight, yet their accumulation in the multipartite and interrelated chains of the metabolic processes and the development of these chains of changes within the organism may become the cause of appreciable physiological disturbances and of high sensitivity of complex organisms to irradiation. NSA 9-7616

11757
RADIATION OSTEITIS OF THE RIBS FOLLOWING TREATMENT FOR CANCER OF BREAST. L. W. Paul and E. A. Poble. *Radiology* **38**, 543(1942).

11758
AIR CONTAMINATION AND RESPIRATORY PROTECTION IN RADIOISOTOPE WORK. G. W. Morgan and C. R. Buchanan (Isotopes Div., Advisory Field Service Branch, AEC.) Jan. 19, 1953. 29p. (AECU-2821)

Air contamination associated with the use of radioactive isotopes in the laboratory is discussed. Positive control measures to prevent contamination are emphasized. The various forms of possible contamination and mechanisms influencing their stability in the air are discussed. Data are included on maximum permissible air contamination values, the pathway of inhaled contaminants once they enter the respiratory system, and the characteristic absorption, deposition, and pulmonary retention pattern of contaminants. The characteristics of various respiratory protective devices are discussed NSA 8-3654

11759
SOME ASPECTS OF THE PROBLEM OF RADIONECROSIS OF THE JAWS. W. D. MacLennan. *Proc. Roy. Soc. Med. (London)*. **48**, 1017-22(1955).

Following oral radiotherapy, patients frequently suffer from xerostomia, loose teeth, necrosis of the mandible.

11760
BASIC SAFETY REQUIREMENTS IN RADIOISOTOPE WORK.

G. W. Morgan (Isotopes Div., Advisory Field Service Branch, AEC). p. 252-72 of CONFERENCE ON THE USE OF ISOTOPES IN PLANT AND ANIMAL RESEARCH. Apr. 1953. 21p. (TID-5098)

The basic problems involved in the safe handling of radioisotopes and in the safe disposal of radioactive wastes are reviewed. Topics discussed include units of measurement and maximum permissible exposure limits, principles of protection, surveying and monitoring procedures, design of laboratories for radioisotope work, and the basic principles and problems of disposal of radioactive laboratory waste. NSA 8-59

11761
BIOLOGICAL EFFECTS OF RADIOACTIVITY. A. Richards. *Science* **42**, 287-300(1915).

Life processes are accelerated by brief exposures, stronger treatment inhibits or destroys life. Chromatin of cells may be injured. Changes in enzymes due to radiation play an important part, either directly or indirectly, in ultimate effects. (A. review and consideration of basic effects.)

11762
STERILIZATION OF FOODS BY SOFT X-RAYS. Radcliffe F. Robinson, Robert C. McMaster, and Jules H. Cahn (Battelle Memorial Inst., Columbus, Ohio). Oct. 15, 1953. 13p. (NP-5741)

The effectiveness, building costs, space requirements, versatility, and equipment costs of the application of soft x rays to food sterilization are discussed. NSA 9-6821

11763
EFFECTS OF X RAYS IN EXPERIMENTAL TUBERCULOSIS; ON MARROW DISORDERS OBSERVED IN THE COURSE OF TREATMENT. Rodet and Bertin-Sans. *Presse Medicale* **6**, 256(1898).

11764
THE EFFECTS OF ROENTGEN RADIATION ON PROTOPLASMIC STRUCTURE IN THE SO-CALLED "LATENT" PERIOD. S. S. Weil and J. G. Liebersohn. *Zentralbl. Allg. Path. und Path. Anat.* **37**, 247-250(1926). (In German).

11765
FIRST ATTEMPTS AT MICROLOCALIZED RADIOTHERAPY OF THE HYPOPHYSIS AND HYPOTHALAMUS. Carlos Santos. Translated from *J. Soc. cienc. Med. Lisboa* **117**, 401-60(1953). 39p. (AEC-tr-2132). NSA 9-4925

11766
THE EFFECT OF ROENTGEN AND RADIUM RAYS ON EPITHELIAL CARTILAGE. C. Segale. *La Radiologia Medica* **8**, 234(1920). (In Italian).

11767
ACTION OF X RAYS ON THE HEART. G. Seguy and F. Quenisset. *Comptes. rend.* **124**, 790(1897). (In French).

11768
CHRONIC EXTERNAL IRRADIATION EFFECTS OF RADIATION UPON A TRANSPLANTED MOUSE LYMPHOSARCOMA. Joanne Weikel Hollcroft and Egon Lorenz (Argonne National Lab.). p.32-4 of BIOLOGICAL AND MEDICAL DIVISIONS, QUARTERLY REPORT, NOVEMBER, DECEMBER, JANUARY 1948-49. (ANL-4253)

11769
POLONIUM IN THE URINE OF MINERS EXPOSED TO RADON. Mary Sultzer and J. B. Hursh (Atomic Energy Project, Univ. of Rochester). Dec. 7, 1953. 28p. Contract W-7401-eng-49. (UR-266)

The urine of 19 miners working in the U mines of the Colorado Plateau and chronically exposed to high Rn concentration has been found to contain amounts of Po^{210} varying from 2 to 38 $\mu\mu\text{c}$ per liter, whereas no Po could be found in the urine of unexposed laboratory personnel. It is

proposed that urinary Po measurements may serve as a rough measure of cumulative lung exposure to Rn and its daughters since the daughters decay to Pb^{210} , a Pb isotope with a long effective half life in the body and a decay scheme producing Po^{210} . Calculations are presented to show that Po levels in the range of the experimental values obtained on miners' urine might be expected on general grounds and that a part of the body Pb^{210} content comes from the Rn accumulation in body fat NSA 8-1507

11770

ON THE EFFECT OF ROENTGEN RAYS ON SKIN CAPILLARIES. K Siedamgrotzky. *Strahlentherapie* 19, 84(1925). (In German).

11771

ADMINISTRATIVE PROBLEMS IN RADIATION PROTECTION. Irving R. Tabershaw and Saul J. Harris (New York State Labor Department, New York). *Nucleonics* 12, No. 12, 8-13(1954) Dec.

In the light of new legislation and wider application of radiation, health and safety regulations on federal, state, local, and industrial levels are reviewed. Existing codes are analyzed, and items essential to formulation of effective radiation protection codes are suggested. NSA 9-840

11772

URANIUM MINING OPERATIONS ON THE COLORADO PLATEAU. J. D. Terrey and P. W. Jacoe (Colorado State Dept. of Public Health, Denver). *AMA. Arch. Ind. Health* 12, 375-7(1955) Oct.

11773

INFLUENCE OF ROENTGEN RADIATION ON CYTOPLASMA. S. S. Weil and S. R. Frenkel. *Virchow's Arch. Path. Anat. und Physiol. und Klin. Med.* 257, 846-850 (1925). (In German).

11774

AN EVALUATION OF THE PULMONARY RADIATION DOSAGE FROM RADON AND ITS DAUGHTER PRODUCTS. Jacob Shapiro (Atomic Energy Project, Univ. of Rochester). *Apr.* 9, 1954. 150p. Contract W-7401-eng-49. (UR-298).

The pulmonary radiation dosage from the radon-radon daughter product atmosphere was investigated in experiments in which measurements were made of the radioactivity deposited in the lungs of rats and dogs breathing in an exposure chamber containing 2×10^{-8} curies-liter radon. The chamber was 2' x 3' x 6'. The results of these experiments indicate that most of the radiation dosage to the lungs is produced by these daughter products, removed as particulates from the air, rather than by gaseous radon and the daughter products of the radon molecules decaying in the lungs. NSA 8-3949

11775

CHANGES IN THE EYE AND FACIAL SKELETON OF A NEW-BORN CAT DUE TO ROENTGEN IRRADIATION. L. Tribondeau and D. Recamier. *C. R. Soc. Biol.* 58, 1031(1905). (In French).

11776

EFFECT OF X-RAYS ON THE EYE DURING THE COURSE OF DEVELOPMENT. L. Tribondeau and G. Belley. *Arch. d'electr. Med.* 15, 907(1907). (In French).

11777

EFFECT OF X-RAYS ON THE LIVER OF THE NEW-BORN CAT. L. Tribondeau and J. Hudellet. *C. R. Soc. de Biol.* 62, 102(1907). (In French).

11778

THE USE OF X-RAYS IN THE REGION OF THE EYE. L. Tribondeau and P. Laffargue. *Arch. Elect. Med.* 15, 999(1908). (In French).

11779

PROBLEMS ARISING FROM X-IRRADIATION OF THE

ADULT VISUAL APPARATUS. L. Tribondeau and P. Laffargue. *Arch. Electr. Med.* 16, 597(1908). (In French).

11780

EFFECT OF X-RAYS ON THE GENITALS. F. Villeman. *Comptes. Rend.* 142, 723(1906). (In French).

11781

REGENERATION OF THE SEMINAL GLAND AFTER DESTRUCTION BY X-RAYS. F. Villemm. *C. R. Soc. de Biol.* 60, 1076(1906). (In French).

11782

POSSIBILITIES OF IMPROVED THERAPY OF CANCER PATIENTS. C. Voegtlin. *Jour. Nation. Cancer Inst.* 1(5), 585-98(1941).

Need for protection of clinical and laboratory personnel against overexposure to x-, γ -, and neutron rays in course of therapy is stressed. Maximum safe daily dose set at 0.1r. X-rays and Ra are effective in curing localized tumors, but fail completely in advanced stages of disease when tumor is widely disseminated. BA 15-17695

11783

RADIATION PROTECTION IN THERAPEUTIC RADIOLOGY. H. O. Wyckoff (National Bureau of Standards, Washington, D. C.). *Am. J. Roentgenol. Radium Therapy Nuclear Med.* 73, 655-60(1955) Apr.

Problems of protection associated with the use of therapeutic radiation equipment are reviewed NSA 9-3373

11784

PUBLIC HEALTH ASPECTS OF INDUSTRIAL X-RAY APPARATUS IN OHIO. H. G. Bourne and E. J. Cordier. *Indust. Med. Surg.* 21, 21-24(1952).

11785

X-RAY PROTECTION IN DIAGNOSTIC RADIOLOGY. C. B. Braestrup. *Radiology* 38, 207-216(1942).

11786

THE ANEMIA OF INFECTION. XII. THE EFFECT OF TURPENTINE AND COLLOIDAL THORIUM DIOXIDE ON THE PLASMA IRON AND PLASMA COPPER OF DOGS. G. E. Cartwright, C. J. Gubler and M. M. Wintrobe. *J. Biol. Chem.* 184(2), 579-87(1950).

Intravenous injection of single dose of colloidal ThO_2 (2 ml/kg of body wt.) into each of 13 dogs resulted in average decrease in plasma Fe of 29% in 24 hours 3 consecutive daily injections into each of 9 dogs resulted in 446 per cent increase in plasma Fe in 3-7 days. BA 24-35471

11787

HAZARDS IN THE USE OF RADIOACTIVE STATIC ELIMINATORS AND THEIR CONTROL. J. E. Silson. *Amer. J. Public Health* 40(8), 343-52(1950).

Author feels that film badge monitoring and medical supervision of workers is advisable. BA 24-36337

11788

RADIATION SURVEY OF X-RAY OUTPUT OF AN ELECTRON MICROSCOPE FROM PERSONNEL HAZARD VIEWPOINT. L. B. Silverman, S. B. Elhott and M. A. Greenfield. *Science* 110(2858), 376-7(1949). BA 24-11740

11789

HANDBOOK OF RADIOACTIVITY AND TRACER METHODOLOGY. William Siri, E. C. Dougherty, R. W. Dunn, J. S. Robertson, C. A. Tobias, P. P. Weymouth and M. C. Fishler. Dept. of the A. F., Air Material Command, AF Tech. Rept. 5669. (1948). 867p.

Includes description of elements used in biological studies, isotopes in therapy and diagnosis, effects of natural radioactive elements on plants and animals. BA 23-337

11790

BETA- AND X-RAY DOSAGE IN RELATION TO SKIN REACTION. H. D. Griffith. *Arch. Geschwulstforsch.* 6, 305-11(1954). (In German).

Author reports that β rays dermatitis of 3 years duration was clinically less troublesome than the comparable lesions due to x-rays.

11791

MEDICAL PHYSICS, VOL. I AND II. Otto Glasser. Chicago, Year Book Publishers, Inc. 1944. 1744p. 1950. 1227p.

11792

SOME PUBLIC HEALTH PROBLEMS IN NUCLEAR FISSION OPERATIONS. Arthur E. Gorman and Abel Wolman. Amer. Jour. Publ. Health 39(4), 443-53(1949).

Authors discuss problems of environmental and industrial sanitation existing in atomic energy industry with reference to water supply and waste disposal.

BA 24-6883

11793

PRECAUTIONS FOR WORKERS USING RADIOACTIVE ISOTOPES. G. H. Guest. Canadian Jour. Comp. Med. 12(12), 323-33(1948). BA 23-14176

11794

HISTORICAL SKETCH OF THE BIOLOGICAL APPLICATION OF TRACER ELEMENTS. G. Hevesy. Cold Spring Harbor Symposia on Quantitative Biology 13, 129-50(1948).

A brief history of early research and applications in isotopic elements is given. Biological investigations using natural and artificially produced isotopes and radioisotopes are cited. BA 23-23059

11795

THE CHARACTERISTIC RADIOACTIVITY OF HUMAN BLOOD AND ITS SIGNIFICANCE TO THE PROBLEM OF RADIUM POISONING. Adolf Krebs. Kolloid-Z 89, 309-10(1939).

By means of a special Geiger Counter, radioactivity of normal human blood was determined to be 10^{-12} to 10^{-13} gm of Ra equivalent per cc of fresh blood. Author demonstrates importance of this quantity in limiting dose of Ra therapy. Early diagnosis of Ra poisoning with this apparatus is discussed. BA 14-8138

11796

ADVANCES IN BIOLOGICAL AND MEDICAL PHYSICS. J. H. Lawrence and J. G. Hamilton. New York, Academic Press, Inc. 1951. Vol. 2. 348p.

Includes chapters on the biological effects of radiations, carcinogenic effects of radiations. These chapters are abstracted separately.

11797

RADIATION DOSES RECEIVED BY THE SKIN OF PATIENTS DURING ROUTINE DIAGNOSTIC X RAY EXAMINATIONS. J. H. Martin. Brit. J. of Radiology 20, 279-283(1947).

11798

EFFECT OF NITROGEN MUSTARD ON SERUM COMPLEMENT IN VITRO AND IN PATIENTS WITH NEOPLASTIC DISEASE. Chester M. Southam and Yvette Goldsmith. Proc. Soc. Exptl. Biol. Med. 76(3), 430-2(1951).

No depression of human complement titer were observed following clinical use of nitrogen mustard and x-rays in maximal dosage. Human complement was inactivated by high concentrations of nitrogen mustard in vitro, but not by concentrations in range which is achieved in clinical usage. BA 25-24297

11799

RADIATION-EXPOSURE SURVEY OF X-RAY AND ISOTOPE PERSONNEL. Charles K. Spalding, E. DeAmicis and R. F. Cowing. Nucleonics 5(6), 63-66(1949).

As estimated from standard dental film packs in film badge holders, the total body radiation dosages in x-ray department personnel were frequently in excess of recommended tolerance dose, among isotope laboratory workers, tolerance dose was rarely exceeded.

BA 24-33014

11800

STANDARDS OF RADIOLOGICAL PROTECTION AND CONTROL. THE ROLE OF ENGINEERING IN NUCLEAR ENERGY DEVELOPMENT. K. Z. Morgan. (Oak Ridge National Lab.). p.176-209 OF THE ROLE OF ENGINEERING IN NUCLEAR ENERGY DEVELOPMENT; THIRD ANNUAL OAK RIDGE SUMMER SYMPOSIUM; AUG. 27 TO SEPT. 7, 1951. Dec.

1951. 516p. (TID-5031)

11801

STRAY RADIATION MEASUREMENT ON X-RAY PERSONNEL AND IN THE X RAY ROOM WITH SERIES INVESTIGATIONS WITH THE USE OF X RAY PHOTOGRAPHY. RADIATION PROTECTIVE APPARATUS. Steffens. Fortschr. Geb. Roentgenstrahlen 61, 365-73(1940). (In German).

Considerable values for scattering found as far as 3 and 4.7 m from apparatus, which in an 8 hour working period would sometimes exceed tolerance dose. BA 23-15315

11802

ACTION OF HIGH INTENSITY ELECTRONS IN MICRO-ORGANISMS. I. INACTIVATION OF BACTERIA AND VIRUSES. AN ABSTRACT. Frederick B. Traub, Wolfgang Huber, Arno Brasch and Ulrich Friedemann. Fed. Proc. 10, 422(1951). BA 25-31188

11803

COMPARATIVE METABOLISM OF RADIUM, STRONTIUM AND CALCIUM. William P. Norris and Walter Kiseleski. Cold Spring Harbor Symposia on Quantitative Biology 13, 164-72(1948).

Intravenous injection of rats with either Ca^{45} , Sr^{89} , Sr^{90} or Ra results in rapid urinary and fecal excretion. There are quantitative but not qualitative differences in biological behavior of 3 elements. Retentions are in decreasing order: Ca, Sr, Ra. Intraperitoneal injection of Ra shows that retention is proportional to dose.

BA 23-23205

11804

HAZARDS OF SHOE-FITTING FLUOROSCOPES. Willard W. Van Allen. Publ. Health Repts. 66(12), 375-8(1951).

Scattering radiation of 50-100 mr./min. found in immediate vicinity of customer being examined may constitute hazard to clerks who regularly occupy such a position. BA 25-19542

11805

PROTECTING PHOTOFLUOROGRAPHIC PERSONNEL FROM EXCESSIVE RADIATION. Willard W. Van Allen. Public Health Reports 65, 865-868(1950).

11806

SECONDARY RADIATION LIMITS IN PHOTOFLUOROGRAPHY. Willard W. Van Allen. Publ. Health Repts. 66(22), 712-6(1951). BA 25-30113

11807

HEALTH PHYSICS, INSTRUMENTATION, AND RADIATION PROTECTION. H. M. Parker. (Tumor Inst. of the Swedish Hospital, Seattle, Washington). p.223-85 of ADVANCES IN BIOLOGICAL AND MEDICAL PHYSICS. John H. Lawrence and J. C. Hamilton, eds. New York, Academic Press, Inc. Vol. 1. 1948.

11808

MEASUREMENT OF RADIOACTIVITY IN HUMAN BREATH. A. H. Ward and P. G. Jensen. Nature 167(4250), 600(1951). BA 25-32869

11809

PROTECTION IN RADIUM TELETHERAPY AT WESTMINSTER HOSPITAL, A SUMMARY OF MEASUREMENTS OF GAMMA-RAY DOSES MADE OVER A NUMBER OF YEARS WITH CONDENSER IONIZATION CHAMBERS CARRIED BY THE STAFF. C. W. Wilson. Brit. Journal of Radiology 13, 105-107(1940)

11810

PERSONAL DIARY OF RADIATION DOSAGE, PLEA FOR A

STANDARDIZED SYSTEM. M. H. Poppel, J. Sorrentino, and H. G. Jacobson. *J. Amer. Med. Assoc.* 147, 630-2 (1951).

11811

IONIZING RADIATION MATERIALS AS AIR POLLUTANTS. Abel Wolman. *Arch. Indust. Hygiene and Occup. Med.* 2, 134-136(1950).

11812

RADIOPHOSPHORUS AND ITS BIOLOGICAL UTILIZATION. L. Mallet and H. LeCamus. *J. Radiol. Electr.* 25, 168 (1942-43). (In French).

11813

RECENT CLINICAL DEVELOPMENTS IN THE THERAPEUTIC APPLICATION OF RADIOPHOSPHORUS AND RADIOIODINE. J. G. Hamilton and J. H. Lawrence. *J. Clin. Invest.* 21, 624(1942).

11814

PHOSPHORUS METABOLISM IN NEOPLASTIC TISSUES. L. A. Erf and J. N. Lawrence. *Proc. Soc. Exper. Biol. and Med.* 46, 694(1941).

11815

PROGRESS REPORT: (1) THE INFLUENCE OF COBALT STIMULATION ON THE SENSITIVITY OF THE HEMOPOIETIC SYSTEM OF RATS AND GUINEA PIGS TO X-IRRADIATION AND P³². (2) THE SIGNIFICANCE OF ECTOPIC BLOOD FORMATION IN SR⁸⁹ INTOXICATION (3) THE QUANTITATIVE DETERMINATION OF FIBRINOGEN IN RABBITS HAVING A NITROGEN MUSTARD INDUCED COAGULATION DEFECT. (4) CLINICAL STUDIES ON THE TREATMENT OF LEUKEMIA, HODGKINS' S DISEASE AND RELATED DISEASES WITH VARIOUS DOSAGES OF RADIOARSENIC. L. O. Jacobson, M. H. Block, E. K. Marks, E. Skirmont and E. Simmons (Argonne National Lab.), p.12-16 of DIVISION OF BIOLOGICAL AND MEDICAL RESEARCH, QUARTERLY REPORT, AUGUST, SEPTEMBER, OCTOBER, 1948, 1948, 198p. (ANL-4227)

11816

PHOSPHORUS METABOLISM IN LEUKEMIC BLOOD. L. W. Tuttle, K. G. Scott, and J. H. Lawrence. *Proc. Soc. Exper. Biol. and Med.* 41, 20(1939).

11817

RADIOACTIVE IRON AND ITS EXCRETION IN URINE, BILE AND FECES. P. F. Hahn, W. F. Bale, R. A. Hettig, M. D. Kamen and G. H. Whipple. *Journ. Exper. Med.*, 70, 443(1939).

11818

FORMATION OF HYDROXYLAMINE FROM AMINO-COMPOUNDS IN AQUEOUS SOLUTION BY IRRADIATION WITH X RAYS. George Scholes and J. Weiss. *Nature* 167 (4252), 693(1951).

Hydroxylamine (cell poison and catalase inhibitor) was produced by irradiation of adenine, guanine, cytosine or other amino compounds, nucleic acid gave little and hypoxanthine, uracil, uridine and ammonia gave none. Amino-group is apparently the source. BA 25-35843

11819

QUARTERLY TECHNICAL REPORT [FOR] JULY 1 THRU SEPTEMBER 30, 1953. (Atomic Energy Project, Univ. of Rochester). Nov. 10, 1953. 47p. Contract W-7401-eng-49. (UR-290)

Severe neurological dysfunction and multiple sub-arachnoid hemorrhage are described which were observed in a dog following exposure to 550 r x radiation. Factors affecting the preparation of tissue samples from the carcasses of large animals prior to the radiometric determination of Po are discussed. Preliminary experiments to determine the effect of Piromen on the phagocytosis-promoting effect on leukocytes showed that the

addition of Piromen to a mixture of heparinized whole blood and saccharated Fe did not increase the uptake of the Fe by human or dog leukocytes. Further evidence is presented for the in vivo incorporation of α -C¹⁴-acetate into the stroma of erythrocytes. An application of the findings to studies of defects in erythrocyte stroma in pernicious anemia is described. NSA 8-977

11820

QUANTITATIVE BIOLOGICAL DOSE CONTROL IN INTERSTITIAL RADIUM THERAPY. B. Jolles. *Brit. J. Radiol.* 19, 143(1946).

For ordinary regions (tongue, skin, breast, soft parts) in healthy condition, the range of tolerance to implantation is from 5500 r to 7000 r and 6000 r delivered in seven to ten days.

11821

COLLOIDAL GOLD CONTAINING THE RADIOACTIVE ISOTOPE Au¹⁹⁸ IN THE SELECTIVE INTERNAL RADIATION THERAPY OF DISEASES OF THE LYMPHOID SYSTEM. C. W. Sheppard, J. P. B. Goodell and P. F. Hahn. *J. Lab. and Clin. Med.* 32, 1437(1947).

11822

FACTORS REGULATING THE ABSORPTION OF IRON IN DOGS AS MEASURED WITH THE RADIOACTIVE ISOTOPE W. M. Balfour. *Amer. Journ. Path.*, 17, 438(1941).

A tissue factor, possibly the mucosal iron of the intestine, was the determining factor in iron absorption.

11823

CELLULAR RADIOPHYSIOLOGY. C. Regaud and A. Lacassagne. *Radiophysiol. et Radiother.* 1, 1(1929). (In French).

Authors review the subject of biological effects of radiation, including effects of dose and type of radiation, cell viability, effects on reproductive cell lines, anomalies of cell division and heritability of radiolesions. Morphological and physiological changes in cells of testes, glands, connective tissue and peripheral blood are described.

11824

RADIATION HAZARDS IN PHOTOFLUOROGRAPHY. FURTHER PROBLEMS IN X-RAY PROTECTION, PART I. Milton L. Birnkrant and Paul S. Henshaw. *Radiology* 44, 564-68(1945).

11825

SOME NOTES ON INDIUM--WITH SPECIAL REFERENCE TO ITS TOXIC PROPERTIES. Frances M. Turner (Gt. Brit. Atomic Energy Research Establishment, Harwell, Berks, England). Aug. 1957. 4p. (AERE-Med/M-18) NSA 12-2714

11826

ROLE OF STRUCTURAL DEGRADATION IN THE LOSS OF SEROLOGICAL ACTIVITY OF OVALBUMIN IRRADIATED WITH GAMMA-RAYS. Hugo Fricke, Charles A. Leone, and Wendell Landmann (Argonne National Lab., Lemont, Ill.). *Nature* 180, 1423-5(1957) Dec. 21. NSA 12-3495

11827

CELLULAR RADIOBIOLOGY. E. L. Powers (Argonne National Lab., Lemont, Ill.). *Ann. Rev. Nuclear Sci.* 7, 63-88(1957). NSA 12-4664

11828

PEPSIN DIGESTION OF ALBUMEN SERUM EXPOSED TO GAMMA RADIATION WITHIN OR WITHOUT THE ORGANISM. Ya. A. Epshtein and E. A. Zabozaeva (Ab Ali Ibn-Sin Stal'nabad Med. Inst.). *Med. Radiol.* 1, No. 6, 65-9 (1956) Nov.-Dec. (In Russian). NSA 11-3286

11829

OUTLINE FOR COURSE IN HEALTH PHYSICS, 1948-1949. (University of Rochester). nd. 20p. (M-4460)

A course in health physics to be given as a one-year course is described. It consists of the following subjects, instrumentation and monitoring, industrial hygiene and toxicology, radiation biology, introduction to research, introduction to modern physics, introduction to nuclear physics, mathematics. A list of required texts and reference books is included. NSA 4-1632

11830

California, Univ., Berkeley. Radiation Lab. MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT FOR JULY, AUGUST, SEPTEMBER 1956. Nov. 1, 1956. 21p. (UCRL-3573)

Progress is reported on the following studies: the effect of surgical and radiothyroidectomy--parathyroidectomy with I^{131} and At^{211} on breeding in the female rat; the tissue distribution of Sr^{90} in adult, young, and infant monkeys; the *in vivo* determination of whole-body retention of trace amounts of I^{131} in rats; the effect of thyroid-hormone therapy on health and longevity of rats receiving high levels of I^{131} ; the radiation-induced oxidation of acetic acid-oxygen solutions; the radiation-induced reduction of formic acid in oxygen-free solution; the growth of ultraviolet-induced autotrophs of yeast; and heat inactivation of yeast. Routine health chemistry activities for the period are summarized. NSA 11-4227

11831

California, Univ., Berkeley. Radiation Lab. BIOLOGY AND MEDICINE QUARTERLY REPORT FOR OCTOBER, NOVEMBER, DECEMBER 1956. Jan. 28, 1957. 51p. (UCRL-3653).

Data are presented from the following studies: the growth of osteogenic sarcoma transplants in rats; the effect of thyroid hormone therapy after large doses of I^{131} in rats; the radiation chemistry of formic acid solutions and systems; the radiation chemistry of pepsin solutions; tracer studies of iron metabolism in anemia; tracer studies of the life span of human erythrocytes; tracer studies on leukocyte life spans in normal, irradiated, and leukemic mice; tracer studies on carbon metabolism in diabetes; and lymphocyte response to low-level radiation exposure in man. Health chemistry and health physics activities for the period are summarized. A list of papers presented or published during the period is included. NSA 11-5136

11832

PROTECTION AGAINST RADIATIONS FROM RADIUM, COBALT-60, AND CESIUM-137. Natl. Bur. Standards Handbook 54, Sept. 1, 1954. 60p. NSA 9-1452

11833

MEDICAL AND HEALTH PHYSICS QUARTERLY REPORT [FOR] OCTOBER, NOVEMBER, DECEMBER 1955. (California, Univ., Berkeley, Radiation Lab.). Jan. 24, 1956. 61p. Contract W-7405-eng-48. (UCRL-3268).

Progress is reported in the following studies: the effect of therapeutic doses of At^{211} on reproduction and development in rats, the tissue distribution and excretion of Ac^{221} in rats, the effect of stable Tb on the distribution of intravenously administered Tb^{60} in rats, the radiation chemistry of formic acid and glycine the formation of x-ray-induced dominant lethal mutations in *Saccharomyces*, factors affecting storage of red blood cells in the spleen, tracer studies of Fe metabolism in man, blood volume determinations, electrocardiographic changes in dogs as a manifestation of myocardial alteration following burns, P^{32} tracer studies on the effects of radiation on nucleic acid metabolism in rats and in Ehrlich ascites tumor cells inoculated into mice, a mathematical analysis of the con-

centration dependence of frictional and sedimentation coefficients of proteins, and radioinduced changes in lipoprotein metabolism in rats. NSA 10-3165

11834

PERMISSIBLE DOSE FROM EXTERNAL SOURCES OF IONIZING RADIATION. Natl. Bur. Standards Handbook 59, Sept. 24, 1954. 79p. \$0.30(GPO). NSA 9-1453

11835

RADIOACTIVE-WASTE DISPOSAL IN THE OCEAN. Natl. Bur. Standards (U.S.) Handbook 58, Aug. 1954. 31p.

Recommendations of the National Committee on Radiation Protection governing radioactive-waste disposal in the ocean are presented. Factors affecting safety and convenience are discussed. NSA 9-604

11836

REPORT ON BIOLOGICAL, MEDICAL, AND BIOPHYSICS PROGRAMS. PART I. SEMIANNUAL REPORT OF RADIOLOGICAL PHYSICS DIVISION. PART II. QUARTERLY REPORT OF BIOLOGICAL AND MEDICAL RESEARCH DIVISION. (Argonne National Lab., Lemont, Ill.). Jan. 1956. 224p. Contract W-31-109-eng-38.

Radiological Physics. Progress is reported on the following studies: the effect of gas pressure on the performance of ionization chambers, the efficiency of the twin scintillator method for measuring neutron fluxes to energies greater than 14 Mev, the effects of radiation on the optical and scintillation properties of various organic solvents, with and without added scintillator, Rn contamination in apparatus used for measurements of expired Rn from humans having natural body Ra, the use of butyl phosphates as extractants of Th from bone samples, the performance of scintillation counters in the detection of Rn, the bone deposition of Ca^{45} following injection in dogs as determined from the specific activity of the blood as a function of time, the feasibility of adding heavy metal-organic compounds to liquid scintillators to increase absorption of γ rays, the performance of a halogen detector, application of the low-level γ -ray facility to the measurement of the radioactive burden of humans due to both natural and acquired radioactivity, and instrument design for studies on the effect of weather elements upon the rate of atmospheric diffusion and the capacity of the atmosphere to dispose of contaminants. Biological and Medical Research. Results are presented from a survey of parasites infesting laboratory mice and the effectiveness of various control measures, the effects of ultraviolet light on the mating reaction in paramecium; the effect of β -emitting isotopes upon survival and upon the incidence of malignant bone tumors following injection in mice, calculations of the total radiation dose from body deposits of Ra, decay constants for radioisotopes, effects of x irradiation on plasma constituents in chicks, ascorbic acid and nucleic acid metabolism in guinea pigs, identification of *Escherichia Coli* enzymes, protein syntheses in the pancreas and liver of rats and in yeast, biochemical patterns in health and in the presence of malignant tumors, the morphology of connective tissue, radioinduced bacterial inactivation, the response of *Drosophila* to single and periodic x-ray exposure, the radiosensitivity of pigeons, radiation effects on nucleic acids in grasshopper eggs, factors affecting plant transport and radiodecomposition of C^{14} -labeled sugars, neutron dosimetry, biological effects of neutrons; factors affecting enzyme activity and synthesis, effects of x radiation on amoeba, the protective effects against radiation injuries in mice of cells perfused from hypoxic spleens, the establishment of a frozen ascites tumor bank, and the liquid scintillation counting of tritium-labeled water. NSA 10-3327

11837

ATOMIC ENERGY IN CLINICAL MEDICINE. II. PROTEC-

TION AGAINST RADIATION. *Ars Med.* 5, 358-71(1950) May. (In French).

This article reviews the inherent dangers in working at the various atomic energy installations in the United States and the precautionary measures taken to protect the workers. Some of the topics discussed are monitoring of the atmosphere, waste disposal, personnel and area monitoring, and plutonium and beryllium poisoning. NSA 4-4142

11838
INDUSTRIAL HYGIENISTS DISCUSS RADIATION HAZARDS. *Chem. and Eng. News* 26, 1074-76(1948) Apr. 12.

Among the papers presented at the ninth annual meeting of the American Industrial Hygiene Association in Boston in March were the following: "Protection Against Radiation Hazards and Maximum Allowable Exposure Values" - by K. Z. Morgan of the Oak Ridge National Laboratories, "Radiation Measurements in Health Physics" by J. W. Healy of the Hanford Engineer Works. NSA 1-85

11839
MAXIMUM PERMISSIBLE AMOUNTS OF RADIOISOTOPES. *Nucleonics* 8, No. 2, 70-5(1951) Feb.

The International Commission on Radiological Protection (ICRP) draws attention to the data on maximum permissible exposures to radioisotopes for occupational workers presently used in the United States, Canada, and the United Kingdom. The isotopes considered are Ra^{226} , Pu^{239} , Sr^{88} , Sr^{90} , Po^{210} , T , C^{14} , Na^{24} , P^{32} , Co^{60} , and I^{131} . NSA 5-1475

11840
M. W. KELLOGG CO. RADIATION INCIDENT ON MARCH 13, 1957. *Nucleonics* 15, No. 12, 42-3(1957) Dec.

This statement by the General Manager of the AEC concerns the background and facts relating to an incident involving the uncontrolled release of radioactive Ir^{192} at the South Houston plant of the Nuclear Products Div. of the M. W. Kellogg Co. in March 1957. NSA 12-2699

11841
THE EFFECTS OF SICKLING ON ION TRANSPORT, II. THE EFFECT OF SICKLING ON SODIUM AND CESIUM TRANSPORT. D. C. Tosteson. (Brookhaven National Lab., Upton, N. Y. and National Heart Inst., Bethesda, Md.). *J. Gen. Physiol.* 39, 55-67(1955) Sept. 20. NSA 10-52

11842
HEALTH PHYSICS REPORT FOR APRIL, MAY, JUNE 1957. (Knolls Atomic Power Lab., Schenectady, N. Y.) 40p. Contract W-31-109-Eng-52.

Routine personnel, in-plant, and environmental radiation monitoring procedures engaged in during the period are summarized. NSA 12-4058

11843
HEALTH PHYSICS REPORT FOR OCTOBER, NOVEMBER, DECEMBER 1957. (Knolls Atomic Power Lab., Schenectady, N. Y.). 43p. Contract W-31-109-Eng-52. (KAPL-1914)

Personnel, in-plant, and environmental radiation monitoring procedures engaged in during the period are summarized. NSA 12-10323

11844
RECOMMENDATIONS OF THE INTERNATIONAL COMMISSION ON RADIOLOGICAL UNITS. *Radiology* 62, 106-9 (1954) Jan.

Recommendations of the International Commission on Radiological Units, as revised at the Seventh International Congress of Radiology, Copenhagen, July 1953, are presented. NSA 8-1968

11845
HEALTH PHYSICS REPORT FOR JULY, AUGUST, SEPTEMBER 1957. (Knolls Atomic Power Lab., Schenectady,

N. Y.). 43p. Contract W-31-109-Eng-52. (KAPL-1889).

Personnel, in-plant, and environmental radiation monitoring procedures engaged in during the period are summarized. NSA 12-4059

11846
CODE OF PRACTICE FOR THE PROTECTION OF PERSONS EXPOSED TO IONIZING RADIATIONS. PART A. USE OF X-RAYS FOR DIAGNOSIS, USE OF X-RAYS AND γ -RAY BEAM UNITS FOR THERAPY. PART B. USE OF RADIOACTIVE ISOTOPES. SUPPLEMENT; PROTECTION AGAINST IONIZING RADIATIONS - FUNDAMENTAL DATA. London, Her Majesty's Stationary Office, 1957. 86p. NSA 12-5865

11847
THE LOCAL EFFECT OF RADIATION ON BLOOD, BLOOD FORMING ORGANS, KIDNEYS AND TESTICLES. E. Peters. *Fortschr. Geb. Rontgenstr.* 16, 11, 16, 31(1910-1911). (In German).

11848
THE EFFECT OF RADIOACTIVE ISOTOPES IN PRODUCING LOCALIZED BIOLOGICAL EFFECTS. J. H. Muller. *Experientia* 1, 199(1945).

11849
ACTION OF X RAYS ON THE BLOOD AND BONE MARROW. C. Aubertin and E. Beaujard. *Folio Haematol.* 6, 31(1908). (In French).

Leucopenia after x-irradiation equivalent to therapeutic irradiation is not caused by decreased production of leukocytes by bone marrow, but by the formation of hyper-destructive macrophages in the spleen. Massive and repeated x-ray doses, however, will inhibit leukopoiesis.

11850
THE ACTION OF THE RADIATIONS EMITTED BY (1) RADIUM PLACQUES, (2) UNFILTERED AND FILTERED RADON SEEDS AND (3) INTRAVENOUS INJECTION OF RADON. A. Eidmow. *Brit. J. Radiol.* 13, 357(1940).

Lethal doses of Ra, applied (1) to the body surface, (2) by implantation of radon seeds subcutaneously or (3) as intravenously injected radon in solution in citrated blood caused identical histological and hematological changes in experimental animals. The author felt that leukopenia, which was proportional to radiation dose, could not be considered as a direct effect of radiation on leukocytes. Toxic and lethal actions of Ra or Rn were attributed to the hard β radiation which is "directly absorbed" by the blood stream causing lethality through its effects on endothelial cells and the induction of generalized toxemia.

11851
PROGRESS IN DEEP ROENTGEN THERAPY. Ernst Stark. *Strahlentherapie* 12, 1024(1923). (In German).

This paper includes a description of late effects of radiation and their causes. It is primarily a review of radiation therapy results in a variety of diseases including tuberculosis and many tumors.

11852
THE USE OF BLOOD COUNTS TO INDICATE THE EFFICIENCY OF X RAY AND RADIUM PROTECTION. J. C. Mottram. *Brit. Med. J.* , 269(1921).

11853
INTERPRETATION OF BLOOD COUNTS IN RADIUM AND X RAY WORKERS. J. C. Mottram. *Lancet* 1, 42(1931).

11854
TEMPORARY RADIATION AMENORRHEA AND HUMAN HEREDITY EPIDEMIOLOGICAL STUDY Hans Luxenburger. *Strahlentherapie* 45, 679(1932)

11855
THE GENETIC BASIS OF ROENTGEN MUTATIONS. Paula Hertwig. *Strahlentherapie* 45, 657-78(1932).

A review of effects on genes and chromosomes including observations on various organisms including *Drosophila*, *Triton* and *Habrobracon*.

11856

THE EFFECTS OF RADIATION ON GERM CELLS WITH SPECIAL REFERENCE TO MAN. J. B. S. Haldane. Brit. J. Radiol., Suppl. 1-3, 99 (1947-50).

This paper is introductory to the four papers following it. Author cautions that results of studies using experimental animals cannot be extrapolated to man.

11857

RADIUM NECROSIS OF THE INTESTINE. B. Fisher. Strahlentherapie 13, 333(1922). (In German).

A description of 3 (fatal) cases of necrosis of the intestine following the use of deep radiation therapy for abdominal tumors.

11858

ON THE EFFECT OF GRENZ RAYS ON LEUKOCYTE AND THE BLOOD PICTURE. P. Eckel. Strahlentherapie 45, 525-37(1932). (In German).

Rabbits were exposed to various doses of soft x-rays (Grenz rays) and blood picture described after exposure.

11859

OVARIAN HISTOLOGY WITH RESPECT TO THE QUESTION OF GERMINAL DAMAGE DUE TO ROENTGEN RAYS. Rudolf Dryoff. Strahlentherapie 45, 711(1932). (In German).

Author reports observations on pregnancies of irradiated mothers. Studies on drosophila ovaries and consideration of the significance of the observations to humans are also included.

11860

ACTION OF RADIATION ON AQUEOUS SOLUTIONS. EXPERIMENTAL WORK WITH ENZYMES IN SOLUTION. W. M. Dale. Brit. J. Radiol. Suppl. 1-3, 46(1947-50).

11861

OESTRUS, ONSET OF OVULATION AFTER TEMPORARY STERILIZATION BY ROENTGEN RAYS (EXPERIMENTAL ANIMALS). J. V. Khreninger-Guggenberger. Strahlentherapie 45, 747(1932). (In German).

11862

RADIATION INJURY OF MOUSE AND RAT SPERM. OBSERVATIONS ON FERTILIZED OVA. H. Brenneke. Strahlentherapie 60, 214(1937). (In German).

When a small (200 r) x ray dose was delivered to mouse testes, and normal female mated with the irradiated male, many fertilized ova died before completing development due to chromosome translocations in the sperm.

11863

TWO CASES OF LEUKAEMIA TREATED BY THE ROENTGEN RAYS. W. I. Bruce. Lancet 1, 211(1906).

11864

A STUDY OF THE RELATIVE TOXIC EFFECTS PRODUCED BY REGIONAL RADIATION. W. Denis and C. L. Martin-Aldrich. Amer. J. Med. Sci. 160, 555(1920).

Rabbits were exposed to x-rays from a Coolidge tube. Effects of partial body exposure (heart, lungs, thyroid, liver, kidney, stomach, spleen, intestines, thigh, anterior or posterior abdomen) to various doses are described.

11865

METHODS FOR THE CONTROLLED SELECTIVE LOCALIZATION OF RADIOISOTOPES OF ZIRCONIUM, COLOMBIUM AND YTTRIUM IN LIVER, SPLEEN AND BONE MARROW. E. Dobson, J. Gofman, H. Jones, L. Kelly and L. Walker. Proc. IV Intern. Cancer Research Congress (1947).

11866

PRELIMINARY OBSERVATIONS ON THE EFFECT OF RADIUM CHLORIDE INJECTIONS IN PATIENTS. Walter Altschul. Strahlentherapie 45, 579(1932). (In German).

11867

CHANGES IN THE BLOOD PICTURE DUE TO ROENTGEN IRRADIATION AND THEIR PROGNOSTIC SIGNIFICANCE. Hans Bosch. Strahlentherapie 45, 503-524(1932). (In German).

Author reports his observations on patients receiving therapy.

11868

General Electric Co. Hanford Atomic Products Operation, Richland, Wash.

BIOLOGICAL EFFECTS OF I^{131} CONTINUOUSLY ADMINISTERED TO SHEEP. L. K. Bustad, L. A. George, C. M. Barnes, S. Marks, D. E. Warner, K. E. Herde, and H. A. Kornberg. Radiation Research 6, 380(1957). 131p. (HW-30437)

Sheep received I^{131} orally each day over a period of 4 years. All animals showed diminished thyroid activity within 4 years and before clinical changes were evident. The study continues, using doses of 0.15, 0.5 and 1.5 $\mu\text{c}/\text{day}$.

11869

EFFECTS OF RADIATION ON THE EYES. Birch-Hirschfeld. Therapeutics Rundschau 34 (1908). Abstracted in Brit. J. Radiol. 13(1908).

Observations on the changes in the irradiated eyes of patients are described, including changes in the optic nerve, leading to atrophy, and changes in blood vessels. Role of changes induced in lecithin by irradiation is discussed.

11870

EFFECTS OF SMALL X RAY DOSES ON THE FERTILITY OF RATS AND MICE. H. Schafer. Z. Mikro. Anat. F., 46, 1(1939). (In German).

Author describes both physiological and histological effects.

11871

EFFECT OF TOTAL BODY X IRRADIATION ON THE SUSCEPTIBILITY OF MICE TO *E. COLI* ENDOTOXIN. J. P. Sanford and H. E. Noyes. Radiation Res. 7, 58(1957).

A dose of 400 r produced leukopenia and weight loss but no increase in susceptibility to endotoxin over a period of 21 days.

11872

PRODUCTION OF TRANSLOCATIONS AND MUTATIONS IN MICE BY MEANS OF X RAYS. G. D. Snell. Genetics 20, 545(1935).

Death in utero of mouse ova fertilized by sperm from low dose (approx. 200 r) local irradiation of mouse testes is due to chromosome translocations in the sperm. (Also describes fertility studies and histological studies in rats) Some offspring were semi-sterile after 800 r dose to testes, or 260 r to the ovaries

11873

ACTION OF RADIUM ON BLOOD. C. Aubertin and A. Delamore. C. R. Soc. Biol. 64, 437(1908). (In French).

11874

NOTE RELATIVE TO THE INFLUENCE OF X RAYS ON THE FERTILITY OF RABBITS. J. Bergonie and L. Tribondeau. C. R. Soc. Biol. 64, 478(1908).

Previous studies showed that x-rays affected various functions of rabbit sperm independently in that after receiving a sterilizing dose, sperm remained motile but did not fertilize ova of females. Study reported here was designed to determine whether various functions of ova were also affected independently. Ovaries were exposed surgically and exposed to various doses of x-ray, and 8 days and 15 days after exposure the females were inseminated by normal males. After small radiation doses, normal pregnancies resulted, after 60 min. irradiation, pregnancy terminated prematurely with delivery of small, non-viable fetuses. Macroscopically, ovaries showed little change, but on histological study it was observed that very few intact primordial follicles and Graafian follicles remained. "Dissociation of functions" of ova was not observed.

11875

ROENTGEN RAY INTOXICATION. II. A STUDY OF THE SEQUENCE OF CLINICAL, ANATOMICAL AND HISTOLOGICAL CHANGES FOLLOWING A UNIT DOSE OF X RAYS. S. L. Warren and G. H. Whipple. *J. Exp. Med.* 35, 203-211(1922).

Initial injury of small intestine is responsible for severe clinical reaction and lethal intoxication following total body exposure of dogs to large x-ray doses. Observations reported include: slight elevation of BUN, no clinical signs of intoxication, fragmentation of lymphocyte nuclei in spleen and lymph nodes during the 1st 24 hours; onset of clinical intoxication, severe injury of intestinal epithelium in 2nd 24 hrs., severe intoxication and anatomical changes in 3rd 24 hrs., increasing intoxication and decline into a moribund state during the 4th 24 hrs. after exposure. Lymphocytes in Peyer's Patches appeared to be much less sensitive than neighboring intestinal epithelium.

11876

ROENTGEN RAY INTOXICATION. III. SPEED OF AUTOLYSIS OF VARIOUS BODY TISSUES AFTER LETHAL X RAY EXPOSURES. THE REMARKABLE DISTURBANCE IN THE EPITHELIUM OF THE SMALL INTESTINE. S. L. Warren and G. H. Whipple. *J. Exp. Med.* 35, 213-24(1922).

Gastro-intestinal tract, spleen, liver, pancreas and kidneys were studied to determine pattern and rate of autolysis in normal and heavily x-irradiated dogs. In the intestine after x-irradiation, crypt epithelium autolyzes faster than does epithelium of tips of villi. The reverse relationship occurred in intestine of unirradiated dogs. Clinically, gastro-intestinal signs were maximal on 4th post-exposure day and death commonly occurred then. Dogs surviving the 4th day after irradiation recovered.

11877

A STUDY OF THE EFFECTS OF RADIUM ON NORMAL BRAIN TISSUE. C. S. Williamson, R. O. Brown and J. W. Butler. *Surg. Gynec. and Obst.* 31, 239(1920).

Consistent changes were observed in the blood vessels of irradiated dogs' brains.

11878

CANCER OF RADIOLOGISTS. Ledoux-Lebard. *Paris Med.* 12, 299-303(1922) (In French).

Chronic radiodermatitis, like all chronic irradiation, favors the development of cancer. Author believes malignant transformation occurs in 20-30% of cases of chronic radiodermatitis.

11879

A CASE OF DERMATITIS FROM ROENTGEN RAYS. H. R. Crocker. *Brit. Med. Jour.* 1, 8(1897).

One hour x ray exposure of a broad abdominal area resulted in a burn resembling sunburn. Hair of the area was not lost.

11880

IONIZATION AND ITS BEARING ON THE BIOLOGICAL EFFECTS OF RADIATION. G. Failla. Ch. III in: *Biological Effects of Radiation*, McGraw-Hill Book Co. B. M. Duggar, Editor. 1, 87-121(1936).

11881

DERMATITIS CAUSED BY ROENTGEN RAYS. H. C. Drury. *Brit. Med. J.* 2, 1377-8(1896).

Exposure to 2 doses (1 hr. and 1.5 hrs) of x rays for kidney stone studies resulted in nausea in the one case and in the second, nausea plus severe erythema progressing to lesion with discharge.

11882

Atomic Bomb Casualty Commission, Hiroshima, Japan. HUMAN RADIATION INJURY. THE CORRELATION OF LEUKOCYTE DEPRESSION WITH MORTALITY. A RE-EVALUATION OF THE EARLY EFFECTS OF THE ATOMIC

BOMBS ON THE JAPANESE. G. J. Jacobs, F. X. Lynch, E. P. Cronkite, and V. P. Bond. 1957. 29p. (ABCC-09-59)

11883

PHYSICAL DOSIMETRY AND CLINICAL OBSERVATIONS INVOLVED IN AN ACCIDENTAL CRITICAL ASSEMBLY EXCURSION. R. J. Hasterlik and L. D. Marinelli. *Proc. Internat. Conf. on Peaceful Uses of Atomic Energy* 11, 25-34(1956).

11884

EFFECTS OF X RAYS AND RADIUM UPON REGENERATION. W. C. Curtis. p.411-457 of *BIOLOGICAL EFFECTS OF RADIATION*. B. M. Duggar, ed. New York. McGraw-Hill Book Co., 1936.

11885

THE EFFECT OF RADIATION ON PROTEINS. J. H. Clark. p.303-322 of *BIOLOGICAL EFFECTS OF RADIATION*. B. M. Duggar, ed. New York. McGraw-Hill Book Co., 1936.

11886

EFFECTS OF IONIZING RADIATION ON RESISTANCE AND INFECTION. D. N. Talmadge. *Ann. Review Microbiol.* 9, 335(1955).

11887

STATISTICAL TREATMENT OF BIOLOGICAL PROBLEMS IN IRRADIATION. L. J. Reed. p.227-251 of *BIOLOGICAL EFFECTS OF RADIATION*. B. M. Duggar, ed. New York. McGraw-Hill Book Co., 1937.

11888

THE BIOLOGICAL EFFECTIVENESS OF X RAY WAVE LENGTHS. C. Packard. p.459-471 of *BIOLOGICAL EFFECTS OF RADIATION*. B. M. Duggar, ed. New York. McGraw-Hill Book Co., 1936.

11889

HEMATOLOGICAL AND CHEMICAL OBSERVATIONS IN CASES OF SPLEEN-MEDULLARY LEUKEMIA UNDER X RAY TREATMENT. J. C. G. Ledingham. *Lancet* 1, 366-8(1906).

Author reports his studies on uric acid and leukocyte levels in patients receiving x-ray therapy for leukemia. Uric acid excretion increased during therapy but the increase could not be correlated with the leukopenia. The leukopenia was attributed to diminished leukocyte production rather than to increased destruction. Evidence is interpreted as favoring the view that x-rays have an inhibitory effect on hematopoiesis.

11890

THE EFFECTS OF RADIUM AND X RAYS ON EMBRYONIC DEVELOPMENT. E. G. Butler. p.389-410 of *BIOLOGICAL EFFECTS OF RADIATION*. B. M. Duggar, ed. New York. McGraw-Hill Book Co., 1936.

11891

THE EFFECTS OF IRRADIATION ON VENOMS, TOXINS, ANTIBODIES AND RELATED SUBSTANCES. S. C. Brooks. p.341-88 of *BIOLOGICAL EFFECTS OF RADIATION*. B. M. Duggar, ed. New York. McGraw-Hill Book Co., 1936.

11892

IMMEDIATE CHANGES OF LEUKEMIC BLOOD UNDER RADIOTHERAPY. C. Aubertin and E. Beaujard. *Compt. rend. soc. biol.* 57, 982(1904).

X ray treatment caused decreased WBC count, but affects granulocytes more than other cell series.

11893

DECONTAMINATION CHART. *Nucleonics* 9, No. 5, C12-15(1951) Nov.

The results of extensive studies of methods of decontamination are presented in the form of a chart. For each type of surface listed--paint, asphalt, metal, concrete or

brick, tile, wood, and soil--several decontaminating materials are compared with respect to type of action, technique to be used, advantages, and disadvantages. Some of the decontaminating agents are water, steam, soapless detergents, complexing agents, trisodium phosphate, organic solvents, caustics, wet sandblasting, vacuum blasting, and vacuum cleaning. NSA 5-6975

11894

ACCIDENT AT WINDSCALE. Anonymous. Brit. Med. J. 5054, 1166-8(1957).

11895

ATOMIC RADIATION AND LIFE. P. Alexander. Penguin Books, Baltimore (1957).

11896

EFFECTS OF BLOCKING INTRACELLULAR STRUCTURES ON THE RADIO RESISTANCE OF CELLS. M. N. Meisel, N. A. Pomoshchnikova, and T. S. Sokolova (Inst. of Microbiology, Academy of Sciences, U.S.S.R.). Doklady Akad. Nauk. S.S.S.R. 117, 143-5(1957) Nov. 1. (In Russian). NSA 12-5823

11897

THE PHYSIOLOGICAL EFFECTS OF RADIATION UPON ORGAN AND BODY SYSTEMS. S. L. Warren. Chapter XIV, p.473-539 in: Biological Effects of Radiation. B. M. Duggar, ed. McGraw-Hill Book Co. 1936. Vol. 1.

Author*reviews effects of ionizing radiation on skin, blood vessels, R-E system, connective tissue, gastro-intestinal tract, lungs, liver, heart, kidneys, adrenals, ear, nerve tissue, bone, cartilage and the hematopoietic tissues.

11898

THE EFFECT OF ROENTGEN RAYS ON RAT TESTES. H. V. Wattenwyl and C. A. Joel. Strahlentherapie 72, 620-92(1942). (In German).

11899

BIOLOGICAL EFFECTS OF ALPHA PARTICLES. R. L. Zirkle. Chap. XVI. In: Biological Effects of Radiation. B. M. Duggar, Editor. McGraw-Hill Book Company 1, 559-572(1936).

Advantageous properties of alpha particles. Suitable sources of alpha particles. Effects upon macroscopic struct. and system. Effects upon single cells, parts of cells, and small groups of cells.

11900

RETENTION OF RADIOPHOSPHORUS IN WHOLE AND ALIQUOT PORTIONS OF TISSUES OF PATIENT DEAD OF LEUKEMIA. L. A. Erf. Proc. Soc. Exper. Biol. and Med 47, 287(1941).

11901

ABSTRACT OF PAPER PRESENTED AT THE GYNECOLOGY CONGRESS IN HEIDELBERG, SECTION OF RADIUM THERAPEUTICS, MAY 26-27, 1923. Hofbauer. Amer. J. Roentgenol. Radium Therapy 10, 993-999(1923).

The paper described the effect of the female genital tract of irradiating the midbrain and hypothalamus. Clinical and histological findings are both indicated.

11902

ABSTRACT OF PAPER PRESENTED AT THE GYNECOLOGY CONGRESS IN HEIDELBERG; SECTION OF RADIUM THERAPEUTICS, MAY 26-27, 1923. Lahm. Amer. J. Roentgenol. Radium Therapy 10, 993-999(1923).

The sequence of histological changes in healing irradiated carcinoma are described. The author stresses the importance of preserving tropic nerves.

11903

ABSTRACT OF PAPER PRESENTED AT THE GYNECOLOGY CONGRESS IN HEIDELBERG; SECTION OF RADIUM

THERAPEUTICS, MAY 26-27, 1923. Geller. Amer. J. Roentgenol. Radium Therapy 10, 993-999(1923).

Three cases of Endocrine disease treated with irradiation of the hypophysis are described.

11904

STUDIES ON THE EFFECTS OF RADIATION ON PEA AND BEAN SEEDLINGS ARE REPORTED. Martius. Abstract of Paper Presented at the Gynecology Congress in Heidelberg; Section of Radium Therapeutics, May 26-27, 1923. Am. J. Roentgenol. Radium Therapy 10, 993-99(1923).

11905

HISTOLOGICAL CHANGES AFTER X-IRRADIATING MICE WITH AND WITHOUT CARCINOMA ARE DESCRIBED. Vorlander. Abstract of paper presented at the Gynecology Congress in Heidelberg, Section of Radium Therapeutics, May 26-27, 1923. Amer. J. Roentgenol. Radium Therapy 10, 993-999(1923).

11906

IRRADIATION OF THE SPLEEN IS DESCRIBED AS A SUCCESSFUL THERAPEUTIC MEASURE FOR VAGINAL BLEEDING. Werner. Abstract of paper presented at Gynecology Congress in Heidelberg, Section of Radium Therapeutics, May 26-27, 1923. Amer. J. Roentgenol. Radium Therapy 10, 993-999(1923).

11907

RECOMMENDATIONS OF THE BRITISH X-RAY AND RADIUM PROTECTION COMMITTEE, SEVENTH REVISED REPORT. BRITISH X-RAY AND RADIUM PROTECTION COMMITTEE. Oct., 1948 16p. (NP-922)

Protective measures recommended are included under the following sections, working hours and other conditions, general x-ray and radium recommendations, x-ray protective recommendations, electrical precautions in x-ray rooms, film storage recommendations, x-rays for industrial and research purposes, radium protective recommendations, electrical precautions for electromedical apparatus, and ultra-violet therapy NSA 3-544

11908

RECOMMENDATIONS OF THE INTERNATIONAL COMMISSION ON RADIOLOGICAL UNITS (LONDON 1950). Am. J. Roentgenol. Radium Therapy 65, 99-102(1951) Jan.

Recommended units, dose or specifications of conditions of roentgen and γ -ray treatments, and measuring instruments are presented, with the rules governing the selection and work of the Commission. NSA 5-1772

11909

EXPERIMENTAL STUDIES ON THE EFFECT OF ROENTGEN RAYS ON BLOOD SERUM OF ANIMALS. H. Leidenfrost. Zeitsch. Roentgenk. 12, 186-191(1910). (In German).

11910

MEDICAL X-RAY PROTECTION UP TO 2 MILLION VOLTS (HANDBOOK 41). Natl. Bur. Standards Mar. 30, 1949. 41p.

Protection procedures and rules for use in connection with x-radiation therapy are listed and discussed. Fluoroscopic, radiographic, and dental units, and mobile diagnostic x-ray units are described and necessary protective measures for each are covered. Structural details of barriers, protective measures for high voltage circuits, and first aid instructions and devices are included. An appendix contains radiation attenuation curves, lists of necessary lead thicknesses for various beam intensities, a distance protection article, and a summary of various dangers not enlarged upon in the body of the book.

NSA 3-222

11911

THE CAUSE AND PREVENTION OF THE CONSTITUTIONAL EFFECTS ASSOCIATED WITH THE MASSIVE DOSES OF

DEEP ROENTGENTHERAPY. G. E. Pfahler. Amer. J. Roentgen. 3, 310(1916).

11912

INDUCED MUTATION IN PLANTS. L. J. Stadler. In: Biological Effects of Radiation. B. M. Duggar, Editor. McGraw-Hill Book Co. 2, 1263-1280(1936). BA 36-18025

11913

POST HOC OR PROPTER HOC? CAN X-RAY ACTIVATE LATENT PELLAGRA? G. M. Niles. Amer. J. Roentgen. 2, 529(1914).

11914

THE SENSITIZING EFFECT OF COLD ON ROENTGENIZED SURFACES. C. A. Simpson. Amer. J. Roentgen. 3, 485 (1916).

11915

RADIATION AND THE STUDY OF MUTATION IN ANIMALS. J. Schultz. p.1209-61 of BIOLOGICAL EFFECTS OF RADIATION. B. M. Duggar, ed. New York. McGraw-Hill Book Co., 1936. BA 36-18025

11916

INDUCED CHROMOSOMAL ABERRATIONS IN ANIMALS. T. Dobzhansky. p.1167-1208 of BIOLOGICAL EFFECTS OF RADIATION. B. M. Duggar, ed. New York. McGraw-Hill Book Co., 1936. BA 36-18025

11917

X-RAY IDIOSYNCRACY. G. M. Mackee. Amer. J. Roentgen. 3, 293(1916).

11918

THE CAUSE AND PREVENTION OF THE CONSTITUTIONAL SYMPTOMS FOLLOWING DEEP ROENTGENTHERAPY. S. Lange. Amer. J. Roentgen 3, 356(1916).

11919

EFFECTS OF RADIATION ON BACTERIA. B. M. Duggar. p.1119-1149 of BIOLOGICAL EFFECTS OF RADIATION. B. M. Duggar, ed. New York. McGraw-Hill Book Co., 1936.

11920

THE EFFECTS OF RADIUM RAYS ON PLANTS. C. Stuart Gager. p.987-1013 of BIOLOGICAL EFFECTS OF RADIATION. B. M. Duggar, ed. New York. McGraw-Hill Book Co., 1936. BA 36-18025

11921

INDUCED CHROMOSOMAL ALTERATIONS IN MAIZE. E. G. Anderson. p.1297-1310 of BIOLOGICAL EFFECTS OF RADIATION. B. M. Duggar, ed. New York. McGraw-Hill Book Co., 1936.

11922

HEALING OF SERIOUS FRACTURES BY MEANS OF IRRITATIVE ROENTGEN DOSES. M. Fraenkel. Munchen. Med. Wehnschr. 8, 211(1915). (In German).

11923

THE EFFECTS OF RADIATION ON FUNGI. E. C. Smith. p.889-918 of BIOLOGICAL EFFECTS OF RADIATION. B. M. Duggar, ed. New York. McGraw-Hill Book Co., 1936.

11924

INDUCED CHROMOSOMAL ALTERATIONS. T. H. Goodspeed. p.1281-95 of BIOLOGICAL EFFECTS OF RADIATION. B. M. Duggar, ed. New York. McGraw-Hill Book Co., 1936.

11925

BIOLOGICAL ASPECTS OF THE QUANTUM THEORY OF RADIATION ABSORPTIONS IN TISSUES. J. W. Gowen. p.1311-1330 of BIOLOGICAL EFFECTS OF RADIATION. B. M. Duggar, ed. New York. McGraw-Hill Book Co., 1936.

11926

THE MASSIVE VS. THE FRACTIONAL DOSE IN ROENTGEN THERAPY. A. M. Cole. Amer. J. Roentgen. 2, 762(1915).

11927

EFFECTS OF REPEATED INJECTIONS OF POLONIUM

UPON LABORATORY ANIMALS. R. K. Davis (Mound Laboratories, Miamisburg, Ohio). Report For Biol. Res., 8-30(1951). (MLM-648)

11928

PROGRESS REPORT: MANGANESE REMOVAL. Joan F. Fried, M. W. Rosenthal and E. Maretti. Biological and Medical Research Division Quarterly Rep. 131-136 (1956). (ANL-5655)

11929

AN AMERICIUM-241 ACCIDENT. R. E. Rowland, C. E. Miller and L. D. Marinelli. Report on Biological, Medical and Biophysics Programs. 1956. (ANL-5518)

11930

BREMSSTRAHLUNG MEASUREMENT OF Sr^{90} IN DOGS. P. F. Gustafson and C. E. Miller. p.49-51 "Report on Biological, Medical and Biophysics Programs." 1956. (ANL-5518)

11931

PROGRESS REPORT: MEASUREMENT OF THE γ -RAY ACTIVITIES FROM THE HUMAN BODY. C. E. Miller and L. D. Marinelli. p.52-56 "Report on Biological, Medical and Biophysics Programs." 1956. (ANL-5518)

11932

RELATIVE EFFECTS ON SURVIVAL AND TUMOR INCIDENCE OF SOME INTERNAL EMITTERS. Miriam P. Finkel. p.105-112 "Report on Biological, Medical and Biophysics Programs." 1956. (ANL-5518)

11933

LOCAL TUMORS FOLLOWING INJECTION OF Y^{91}PO_4 . Hermann Lisco, M. P. Finkel and A. M. Brues. p.115 of Report on Biological, Medical and Biophysical Programs, 1956. (ANL-5518)

11934

Western Reserve University, Cleveland, Ohio
STUDIES WITH CERTAIN THORIUM SALTS. Paul A. Mattis, J. White, J. Hartzel, I. Hittle and W. C. Lynam. p.48-68 of SEMI-ANNUAL REPORT: JUNE 1948. Hymer L. Friedell. Sept. 10, 1948. (WRU-7)

11935

Western Reserve University, Cleveland, Ohio
I. PRELIMINARY EXCRETION STUDIES WITH $\text{Sr}^{89, 90}$. II. DISTRIBUTION OF P^{32} AND $\text{Sr}^{89, 90}$ IN ALBINO RATS. p.5-27 of SEMI-ANNUAL REPORT: JUNE 1948. Hymer L. Friedell. Sept. 10, 1948. (WRU-7)

11936

Western Reserve University, Cleveland, Ohio.
I. DEVELOPMENT OF MALIGNANT TUMORS IN RATS INJECTED WITH P^{32} ; II. FURTHER OBSERVATIONS OF RATS SURVIVING AN LD_{50} DOSE OF P^{32} ; III. FURTHER OBSERVATIONS OF RATS RECEIVING REPEATED DOSES OF P^{32} . S. Koletsky, A. Bengston, and V. Milanich. p.32-45 of SEMI-ANNUAL REPORT, JULY 1949. Hymer L. Friedell. Mar. 24, 1950. (WRU-24)

11937

Argonne National Lab.
TOXICITY OF RADIOSTRONTIUM IN CARNIVORES: CURRENT STATUS OF THE LONG-TERM CAT AND DOG EXPERIMENTS. M. P. Finkel, R. J. Flynn, J. W. Clark, G. Scribner, J. Lestina, H. Lisco and A. M. Brues. 16-20 "Biological and Medical Division Quarterly Report, Oct., Nov., Dec., 1956." 1956. (ANL-5696)

11938

Argonne National Laboratory Biological Div.
THE RETENTION OF P^{32} BY YOUNG ADULT CF-1 FEMALE MICE. Miriam P. Finkel. Aug. 1947. (AECD-2024P, ANL-4078)

11939

POST TREATMENT MODIFICATION OF X-RAY MUTA-

GENESIS IN PARAMECIUM. R. F. Kimball, N. Gaither and S. M. Wilson. Radiation Research 5, 485(1956).

Treatment of paramecia immediately after x-irradiation slowed subsequent cell division. To see whether the length of the interdivision interval was involved in the radiation effect, the animals were subjected to temp. of 6°C-37°C starting within one hour post-exposure and maintained at the selected temp. for 24 hours before being returned to 27°C. Lowering the temp. was found to decrease the number of radiation induced mutations slightly, the effect of low temp. being less marked when combined with exposure to H₂O₂. Appropriate doses of streptomycin immediately after or within 2 hrs. after irradiation caused an increase in mutations although streptomycin *per se* was not mutagenic. Streptomycin had no effect if it was added after the first post-exposure division. Authors concluded that an appreciable fraction of "mutational changes" are not irrevocably established in paramecia until at least 2 hrs. post-exposure provided that a division does not occur during that interval. (from authors' abstract).

11940

Argonne National Lab.

THE COMPARATIVE SKELETAL RETENTION OF CALCIUM AND STRONTIUM IN EPINEPHALUS STRIATUS. BLOCH. C. F. Decker, Walter Chavin and William P. Norris. p. 89-91 "Biological and Medical Division Quarterly Report." 1956. (ANL-5696)

11941

Western Reserve Univ., Cleveland, Ohio.

I. THE DISTRIBUTION AND METABOLISM OF YTTRIUM-91 IN THE MALE ALBINO RAT. J. Storaasli, F. Bonte, M. Berg, and S. Rosenberg. p.9-13 of SEMI-ANNUAL REPORT, JULY 1949. Hymer L. Friedell. Mar. 24, 1950. (WRU-24)

11942

Argonne National Lab.

THE TOXICITY OF Sr⁸⁹ IN MICE. Miriam P. Finkel, A. M. Brues, and H. Lisco. p.25-9 of BIOLOGICAL AND MEDICAL RESEARCH DIVISION QUARTERLY REPORT. A. M. Brues, Director. April 1954. (ANL-5247)

11943

Argonne National Lab.

THE PATTERN OF RADIUM RETENTION IN MAN. W. P. Norris, T. W. Speckman, and P. F. Gustafson. 6p. 1954. (ANL-5247)

11944

MINUTES OF THE PERMISSIBLE DOSES CONFERENCE HELD AT CHALK RIVER CANADA SEPT. 29-30, 1949. 19p. (RM-10)

11945

Mound Laboratories, Miamisburg, Ohio.

EFFECTS OF POLONIUM UPON THE LIFE SPAN OF RATS. R. K. Davis and G. T. Stevenson. p.4 of BIOLOGICAL RESEARCH QUARTERLY PROGRESS REPORT THROUGH DECEMBER 17, 1953. Mar. 10, 1954. (MLM-952)

11946

Mound Laboratories, Miamisburg, Ohio

EFFECTS OF REPEATED LOW INTRAVENOUS INJECTIONS OF POLONIUM UPON RATS. R. K. Davis and G. T. Stevenson. p.5 of BIOLOGICAL RESEARCH QUARTERLY REPORT THROUGH DECEMBER 17, 1953. March 10, 1954. (MLM-952)

11947

Univ. of Utah, Salt Lake City, Utah, Radiobiological Lab.

ON THE QUESTION OF Rn²²⁸ TRANSLOCATION IN Ra²²⁸ DOGS. M. A. Van Dilla, B. J. Stover, and J. S.

Arnold. p.24-36 of SEMI-ANNUAL PROGRESS REPORT. Contract AT(11-1)-119. September 30, 1955. (AECU-3109)

11948

Univ. of Utah, Salt Lake City, Utah, Radiobiology Lab.

RADON ESCAPE FROM BONE CONTAINING RADIUM. M. A. Van Dilla, J. S. Arnold, and R. L. Floyd. p.13-23 of SEMI-ANNUAL PROGRESS REPORT. Contract AT(11-1)-119. September 30, 1955. (AECU-3109)

11949

Argonne National Laboratory

TOXICITY OF STRONTIUM-90 AND OF CALCIUM-45 IN MICE. Miriam P. Finkel. p.16-20 "Biological and Medical Research Division Quarterly Report for April, May, June, 1956." 1956. (ANL-5597)

11950

Argonne National Lab. Biological and Medical Division METABOLISM OF CALCIUM-45 IN SOFT TISSUES.

Blanche J. Holloway and William P. Norris. p.79-80 "Quarterly Report for April, May, June, 1956." (ANL-5597)

11951

Mound Laboratory, Miamisburg, Ohio

EFFECTS OF ACTINIUM ON EXPERIMENTAL ANIMALS. W. P. Jolley, D. Roesch, R. Horne, E. S. Robajdek, J. E. Campbell, D. S. Anthony, R. N. Cowden, and R. E. Zipf. p.6-9 of BIOLOGICAL RESEARCH QUARTERLY PROGRESS REPORT THROUGH DECEMBER 17, 1953. March 10, 1954. (MLM-952)

11952

Argonne National Lab., Ill.

THE RETENTION OF STRONTIUM-85 IN RATS AS A FUNCTION OF ANIMAL AGE AT INJECTION. Thomas W. Speckman and William P. Norris. p.77-78 of BIOLOGICAL AND MEDICAL RESEARCH DIVISION QUARTERLY REPORT FOR APRIL, MAY, JUNE, 1956. (ANL-5597)

11953

Argonne National Lab. Biological and Medical Research Division

THE EFFECT OF IONIZING RADIATION ON FERTILITY IN THE FEMALE MOUSE. II. POLONIUM-210. Margaret H. Sanderson and S. Phyllis Stearner. p.39-40 "Quarterly Report for April, May, June, 1956." (ANL-5597)

11954

Argonne National Lab. Biological and Medical Division

RADIO-RUTHENIUM TRANSPORT IN MICE. Howard Walton, Jr. and A. M. Brues. p.75-80 "Quarterly Report for April, May, June, 1955." 1955. (ANL-5456)

11955

Argonne National Lab. Biological and Medical Divisions

EFFECTS OF RADIUM ON ALKALINE PHOSPHATASE ACTIVITY OF TISSUES. Stanton H. Cohn and William P. Norris. p.10-23 "Quarterly Report, May, June, July, 1948." 1948. (ANL-4205)

11956

SKELETAL METABOLISM STUDIES WITH RADIOCALCIUM. C. L. Comar. Proc. of the Fourth Annual Oak Ridge Summer Symp. 225-239(1952).

11957

Argonne National Lab. Biological and Medical Divisions

RETENTION OF RADON BY THE MOUSE. PART II. METHOD OF ESTIMATING BIODECAY FROM EXPERIMENTAL DATA. Jerome Cornfield. p.50-60 "Quarterly Report Nov. 1948-Feb. 1, 1949." 1948. (ANL-4253)

11958

Mound Laboratories, Miamisburg, Ohio

HEMATOLOGICAL AND PATHOLOGICAL STUDIES ON RATS INJECTED INTRAVENOUSLY WITH MULTIPLE DOSES OF POLONIUM. R. N. Cowden and R. E. Zipf. p.37-55 "Report for Biological Research." 1951. (MLM-626)

11959

Argonne National Lab., Biological and Medical Divisions
CHRONIC EXTERNAL IRRADIATION. E. Lorenz and
M. Sutton. Quarterly Report, August, 1948 to Nov. 1948.
1948. 16p. (ANL-4227)

11960

Argonne National Lab., Biological and Medical Research
Division

TOXICITY OF STRONTIUM-90 AND OF CALCIUM-45
IN MICE. I. STATUS OF EXPERIMENTS 200-300 DAYS
AFTER INJECTION. Miriam P. Finkel and G. M.
Schriber. p. 36-37 "Quarterly Report, April, May, June,
1955." (ANL-5456)

11961

METABOLISM OF RADIOACTIVE FISSION PRODUCTS.
Anonymous. *Concours Med.* 72(19), 1553-4(1950).

11962

University of California Radiation Lab.
METABOLIC PROPERTIES OF PLUTONIUM AND ALLIED
MATERIALS. Med. and Health Physics Quarterly Report.
1950. 105p. (AECD-2901)

The localized ion of Ca^{45} , Sr^{90} , Pm^{147} , Am, and Pu
in the skeletal tissues of rats has been investigated by
radioautoradiography of costochondral junction. Photo-
graphs and radioautographs of histological sections through
the junction are presented. The distribution of tracer Ca
and Sr but none of the other 3 elements coincides exactly
with that of bone salts and Ca deposited in cartilage.

11963

Argonne National Lab.
THE DISTRIBUTION AND EXCRETION OF Sr^{90} , Y^{90} IN THE
DOG. W. E. Kisielewski, p.68-71 of BIOLOGICAL AND MEDICAL
RESEARCH DIVISION QUARTERLY REPORT, APRIL
1954. (ANL-5247)

11964

Argonne National Lab.
RADIUM TOXICITY. L. D. Marinelli, P. F. Gustafson
and T. W. Speckman. p. 129-130. 1954. (ANL-5288)

11965

Argonne National Lab., Ill.
THE METABOLISM OF INTRAVENOUSLY INJECTED
CALCIUM⁴⁵. William P. Norris and Walter Kisielewski,
p.134-39 of BIOLOGICAL AND MEDICAL DIVISIONS
QUARTERLY REPORT, NOVEMBER, DECEMBER,
JANUARY, 1948-49. 1948. (ANL-4253)

11966

Argonne National Lab.
STUDIES ON RADIUM METABOLISM IN RATS. W. P.
Norris, T. W. Speckman, R. A. Craig and C. Armstrong.
p.79-82 of REPORT ON BIOLOGICAL, MEDICAL,
AND BIOPHYSICS PROGRAM. PT. I. QUARTER-
LY REPORT OF BIOLOGICAL AND MEDICAL
RESEARCH DIVISION. PART 2. SEMI-ANNUAL
REPORT OF RADIOLOGICAL PHYSICS DIVISION,
July 1954. (ANL-5288)

11967

A PRELIMINARY REPORT ON THE EFFECTS OF ROENT-
GEN RAYS ON GASTRIC HYPERACIDITY. L. Bryan and
H. F. Dormody. *Amer. J. Roentgenol.* 8, 623(1920).

11968

INFLUENCE OF RADIUM ON CANCER TISSUES. J. Ewing.
Amer. J. Roentgenol. 5, 52(1918).

11969

THE ABSORPTION OF RADIUM RADIATIONS BY TISSUES
G. Failla. *Amer. J. Roentgenol.* 8, 215(1921).

11970

SOME ROENTGEN-RAY EVIDENCE RELATED TO THE
ETIOLOGY OF CARCINOMA. C. I. Martin. *Amer. J.*
Roentgenol. 6, 180(1919).

X-ray dose causes contraction of skin and rapid con-
nective tissue growth.

11971

ROENTGEN RAY TREATMENT OF ACNE VULGARIS.
J. M. Martin and C. L. Martin. *Amer. J. Roentgenol.* 8,
468(1920).

Authors review possible causes of acne and report
results of an experiment on guinea pigs to determine
x-ray effect on skin.

11972

SURGERY OF X-RAY LESIONS. L. L. McArthur. *Amer. J.*
Roentgenol. 4, 521(1917).

X-ray burns may result in carcinoma, therefore should
be excised surgically.

11973

A HISTOLOGICAL STUDY OF THE EFFECTS OF RADIUM
ON CARCINOMA OF THE CERVIX. C. C. Norris and
N. S. Rothschild. *Amer. J. Roentgenol.* 8, 604(1920).

11974

PRESENT STATUS OF ROENTGENOTHERAPY IN
LEUKEMIA. H. K. Pancoast. *Amer. J. Roentgenol.* 4,
611(1917).

11975

SOME EFFECTS OF ROENTGEN RAYS ON CERTAIN
BACTERIA. M. W. Perry. *Am. J. Roentgenol.* 6, 464
(1919).

Roentgen radiation, in doses up to twice the doses
used for radiation therapy of human diseases, does not
prevent growth of *B. typhosus* and *S. aureus* on inert
media, nor does it destroy the organisms of tuberculosis
lesions *in situ* or prevent development of glandular
tuberculosis. The radiation does tend to increase the
susceptibility of *B. typhosus* and *S. aureus* to killing by
heat.

11976

THE CAUSE AND PREVENTION OF THE CONSTITUTIONAL
EFFECTS ASSOCIATED WITH THE MASSIVE DOSES OF
DEEP ROENTGENOTHERAPY. G. E. Pfahler. *Amer. J.*
Roentgenol. 5, 5(1918).

11977

THE CAUSE OF CONSTITUTIONAL SYMPTOMS FOLLOW-
ING DEEP ROENTGENOTHERAPY - FROM THE VIEW-
POINT OF THE EXPERIMENTAL PHYSIOLOGISTS. P.
Roth. *Amer. J. Roentgenol.* 5, 33(1918).

From observation the author discounts gases as
cause. He suggests that deep x-ray in gastric region
triggers the reaction.

11978

THE CLASSIFICATION OF UTERINE CARCINOMA FOR
THE STUDY OF THE EFFICACY OF RADIUM THERAPY.
H. Schmitz. *Amer. J. Roentgenol.* 7, 383(1920).

11979

THE BLOOD IN CANCER UNDER ROENTGENOTHERAPY
(PRELIMINARY REPORT). R. H. Stevens. *Amer. J.*
Roentgenol. 4, 215(1917).

11980

X-RAY TREATMENT OF TONSILS AND ADENOIDS.
W. D. Witherbee. *Amer. J. Roentgenol.* 8, 25(1921)

The author suggests that massive x-ray dose where
operation is impossible will kill bacteria and cure infection.

11981

THE ABSENCE OF ONE KIDNEY ASSOCIATED WITH
HEREDITARY ABNORMALITIES IN THE DESCENDANTS
OF X-RAYED MICE. H. J. Bagg. *Proc. Soc. Exp. Biol.*
and Med. 21, 146-149(1923).

11982

THE ABSENCE OF BOTH KIDNEYS ASSOCIATED WITH
HEREDITARY ABNORMALITIES IN MICE. H. J. Bagg.
Proc. Soc. Exp. Biol. and Med. 21, 228-229(1924).

11983

HEREDITARY STRUCTURAL DEFECTS IN THE DESCENDANTS OF MICE EXPOSED TO ROENTGEN-RAY IRRADIATION. H. J. Bagg and C. C. Little. *Amer. Jour. Anat.* 33, 119-145(1924).

11984

EFFECTS OF IRRADIATION ON FETAL DEVELOPMENT. H. Bailey and H. J. Bagg. *Amer. Jour. Obstet. and Gynecol.* 5, 3-15(1923).

The authors review and discuss the effects of radium and x-radiation on animal development (rats, amphibians, drosophila, silkworms, rabbits) and present results of clinical studies showing effects of the radiations on human embryonic development.

11985

THE ARTIFICIAL PRODUCTION OF MONSTERS DEMONSTRATING LOCALIZED DEFECTS AS THE RESULT OF INJURY FROM X-RAYS. W. M. Baldwin. *Amer. Jour. Physiol.* 52, 296-303(1920).

11986

THE ARTIFICIAL PRODUCTION OF MONSTERS CONFORMING TO A DEFINITE TYPE BY MEANS OF X-RAYS. W. M. Baldwin. *Anat. Rec.* 17, 135-163(1919).

11987

THE ARTIFICIAL PRODUCTION OF SYRINGOMYELOCELE IN THE TADPOLE BY MEANS OF X-RAYS. W. M. Baldwin. *Anat. Rec.* 22, 305-309(1921).

11988

FURTHER STUDIES ON THE VARIATION IN SUSCEPTIBILITY OF AMPHIBIAN OVA TO THE X-RAYS AT DIFFERENT STAGES OF DEVELOPMENT. C. R. Bardeen. *Amer. Jour. Anat.* 11, 419-498(1911).

11989

VARIATIONS IN SUSCEPTIBILITY OF AMPHIBIAN OVA TO THE X-RAYS AT DIFFERENT STAGES OF DEVELOPMENT. C. R. Bardeen. *Anat. Rec.* 3, 163-165(1909).

11990

THE INHIBITIVE ACTION OF THE ROENTGEN RAYS ON REGENERATION IN PLANARIANS. C. R. Bardeen and F. H. Baetjer. *Jour. Exp. Zool.* 1, 191-195(1904).

11991

EFFECTS OF X-RAYS ON THE GALLBLADDER BY EXPERIMENTAL PRODUCTION OF CHOLECYSTITIS. J. Brahm and L. Darnbacher. *Radiology* 13, 103-108(1929).

Authors observed acute and chronic cholecystitis in dogs exposed to x-rays in doses similar to those used in x-ray therapy. Histological changes observed included hemorrhage, inflammatory edema, round cell infiltration, fibrous tissue hyperplasia and sometimes necrosis of the epithelium. The gall bladder was, relatively, more sensitive to irradiation than were the organs neighboring it.

11992

Argonne National Lab., Division of Biological and Medical Research

PROGRESS REPORT: MEDICAL ASPECTS OF THE RADIUM TOXICITY PROGRAM. W. B. Looney. Quarterly Report, Aug., Sept., Oct., 1951. (ANL-4713). NSA 6-2555

11993

EFFECT OF GAMMA IRRADIATION ON CELL DIVISION IN TISSUE CULTURE IN VITRO. R. G. Cantl and F. G. Spear. *Proc. Roy. Soc. Biol.* 102, 92-101(1927).

Authors studied the choroid of 6-7 day chick embryos, counting the number of mitoses at various times after exposure to various doses of γ rays. The number of mitoses decreased as dose increased, although the authors found that there was a critical dose and intensity below which no radiation effect was observed.

11994

THE OCCURRENCE OF HEPATIC LESIONS IN PATIENTS TREATED BY INTENSIVE DEEP ROENTGEN IRRADIATION.

J. T. Case and A. S. Warthin. *Amer. Jour. Roentg. and Rad. Ther.* 12, 27-46(1924).

11995

THE BIOLOGICAL EFFECT OF RADIUM. C. F. Charlton. *Radiology* 7, 137-139(1926).

Histological studies were performed serially during radium and x-ray therapy of tumors and observations are described. Both radium and x-rays showed a definite sequence of changes, *viz*: a latent period, swelling of malignant cells, keratinization and finally, disintegration. Excessive doses of radiation did not cause tumor regression, but hastened tumor growth.

11996

RADIUM IN GYNECOLOGY. J. G. Clark and C. C. Norris. J. B. Lippincott Company, Philadelphia (1927).

11997

THE ACTION OF REPEATED DOSES OF X-RAYS UPON THE DEVELOPING CHICK EMBRYO. H. A. Colwell, R. J. Gladstone, and C. P. G. Wakeley. *Jour. Anat.* 57, 1-11(1922).

11998

EFFECTS OF RADIUM ON LIVING SUBSTANCE. I. THE INFLUENCE OF RADIATIONS OF RADIUM UPON THE EMBRYONIC GROWTH OF THE POMACE-FLY DROSOPHILA AMPELOPHILA, AND UPON THE REGENERATION OF THE HYDROID TUBULARIA CROCEA. E. D. Congdon. *Bull. Mus. Comp. Zool.* 53, 345-358(1912).

11999

EFFECT OF INJECTION OF ACTIVE DEPOSIT OF RADIUM EMANATION ON RABBITS. H. J. Corper and L. Hektoen. *Jour. Infect. Dis.* 31, 305-312(1922).

Intravenous administration to rabbits of the active deposit of radium proved lethal when the dose administered was 8-10 millicuries. There was an initial leukocytosis, followed by leukopenia. It is suggested that non-lethal doses may depress the formation of a (leukocyte) lysin.

12000

SENSITIVITY TO X-RAYS OF CELLS IN VITRO. S. F. Cox. *Arch. Exp. Zellforsch.* 11, 121-131(1931).

Author describes his studies on x-ray effects on the choroid and sclera of chick embryos and on fibroblast cultures. Radiosensitivity was greatest when mitotic activity was greatest.

12001

SOME CONSIDERATIONS RELATIVE TO THE ACTION OF X-RAYS ON TISSUE CELLS. J. A. Crowther. *Proc. Roy. Soc., [London] B.* 96, 207-211(1924).

The effect of various single doses of x-rays on embryonic development in groups of chick and frog embryos was studied. Large doses inhibited development or were lethal, very small doses appeared to accelerate development

12002

STUDIES OF THE SYSTEMATIC EFFECT OF ROENTGEN RAYS. II. THE ACID BASE BALANCE AND THE SERUM PROTEINS OF DOGS BEFORE AND AFTER IRRADIATION. Leita Davy. *Amer. Jour. Roentg. and Rad. Ther.* 25, 255-265(1931).

The author describes changes in serum protein and in acid-base balance in dogs following a dose of 500 r delivered to: 1. total body, 2. dorsal chest, 3. dorsal aspects of lower body, or ventral or dorsal aspects of lower body. Serum protein changes were related to total x-ray dose rather than to part of body exposed. Blood changes in dogs irradiated over ventral and dorsal aspects of posterior body were not significantly different in dogs with generalized infection and in normal dogs similarly irradiated although irradiation proved lethal only to the infected animals.

12003

MORPHOLOGICAL CHANGES OF THE BLOOD FOLLOWING

IRRADIATION OF SPLENIC AREA WITH SO-CALLED STIMULATING DOSES. A. Dazi. *Radiol. Med.* 11, 552-561(1930).

12004
THE "TOLERANCE CONCENTRATION" OF RADON IN THE ATMOSPHERE. John Read and J. C. Mottram. *Brit. J. Radiol.* 12, 54(1939).

The authors give their reasons for suspecting that the leukopenia observed in Ra workers is due to inhalation of radon. The maximum permissible concentration of radon in air is calculated, the calculations being based on the MPE for x-rays at the time the paper was written (10^{-5} r per sec. for a 7 hr. work day). The estimated MPC for radon: 10^{-11} curies per cc of air. This concentration is compared with that found in the Joachimsthal mines. Observations on mice exposed to various concentrations of radon are described and compared with findings in x-irradiated mice.

12005
INFLUENCE OF TEMPERATURE UPON BIOLOGICAL ACTION OF X-RAYS. A. Dognon. *Arch. Physical Therapy* 9, 55-59(1928).

The author studied injury in *Ascaris* embryos following exposure to x-rays at various temperatures. Temperatures ranging from 5-20°C did not influence the response to x-irradiation but between 20° and 47° the number of embryos injured increased rapidly with increasing temperature. Author postulates that the biological reaction has two components: a photochemical process that is not temperature dependent and an ordinary chemical reaction which is markedly influenced by temperature. The photochemical reaction follows and is dependent on the temperature dependent reaction. CA 22-3458

12006
IMMEDIATE METABOLIC DISTURBANCES FOLLOWING DEEP ROENTGEN RAY THERAPY. H. P. Dorn, A. Bollinger and F. W. Hartman. *Amer. Jour. Roentg. and Rad. Ther.* 13, 54-63(1925).

12007
THE RELATIVE SENSITIVITY OF THE KIDNEY TO IRRADIATION. H. P. Dorn, A. Bollinger and F. W. Hartman. *Radiology* 8, 142-148(1927).

The authors found the kidney to be highly radiosensitive, as judged by both morphological and functional changes. They ranked intestine, stomach, pancreas, ovary, spleen lung, adrenal and liver in order of decreasing radiosensitivity, with kidney in the first rank. Radiation-induced nephritis and hypertension in patients and experimental animals are described.

12008
THE ACTION OF X-RAYS ON THE DEVELOPING CHICK. J. F. Gaskell. *Proc. Roy. Soc. [London] B* 83, 305-310 (1911).

Mitosis in growing tissues is inhibited by x-rays, the inhibition being reversible if injury is not too severe. The dose which is sufficient to preclude recovery decreases as the mitotic activity of tissue increases and decreases as development of the embryo advances.

12009
SOME EFFECTS OF THE ROENTGEN RAYS ON THE DEVELOPMENT OF EMBRYOS. P. K. Gilman and F. H. Baetjer. *Am. J. Physiol.* 10, 222-24(1904).

During the first 3-4 days of x-irradiation for 15 min. each day, development of fertilized *Amblystoma* eggs was accelerated, and acceleration persisted for as long as 10 days in a few cases, size being the major criterion of development during this stage. Continued daily exposure, after the 10th or 11th day, resulted in cessation of growth and various morphological anomalies. Animals receiving repeated exposures during only 1 day tended to recover and

develop normally, although more than half such *amblystoma* showed morphological anomalies of development. Similar results were observed when chick embryos were irradiated daily. Various types of developmental anomalies that were observed are described.

12010
FIRST OBSERVATIONS ON THE PHYSIOLOGICAL EFFECTS OF ROENTGEN RAYS ON THE HUMAN SKIN. O. Glasser. *Amer. Jour. Roentg. and Rad. Ther.* 28, 75-80(1932).

12011
ERYTHEMA AND TOLERANCE DOSES IN AMERICAN CLINICS. O. Glasser and U. V. Portmann. *Radiology* 14, 346-350(1930).

12012
THE PHYSICAL FOUNDATION OF GRENZ-RAY THERAPY. O. Glasser. *Radiology* 18, 713-726(1932).

Physical properties of grenz rays are discussed and problems in dosimetry are reviewed. The threshold erythema dose for this soft radiation was found to be approximately 250 r. Increase in skin effect with increasing dose was found to be less than with x-rays.

12013
THE EFFECTS OF THE RAYS OF RADIUM UPON PLANTS. C. S. Gager. *Mem. New York Bot. Gard.* 4, 1-278(1908).

12014
THE EFFECT OF RADIUM ON GROWTH AND DEVELOPMENT IN EGGS OF CREPIDULA AND PAGURUS. F. S. Hammett, Matie Green and Eleanor Davenport. *Proto-plasma* 15, 415-421(1932).

12015
THE ACTION OF SALTS OF RADIUM UPON GLOBULINS. W. B. Hardy. *Jour. Physiol* 29, *Proc. of Physiol. Soc.* May 16, 1903, XXIX-XXX(1903).

12016
THE SPECTRO-PHOTOMETER ANALYSIS OF THE COLOR OF SKIN FOLLOWING RADIATION BY ROENTGEN RAYS. M. Harris, E. T. Leddy and C. Sheard. *Radiology* 19, 233-256(1932).

12017
FUNCTIONAL STUDIES THROUGHOUT COURSES OF ROENTGEN RAY NEPHRITIS IN DOGS. M. Hartmann, A. Bolliger, and H. B. Doub. *J. Am. Med. Assoc.* 88, 130-145(1927).

Irradiation of the kidneys of dogs with penetrating x-rays produces a kidney lesion very similar to that of human chronic interstitial nephritis. Authors were unable to correlate serial changes in results of any one kidney function test with progressive pathological changes in the affected kidneys.

12018
EXPERIMENTAL NEPHRITIS PRODUCED BY IRRADIATION. M. Hartmann, A. Bolliger, and H. B. Doub. *Am. J. Med. Sci.* 172, 487-500(1926). *Bull. Johns Hopkins Hospital* 41(1), 36-61(1927).

The histological changes in x-ray-induced nephritis in dogs, and the course of pathological changes during the various stages of the nephritis are described.

12019
ON THE ACTION OF THE SECONDARY X-RAYS FROM COPPER ON THE DEVELOPMENT OF THE OVA OF *ASCARIS MEGALOCOPHALA*. S. Hastings. *Arch. Mid-dlex Hosp.* 27, 154-156(1912).

12020
A CONTRIBUTION TO THE STUDY OF THE EFFECTS OF RADIATION ON SILKWORMS. S. Hastings, H. Beckton, and B. H. Webb. *Arch. Middlesex Hosp.* 27, 128-153(1912).

12021
THE INFLUENCE OF THE X-RAY ON THE PRODUCTION OF ANTIBODIES. L. Hektoen. *Jour. Infect. Dis.* 17, 415-422(1915).

The production of hemolytic antibody by rats injected with sheep erythrocytes is not affected by x-irradiation immediately after injection unless the x-ray dose is great enough to be detrimental to the general health of the rats. Author interprets the results as indicating that antibodies are produced by spleen and lymphatic tissues and marrow (the most radiosensitive tissues).

12022
CHANGES IN SUSCEPTIBILITY OF DROSOPHILA EGGS TO ALPHA PARTICLES P. S. Henshaw and C. T. Henshaw. *Biol. Bull.* **64**, 348-357(1933).

Susceptibility to injury by α particles varies with the developmental stage of the embryo. Sensitivity increases during cleavage and blastulation, is maximal in early gastrulation. Sensitivity to x-rays and γ rays differed from sensitivity to α particles, and analysis of the various experimental results showed that the responses of the various stages to α particles could be accounted for by movement of cells into and out of the short penetration range of the α particles.

12023
SKIN TOLERATION DOSES IN ROENTGEN UNITS AND THEIR RELATION TO THE QUALITY OF RADIATION. P. M. Hickey and E. A. Pohle. *Radiology* **12**, 300-316(1929).

12024
THE EFFECT OF EXPOSURE TO ROENTGEN RAYS ON REPRODUCTION IN MALE RATS. D. R. Hooker. *Amer. Jour. Roentg. and Rad. Ther.* **14**, 327-336(1925).

12025
A REMARKABLE SEQUEL TO AN ATTEMPT TO DETERMINE THE X-RAY LETHAL DOSE FOR TISSUE CULTURES GROWING IN VITRO. F. L. Hopwood and M. Donaldson. *British Jour. Radiol.*, N. S. **3**, 69-75 (1930).

A previously reported effect of various doses of x-rays on cultures of chick choroid (death after various numbers of sub-cultures, the number of viable sub-cultures increasing with decreasing dose) is shown to have been an artefact.

12026
STUDIES ON THE EFFECTS OF ROENTGEN RAYS ON GLANDULAR ACTIVITY. EFFECT OF EXPOSURE OF ABDOMINAL AND THORACIC AREAS TO ROENTGEN RAYS ON GASTRIC SECRETIONS, ROENTGEN CACHEXIA. A. C. Ivy, J. E. McCarthy, and B. H. Orndorff. *J. Am. Med. Assoc.* **83**, 1977-1984(1924).

The authors' experimental studies on dogs demonstrate that the intestinal mucosa is more radiosensitive to x-radiation than is the mucosa of the fundus of the stomach. Effects of various doses on general condition, appetite and gastric secretion are described.

12027
CYTOLOGICAL AND PHYSIOLOGICAL CHANGES IN VICIA FABA IRRADIATED WITH ROENTGEN RAYS. H. Komuro. *Botan. Gaz.* **77**, 446-452(1924).

12028
THE DIRECT AND INDIRECT ACTION OF RADIATION ON CANCER TISSUES. A. Lacassagne. *Radiology* **11**, 393-401(1928).

The author considers the destruction of cells by radiation with respect to 1. a direct action, 2. a local direct action, and 3. an indirect, generalized action. The direct effect is manifest at the cellular level.

12029
ON RADIUM AS A STIMULUS OF CELL DIVISION. W. S. Lazarus-Barlow and H. Beckton. *Arch. Middlesex Hosp.* **30**, 47-71(1913).

12030
INVESTIGATION OF THYMUS STIMULATION BY ROENTGEN RAYS. M. Lenz. *Amer. Jour. Roentg. and Rad. Ther.* **13**, 226-234(1925).

The thymus glands of rabbits were exposed to x-rays and the glands were examined at autopsy of the animals 1, 4, 11 and 12 days post-exposure. (Observations on spleen and lymph nodes are also described.) Radiation accelerated thymic involution and this effect is compared with effects of involution due to aging. Radiation did not stimulate hypofunctioning thymus glands.

12031
PIGMENTARY REACTION IN RANA CLAMITANS LARVAE FOLLOWING TREATMENTS WITH X-RAYS. W. T. Levine. *Proc. Soc. Exp. Biol. and Med.* **28**, 594-596(1931).

12032
EFFECT OF IRRADIATION ON ELECTROPHORETIC VELOCITY, VIABILITY, AGGLUTINABILITY, LYSIS, AND pH OF ESCHERICHIA COLI. M. W. Lisse and R. P. Tittsler. *Penn. Agric. Exp. Sta. Tech. Bull.* **276**, 4-44 (1932).

12033
THE OCCURRENCE OF FOUR INHERITABLE MORPHOLOGICAL VARIATIONS IN MICE AND THEIR POSSIBLE RELATION TO TREATMENT WITH X-RAYS. C. C. Little and H. J. Bagg. *Jour. Exp. Zool.* **41**, 45-91(1924).

12034
PROBLEMS OF TRUE TISSUE REACTION AFTER ROENTGEN IRRADIATION. M. Magat. *Jour. Eksp. Biol. i. Med.* **11**(32), 243-251(1929).

12035
RELATIVE SUSCEPTIBILITY TO X-RAYS OF EGGS AND SPERM OF ARBACIA. J. W. Mavor and D. M. de Forest. *Proc. Soc. Exp. Biol. and Med.* **22**, 19-21(1924).

12036
THE TREATMENT OF INFECTIOUS DISEASES BY LEUCOCYTOLYSIS PRODUCED BY ROENTGENIZATION OF THE SPLEEN. I. I. Manoukhine. *Lancet* **200**, 685-687 (1921).

The author describes experimental studies on monkeys and guinea pigs infected with the tubercle bacillus and irradiated over the spleen with small doses of x-ray. Similar studies on tuberculous patients are also described. The beneficial effects of irradiating the spleen are attributed to the release of leukocytolysins from splenic leukocytes, and an increase in the level of circulating antibodies and related immunologically active substances. The author describes the preparation of curative sera (against dysentery and non-infectious diseases) from the blood of patients subjected to x-irradiation of the spleen.

12037
THE EFFECT OF IRRADIATION ON THE URETER. C. L. Martin and F. T. Rogers. *Amer. Jour. Roentg. and Rad. Ther.* **16**, 215-218(1926).

Ureteral stricture and hydronephrosis were produced in dogs by a 75 mg-hr dose of radium applied directly to the ureter. Smaller doses produced partial stricture.

12038
THE EFFECT OF ROENTGEN RAYS ON THE ADRENAL GLAND. C. L. Martin, F. T. Rogers, and N. F. Fisher. *Amer. Jour. Roentg. and Rad. Ther.* **12**, 466-471(1924).

Authors observed fibrosis of the adrenal gland following heavy x-irradiation subsequent to removal of the contralateral gland. Endocrine function was maintained. When the dose equal to that applied to the adrenal was delivered to an isolated loop of small intestine, cachexia and death ensued. Irradiation of the upper pole of one kidney produced fibrosis.

12039
REMARKS ON THE DELAYED OR REMOTE APPEARANCE OF X-RAY BURNS AFTER LONG PERIODS OF LATENCY. R. Matas. *Amer. Jour. Roentg. and Rad. Ther.* **13**, 37-40(1925).

The author describes late skin lesions that developed following therapeutic doses of x-ray for exophthalmic

goutre and epidermal carcinoma. Period of latency was 4 years in one case, 3 years in the other. Surgical treatment of the ulcerated lesions is described.

12040
ABNORMAL DEVELOPMENT OF FROG EMBRYOS AS A RESULT OF TREATMENT OF OVA AND SPERM WITH ROENTGEN RAYS. J. H. McGregor. *Science* 27, 445-446(1908).

12041
THE ALLANTOIC MEMBRANE OF THE CHICK EXPOSED TO BETA RADIATION. W. Moppett. *British Jour. Radiol.* N.S. 5, 342-348(1932).

12042
ON THE ACTION OF BETA AND GAMMA RAYS OF RADIUM ON THE CELL IN DIFFERENT STATES OF NUCLEAR DIVISION. J. C. Mottram. *Arch. Middlesex Hosp.* 30, 98-119(1913).

12043
HISTOLOGIC CHANGES IN LYMPHATIC GLANDS FOLLOWING EXPOSURE TO RADIUM. J. C. Mottram. *Amer. Jour. Med. Sci.* 165, 469-479(1923).

12044
EFFECTS OF RADIUM AND RADIUM IN COMBINATION WITH METALLIC SENSITIZERS ON ENDAMOEBIA DYSENTERIAE IN VITRO. Elizabeth C. Nasset and C. A. Kofoed. *Univ. California Publ. Zool.* 31, 387-416(1928).

12045
STUDIES OF EFFECTS OF X-RAYS ON GLANDULAR ACTIVITY. B. H. Orndorf, J. I. Farrell, and A. C. Ivy. *Jour. Radio.* 4, 189-199(1923).

12046
STUDIES ON THE EFFECT OF ROENTGEN RAYS ON GLANDULAR ACTIVITY - EXTERNAL PANCREATIC SECRETION. B. H. Orndorf, J. I. Farrell and A. C. Ivy. *Amer. Jour. Roentg. and Rad. Ther.* 16, 349-354(1926).

The amount of secretion from an irradiated segment of pancreas and the concentration of lipase and trypsin in the secretion were measured in dogs with chronic fistulae. The effects of three different doses were compared. The pancreas was found to be relatively radioresistant, in terms of its exocrine function, and to have great ability to recover from radiation injury.

12047
THE BIOLOGICAL EFFECTIVENESS OF HIGH VOLTAGE AND LOW VOLTAGE X-RAYS. C. Packard. *Amer. Jour. Cancer* 16, 1257-1274(1932).

Equal doses of x-rays of three different wave lengths (0.05, 0.08 and 1.70 Å produced at 500, 300 and 12 Kv) produced equal quantitatively measured effects on *Drosophila* eggs and on mouse tumor tissue. Doses were measured by means of ionization chambers. The results reported confirm conclusions based on earlier experiments using wave lengths of 0.20, 0.30, 0.50 and 0.70 Å, namely that the biological effectiveness in the systems studied is independent of wave length.

12048
THE SATURATION METHOD IN ROENTGENTHERAPY, AS APPLIED TO DEEP SEATED MALIGNANT DISEASE. G. E. Pfahler. *British Jour. Radiol.* 31, 45-54(1926).

12049
PATHOLOGY OF TOTAL BODY IRRADIATION IN THE MONKEY. H. G. Schlumberger and J. J. Vazquez. *Am. J. Pathol.* 30, 1013-48(1954).

The authors found the LD_{50/30} dose for total body x-ray exposure of the rhesus monkey to be approximately 550 r. Gross and microscopic pathology of the irradiated animals is described.

12050
STUDIES ON THE SUSPENSION STABILITY OF THE HUMAN BLOOD. THE CHANGES OF THE SEDIMENTATION

RATE OF THE ERYTHROCYTES IN VITRO AND IN VIVO AFTER X-RAY EXPOSURE. E. A. Pohle. *Radiology* 6, 55-58(1926).

12051
STUDIES OF THE ROENTGEN ERYTHEMA OF THE HUMAN SKIN. E. A. Pohle. *Radiology* 8, 185-194(1927).

12052
A STUDY OF THE EFFECT OF GRADED DOSES OF TWO DIFFERENT WAVE LENGTHS ON THE SKIN OF RATS. E. A. Pohle and C. H. Bunting. *Radiology* 15, 647-659(1930).

12053
STUDIES OF THE ROENTGEN ERYTHEMA OF THE HUMAN SKIN. E. A. Pohle and C. S. Wright. *Radiology* 14, 351-363(1930).

12054
THE SKIN ERYTHEMA DOSE WITH A COMBINATION OF TWO TYPES OF RADIATION. Edith Quimby. *Amer. Jour. Roentg. and Rad. Ther.* 17, 621-625(1927).

12055
THE BIOLOGICAL EFFECTS OF RADIUM. W. A. Pusey. *Science* 33, 1001-1005(1911).

12056
STUDIES ON THE SUSPENSION STABILITY OF HUMAN BLOOD. I. THE VELOCITY OF SEDIMENTATION OF ERYTHROCYTES IN X-RAY THERAPY CASES. E. A. Pohle. *Radiology* 5, 206-210(1925).

12057
THE SUSCEPTIBILITY OF CELLS TO RADIUM RADIATIONS. C. Packard. *Proc. Soc. Exp. Biol. and Med.* 20, 226-227(1923).

The radiosensitivity of paramecia and other protozoa is influenced by cellular temperature during irradiation and by the permeability of the cell membrane.

12058
THE EFFECT OF ROENTGEN RADIATION ON THE VELOCITY OF ERYTHROCYTE SEDIMENTATION. E. H. Rubin and O. Glasser. *Amer. Jour. Roentg.* 18, 520-527(1927).

The increased sedimentation rate of red cells in whole blood x-irradiated *in vitro* is shown to be due to the heat generated during irradiation with unfiltered x-rays. The change is thought to be due primarily to the temperature effects on cells.

12059
EXPERIMENTS ON X-RADIATION AS A CAUSE OF CHANGES IN PERMEABILITY. A. Richards. *Amer. Jour. Physiol.* 36, 400-419(1915).

12060
TEMPERATURE COEFFICIENT OF THE ACTION OF β RAYS UPON THE EGG OF NEREIS. A. C. Redfield and Elizabeth M. Bright. *Jour. Gen. Physiol.* 1, 255-259(1918).

12061
THE PHYSIOLOGICAL ACTION OF IONIZING RADIATIONS. I, II. A. C. Redfield and Elizabeth M. Bright. *Am. J. Physiol.* 68, 54-61, 62-69(1924).

The authors develop a theory based on the assumption that some constituent of protoplasm is ionized by β rays at a rate proportional to β ray intensity. The ions formed may 1. recombine or 2. combine with some other constituent in which as their number determines the value of the velocity coefficient of the reaction. An equation is developed which correctly describes results of experiments with *Nereis* eggs. The effect of temperature on the reaction rates is also considered theoretically and demonstrated by means of certain experimental results.

12062
THE PHYSIOLOGICAL ACTION OF IONIZING RADIATIONS. IV. THE COMPARISON OF β - AND X-RAYS. A. C.

Redfield and Jeanne Wertheimer. *Am. J. Physiol.* **68**, 368-378(1924).

The relative biological effectiveness of β and x-rays on *Nereis limbata* eggs is considered to depend on the degree to which the ions formed by them tend to recombine. When recombination is the same for β and x-rays, the physiological effects are also the same. The relationship between radiation intensity and physiological reaction rate are thought to be due to dense ion fields formed in paths of secondary particles. The temperature coefficient is 1:1 for the x-ray-induced physiological effect.

12063

THE SENSIBILITY OF BONY STRUCTURES TO RADIATIONS AND THE MECHANISM OF RADIO-NECROSIS OF BONES. C. Regaud. *Jour. Radiol. et Electrol.* **6**, 485-488(1922).

The author describes the effects of radiation on both normal and cancerous bone of patients receiving radiation therapy. Normal adult bone is considered to be more radiosensitive than skin if very short wave length radiation is used. The author emphasizes the importance of secondary radiation in bone (due to high Ca content). The secondary radiation is readily absorbed by connective tissue and blood vessels.

12064

EFFECT OF RADON ON CHLOROPHYLL CONTAINING CELLS. E. J. Rochlin-Gleichgewicht. *Vestnik Roentgen. i Radio.* **8**, 387-407(1930).

12065

THE EFFECT OF X-RAYS ON THE RATE OF CELL DIVISION IN THE EARLY CLEAVAGE OF PLANORBIS. A. Richards. *Biol. Bull.* **27**, 67-96(1914).

12066

EFFECT OF ROENTGEN RAYS ON THE TOBACCO, OR CIGARETTE, BEETLE AND THE RESULTS OF EXPERIMENTS WITH A NEW FORM OF ROENTGEN TUBE. G. A. Runner. *Jour. Agric. Res.* **6**, 383-388(1916).

12067

THE ACTION OF RADON "SEEDS" ON TUMOR AND LIVER CELLS OF THE RAT. S. Rues and G. M. Scott. *British Jour. Radiol.* **32**, 239-244(1927).

Jensen's rat sarcoma and rat liver exposed *in vivo* to radiation from radon "seeds" showed areas of destruction that tended to be proportional to radiation dose. Liver cells near blood vessels were more resistant than were cells more remote from them. Total dose rather than intensity determined the degree of damage observed.

12068

THE DIFFERENTIAL ACTION OF X-RAYS AND GAMMA RAYS UPON SOME LIVING TISSUES. S. Rues and G. M. Scott. *British Jour. Radiol.*, N S. **2**, 301-308(1920).

12069

RADIOACTIVE SUBSTANCES IN BODY FIVE YEARS AFTER DEATH. A. U. Saint George, A. O. Gettler, and R. H. Muller. *Archives of Pathol.* **7**, 397-405(1929).

12070

THE pH OF HUMAN MIXED SALIVA DURING IRRADIATION FROM INTRAORAL CARCINOMA. G. S. Sharp. *Amer. Jour. Roentg. and Rad. Ther.* **25**, 266-270(1931).

12071

BILE SALT METABOLISM. II. PROTEOSE AND X-RAY INTOXICATION. F. S. Smyth and G. H. Whipple. *Jour. Biol. Chem.* **59**, 637-659(1924).

An x-ray dose (1/3 minimum lethal dose) to the liver did not alter bile salt output in bile fistula dogs, but larger doses did result in decreased output. The effects of x-irradiation are compared with proteose intoxication and with effects of thyroxin.

12072

EFFECTS OF ULTRAVIOLET RAYS, RADIUM AND X-RAYS ON PROTEINS. Mona Spiegel-Adolf. *Arch. Path.* **12**, 533-542(1931).

The author placed crystals that fluoresce in the ultra-violet region when irradiated by Ra or x-rays in quartz tubes and immersed them in protein solutions. When these solutions were irradiated with x-rays or Ra, the protein coagulated, but they did not coagulate when similarly irradiated in the absence of the UV fluorescing crystal. Other observations on erythrocytes and paramecia are reported briefly.

12073

STUDY OF SKIN REACTIONS AFTER DIVIDED ROENTGEN RAY DOSAGE. W. Stenstrom and W. L. Mattick. *Amer. Jour. Roentg. and Rad. Ther.* **15**, 513-519(1926).

12074

CONCERNING THE VISIBILITY OF ROENTGEN RAYS. R. B. Taft. *Amer. Jour. Roentg. and Rad. Ther.* **28**, 245-248(1932).

12075

THE ACTION OF RADIUM UPON THE FORMATION OF BLOOD CAPILLARIES AND CONNECTIVE TISSUE. T. Takahashi. *British Jour. Radiol.*, N. S. **3**, 439-445(1930).

Injury and repair in young capillaries and fibroblasts (young rats) exposed to various doses of β and γ radiation from radium are described. No "stimulating" effect was observed.

12076

STUDIES ON X-RAY EFFECTS. II. STIMULATIVE ACTION ON THE LYMPHOCYTES. Marguerite Thomas, H. D. Taylor, and W. D. Wetherby. *Jour. Exp. Med.* **29**, 75-82(1919).

Changes in the lymphocyte counts of 9 rabbits exposed to low doses of x-rays from a Coolidge tube are described. Following an initial decrease, the counts were elevated 15-35 days after the smaller exposures only and this is considered to represent "stimulation."

12077

EFFECT OF HEAVY RADIATION ON PLEURA AND LUNGS. A. F. Tyler and J. R. Blackman. *Jour. Radiology* **3**, 469-475(1922).

12078

THE PREVENTION OF HYPERPLASIA OF THE THYROID IN THE OPOSSUM BY X-RAYS. O. M. Walters, B. J. Anson and A. C. Ivy. *Radiology* **18**, 583-591(1932).

The hyperplasia of the thyroid that occurs in opossums on a high protein diet was definitely decreased, but not entirely prevented, by the x-ray dosages used.

12079

INTESTINAL LESIONS AND ACUTE INTOXICATION PRODUCED BY RADIATION IN A VARIETY OF ANIMALS. S. L. Warren and G. H. Whipple. *J. Exptl. Med.* **38**, 741-752(1923).

Common laboratory animals are about equally sensitive to x-ray given over the abdomen. Clinical reaction following a minimum lethal dose is very similar and intestinal pathology identical. Rat and guinea pig are slightly more sensitive to x-ray than are dog, cat and rabbit. By contrast birds, frogs and reptiles are very resistant to x-ray and may tolerate 2 or 3 doses of radiation that would be lethal for dogs. The possibility that human intestinal tract is likewise sensitive to radiation must be considered in conditions where abdominal and pelvic radiation is being used.

12080

BACTERIAL INVASION OF THE BLOOD STREAM AS INFLUENCED BY X-RAY DESTRUCTION OF THE MUCOSAL EPITHELIUM OF THE SMALL INTESTINE. S. L. Warren and G. H. Whipple. *J. Exptl. Med.* **38**, 713-723(1923).

The authors describe their studies on dogs, showing that the x-ray has a specific effect upon the epithelium lining the crypts and covering the villi of the small intestine. A suitable dose of x-ray will destroy this epithe-

lumen in large measure, leaving empty crypts and naked villi exposed to swarms of bacteria in the intestine. Subsequently, an overwhelming invasion of the tissues, lymph and blood by intestinal bacteria does not occur. It is therefore suggested that the intestinal epithelium is not the all-important barrier which protects the tissues from invasion by intestinal bacteria.

12081

THE ACTION OF THE RAYS FROM RADIUM UPON SOME SIMPLE FORMS OF ANIMAL LIFE. E. G. Willcock. J. Physiol. 30, 449-454(1904).

Resistance to the lethal effect of radium rays varies with species (*Euglena irridis*, *Stentor irridis*, *Hydra irridis* and *Hydra fusca*). Chlorophyll-containing organisms tended to move away from the radiation.

12082

A SUMMARY OF THE EFFECTS OF REPEATED ROENTGEN RAY EXPOSURES UPON THE HUMAN SKIN, ANTECEDENT TO THE FORMATION OF CARCINOMA. S. B. Wolbach. Amer. Jour. Roentg. and Rad. Ther. 13, 139-143(1925).

12083

FURTHER STUDIES IN THE EFFECTIVENESS OF DIFFERENT WAVELENGTHS OF RADIATION. F. C. Wood. Radiology 5, 199-205(1924).

The author observed effects of radiation of different wave lengths on human skin, mouse and rat tumors and on *Drosophila* eggs and concluded that there is little or no difference between the action of short and long wave lengths of x-ray within the limits of ordinary practice.

12084

THE EFFECT ON TUMORS OF RADIATION OF DIFFERENT WAVELENGTHS. F. C. Wood. Amer. Jour. Roentgenol. 12, 474-481(1924).

12085

THE ACTION OF LIGHT, X-RAYS, AND RADIUM ON THE MOVEMENT OF CILLATED EPITHELIUM (A STUDY IN TISSUE CULTURE METHOD.) T. Umeda. (Japanese, English abstract.) Acta. Dermat. 10, 597-604(1927).

12086

THE EFFECT OF RADIUM RAYS ON THE PROTOPLASM OF A CELL. S. S. Wail and S. R. Frenkel. Ann. Roentg. et Radiol. 2, 140-143(1926).

In irradiated frog embryos, mitochondria and cytoplasmic granules are altered first, nuclear changes subsequently following exposure to radium rays.

12087

REVIEW OF THE THEORIES OF THE MECHANISM OF ACTION OF RADIATION IN THE TREATMENT OF CANCER. K. W. Steenstrom. Jour. Cancer Res. 9, 190-203(1925).

12088

LESIONS OF THE CORPUS STRIATUM BY RADIUM EMANATION AND THE ACCOMPANYING STRUCTURAL AND FUNCTIONAL CHANGES. D. J. Edwards and H. J. Bagg. Amer. Jour. Physiol. 65, 162-73(1923).

The authors produced lesions in the corpus striatum of dogs by means of buried radium emanation tubes. The gross and microscopic pathology of the well localized lesions are described. Neurological changes were observed when bilateral lesions were produced simultaneously. These included tremors and hypertonia immediately and, in animals maintained long enough (2-33 weeks), temporary dysphagia, dysarthria, conjunctivitis, clumsiness, tremor and hypertonia.

12089

INTRATHORACIC CHANGES INDUCED BY HEAVY RADIATION. W. A. Evans and T. Leucutia. Amer. Jour. Roentg. and Rad. Ther. 13, 203-220(1925).

Early and late clinical and roentgenographic changes in the chest following various therapeutic regimens (radiation therapy) are described and discussed.

12090

RADIUM THERAPY IN CANCER. J. Ewing. J. Am. Med. Assoc. 68, 1238-1247(1917).

12091

PRECONCEPTION OVARIAN RADIUM IRRADIATION OF ALBINO RAT (*MUS NORVEGICUS ALBINUS*) A BIOLOGICAL STUDY. G. S. De Renyi, M. De Renyi, and D. P. Murphy. Am. J. Roentgenol. Radium Therapy 28, 764-83(1932).

12092

THE OCCURRENCE OF ROENTGEN PLEUROPNEUMONITIS IN TREATMENT OF BREAST CANCER. R. H. Fike. Am. J. Roentgenol. Radium Therapy 27, 509-512(1932).

12093

THE RELATION OF CHEMICAL, COLLOIDAL AND BIOLOGICAL EFFECTS OF ROENTGEN RAYS OF DIFFERENT WAVELENGTHS TO THE IONIZATION WHICH THEY PRODUCE IN AIR. II. ACTION OF ROENTGEN RAYS ON SOLUTIONS OF FERROSULPHATE. H. Fricke and S. Morse. Amer. Jour. Roentgenol. 18, 426-430(1927).

12094

BASIS FOR MAXIMUM PERMISSIBLE STANDARDS FOR INTERNAL EXPOSURE. R. S. Thompson, H. M. Parker, and H. A. Kornberg. Proc. of the International Conf. on the Peaceful Uses of Atomic Energy 13, 201(1956) United Nations, N. Y.

In order to establish MPC's for internal emitters in air or material that may be ingested, it is necessary to know: 1. permissible critical organ burden, 2. concentration of the radioisotope in air, water or material ingested and 3. limiting factors other than direct human ingestion, e. g. concentration along food chains. MPC values for P-239, Ru-106, I-131, P-32, Na-24 and H-3, are discussed critically.

12095

CHANGES IN THE PROTOPLASM OF NEREIS EGGS INDUCED BY β RADIATION. A. Forbes and Catharine Thacher. Amer. Jour. Physiol. 74, 567-578(1925).

12096

THE BACTERIOSTATIC EFFECT OF BECQUEREL RAYS. E. Aschkinass and W. Caspari. Pfluger's Arch. Ges. Physiol. 86, 603-618(1901). (In German).

12097

ROENTGEN RAYS AND MINERAL METABOLISM. Anderson and Kohlmann. Fortschr. Geb. Roentgenstrahlen Kongressheft 30, 102-05(1923). (In German).

12098

THE EFFECT OF α RAYS ON TISSUES IN CULTURE. H. C. Andersen and M. Fischer. Strahlentherapie 48, 500-507(1933). (In German).

12099

DEVELOPMENT OF THE EMBRYO AND BLASTODERM FROM X IRRADIATED EGGS. P. Ancel and P. Vintemberger. Compt. Rend. Soc. Biol. [Paris] 92, 172-174 (1925). (In French).

12100

EFFECT OF CELLULAR ACTIVITY ON THE MANIFESTATION OF X-RAY INDUCED LESIONS IN THE BLASTODERM OF THE IRRADIATED CHICKEN EGG. P. Ancel and P. Vintemberger. Compt. Rend. Soc. Biol. [Paris] 91, 1425-1428(1924). (In French).

12101

THE EFFECT OF X-RAYS ON EMBRYONIC DEVELOPMENT. DO THE RAYS HAVE AN ACCELERATING EFFECT? P. Ancel and P. Vintemberger. Arch. Biol. 35, 1-43(1925). (In French).

The authors describe effects observed in chick embryos and in fertilized frogs' eggs exposed to various doses of x-rays.

12102

EFFECT OF X-RAYS ON CLEAVAGE AND GASTRULA-

TION IN RANA FUSCA. P. Ancel and P. Vintemberger. Compt. Rend. Soc. Biol. [Paris] 91, 1267-1270 (1924). (In French).

12103

EFFECT OF ROENTGEN RAYS ON CELL DIVISION. W. Alberti and G. Politzer. Arch. Mikrosk. Anat. und Entwicklungsmech. (Roux) 103, 284-307 (1924). (In German).

Metaphase was found to be the most radiosensitive phase of the cell cycle in the studies reported on the cornea of salamander larvae.

12104

THE EFFECT OF α AND β RAYS ON PROTOPLASM. Nora Feichtinger. Protoplasma 14, 36-51 (1931). (In German).

Roots of Crepis virens were irradiated with α or β rays and the effects, when equal amounts of energy were absorbed, were compared. The effect was found to depend on the total number of ionizations produced and was the same for equal amounts of α and β radiation. Cytological changes observed in the irradiated cells are described.

12105

THE EFFECT OF ROENTGEN IRRADIATION ON CALCIUM AND POTASSIUM METABOLISM IN RABBITS. I. SERUM AND SKIN. K. Adler and O. Wiederhold. Strahlentherapie 44, 383-392 (1932). (In German).

12106

STUDIES ON THE CHANGES IN STRIATED MUSCLE DUE TO ROENTGEN IRRADIATION OF ANIMALS. L. Fedder and H. Hellner. Strahlentherapie 30, 682-705 (1928). (In German).

Irreparable damage to nuclei of myocardial muscle cells was observed.

12107

ANIMAL STUDIES ON THE CASTRATION DOSE OF RADIUM. K. Abe. Strahlentherapie 16, 554-559 (1924). (In German).

Unchanged primary follicles were found in both ovaries of rabbits after exposure to 1500 mg hrs. of radium placed over ovaries on the back. No intact primary follicles were formed after 2000 mg hrs. or more.

12108

EFFECT OF RADIUM SULFATE ON TOXINS. G. Fabre and E. Ostrovsky. Compt. Rend. Assoc. Franc. Av. Sci. 40, 122-123 (1911). (In French).

12109

ACTION OF RADIUM ON BACTERIAL TOXINS. G. Fabre and E. Ostrovsky. Compt. Rend. Assoc. Franc. Av. Sci. 40, 1004-1006 (1912). (In French).

12110

EFFECT OF RADIUM ON CULTURES OF PATHOGENIC PROTOZOA. R. Bruynoghe and A. Dubois. Compt. Rend. Soc. Biol. [Paris] 93, 840-850 (1925). (In French).

The authors studied pathogenicity and ability to multiply of certain Trypanosomes after x-irradiation in vitro. Irradiation can destroy infectivity (causing extreme retardation in cell division) after injection. This effect was observed in Leishmania tropica after 62 hours of exposure in vitro. Motility was maintained in spite of loss of ability to divide. T. inopinatum and T. ictero-hemorrhagiae were also studied. Cell division and pathogenicity could be affected separately.

12111

X-RAY EFFECTS ON CELL PERMEABILITY. K. Brummer. Strahlentherapie 21, 447-451 (1926). (In German).

Defibrinated blood of patients was irradiated with various x-ray doses and the permeability of cells to a dilute solution of methylene blue in isotonic saline was measured.

12112

A CASE OF PERNICIOUS ANEMIA DUE TO RADIUM.

Broule et Boulin. Bull. Mem. Soc. Med. Hospitaux Paris 12, 528 (1925). (In French).

12113

EFFECT OF ROENTGEN, RADIUM AND U-V RAYS ON THE COMPONENTS OF THE WASSERMAN REACTION. G. Brann. Zeitsch. Immunitätsf. und Exp. Ther. Orig. 44, 27-32 (1925). (In German).

12114

DOES HYPERSECRETION MODIFY THE RADIO SENSITIVITY OF THE SUBMAXILLARY GLAND? M. Brancovici. Compt. Rend. Soc. Biol. [Paris] 99, 757-758 (1928). (In French).

12115

EFFECT OF X RAY ON SILK WORM DEVELOPMENT. H. Bordier. Radium 2, 410 (1905). (In French).

12116

EFFECT OF X RAYS ON THE DEVELOPMENT OF THE CHICK EMBRYO. H. Bordier and J. Galimard. Arch. d'elec. Med. Exp. et Clin. 13, 491-494 (1905). (In French).

12117

ANTIBODIES AND ROENTGEN RAYS. M. Fiorini and A. Zironi. Arch. Electr. Med. 24, 113-116 (1914). (In French).

Roentgen irradiation did not affect the production of agglutinins or hemolysins by rabbits nor did it alter the agglutinability of typhoid bacilli in vitro.

12118

EFFECTS ON RADIUM ON FERTILIZED AND NON-FERTILIZED EGGS IN THE FIRST DEVELOPMENTAL STAGES. Georges Born. Compt. Rend. Acad. Sci. [Paris] 136, 1085-1086 (1903). (In French).

The radiation was lethal to spermatozoa, damaging the naked chromatin, but stimulated the chromatin of the egg, protected by protoplasm, to undergo parthenogenesis.

12119

ACTION OF RADIUM RAYS ON YEAST. A. Kotzareff and F. Chodat. Compt. Rend. Soc. Phys. et Hist. Nat. Geneve 40, 36-39 (1923). (In French).

12120

EFFECT OF ROENTGEN RAYS ON PLANTS. M. Kornicke. Handb. Ges. Anwend. Elektr. 3, Teil 3., Heft 3, (1922). (In German).

12121

MICROCHEMICAL AND CYTOLOGICAL STUDY ON THE EFFECT OF ROENTGEN RAYS ON PLANT TISSUES. H. Komuro. Fortsch. Geb. Roentgens. 41, 984-989 (1930). (In German).

The author describes studies concerning the staining reaction of Vicia faba root tips after irradiation.

12122

SIGNIFICANCE AND PREVENTION OF ROENTGEN CATARACTS. M. Cremer. Strahlentherapie 36, 732-735 (1930). (In German).

12123

ON DELAYED REACTIONS OF SKIN, MOUTH AND PHARYNX AFTER X-IRRADIATION. H. Coutard. Compt. Rend. Soc. Biol. [Paris] 86, 1140-1142 (1922). (In French).

Irradiation produces severe damage to skin and mucous membranes, but these heal apparently completely. Greater doses cause longer reaction and more pain.

12124

AN EFFECT OF ROENTGEN RAYS ON THE RABBIT OVARY. H. V. Klein. Strahlentherapie 25, 443-456 (1927). (In German).

A dose of 4 H units (0.2 mm Zn and 1 mm Al filtration) was delivered over the ovaries of nine-week old rabbits. An identical dose was delivered three weeks later and caused pronounced estrus and sexual hyperesthesia for several weeks. The results were interpreted as indicating that part of the germinal epithelium was injured and the

uninjured part underwent compensatory growth, resulting in increased exocrine and endocrine secretion by the ovary. A stronger dose would be required to obtain ovulation while preserving the interstitial gland tissue in the mature rabbit.

12125

EFFECT OF RADIATIONS ON VAGAL EXCITABILITY. P. Chailey-Bert and A. Zimmern. *Compt. Rend. Soc. Biol. [Paris]* 100, 719(1929). (In French).

Arterial blood pressure, pulse rate and amplitude and cardiac rhythm were used as criteria of radiation effect on the vagus nerve of dogs that had been irradiated (under anesthesia) over exposed vagus nerve in the neck. Effects of x-rays and ultraviolet were compared. Radiation (both x-ray and U-V) decreased the amplitude and increased the rate of the pulse, depressed the oculocardiac reflex (more with x-rays than with U-V) and modified the excitability of the vagus nerve.

12126

STUDIES ON EFFECTS OF ROENTGEN RAYS ON ERYTHROCYTE SEDIMENTATION RATE. J. Klein. *Strahlentherapie* 16, 232-234(1924). (In German).

12127

HISTOLOGICAL STUDIES OF THE EFFECTS OF X-RAYS ON THE ADRENAL GLAND AND ADRENAL INNERVATION. A. Celotti. *Boll. Soc. Ind. Biol. Sper.* 6, 988-1000(1931). (In Italian).

12128

EFFECT OF ROENTGEN RAYS ON ERYTHROCYTE SEDIMENTATION IN VITRO. Cécile Jaller. *Deut. Med. Wochenschr.* 50, 1080-1081(1924). (In German)

12129

PHYSIOLOGY OF ROENTGEN AND RADIUM RAYS. W. Caspari. *Brethel's Handbook of Normal and Pathological Physiology* 17, 343-391(1926).

12130

THE EFFECT OF ROENTGEN RAYS ON WOUND HEALING. S. Fukase. *Strahlentherapie* 36, 102-115(1930). (In German).

Wound healing of surgical incisions on the abdomen of rabbits was studied. One half of each wound was x-irradiated, the other half being shielded with Pb. The x-irradiated half healed by primary intention, the shielded half developed granulation tissue first. The author interprets this as a repression of inflammation of x-rays.

12131

HISTOGENESIS OF REGENERATION IN THE PLANARIAN. O. Bartsch. *Arch. Mikrosk. Anat. und Entwicklungsmech.* (Roux) 99, 187-221(1923). (In German).

12132

ON THE PHYSIOLOGICAL EFFECT OF BEQUEREL RAYS. H. von Bayer. *Zeitschr. Allg. Physiol.* 4, 79-86(1904). (In German).

12133

BACTERICIDAL EFFECTS OF ROENTGEN RAYS. C. Fried. *Strahlentherapie* 21, 56-72(1926). (In German).

The bactericidal power of venous blood of various patients was increased after the patients had received x-ray exposures (therapeutic). Irradiation of blood or serum in vitro had no such effect.

12134

EFFECT OF X RAYS ON LYMPHOCYTOMA (CLINICAL AND HISTOLOGICAL STUDY.) J. Belot, L. Nahen and Cailhau. *Jour. Radiol.* 9, 305-315(1925). (In French).

12135

EXPERIMENTAL STUDIES ON THE RADIOSENSITIVITY OF THE ADRENAL GLAND. H. Frey. *Acad Radiologia* 9, 23-53(1928). (In German).

The author observed transient hyperemia and retardation of cell division in the adrenal after irradiation.

12136

VITAL STAINING OF RELICULOENDOTHELIAL ELEMENTS AFTER ROENTGEN IRRADIATION. E. Benassi. *Radiol. Med.* 16, 874-891(1929). (In Italian).

12137

THE EFFECT OF ROENTGEN RAYS ON HEMOLYTIC COMPLEMENT OF GUINEA PIGS. E. Frankel. *Berl. Klin. Wochenschr.* 49, 2030-2032(1912). (In German).

The level of hemolytic complement in x-irradiated guinea pigs is shown to vary independently of the leukocyte count, although in general, severe leukopenia was accompanied by poor complement fixation. Small doses (fractionated doses) applied over several weeks caused decreased complement level in only a few animals. Following a single exposure to 2-2.4 erythema doses, most animals were severely ill after about the 10th post-exposure day. In spite of this severe debilitation, there was no depression of complement titre. No clear relationship was demonstrated between dose and titre.

12138

EFFECT OF ROENTGEN RAYS ON AGGLUTININS. E. Frankel and K. Schilling. *Berl. Klin. Wochenschr.* 50, 1299-1301(1913). (In German).

12139

THE EFFECT OF THORIUM X INJECTIONS ON AGGLUTININS. E. Frankel and F. Gumpertz. *Berl. Klin. Wochenschr.* 51, 209-210(1914). (In German).

Injections had very little effect on production of typhoid agglutinin except when very large radiation doses were given.

12140

THE PHARMACOLOGICAL EFFECT OF RADIOACTIVITY. A. Benedicenti. *Soc. Ital. Biol. Sper.* 7, 363-424(1932). (In Italian). CA 26-5660

12141

ACTION OF X RAYS ON RABBIT RED BLOOD CELLS. J. L. Bergonie and Tribondeau. *Arch. Elect. Med.* 16, 597(1908). (In French).

12142

EFFECT OF RADIUM ON TISSUES IN VITRO. A. Fischer and M. Horowitz. *Strahlentherapie* 40, 465-469(1931). (In German).

Using chick embryo connective tissue cells, the authors observed a latent period between exposure to radium rays and manifestations of injury. Length of latent periods appeared to be independent of mitotic rate at the time of exposure.

12143

PHYSIOLOGICAL AND MORPHOLOGICAL CHANGES IN THE CHICK EMBRYOS EXPOSED TO RADIOACTIVE SUBSTANCES. U. Bisceglie and G. Bucciardi. *Arch. Exp. Zellforsch.* 7, 444-483(1929). (In Italian).

12144

HISTOLOGY OF ROENTGEN IRRADIATED SKIN. H. G. Bode. *Strahlentherapie* 40, 515-545(1931). (In German).

The author describes histological changes in the skin of guinea pigs following x-irradiation with and without local application of the sensitizing agents, 1. croton oil or 2. chrysarobin.

12145

HISTOLOGICAL CHANGES IN ROENTGEN IRRADIATED SKIN. H. G. Bode and E. Riecke. *Strahlentherapie* 35, 265-288(1930). (In German).

The authors describe the histological picture of the skin of guinea pigs and rabbits at various times after x-irradiation. Skin of some animals had local application of chrysarobin, croton oil or salvarsan prior to irradiation.

12146

EFFECT OF X-RAYS ON BLOOD CELLS IN VIVO AND IN

VITRO. G. Ollino. Clin. Med. Ital. 54, 373-79(1915). (In Italian).

12147

THE EFFECT OF PENETRATING RADIUM RAYS ON SERUM AND EGG ALBUMEN. A. Fernau. Biochem. Zeitsch. 167, 380-383(1926). (In German).

12148

ALTERATIONS IN PROTOPLASMIC VISCOSITY DUE TO RADIATION. Nora Feichtinger. Naturwissenschaften 21, 569-575, 589-591(1933). (In German).

12149

THE SIGNIFICANCE OF THE TIME FACTOR IN DECREASING THE RADIUM RADIATION EFFECT ON EUDORINA ELEGANS. A. Luntz. Strahlentherapie 41, 132-134(1931). (In German).

The effects of single fractionated dose and the effects of 2 dose fractions administered from 0-40 hours apart as well as effects of exposure at some earlier time were studied using the lethal effect of eudorina elegans as an end point.

12150

CHANGES IN THE LIVER DUE TO ROENTGEN IRRADIATION. M. Ludm. Strahlentherapie 19, 138-41(1925). (In German).

The author describes histological changes in livers of guinea pigs and rabbits exposed to various (large) doses of unfiltered x-rays. Changes included: hyperemia, chromatin abnormalities in parenchymal cells and lymphocytic infiltration of Ghisson's capsule.

12151

EXPERIMENTAL STUDIES ON THE QUESTION OF THE BIOLOGICAL EFFECT OF ROENTGEN RAYS. A. Low-Beer. Strahlentherapie 46, 469-516(1933). (In German).

Author describes results of his studies on the effects of x-irradiation on cholesterol in solution and on the cholesterol level in x-irradiated mice and humans.

12152

RADIUM IN BIOLOGY AND MEDICINE. E. S. London. Leipzig. Akadem. Verlagsgesellschaft. (1911). 197p. (In German).

12153

THE INCREASED RESISTANCE AND THE INCREASED ANTIBODY LEVEL DUE TO BONE MARROW IRRITANTS, THORIUM X AND ARSENICALS. H. Lippmann. Zeitsch. Exp. Path. Therap. 16, 124-140(1914). (In German).

Thorium x increases the production of erythrocytes and leukocytes, stimulates antibody production and the production of new agglutinins. It protects mice against death following injection of a fatal dose of pneumococci. Thorium x does not change a negative Wasserman test to a positive during sero-negative stage of infection as does salvarsan which acts directly on the spirochetes and destroys them, liberating fresh antigen into the circulation.

12154

ON THE SIGNIFICANCE OF BETA RAYS IN THE BIOLOGICAL EFFECT OF ROENTGEN RAYS. A. Liechtl. Acta. Radiol. 5, 385-394(1926). (In German).

The author studied the effects of secondary rays from bright and colloid metals on *B. prodigiosus* and on skin and testes of rabbits. The effect of 2° rays on the dose measurement in x-ray therapy is considered. Secondary β rays are considered to be of decisive importance in the biological effectiveness of x-rays. The author proposes that there is a "membrane effect" of x-rays and supports this by citing experiments in which the potential difference between oil and glass chains was increased by x-rays. Other experiments are also cited.

12155

THE EFFECT OF SECONDARY RAYS FROM METALS. A. Liechtl. Klin. Wochensh. 3, 825-828(1924). (In German).

A metal with an atomic number of 47-51 or 79-90 or the salt of such a metal, emits (under fixed operating conditions of the x-ray tube) secondary radiation which greatly increases the total radiation dose delivered to *B. prodigiosus*. The mechanism of the effect is discussed, the ultimate biological effectiveness being attributed to the production of secondary β rays in the bacteria.

12156

THE PHYSICO-CHEMICAL EFFECT OF ROENTGEN RAYS IN LIVING ORGANISMS. G. D. Lieber. Strahlentherapie 20, 93-102(1925). (In German).

The author describes results of histochemical studies of hair follicles of dogs, white rats and guinea pigs following x-irradiation.

12157

MICROSCOPIC STUDIES ON THE EFFECT OF RADIUM RAYS ON EMBRYONIC AND REGENERATIVE DEVELOPMENT. O. Levy. Arch. Entwicklungsmech. 21, 130-49 (1906). (In German).

12158

EXPERIMENTAL STUDIES ON THE REACTION OF THE ROENTGEN IRRADIATED ANIMAL TO BACTERIAL INFECTION WITH RESPECT TO PRODUCTION OF SPECIFIC ANTIBODIES. A. Lawen. Mitt. Grenzgeb. Med. Chir. 19, 141-186(1909). (In German).

12159

ON THE EFFECT OF ROENTGEN RAYS OF VARIOUS WAVE LENGTHS ON BIOLOGICAL OBJECTS. IV. H. Langendorff, M. Reuss and A. Reuss. Strahlentherapie 46, 655-662(1933). (In German).

The lethality curve for algae has the same shape for x-rays with wave lengths of 0.56 Å and 1.54 Å. The curve is of an entirely different shape than the lethality curve using UV radiation, however, The "time factor" is very small with algae, the dark shield exponent being at least 0.98-1.0.

12160

CHANGES IN SEMINAL EPITHELIUM PRODUCED BY THE RAYS OF URANIUM X. A. Lacassagne, J. Lattes, and G. Fournier. Compt. Rend. Soc. Biol. [Paris] 99, 1643(1928). (In French).

12161

EFFECT OF RADIATIONS ON BLOOD LEUKOCYTES STUDIED BY MEANS OF TISSUE CULTURES. A. Lacassagne and H. Gricouff. Jour. Radiol. et Elect. 11, 573-580 (1927). (In French).

The authors interpret their experimental studies of rabbit leukocytes irradiation in vitro with x-rays, α , β or γ rays and in vivo studies of irradiated animals as indicating that radiation leukopenia is due to injury of leukopoietic centers and decreased production of cells. Among criteria of x-ray effects in the in vitro studies were: cell survival, motility, migration, nuclear pyknosis, transformation to macrophages, epithelioid and giant cells.

12162

UNEQUAL ABSORPTION OF THE TWO TYPES OF RAYS FROM URANIUM X AS DEMONSTRATED BY THEIR DIFFERING BIOLOGICAL EFFECTS. A. Lacassagne, G. Fournier, and J. Lattes. Comp. Rend. Soc. Biol. [Paris] 99, 1641(1928). (In French).

Finely ground uranium and thorium fluoride were incorporated in paraffin, placed in small cylinders (trophs) and imbedded in the testes of adult dogs. Histo-pathological changes in testes at various distances from the source are described. The greatest effect was observed in the seminal epithelium.

12163

CYTOLOGICAL CHANGES IN PARAMECIA EXPOSED TO RADIATION OF MESOTHORIUM. E. Markowits. Arch. Zellforsch. 16, 238-248(1922). (In German).

Major changes observed in the irradiated paramecia were: 1. reduction in size and disintegration of macronuclei, 2. stickiness of macronuclei during division, 3. failure of micronuclear division, 4. liquefaction of plasma and withdrawal from the pellucida and 5. reduction in the size of the progeny.

12164

ROENTGEN RADIATION AND BLOOD CELL SEDIMENTATION RATE. F. von Mikulicz-Radecki. Zentralbl. Gynak. 47, 1075-1076(1928-1932). (In German).

An explanation of the different relationships after intense x-irradiation demonstrated, in the majority of the cases, a distinct fall in the "sinking slowness." The observed results, which are in contrast to the expected results, suggest that there is either a direct alteration of the electric charge of the red cells or an alteration of the fibrinogen due to the x-rays.

12165

EFFECT OF EMANATIONS OF RADIUM ON THE REPRODUCTIVE RHYTHM AND THE MORPHOLOGY OF COLPIDIUM COLPODA. G. Meldolei and G. Reverberi. Boll. Ist. Zool. R. Univ. Roma 8, 1-35(1930). (In Italian).

12166

THE COMBINED ACTION OF RADIUM AND CHEMICAL AGENTS ON PLANTS. G. Nadson and A. Jolkevitch. Ann. Roentgenol. et Radiol. 2, 11-39(1926). (In French).

Chemical agents such as iodine, potassium iodide, copper sulfate, chloral hydrate and eosin, introduced into *sinapis alba* either before or after exposure to radium irradiation enhanced the effects of the radiation. Development was more retarded and pathological changes were greater following exposure to the two types of agents than following exposure to only one. On the basis of such observations on *sinapis alba* and other organisms, the author proposes that the effect of radium and x-rays in man after the introduction of colloidal metals is not due to secondary rays but to the additional effects of the second agent. The implications with respect to radiation therapy are discussed.

12167

THE EFFECT OF RADIUM ON YEAST AND THE GENERAL EFFECTS OF RADIUM ON LIVING SYSTEMS. G. A. Nadson. Ann. Roentgenol. et Radiol., Leningrad 1, 47-96 (1922). (In German).

Effect of x-rays, and β and γ rays of radium in yeasts, molds and bacteria demonstrate that the radiations cause premature aging in the organisms and sometimes even death due to acceleration of vital processes.

12168

THE EFFECT OF IRRADIATED SPERM ON THE DEVELOPMENT OF THE SEA URCHIN EGG. O. Hertwig. Arch. Mikrosk. Anat. 82, 1-63(1913). (In German)

12169

EFFECT OF RADIUM RADIATION ON THE UNFERTILIZED FROG EGG AND ITS DEVELOPMENT AFTER FERTILIZATION WITH NORMAL SPERM. G. Hertwig. Arch. mikrosk. Anat. 77, 165-209(1911). (In German).

12170

RADIATION EFFECTS ON METABOLISM AND DEVELOPMENT IN: HANDBOOK OF RADIATION THERAPY, BIOLOGY, AND PATHOLOGY. VOL. 1. J. F. Bergmann. Munchen(1927).

12171

A LITERATURE SURVEY OF RADIUM EXPERIMENTS IN BIOLOGY. G. Hertwig. Strahlentherapie 11, 821-850 (1920). (In German).

12172

EFFECTS OF RADIUM RADIATIONS ON COLLOIDS, HEMOGLOBIN, ENZYMES AND RED BLOOD CELLS

V. Henri and A. Mayer. Compt. Rend. [Paris] 138, 521-524(1904). (In French).

12173

ROENTGEN RAY EFFECTS ON THE ERYTHROCYTES. E. Hayer. Strahlentherapie 33, 196-198(1929). (In German).

The author describes results of studies of the saponin-resistant central zone of red blood cells in agar plates when cellophane or aluminum filters are introduced between the cathode tube and the agar plates.

12174

EFFECTS OF CATHODE RAYS ON ERYTHROCYTES IN BLOOD AGAR PLATES. W. Hausmann and W. E. Pauli. Strahlentherapie 30, 350-58(1928). (In German).

Irradiation of blood agar plates with cathode rays resulted in a ring-shaped area of hemolysis, the central erythrocytes remaining unhemolyzed. These cells were also resistant to lysis by saponin.

12175

BIOLOGICAL EFFECTS OF RADIUM. W. Hausmann and W. Kerl. Strahlentherapie 11, 1027-1033(1920) (In German)

The authors describe the *in vitro* hemolysis of human erythrocytes by the γ rays of radium, and the intensification of this hemolysis by means of calcium tungstate.

12176

ROENTGEN RAY EFFECT ON VITAL STAINING OF TISSUES. L. Halberstadter and O. Wolfsberg. Fortsch. Geb. Roentgenstr. 29, 545-551(1922). (In German).

The rates and characteristics of vital staining of various tissues after irradiation of experimental animals with various doses are described. Lower doses were required to cause marked vital staining of parenchyma than were required for similar staining of connective tissue. The latent period between irradiation and staining is also shorter for parenchyma.

12177

STIMULATING AND DAMAGING EFFECTS OF ROENTGEN RAYS ON ANIMAL TISSUES STUDIED BY VITAL STAINING. L. Halberstadter and O. Wolfsberg. Zeitsch. Ges. Exp. Med. 32, 367-377(1923). (In German)

12178

HISTOLOGICAL STUDY OF X-RAY EFFECTS ON THE OVARY DURING OOGENESIS. G. Gricouloff. Arch. Inst. Radium, Univ. Paris. 2, 1-80(1930). (In French).

12179

THE EFFECT OF ROENTGEN RAYS OF VARIOUS WAVE LENGTHS ON BIOLOGICAL SYSTEMS. III. R. Glocker, H. Langenforff, and A. Reuss. Strahlentherapie 46, 517-528(1933). (In German).

The yeast, *Saccharomyces ellipsoideus*, gave different lethality curves after exposure to 0.56 Å and 1.54 Å x-rays. These are compared with lethality following exposure to α particles and interpreted with respect to the penetrating power of the radiations.

12180

THE EFFECT OF ROENTGEN RAYS OF VARIOUS WAVE LENGTHS ON BIOLOGICAL SYSTEMS. I. R. Glocker and A. Reuss. Strahlentherapie 46, 137-160(1933). (In German).

Lethality curves for beans after exposure to 0.18, 0.56 or 1.54 Å x-rays are interpreted in light of the hit theory and are compatible with it. The shape of the curve does not depend upon the time factor when the duration of radiation is short compared to the rate of growth and when the dark shield exponent is slightly different from one. The results of experiments with α particles are also reported.

12181

DIPHtheria TOXIN AND ROENTGEN RAYS. H. Gerhartz.

Berl. Klin. Wochenschr. 46, 1800-1802(1909). (In German).

12182

STUDIES ON SO-CALLED GRENZ RAYS. G. Gabriel. Strahlentherapie 26, 189-199(1927). (In German).

The author studied the production of erythema in the rabbit using low KVP x-rays.

12183

BIOLOGY OF ROENTGEN RAYS. K. Kovacs. Strahlentherapie 26, 313-328(1927). (In German).

Lethality of paramacia after irradiation in various chemical and biochemical solutions and solutions of hormones was determined.

12184

EFFECT OF X-RAYS ON PERMEABILITY OF THE CELL MEMBRANE. K. Kovacs. Strahlentherapie 30, 77-85(1928). (In German).

The author studied dye diffusion through frog heart after irradiation *in vivo* and *in vitro*.

12185

ROENTGEN RAY EFFECTS ON TISSUES. C. Koretz. Strahlentherapie 22, 319-321(1926). (In German).

In vivo and *in vitro* measurement of changes in permeability of frog leg skin to salt, sugar and dye after x-irradiation are reported. Other studies (infusion of normal saline and grape sugar solution into the peritoneal cavity of dogs and guinea pigs) were also performed to determine the effect of irradiation.

12186

CHANGES IN THE COMPOSITION OF THE BLOOD AFTER ROENTGEN IRRADIATION. C. Kroetz. Strahlentherapie 18, 545-555(1924). (In German).

The author studied acid-base equilibria in dogs and rabbits after x-irradiation.

12187

NEW DATA ON THE PHYSICO-CHEMICAL AND BIOLOGICAL PROPERTIES OF ROENTGEN RAYS. K. Kovacs. (Hungarian). Festsch. Bela Entz. 182-190(1928).

12188

ROENTGEN RAYS AND COMPLEMENT. A. Merlino. Giorn. Batt. Immunol. 4, 522-535(1929).

12189

INJURIOUS EFFECTS OF GRENZ RAYS. M. Monacelli. Strahlentherapie 35, 581-591(1930). (In German).

Late effects of irradiation in patients receiving radiation therapy for various skin conditions such as psoriasis and acne are described. Prominent and major late effects include: telangiectases, vascular spiders, atrophy and depigmentation. Histological sections of some lesions are shown.

12190

DIPHThERIA TOXIN AND ROENTGEN RAYS. J. Morgenroth. Berl. Klin. Wochenschr. 46, 1962(1909). (In German).

12191

EFFECT OF ROENTGEN RAYS ON BONES. W. Muller. Strahlentherapie 16, 1018-1019(1924). (In German).

Rabbits with fractures of radius were treated with small roentgen ray doses and healing was compared with healing unirradiated controls with similar fractures.

12192

EFFECT OF HIGH ENVIRONMENTAL TEMPERATURE AND ROENTGEN RAYS ON ANTIBODY PRODUCTION. P. T. Muller. Sitzungsber. K. Akad. Wiss. Wien. Math.-Nat. Kl. 114(3), 479-496(1905). (In German).

12193

RADIUM EMANATION AND MUSCLE IMBIBITION. P. Mascherpa and A. Sgro. Boll. Soc. Ital. Biol. Sper. 8, 479-484(1933). (In Italian).

Muscle preparations were exposed *in vitro* to solutions of radium emanation. During the first 8 hours of exposure, substances moved rapidly from the muscle into the water and muscle weight decreased. Large doses of emanation

produced muscle weight loss very soon after exposure. Electrical conductivity of the water in which control muscle preparations were immersed was always greater than that of the radioactive water.

12194

ALTERED CELL PERMEABILITY DUE TO ROENTGEN IRRADIATION, PHOSPHOROUS EXCRETION BY SURVIVING TUMOR AND LIVER SLICES. M. A. Magath. Zeitsch. Krebsforsch. 31, 95-104(1930). (In German).

12195

CHANGES IN RED CELL SEDIMENTATION RATE DUE TO ROENTGEN IRRADIATION. F. von Mikulicz-Radecki. Strahlentherapie 16, 222-231(1923-24). (In German).

12196

STUDIES ON THE RELATIONSHIPS BETWEEN ROENTGEN RAYS AND CALCIUM EFFECT ON TUMOR TISSUE. M. A. Magath and M. J. Kolomijetz. Zeitsch. Krebsforsch. 60, 457-472(1930). (In German).

12197

IRRADIATION AND ADRENAL AND PITUITARY FUNCTION. Z. M. Bacq, P. Martinovic, P. Fischer, M. Pavlovic and G. Sladic. p. 237. "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. Springfield, Ill., Charles C. Thomas Co. U. S. Pub. 1956.

12198

CHANGES IN THE REACTIVITY OF THE ORGANISM UNDER THE INFLUENCE OF IONISING RADIATION. O. Bogomolets, A. Boico, G. Diadiucha, Z. Zekhova, V. Lavrick and G. Levitchouk. p. 231. "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Dogs, rats and rabbits were x-irradiated with large single doses and treated, after exposure, with antireticular cytotoxic serum. Observations included, opsonocytaphagic index, coefficient of a trypan blue skin test, cellular composition of wound exudate; changes in protein composition, cellular composition and oxygenation of blood, clinical observations of acute radiation syndrome and histopathological studies (marrow, spleen, connective tissue).

12199

MODIFICATION OF THE X-RAY REACTION IN THE SKIN OF MICE BY SHIELDING OF MINUTE AREAS OF THE SKIN. F. Devik. p. 226 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

A flap of loose skin on mice from a hairless strain was exposed to 2700 r or 4000 r of 50 kv x-rays. Four platinum wires of 0.05 mm diameter were placed in contact with the skin and parallel to each other during exposure to provide a thin layer of shielded skin. Skin reactions were observed daily, biopsy specimens were taken from animals sacrificed 4-14 days post-exposure.

12200

STUDIES ON THE MECHANISM OF POST-IRRADIATION PROTECTION. E. L. Simmons, L. O. Jacobson and J. Denko. "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Studies were done to investigate the nature of late alterations in immunity pattern on irradiated CF₁ mice that had recovered following marrow transplants from several

different donor strains. The CF₁ mouse is normally resistant to leukemia P-1534; DBA mice are susceptible. Irradiated mice surviving after treatment with cells from leukemia-susceptible donors retained their acquired susceptibility as late as 68 days after 750 r. Studies on irradiated rabbits protected with mouse cells are also reported briefly, as are chick embryo cell-protected mice studies.

12201

THE INFLUENCE OF IONISING RADIATION UPON THE NATURAL IMMUNITY. V. L. Troitsky, M. A. Tumanjan and A. J. Friedenstern. p. 221 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

12202

CHANGES IN THE RABBIT TIBIA AND AN ESTIMATION OF THE DOSE RECEIVED BY THE BONE TISSUE FOLLOWING A SINGLE INJECTION OF STRONTIUM. M. Owen and J. Vaughan. p. 287 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

12203

BONE AND RADIOSTRONTIUM - AN ATTEMPT TO EVALUATE THE DOSE DISTRIBUTION. F. Björnerstedt, C. J. Clemedson, A. Engstrom and A. Nelson. p. 294 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

12204

DECONTAMINATION STUDIES. (A SIMPLE *IN VITRO* SYSTEM TO STUDY THE INTERACTION OF RADIOACTIVE METALS WITH PROTEINS FROM BODY FLUIDS AND TISSUES.) R. Lewin, B. Rosoff, H. E. Hart, K. G. Stern and D. Laszlo. p. 29 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

This is a report of an *in vitro* system using 3% solution of crystalline bovine albumin in saline, used in studying the interaction of body fluids with Y-90 at 2 pH levels. Two yttrium chelates were tested for their ability to keep the metal in a diffusible state.

12205

IODINATED TYROSINES AND RADIOSENSITIVITY IN THYROTOXICOSIS. J. D. Abbatt and H. E. A. Farran. p. 305 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Authors describe studies on the blood of patients being treated with I-131 for thyrotoxicosis.

12206

THE RADIATION EXPOSURE OF THE ORGANISM BY INHALATION OF NATURALLY RADIOACTIVE AEROSOLS. W. Jacobi, K. Auran and A. Schraub. p. 310 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

12207

NUCLEIC ACIDS AND AMINO ACID INCORPORATION. E. F. Gale. p. 174 "Ionizing Radiations and Cell Metabolism." (Ciba Foundation London, England). G. E. W. Wolsten-

holme and C. M. O'Connor, eds. Boston, Mass. Little, Brown and Co., 1956.

Disrupted staphylococcal preparations exposed to x-ray doses of 50,000 r or 150,000 r showed no change in the ability of their RNA or DNA to promote glycine incorporation.

12208

EFFECTS OF LONG-TERM IRRADIATION ON LYSOGENIC BACTERIA. H. Marcovich and R. Latarjet. p. 281 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

The authors determined the percent of bacteria induced (lysogenic *E. coli*) as a function of x-ray dose over a wide range of doses.

12209

RESTORATION OF PRIMORDIAL FOLLICLES IN THE IRRADIATED OVARY. P. Dasaive. p. 274 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

A dose of 2500 r completely and permanently sterilizes the ovarian follicular apparatus in rabbits. A non-sterilizing dose of 1050 r is followed by restoration, eventual effects of which are more important than those following the same total dose in 5 fractions at 48 hour intervals. Results indicate an increased radiosensitivity of the primordial follicles on the days immediately following the first fractionated irradiation. This increase enhances the efficiency of succeeding dose fractions.

12210

STUDIES ON THE TIME-INTENSITY FACTOR AFTER WHOLE-BODY X-IRRADIATION. B. Rejewsky, K. Auran and I. Wolf. p. 267 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

The authors studied survival time, LD₅₀ as a function of dose rate (0-60 Kr/day), and mortality curves in male and female mice. The sexes respond differently to long continued radiation.

12211

EFFECTS OF RADIATION ON AGEING. H. J. Curtis and R. Healy. p. 261 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

The authors compared the effect of x-rays, typhoid infection and nitrogen mustard on life span of mice. They also studied the effect of treatment, after recovery from one exposure, with one of the three agents not used initially. An effort was made to evaluate the state of capillary circulation in treated and untreated animals.

12212

EFFECT OF WHOLE-BODY IRRADIATION AND VARIOUS DRUGS ON ERYTHROPOIETIC FUNCTION IN THE RAT. STUDIES WITH RADIOACTIVE IRON. L. F. Lamerton and E. H. Belcher. p. 321 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

12213

IONIZING RADIATIONS AND CELL METABOLISM. p. 318 of CIBA FOUNDATION CONFERENCE HELD IN LONDON, ENGLAND ON MAR. 6-9, 1956. G. E. W.

Wolstenholm and C. M. O'Connor, eds. Boston, Mass., Little, Brown and Co., 1956.

12214

THE EFFECT OF REPEATED SMALL DOSES ON THE FERTILITY OF THE WHITE MOUSE. H. and M. Langendorff. p. 257 "Advances in Radiobiology" (Proc. of Fifth Internat. Conf. on Radiobiology, held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Male mice were exposed to 2.5 r/day and mated to unirradiated females after various cumulative doses. Similar experiments were done with irradiated female mice, mating them with unirradiated males. The number of litters and offspring per litter were recorded. For comparison, other animals received single doses ranging from 50-450 r. Sterility curves for males and females differ.

12215

IN VIVO UPTAKE OF RADIOACTIVE IRON BY THE ERYTHROID CELLS OF RAT BONE MARROW. E. B. Harriss. p. 333 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

The authors determined the uptake of radioactive iron by various maturation stages of red cell precursors in the marrow of normal adult male rats as a function of time after intravenous injection. In this species (in contrast to rabbits and man) Fe is incorporated in all stages of developing rbc, even cells as late as reticulocytes

12216

THE RELATIVE IMPORTANCE OF DIRECT AND INDIRECT RADIOCHEMICAL PROCESSES IN RADIOBIOLOGY. P. Alexander. p. 8 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology in Stockholm Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Changes in temperature and oxygen concentration as well as added substances may influence radiation induced chemical changes in solids where the action must be "direct." This paper includes new data on effect of oxygen on (1) crosslinking of thin polyethylene films by 2 MeV electrons and (2) viscosity changes in irradiated polystyrene sulfonate.

12217

RADIATION SENSITIVITY OF MOLECULES IN INTACT CELLS. F. Hutchinson. p.3 of "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology in Stockholm, Aug. 15-19, 1956). Springfield, Ill., Charles C. Thomas Co., 1956.

The author studied inactivation of invertase, alcohol dehydrogenase and Co-A in yeast (wet and dry) by 4 MeV deuterons and 8 MeV α particles and interpreted results in relation to Zirkle and Tobias' "migration model" in which radiation dose and biological effect are related through a diffusion distance, P.

12218

THE PARTICIPATION OF THE PERIPHERAL NERVOUS SYSTEM IN THE REACTION TO IRRADIATION. V. Slouka. p. 76 "Advances in Radiobiology" (Proc. of Fifth Internat. Conf. on Radiobiology Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

In experiments with Wistar rats, the nervous system is shown to participate in the reaction of gluteal areas to localized exposure to 2000-3000 r of 60 Kv x-rays, 300 r/min. Reaction observed; erythema on 4-5th day, slight

serous exudate on 6-7th day, progression to peak reaction on 8-10th day after which it subsides. Experiments involved surgical denervation, novocaine blocks and drugs influencing the vegetative nervous system.

12219

THE EFFECTS OF LETHALLY DAMAGED CELLS UPON SURVIVORS IN X-IRRADIATED EXPERIMENTAL TUMORS. L. Revesz. "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, Stockholm Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Induced or spontaneous tumors of mice were used in their first transfer generation in their genotype of origin, and Ehrlich ascites tumor in heterozygous animals. Suspensions of known cell numbers were irradiated *in vitro* in N_2 atmosphere with a dose known to be supralethal for such cells. Irradiated cells were then mixed in various (known) proportions with unirradiated cells and inoculated into mice. Latency period before palpable tumors appeared and survival time were measured to determine the effect of lethally damaged cells on the growth of accompanying intact cells.

12220

INDUCTION OF CHROMOSOME BREAKS IN THE YOSHIDA SARCOMA ASCITES CELLS OF THE RAT BY X-RAYS AND FAST ELECTRONS AT DIFFERENT OXYGEN PARTIAL PRESSURES. W. Dittrich. p.86 of ADVANCES IN RADIOBIOLOGY. (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., C. C. Thomas Co. 1956.

12221

OBSERVATIONS ON BACTERIAL GROWTH AND MORPHOLOGY SHORTLY AFTER IRRADIATION AND SOME REMARKS ON THE OXYGEN EFFECT. T. Alper. p. 90 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

12222

THE "SHOOTING" OF BACTERIA ONE AT A TIME BY SINGLE ALPHA PARTICLES. R. J. Munson. p. 105 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes, C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

This paper is a description of the procedure. No results are given, but the authors have in mind the use of the system described to study the relative radiosensitivities of parts of large bacteria.

12223

ALPHA IRRADIATION OF PARTS OF SINGLE METAPHASE CELLS IN CHICK TISSUE CULTURES. R. Munro. p. 108 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, Stockholm, Aug. 15-19, 1956) J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Chick embryo heart cells in tissue culture were subjected to partial-cell irradiation by Po α particles.

12224

THE IRRADIATION OF SINGLE CELLS AND PARTS OF SINGLE CELLS IN TISSUE CULTURE WITH MICROBEAMS OF ALPHA-PARTICLES. M. I. Davis, I. Simon-Reuss and C. L. Smith. p. 114 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Authors report on results of their studies on clotting of peritoneal fluid in normal and irradiated hamsters.

12225

THE EFFECTS OF PRE- AND POST-TREATMENT ON THE RADIATION SENSITIVITY OF MICROORGANISMS. A. Hollaender. p. 123 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Studies on mitosis in the grasshopper neuroblast after 3r of x-rays in isotonic and hypertonic solution and studies on the effect of protective compounds on recovery in bacteria are reported. The discussion of studies with bacteria considers the role of mutation in the recovery process and in response to protective compounds.

12226

THE PRESENT STATUS OF RADIATION PROTECTION BY CHEMICALS AND BIOLOGICAL AGENTS IN MAMMALS. J. A. Cohen, O. Vos and D. W. VanBekkum. p. 134 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Authors review their recent studies on chemical protection and bone marrow therapy in radiation injury. Compounds tested include cysteamine and derivatives. Five figures and 2 tables provide a summary of effects of route of administration of marrow, genetic relationship of marrow donor, rate of appearance of cells from grafted cells in irradiated recipients, and of recipients own cells.

12227

THE BIOLOGICAL ACTION OF IONIZING RADIATIONS FROM THE POINT OF VIEW OF RADIATION CHEMISTRY. G. Stein and A. J. Swallow. p. 16. "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Authors consider that indirect action by "ideal" x-rays can best be interpreted in terms of primary formation of solvated electrons and hydroxyl radicals, which may react with any substance present in excess to give organic free radicals which in turn react with other constituents. Hence, effects of radiation are concentrated in minor components of complex mixtures. Radiation of cells may damage them by causing disorganization, as well as by inactivating specific cell constituents.

12228

X-RAY INACTIVATION OF THE COMPONENTS OF THE SUCCINIC ACID DEHYDROGENASE-CYTOCHROME - CYTOCHROME OXIDASE- SYSTEM. B. G. Rajewsky, and H. Pauly. "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

12229

THE INCORPORATION OF P^{32} INTO LIVER PHOSPHOLIPIDS AND RNA MONONUCLEOTIDES OF IRRADIATED AND NON-IRRADIATED MICE. F. G. Sherman and A. B. Almeida. p. 49 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Authors report studies on P^{32} incorporation into phospholipids and RNA mononucleotides by livers of young male mice at 30, 60, 180 and 380 minutes after total body x irradiation with 500 rads of 200 KV x-rays, and compare results with those representing unirradiated mice.

12230

THE COMBINED ACTION OF X-RAYS AND CHEMICAL INHIBITORS ON IN VITRO KIDNEY TRANSPORT AND RESPIRATION. M. L. Mendelsohn. p. 38 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Respiration and ability to concentrate PAH were studied using kidney slices irradiated in vitro.

12231

CHEMICAL AND BIOLOGICAL ACTION OF PROTECTIVE SH-COMPOUNDS. U. Hagen. p. 187 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

12232

THE DOSE REDUCTION FACTOR FOR CYSTEAMINE AND ISOTHIURONIUM IN THE CASE OF WHOLE BODY X-IRRADIATED MICE AND RATS. A. Catsch. p. 181 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

12233

A BACTERIOLOGICAL TEST FOR THE STUDY OF RADIO-PROTECTION PROBLEMS IN MAMMALS. H. Marcovich and J. F. Duplan. p. 192 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Irradiated rabbits treated with protective compounds were bled and their serum was tested for its ability to protect bacteria. Broth cultures of *E. coli* at the end of the exponential growth phase were irradiated in plasma or broth. Results are interpreted as showing that protection of bacteria, irradiated in plasma of cysteine-injected animal, is a direct consequence of anoxia. (Same conclusion for cysteine added in vitro.)

12234

STUDIES OF RADIATION CHIMAERAS BY THE USE OF CHROMOSOME MARKERS. C. E. Ford, J. L. Hamerton, D. W. H. Barnes and F. Loutit. p. 197 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Authors report studies on irradiated CBA/H mice injected, after exposure, with cell suspensions from spleens of baby mice heterozygous for T6 translocation and having a small chromosome useful as a "marker." Others received rat bone marrow. Once established, the grafted T6 cell strain persists, but rat cells may be progressively replaced by cells of the host from the 6th week onward.

12235

THE CELL FACTOR IN SPLEEN HOMOGENATES AFTER IRRADIATION. J. Soska, V. Drasil and Z. Karpfel. p. 204 in: "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., C. C. Thomas Co. 1956.

12236

SOME EXPERIMENTS IN FAVOR OF THE CELLULAR HYPOTHESIS FOR THE SPLEEN CURATIVE FACTOR. D. W. H. Barnes, M. P. Esnouf and L. A. Stocken. p. 211 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology, held in Stockholm, Aug. 15-19,

1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Results of studies of 30 day survival of CBA mice after lethal x-ray dose and intravenous injection of various spleen fractions (nuclear preparation and cell preparation) are reported.

12237

EFFECTS OF X-RAYS ON THE ACTIVITY OF ENZYMES. E. S. Guzman Barron, S. R. Dickman, T. P. Singer and J. A. Muntz. p.388 "Biological Effects of External X and Gamma Radiation. Part I." R. E. Zirkle, ed. New York. McGraw-Hill Book Co., 1954.

Results of *in vitro* x-irradiation on the activity of of phosphoglyceraldehyde dehydrogenase, adenosinetriphosphatase, yeast hexokinase, succinoxidase, trypsin, ribonuclease, lactic dehydrogenase and catalase are reported. The action of x-rays in moderate doses (0-500 r) resembles that of mild oxidizing agents (e.g. ferricyanide and iodosobenzoic acid) and is not limited to oxidation of SH groups. Enzyme inhibition by protein denaturation also occurred.

12238

AN ELECTROPHORETIC STUDY OF THE EFFECTS OF X-RAYS ON THE PLASMA PROTEIN PATTERN IN DOGS. John A. Muntz, E. S. Guzman Barron and C. L. Prosser. p.373 "Biological Effects of External X and Gamma Radiation. Part I." R. E. Zirkle, ed. New York, McGraw-Hill Book Co., 1954.

Tiselius electrophoresis patterns of plasma proteins were determined before and serially after exposure of dogs to a lethal total body dose of x-rays. The effects of injecting bovine albumin in an effort to correct the low serum albumin levels (and the apparently reciprocal increase in α_2 globulin) that developed during the terminal period, and the effect (on plasma protein picture) of lipid extraction prior to electrophoresis during the terminal period are reported.

12239

EFFECTS OF TOTAL-BODY X IRRADIATION ON A PREEXISTING INDUCED ANEMIA IN RABBITS III. HISTOPATHOLOGICAL STUDIES. Matthew H. Block, L. O. Jacobson, E. K. Marks and E. Gaston. p.339 "Biological Effects of External X and Gamma Radiation. Part I." R. E. Zirkle, ed. New York. McGraw-Hill Book Co., 1954.

Rabbits with pre-existing phenylhydrazine-induced anemias were exposed to 800 r, total body x-ray dose. Histopathological changes in the bone marrow and spleen at various times between 1 hour and 36 days after exposure are reported.

12240

HEPARINEMIA (?): AN ANTICOAGULANT IN THE BLOOD OF DOGS WITH HEMORRHAGIC TENDENCY AFTER TOTAL-BODY EXPOSURE TO ROENTGEN RAYS. J. Garrott Allen, M. Sanderson, M. Milham, A. Kirschen and L. O. Jacobson. p.372 "Biological Effects of External X and Gamma Radiation. Part I." R. E. Zirkle, ed. New York. McGraw-Hill Book Co., 1954.

A one-paragraph summary of observations on a circulating anticoagulant found during the hemorrhagic diathesis induced by whole body exposure to 450 r of x-rays suggests that the anticoagulant may be heparin.

12241

EFFECTS OF LONG-CONTINUED TOTAL-BODY GAMMA IRRADIATION ON MICE, GUINEA PIGS, AND RABBITS. VI. CONCLUSIONS AND APPLICABILITY OF RESULTS TO THE PROBLEM OF HUMAN PROTECTION Egon Lorenz. p.226 "Biological Effects of External X and Gamma Radiation." Part I. R. E. Zirkle, ed. New York. McGraw-Hill Book Co., 1954.

Results of long term exposures of the three species to 1, 2, 4, 8 or 16 r/day are considered in light of implications for man. Life span shortening, decreased fertility, tumor induction and hematopoietic injury are the major effects discussed.

12242

SYMPOSIUM ON RADIATION EFFECTS ON CELLS AND BACTERIA A. Kerner, W. D. Bellamy, G. E. Stapleton and M. R. Zelle. Bacteriol. Reviews 19-20, 22(1955-56).

12243

THE BIOLOGICAL EFFECTS OF COSMIC RAYS. M. Fry. N. Y. State J. Med. 54, 1208(1954).

A review, concerned especially with the relationship between cosmic rays and cancer.

12244

STUDIES ON THE COURSE OF TUBERCULOSIS IN GUINEA PIGS SUBJECTED TO REPEATED X-IRRADIATION AFTER INFECTION ARE DESCRIBED. Rodet and Bertin-Sans. Archives d'Electricite Medicale, Oct. 1898 Reported in Archive Roent. Ray 3, 56(1898-99)

12245

THE POSSIBLE ROLE OF PEROXIDES IN RADIATION AND CHEMICAL MUTAGENESIS IN *DROSOPHILA*. F. H. Sobels. p.449 in "ADVANCES IN RADIOBIOLOGY." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Sweden Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

The hypothesis that peroxide formation may contribute to the mutagenic effect of formaldehyde was tested for *Drosophila* by means of catalase inhibition and by studying mutagenicity of dihydroxydimethyl peroxide which is formed by the reaction of formaldehyde and hydrogen peroxide. Cyanide was used as a catalase inhibitor (increasing rate of mutation induction).

12246

RECENT STUDIES ON CHROMOSOME BREAKAGE AND REJOINING. S. Wolff. p.463 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

12247

COMPARISON OF CHEMICALLY AND X-RAY INDUCED MUTATIONS IN *DROSOPHILA MELANOGASTER*. O. G. Fahmy and M. J. Fahmy. p.437 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

The mutagens included in this comparison are: x-ray, nitrogen mustards, dimethylalkanes, epoxides and polyethyleneimines. Mutations analyzed: dominant lethals (cytological and hatchability tests). Viable chromosome breaks were studied in F_1 larvae salivary gland chromosomes as were sex-linked recessives and lethals

12248

RATE OF DEVELOPMENT OF X-RAY INDUCED DETRIMENTALS AND THE INFLUENCE OF SELECTION PRESSURE. G. Bonnier. p.433 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

12249

THE INDUCTION OF DETRIMENTAL MUTATIONS IN *DROSOPHILA* BY X-RAYS K. G. Luning and S. Jonsson. p.425. "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Rates of induction of detrimental mutations in sperm chromosomes vary with the stage treated in a manner like that shown for visibles and recessive lethals. Weak detrimental mutations were 5 times as numerous as strong detrimental or recessive lethals. Recessive lethals are induced in unfertilized eggs slightly less frequently than in sperm.

12250

GENETIC IMPLICATIONS OF IRRADIATION IN MAN. T. C. Carter. p. 416 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Human radiation genetics has developed from the descriptive study of human populations and experimental study of mutagenesis. Absolute system of measurement (induced mutations expressed as mutations per r per locus) is sometimes used with reference to man when the relative system (mutation rate doubling dose) would be more appropriate. Use of the inappropriate system may result in erroneous conclusions.

12251

PRINCIPLES OF BACK MUTATION AS OBSERVED IN DROSOPHILA AND OTHER ORGANISMS. H. J. Muller and I. I. Oster. p. 407 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

The authors report preliminary results of back mutation of forked locus in Drosophila and conclude that in Drosophila, as in Neurospora, mutations of the same general types that occur spontaneously may be induced by ionizing radiation. These mutations include chemical changes of the types that permit evolution.

12252

RADIATION INDUCED LEUKEMIA IN DENMARK. M. Faber. p. 397 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

12253

INDUCTION OF LEUKEMIA BY RADIATION. J. F. Loutit. p. 388 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

12254

THE IMMEDIATE EFFECTS OF LARGE DOSES OF RADIOACTIVE PHOSPHORUS ON THE PERIPHERAL BLOOD COMPARED WITH THOSE OF EXTERNAL IRRADIATION IN PATIENTS WITH MALIGNANT DISEASE. E. M. Ledlie. p. 382 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

12255

COMPARISON OF THE PHYSIOLOGICAL RESPONSE TO RADIATION AND RADIOMIMETIC CHEMICALS. PATTERNS OF BLOOD RESPONSE. L. A. Elson. p. 372. "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

12256

READ-OFF METHODS IN RADIOHAEMATOLOGICAL

CONTROL. M. Helde. p. 361 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Data from routine blood studies on radiation workers (hospital) and data from experiments previously reported by Langendorff using cats are presented. Conventional methods of plotting blood cell counts over a period of time are compared with plots on probit paper. Irradiation is shown to result in a double or multiple distribution of, for example, lymphocyte counts in probability diagrams in contrast to the normal picture which is a single distribution.

12257

THE LIFE SPAN OF RED CELLS OF THE RHESUS MONKEY FOLLOWING WHOLE-BODY X-RADIATION. C. W. Gilbert, E. Paterson and M. V. Haigh. p. 357. "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Using Fe^{59} as a red cell tag, the red cell life span was measured in monkeys after irradiation with 500 r and in unirradiated monkeys. The rbc life spans were found to be 101 days and 97 days respectively (one monkey each). Conclusion: irradiation does not appreciably shorten the life span of cells already in circulation.

12258

QUANTITATIVE CHANGES IN THE ERYTHROPOIETIC CELLS OF THE RAT BONE MARROW DURING THE FIRST FORTY-EIGHT HOURS AFTER WHOLE-BODY X-IRRADIATION. E. V. Hulse. p. 349 "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Absolute numbers of various maturation stages of erythrocyte precursors in all of the marrow in single femurs were determined in normal rats, 24 hours after exposure to x-ray doses of 25r-5000 r and from 2-48 hours after exposure to 100 r, 600 r and 5000 r. The times of disappearance and return of mitotic activity in the erythroid series are also reported.

12259

ERYTHROPOIETIC ACTIVITY IN IRRADIATED RATS INJECTED WITH HOMOLOGOUS AND HETEROLOGOUS BONE MARROW STUDY WITH Fe^{59} . H. Maisin, A. Dunjic, P. Maldague and J. Maisin. p. 341. "Advances in Radiobiology." (Proc. of Fifth Internat. Conf. on Radiobiology held in Stockholm, Aug. 15-19, 1956). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Fe^{59} was injected 24 hours prior to killing rats 1, 2, 4, 7, 10, 13, 16 or 19 days after x-irradiation according to one of the following regimes: 1. whole body exposure to LD_{50} , 2. one leg shielded with Pb, the rest of the body exposed to LD_{50} , or 3. whole body exposure to LD_{50} followed immediately by intraperitoneal injection of 120 mg of homologous bone marrow suspended in 1 ml saline. Uptake of Fe^{59} by peripheral blood red cells, marrow, liver, spleen, omentum and pancreas was determined.

12260

RELATIVE BIOLOGICAL EFFECTIVENESS OF 100 kvp AND 250 kvp X-RADIATIONS IN THE DOG. D. M. Jones, E. L. Alpen and V. P. Bond. Radiation Research 5, 484 (1956).

RBE of 1.0 was obtained for x-rays in the range 250-2000 kvp, but not for lower energy radiation. With divided bilateral exposure to x-rays of 100 kvp (effective

energy = 30 kVp) and 250 kVp (effective energy = 90 kVp), the $LD_{50/30}$ (midline air dose) was 630 ± 65 r and 280 ± 9 r respectively. Expressed in terms of dose to the median sagittal plane, the values become 300 ± 30 r and 230 ± 7 r respectively.

12261

HOW RADIATION CHANGES THE GENETIC CONSTITUTION. H. J. Muller. p.387. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation, New York, United Nations, 1956.

12262

GENETICS AND IRRADIATED POPULATIONS. T. C. Carter. p.384. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy, held in Geneva Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation, New York, United Nations, 1956.

12263

GENETIC EFFECTS OF RADIATION IN MICE AND THEIR BEARING ON THE ESTIMATION OF HUMAN HAZARDS. W. L. Russell. p.382. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation, New York, United Nations, 1956.

12264

THE GENETIC STRUCTURE OF MENDELIAN POPULATIONS AND ITS BEARING ON RADIATION PROBLEMS. B. Wallace. p.377. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation, New York, United Nations, 1956.

12265

MEDICAL CARE OF WOUNDS CONTAMINATED WITH RADIOACTIVE MATERIALS. E. A. Hathaway and A. J. Finkel. p.362. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation, New York, United Nations, 1956.

12266

A STUDY OF RECOVERY FOLLOWING EXPOSURE OF PART OR THE WHOLE OF THE BODY TO IONIZING RADIATION. P. Lamarque and J. Gary-Bobo. p.351. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation, New York, United Nations, 1956.

Single or fractionated doses of x, γ or β radiation were delivered to 1. the eggs of Bombyx mori, 2. Bacillus rossii, 3. entire body or part of the body of guinea pigs and, 4. the skin of the internal aspect of the forearm of women. Criteria of effect were: hatchability of insect eggs, epilation of guinea pig skin, lethality in guinea pigs and erythema of human skin.

12267

RECOVERY FROM RADIATION INJURY. D. W. H. Barnes and J. F. Loutit. p.348. Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation, New York, United Nations, 1956.

The authors review briefly the data and concepts pertinent to the nature of the protective effect conferred by injecting cells or cell fragments into irradiated hosts. Authors conclude that there is no incontrovertible evidence that the observed protection is not due to intact cells in all cases

12268

THE EFFECT OF NONCELLULAR PREPARATIONS ON SURVIVAL AFTER LETHAL DOSES OF X-RADIATION. E. Goldwasser and W. F. White. p.343. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation, New York, United Nations, 1956.

12269

CYSTEAMINE-CYSTAMINE: ON THE MECHANISM FOR THE PROTECTIVE ACTION AGAINST IONIZING RADIATION. L. Eldjarn, et al. p.335. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation, New York, United Nations, 1956.

The authors describe their studies on the in vitro irradiation of cysteamine and on in vitro and in vivo (mice) irradiated blood serum with and without the addition of cysteamine before irradiation. Cysteamine labeled with S-35 was found to be rapidly bound to serum proteins and to hemoglobin in vitro or in vivo. Inactivation of free radicals from irradiated water appeared not to be the major mechanism of its protective action. The protective effect was considered to be exerted in cells or on the surface of tissue constituents.

12270

POSSIBILITIES AND LIMITATIONS OF THE CHEMICAL PROTECTION OF MAN AND OTHER MAMMALS AGAINST IONIZING RADIATION. Z. M. Bacq. p.332. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation, New York, United Nations, 1956.

This is a short review of desirable properties of a protective agent and of observations from the author's laboratories demonstrating observed effects of protective agents (cystamine) in mice and rats.

12271

THE SCOPE OF CHEMICAL PROTECTION AGAINST IONIZING RADIATION IN MAMMALS. D. W. van Bekkum and J. A. Cohen. p.330. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation, New York, United Nations, 1956

This is a general discussion, reviewing studies by the author and others on the chemical radiation protective agents in mammals.

12272

CELLULAR AND HISTOLOGICAL RADIOLESIONS, THEIR CONSEQUENCES AND REPAIR. J. Maisin, et al. p.315. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation, New York, United Nations, 1956.

The authors report results of studies on rats, the major criteria of protection being survival after otherwise lethal x-ray doses, suppression of gastrointestinal and hematological phases of acute radiation injury and protection of embryos. A marked tendency towards development of cancer in long term survivors (protected animals) was observed.

12273

DOMINANT LETHAL FACTORS AND EMBRYONIC MORTALITY AFTER IRRADIATION AT 180 KV AND 31 MeV. H. Fritz-Niggli. p.179. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation, New York, United Nations, 1956.

Male *Drosophila* at various ages between 0-24 hours were exposed to 3000 r of 180 kv x-rays at 67r/min. Hatchability of eggs was measured as a function of 1. time after irradiation and 2. time in days between irradiation and insemination.

12274

COMPARATIVE BIOLOGICAL EFFECTS OF 1000 MeV PROTONS, 220 KVP AND 30 MeVp ROENTGEN RAYS AND 04 MeV GAMMA RAYS. K. C. Bora. p.303. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation, New York, United Nations, 1956.

Chromosome breaks in *Tradescantia* and growth of pollen grains were studied in these experiments comparing biological effectiveness of the various radiations.

12275

INFLUENCE OF GAMMA RADIATION ON VARIOUS IMMUNITY FACTORS. G. Gaude and J. Coursaget. p. 169. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation. New York, United Nations, 1956.

Rabbits and guinea pigs were exposed (total body) to various doses (single) of Co-60 γ rays and phagocytosis and antibody formation were studied. Phagocytosis studies utilized peritoneal exudate cells and starch particles. Antibody formation, but not *in vitro* phagocytosis of starch, was inhibited by large x-ray doses.

12276

GENETIC DIFFERENCES IN LONGEVITY AND DISEASE RESISTANCE IN ANIMALS UNDER IRRADIATION. J. W. Gowen. p.188. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation. New York, United Nations, 1956.

Hosts: 20 strains of mice each with known and characteristic resistance to *S. typhimurium*. Pathogen: 7 strains of *S. typhimurium* varying in virulence. Normal life span of the normal host strains were independent of their susceptibility to typhoid. Mortality when exposed to large x-ray doses only, to typhoid only and to both stresses was determined for various combinations of hosts and pathogens. Body weights, growth patterns, heart, kidney, liver, testes and spleen weights of WBC levels were also measured.

12277

EFFECT OF DAILY LOW DOSES OF X-RAYS ON SPERMATOGENESIS IN DOGS. G. W. Casarett and J. B. Hursh. p.184. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation. New York, United Nations, 1956.

Results of semen analysis are reported for 4 groups of male beagle dogs receiving 0.06, 0.12 or 0.6 r of x-rays 5 days a week for a period of 150 weeks (at the time of the report). In general, the two lower dose regimes had produced no effects, but the 0.6 r/day dosage produced a successive decline in sperm count and concomitant increases in abnormal sperm after 20-30 weeks of exposure.

12278

STUDIES ON HYPERFERREMIA FOLLOWING ACUTE WHOLE BODY X-IRRADIATION. T. J. Haley. p. 296. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation. New York, United Nations, 1956.

Studies on liberation of iron in x-irradiated rabbits are reported. X-ray doses: 800, 1200 or 1600 r, 250 Kv x-ray. Biological manipulations included: sterile abscesses produced by intramuscular terpine, reticuloendothelial blockage with intravenous colloidal thorium dioxide and localized radiation of 800 r to liver and spleen. Decreased marrow utilization of iron appears to be the major factor in irradiation hyperferremia.

12279

RADIATION EFFECTS ON CELLS: GENETICS OR PHYSIOLOGY? E. L. Powers and C. F. Ehret. Proc. of Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation. New York, United Nations, 1956.

Certain effects in cells of various types are considered in light of the question posed in the title, and

many illustrations of effects are taken from the author's extensive studies with *Paramecia*. Division delay, cell death and mutation induction are reviewed concisely with respect to possible cellular mechanisms.

12280

RELATIONSHIP BETWEEN ELECTROLYTES AND RADIATION EFFECTS ON CELL METABOLISM. W. J. Bair. p.292. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation. New York, United Nations, 1956.

Anaerobic CO₂ production and potassium leakage were studied in x-irradiated yeast subjected to normal culture conditions, starvation, Dowex-50 resin, culture medium with increased potassium content, or starvation.

12281

STUDIES ON THE MECHANISM OF PHYTOHORMONE DAMAGE BY IONIZING RADIATION. S. A. Gordon. p.283. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation. New York, United Nations, 1956.

Biological material studied included: mung bean plants, cabbage leaf discs, Avena and Cocklebur.

12282

COMPARATIVE STUDIES OF THE BIOLOGICAL EFFECTS OF IONIZING RADIATION AND OF RADIOMIMETIC CHEMICALS. A. Haddow. p.213. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva Aug. 8-20, 1955. Biological Effects of Radiation. Vol. 11. New York, United Nations, 1956.

Radiomimetic qualities of the chemicals are reviewed and considered with respect to: hair pigmentation, growth inhibition, carcinogenesis, mutagenesis, cytological changes, and effects on natural and synthetic macromolecules.

12283

BIOLOGICAL DAMAGE RESULTING FROM EXPOSURE TO IONIZING RADIATION. L. H. Gray. p.209. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation. New York, United Nations, 1956.

12284

CYTOLOGICAL AND CYTOCHEMICAL EFFECTS OF RADIUM AND RADIOMIMETIC SUBSTANCE. A. R. Gopal-Ayengar. p.219. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation. New York, United Nations, 1956.

Cytological studies were carried out on mouse tumors irradiated *in vivo* or treated with dichloroethyl aminophenyl butyric acid by intraperitoneal injection. *V. faba* root tips, *Luzula* seedlings and Walker rat ascites tumor were also studied and results are summarized and illustrated.

12285

RELATIVE BIOLOGICAL EFFECTIVENESS. G. D. Adams, H. L. Kohn and R. S. Stone. p.260. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation. New York, United Nations, 1956.

Authors recommend the determination of Relative Biological Effectiveness values as precisely as possible. Standard biological test systems suggested are (1) LD₅₀ of adult mice, (2) LD₅₀ of 4 day old chick embryos, (3) LD₅₀ of haploid yeast, (4) weight loss of mouse testis 28 days after irradiation.

12286

STUDIES OF THE BIOLOGICAL BASIS OF RADIO-SENSITIVITY. T. N. Tahmisiian. p.256. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva,

Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation. New York, United Nations, 1956.

The degree of growth suppression in the grasshopper egg (diapause embryo) was studied in eggs exposed to oxygen, CO, CO₂:N₂ mixtures or KCN before, during or immediately after exposure to 25,000 r of 200 KV x-rays, the major interest being the relationship between radiation injury and oxidative metabolism.

12287

ON THE NATURE OF CHANGES IN METABOLISM UNDER IRRADIATION EFFECTS. N. M. Sissakian. p.248. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation. New York, United Nations, 1956.

Author compares effects of various x-ray doses on enzyme activity when enzymes were irradiated as pure enzymes or tissue extracts *in vitro*, in plant leucoplasts and chloroplasts *in vitro* and in the intact plants (rye seedlings of various ages).

12288

THE PROBLEM OF THE BIOLOGICAL ACTION OF LOW DOSES OF IONIZING RADIATION. M. H. Marcovich. p.244. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation. New York, United Nations, 1956.

The author studied the induction of lysis in a lysogenic strain of *E. coli*. The frequency of inductions was found to be proportional to dose between 1 and 1000 r, the percentage induced varying from 0.01% to 10%. The linear relationship was confirmed by experiment, up to a dose of 0.3 r. Target size, based on these data, would be 90-100 μ . Induction rate was not altered by change in dose rate when a dose rate of 0.06 r/min. was compared with a dose rate of 60,000 r/min. Implications with respect to carcinogenesis are considered briefly.

12289

BIOLOGICAL EFFECT OF IONIZING RADIATIONS ON MICROORGANISMS. M. N. Meissel. p.227. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva Aug. 8-20, 1955. Vol. 11. Biological Effects of Radiation. New York, United Nations, 1956.

This paper is a review of extensive experimental studies on yeast by the author and his colleagues. The morphological, physiological, genetic and biochemical changes observed are summarized.

12290

PROGRESS IN RADIOBIOLOGY. A. Forssberg. C. C. Thomas Co., Springfield, Ill. 17, 557(1956).

Discussion: Synthesis of DNA by Ehrlich ascites tumor cells is promptly resumed after irradiation if DNA is added to the ascitic fluid of the mice post-exposure, regardless of the origin of the DNA or of its time of injection relative to irradiation. In a mixture of unlabelled living cells and C¹⁴ labelled cells irradiated with a uniformly lethal dose of 7000 r, the living, mitotic cells in some experiments took up as much as 25% of the activity from lysed irradiated cells. Results have important implications with respect to interpretation of tracer studies.

12291

PROGRESS IN RADIOBIOLOGY. A. Goldfeder. C. C. Thomas Co., Springfield, Ill., 69-70, 557(1956).

Discussion: Three strains of mice employed in a study of radiation injury and protective agents proved to have inherently different responses (mortality rate after 700 r) to x-irradiation. Males and females also differed in some strains not only in mortality rate but also in oxidation capacity of liver mitochondria and in P/O ratios of liver mitochondria. Histochemical studies of alkaline phosphatase in the liver, kidney, duodenum, spleen and mammary glands of irradiated (12,000 r) and control mice demonstrated that a lethal dose (or greater) of x-ray does not

inactivate this enzyme and that the tissues may contain protective agents for the enzymes.

12292

PROGRESS IN RADIOBIOLOGY. U. Hagen and R. Koch. C. C. Thomas Co., Springfield, Ill., U.S. Publishers. 257, 557(1956).

Discussion: Iodoacetate has been shown to sensitize animals to radiation and in itself can produce tissue changes very similar to those produced by radiation. It reacts quickly with -SH compounds that are protective against radiation.

12293

PROGRESS IN RADIOBIOLOGY. D. B. Cater. C. C. Thomas Co., Springfield, Ill., 276, 557(1956).

Discussion: In vivo measurements of tissue oxygen tension (by means of Pt electrodes) showed little decrease in oxygen tension after cysteine injection although the oxidation-reduction potential fell sharply. (Measured in lactating mammary gland.)

12294

THE HYDROGEN EFFECT IN THE STUDY OF RADIATION DAMAGE DUE TO RADICALS. M. Ebert and Alma Howard. p.324. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., C. C. Thomas Co. 1956.

Growth rate (elongation) of *V. faba* root tips was measured and evaluated as a function of x-ray dose and gaseous atmosphere during irradiation.

12295

THE RADIATION-INDUCED REDUCTION OF DIPHOSPHOPYRIDINE NUCLEOTIDE AND ITS BEARING ON THE OXYGEN EFFECT IN RADIOBIOLOGY. A. J. Swallow. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., C. C. Thomas Co. 1956.

12296

BLOOD DESTRUCTION AND IRON METABOLISM IN THE ACUTE SYNDROME OF RADIATION SICKNESS. N. A. Fedorov. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., C. C. Thomas Co. 1956.

Dogs with ureter gall-bladder anastomoses were irradiated with x ray doses of 200 r-400 r, total body exposures. Studies of blood and hematopoietic tissues were supplemented by determinations of daily excretion of tetrapyrrobin. The existence of a hemolytic process during the acute radiation syndrome is confirmed.

12297

EFFECTS OF RADIATION ON ERYTHROPOIESIS IN THE RAT. TURNOVER STUDIES USING RADIOACTIVE IRON. E. H. Belcher, E. B. Harriess and L. F. Lamerton. p.303 of "Progress of Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

The uptake (percent of injected dose) of Fe⁵⁹ in hind leg, spleen, liver and blood as a function of time after injection is described in normal rats and in rats irradiated with 450 r or 200 r of x-ray to the total body or total body with one leg shielded.

12298

HAEMOPOIETIC REGENERATION IN SPLEEN GRAFTS AFTER IN VIVO AND IN VITRO IRRADIATION. E. H. Betz, G. Booz and J. Firket. p.297. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Splenic tissue irradiated *in vivo* or *in vitro* with doses larger than those required to kill 100% of the animals is still able to regenerate myeloid tissue when transplanted to a normal host. Doses as high as 5000 r do not markedly impair the hematopoietic potentialities of the tissue. It appears that in whole body irradiation, general metabolic disturbances are at least as important as cellular destruction of splenic tissue *per se* in regulating hematopoiesis.

12299

IMMUNOLOGICAL AND HISTOLOGICAL RESPONSE FOLLOWING SPLEEN TREATMENT IN IRRADIATED MICE.

D. W. H. Barnes and J. F. Loutit. p.299. "Progress in Radiobiology." (Proc of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Following therapy (for lethal x-ray dose) with a single dose of strain A spleen, irradiated CBA mice were studied to see whether they produced anti-A agglutinins. At time of autopsy (1, 3, 5, 8, 15, 22, 35 and 44 days after irradiation and spleen cell injection) spleen and thymus were weighed and histological sections prepared of spleen, thymus, lymph node, testes, liver, sternum and femur.

12300

COMPARISON OF THE PHYSIOLOGICAL RESPONSE TO RADIATION AND TO RADIOMIMETIC CHEMICALS - BONE MARROW EFFECTS. L. A. Elson, G. A. Galton, L. F. Lamerton and M. Till. p.285. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

Data comparing the effects of whole body exposure to an x-ray dose of 250 r with effects of the "radiomimetic" compounds, CB 1348 and myleran on the peripheral blood and hematopoietic tissues are tabulated.

12301

THE EFFECTS OF X-RAYS AND RADIOMIMETIC SUBSTANCES ON RAT LYMPHOCYTES. C. Biagini. p.281. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, eds. Springfield, Ill., Charles C. Thomas Co., 1956.

The percent of pyknotic lymphocytes was determined for lymph node lymphocytes of rats treated with a second dose of x-rays or HN₂ after a previous treatment with one of the agents. Exposures to 100 r of x-rays were total body or anterior or posterior half of the body. Dose effect and time-effect curves are presented. If the interval between two exposures is not greater than 2-3 days, effects are partially cumulative. With longer intervals, they are not.

12302

PROTECTIVE EFFECT OF CYSTEAMINE ON MICE INJECTED WITH NITROGEN MUSTARD. A. J. Therkelsen. p.260 of PROGRESS IN RADIOBIOLOGY. (Proc. of Fourth Internat. Conf. held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., C. C. Thomas Co., 1956.

12303

ON THE MECHANISM OF CHEMICAL PROTECTION AGAINST IONISING RADIATION. THE INTERACTION OF CYSTEAMINE AND CYSTAMINE WITH PROTEINS. L. Eldjarn and A. Pihl. p.249 of PROGRESS IN RADIOBIOLOGY. (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., C. C. Thomas Co., 1956.

The authors report on studies of *in vitro* exposure of blood proteins to labelled cysteamine and cystamine and on the fixation of the compounds by proteins. Cystamine, the disulfide form, is considered to be the immediate protective agent in the cell.

12304

DISCUSSION OF PAPER ON p.143 BY vanBekkum and DeGroot. R. Koch and U. Hagen. p.246-48 of PROGRESS IN RADIOBIOLOGY. (Progress of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., C. C. Thomas Co., 1956.

Discussion: Studies on series of compounds of the dithiocarbonate family demonstrated that the protective effect in lethally irradiated mice increased as toxicity increased and that the sulphhydryl group of the compounds is activated by the neighboring amino group to an increasing extent as the amino group is made "more strongly positive" by substitution. Simple idea of capture of radicals or non-specific reducing action does not adequately explain the protective effects.

12305

OBSERVATIONS ON CHEMICAL PROTECTION *IN VIVO* AND *IN VITRO*. D. W. vanBekkum and J. DeGroot. p.243 of PROGRESS IN RADIOBIOLOGY. (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., C. C. Thomas Co., 1956.

Chemical protective agents were studied with respect to their ability 1. to protect mice against the lethal effects of radiation and 2. to protect rat thymocytes irradiated *in vitro*. Protective agents studied were: cysteine, glutathione, cysteamine, diethyldithiocarbamate, histamine, l-epinephrine, β phenylethylamine and cyanide.

12306

STUDY OF A POPULATION OF LYSOGENIC BACTERIA GROWING IN A CONSTANT FIELD OF γ -RADIATION. H. Marcovich. p.236 of PROGRESS IN RADIOBIOLOGY. (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., C. C. Thomas Co., 1956.

12307

MUTATION TO DEFECTIVE LAMBDA LYSOGENY IN *E. COLI*. R. K. Appleyard. p.229 of PROGRESS IN RADIOBIOLOGY. (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., C. C. Thomas, 1956.

12308

THE PRODUCTION OF MUTATIONS OF ECONOMIC VALUE IN CEREAL CROPS. R. N. H. Whitehouse. p.223 of PROGRESS IN RADIOBIOLOGY. (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., C. C. Thomas Co., 1956.

Wheat and barley seeds were irradiated with various doses of fast neutrons and the types and numbers of mutations produced were observed.

12309

DIFFERENTIAL ULTRA-VIOLET IRRADIATION OF THE *HABROBRACON* EGG NUCLEUS. R. C. vonBorstel and H. Moser. p.211 of PROGRESS IN RADIOBIOLOGY. (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., C. C. Thomas Co., 1956.

In nuclear killing, U-V as well as x-rays, α rays and nitrogen mustard kill most embryos before the eighth cleavage stage.

12310

CHEMICAL AND RADIATION MUTAGENESIS IN *DROSOPHILA MELANOGASTER*. O. G. Fahmy and Myrtle Fahmy. p.205 of PROGRESS IN RADIOBIOLOGY. (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., C. C. Thomas Co., 1956.

Mustards, epoxides, amines and mesyloxyalkanes (all alkylating agents) were compared with x-rays as mutagenic agents. Effects measured; incidence of dominant lethals and of F_1 viable (eucentric) chromosomes rearrangements.

12311

X-RAY SENSITIVITY OF TWO WILD-TYPE STRAINS OF *DROSOPHILA MELANOGASTER*. O. Stromnes. p.196. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U. S. 1956.

Four day old males were irradiated and then mated to unirradiated females. Hatchability of eggs was used as criterion of effect (dominant lethal mutations).

12312

AN EXPERIMENTAL AND THEORETICAL INVESTIGATION OF THE LINEAR ABSORPTION COEFFICIENT IN WATER AND BONE FOR γ -RADIATION FROM 13 MeV to 24 MeV. T. Brustad and J. Baarli. p.178 of PROGRESS IN RADIOBIOLOGY. (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes, and C. L. Smith, eds. Springfield, Ill., C. C. Thomas Co., 1956.

12313

LINEAR ENERGY TRANSFER CALCULATIONS ALLOWING FOR DELTA TRACKS. P. R. J. Burch and P. M. Bird. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., 1956.

12314

RELATIVE MUTAGENIC EFFICIENCY OF 4 MeV X-RAYS AS ASSESSED BY THE INDUCTION OF DOMINANT LETHALS IN *DROSOPHILA*. A. J. Bateman. p.144. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U. S. 1956.

12315

THE RELATIVE BIOLOGICAL EFFICIENCY OF 31 MeV BETATRON AND 175 keV X-RAY IRRADIATION AS MEASURED BY RECESSIVE SEX-LINKED LETHALS IN *DROSOPHILA MELANOGASTER*. Jeanne Mossige. p.137. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., 1956.

12316

THE RELATIVE BIOLOGICAL EFFICIENCIES OF 31 MeV BETATRON RADIATION AND 175 keV X-RAYS AS MEASURED BY LETHAL EFFECTS ON 4-DAY CHICK EMBRYOS. P. Oftedal. p.131. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., 1956.

12317

PRODUCTION OF "HIDDEN" BREAKS IN DNA BY THE DIRECT ACTION OF IONISING RADIATION. P. H. Alexander and K. A. Stacey. p.105. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., 1956.

12318

DIFFERENCE IN RADIOSENSITIVITY OF VARIOUS ENZYMES IN TISSUE HOMOGENATE AND IN PURIFIED SOLUTION. H. A. Kunkel, G. Hohne, H. Maass and G. Schubert. p.52. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., 1956.

Liver homogenates were irradiated and enzyme activity was determined in irradiated and unirradiated homogenates from the same liver. The observations that x-irradiation did not inactivate the major enzymes of carbohydrate metabolism suggest that the intracellular environment of enzymes provides effective protection against irradiation damage.

12319

THE EFFECT OF FRACTIONATED X-RAY DOSES ON DNA SYNTHESIS AND GROWTH OF *VICIA FABA* ROOTS. S. R. Pelc and A. Howard. p.8. "Progress in Radiobiology." (Proc. of Internat. Conf. (Fourth on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U. S. 1956.

Growth rate during 10 days following x-irradiation and number of meristematic cells synthesizing DNA during a period of 12 hours post-exposure were measured in bean roots.

12320

RADIATION-INDUCED CHROMOSOME ABERRATIONS IN *TRADESCANTIA*. Norman H. Giles, Jr. p.713-761 of Vol. 1 of RADIATION BIOLOGY. Alexander Hollaender, ed. New York. McGraw-Hill Book Co., Inc. 1954.

Major sub headings are: aberration types and frequencies, experimental techniques, types of aberrations, symmetrical and asymmetrical exchanges, distribution of breaks in chromosomes, distribution of aberration types among nuclei, spontaneous aberrations, time of chromosome division, variations in radiosensitivity with the nuclear cycle, relation of aberration yield to dose and intensity, space factor in reunion, restitution, relative efficiencies of various radiations, effect of absorbed isotopes, modifying factors.

12321

IRRADIATION EFFECTS IN SOLIDS OF DIFFERENT WATER CONTENT. L. Ehrenberg. p.114. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., 1956.

Results of studies on *in vitro* irradiation of starch indicate how biological radiation effects over a range of water contents (*in vivo*) must be explained. At least part of the energy conduction after irradiation is by diffusion of reactive intermediary compounds. At higher water contents, reactions of the kinds occurring in dilute water solutions become more important.

12322

X-RAY SIEVE THERAPY IN CANCER. B. Jolles. Lewis Co., London (1953).

12323

THE CONCEPT OF DOSAGE AND THE DEFINITION OF THE R UNIT. R. Glocker. *Radiology* 18, 93-8(1932).

12324

THE EXPERIMENTAL ANIMAL FOR STUDY OF THE BIOLOGICAL EFFECTS OF RADIATION. J. F. Loutit. p.3-6 of Vol. 11 of PROCEEDINGS OF INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

12325

THE INFLUENCE OF IONIZING RADIATIONS ON ANIMAL ORGANISMS. A. V. Lebedinsky. p.7-24 of Vol. 11 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

The author reviews the role of the nervous system in the general response of animals to irradiation.

12326

BIOLOGICAL EFFECTS OF RADIATION. J. C. Bugher. p.45-8 of Vol. 11 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

12327

BIO-MEDICAL EFFECTS OF NUCLEAR ENERGY. M. Tsuzuki. p.65-7 of Vol. 11 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

12328

A COMMENTARY ON THE MODES OF RADIATION INJURY. A. M. Brues. p.71-5 of Vol. 11 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

12329

MODES OF RADIATION AND INJURY - MEDICAL ASPECTS. E. Rock Carling. p.76-9 of Vol. 11 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

12330

SOME ASPECTS OF THE IMMUNITY OF THE ORGANISM EXPOSED TO IONIZING RADIATION. I. A. Pigalyev. p.80-7 of Vol. 11 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

12331

MODES OF RADIATION INJURY. A. Zuppinger. p.88-92 of Vol. 11 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

12332

EFFECTS OF WHOLE BODY EXPOSURE TO NUCLEAR OR X-RAY ENERGY ON LIFE SPAN AND LIFE EFFICIENCY. J. W. Gowen. p.105-9 of Vol. 11 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

Ten inbred strains of mice were exposed to one of several doses of either x-rays or nuclear radiation and observed throughout their lifespan. Progeny were studied to determine rates of mutation-induction.

12333

BIOLOGICAL EFFECTS OF FAST NEUTRONS AND

GAMMA RAYS. J. W. Clark, et al. p.110-14 of Vol. 11 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

Lethality, mechanism of mortality (infection, spleen weight) and effects of streptomycin and cysteine pre-treatment were studied in CF₁ female mice following exposure to various single doses and dose rates of: 1. fission neutrons, 2. Co⁶⁰ γ rays or 3. mixtures of 1 and 2.

12334

A FORMULATION OF THE RELATION BETWEEN RADIATION DOSE AND SHORTENING OF LIFE SPAN. H. A. Blair. p.118-20 of Vol. 11 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

The author discusses the kinetics of radiation injury and presents a formulation of life span - radiation dose relationships.

12335

MODES OF ACUTE RADIATION DEATH. H. Quastler. p.121-24 of Vol. 11 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

12336

IRREVERSIBILITY OF DAMAGE PRODUCED BY ALPHA-EMITTERS. J. N. Stannard, H. A. Blair and R. C. Baxter. p.125-27 of Vol. 11 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

Studies on albino rats receiving injections of polonium chloride at several dosage levels in single or repeated injections are reported.

12337

EARLY EFFECTS OF RADIATION INJURY. M. Tsuzuki. p.128-29 of Vol. 11 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

The author presents a brief review of the acute illness as observed in Hiroshima and Nagasaki casualties.

12338

LATE EFFECTS OF RADIATION INJURY. M. Tsuzuki. p.130-31 of Vol. 11 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

Late effects of extremely high radiation doses are considered with respect to effects on the exposed persons and on their descendants. Effects: leukemia, cataracts, abortion and stillbirth, altered growth and development of children exposed in utero, nail bed capillary studies on survivors, general condition.

12339

RADIATION INJURY DUE TO RADIOACTIVE FALLOUT. M. Tsuzuki. p.132-33 of Vol. 11 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. New York, United Nations. 1956.

A report of the clinical findings in 23 Japanese fishermen injured by radioactive fallout in March 1954 (Mixed fission product exposure).

12340

SIMILARITY OF EFFECTS PRODUCED BY ABSENCE OF VITAMINS AND BY EXPOSURE TO X-RAYS. W. Cramer, A. H. Drew and J. C. Mottram. *Lancet*, 963-4(1921).

Avitaminosis and starvation characteristically produce a marked reduction in size of lymphoid tissue (spleen, thymus, nodes, Peyer's patches, blood lymphocytes) in rats and mice. Exposure to radium and x-rays produces the same effect. The authors believe that both agents lead to inanition and have especially marked effects on lymphoid tissue, demonstrating its importance for life.

12341

CARCINOGENESIS BY IONIZING RADIATIONS. Jacob Furth and Egon Lorenz. p.1145-1201 of RADIATION BIOLOGY, VOL. 1. Alexander Hollaender, ed. New York. McGraw-Hill Book Co., Inc. 1954.

12342

HISTOLOGICAL CHANGES AFTER IRRADIATION. William Bloom and Margaret A. Bloom. p.1091-1143 of RADIATION BIOLOGY, VOL. 1. Alexander Hollaender, ed. New York. McGraw-Hill Book Co., Inc. 1954.

12343

THE PATHOLOGICAL PHYSIOLOGY OF RADIATION INJURY IN THE MAMMAL. II. SPECIFIC ASPECTS OF THE PHYSIOLOGY OF RADIATION INJURY. Harvey Patt and A. M. Brues. p.959-1028 of RADIATION BIOLOGY, VOL. 1. Alexander Hollaender, ed. New York. McGraw-Hill Book Co., Inc. 1954.

12344

THE EFFECTS OF RADIATION ON MAMMALIAN PRENATAL DEVELOPMENT. Liane Brauch Russell. p.861-918 of RADIATION BIOLOGY, VOL. 1. Alexander Hollaender, ed. New York. McGraw-Hill Book Co., Inc. 1954.

12345

GENETIC EFFECTS OF RADIATION IN MAMMALS. W. L. Russell. p.825-859 of RADIATION BIOLOGY, VOL. 1. Alexander Hollaender, ed. New York. McGraw-Hill Book Co., Inc. 1954.

12346

IMMEDIATE EFFECTS ON DIVISION, MORPHOLOGY AND VIABILITY OF THE CELL. J. Gordon Carlson. p.763-824 of RADIATION BIOLOGY, VOL. 1. Alexander Hollaender, ed. New York. McGraw-Hill Book Co., Inc. 1954.

Main subheadings: Ionizing radiation effects compared with U-V effects; mitotic effects (grasshopper neuroblasts, Arbacia eggs, various plant and animal tissues including tabulated data); morphological effects; cell viability effects.

12347

ANAEROBIC RECOVERY OF ASCARIS EGGS FROM X-IRRADIATION. G. Fahl and C. S. Bachofer. Biol. Bull. 112, 383-389(1957).

12348

THE X-IRRADIATION OF HAPLOID AND DIPLOID STRAINS OF YEAST AND ITS ACTION ON CELL DIVISION AND METABOLISM. E. L. Gonzales and E. S. G. Barron. Biochim. Biophys. Acta 19, 425-431(1956).

12349

NONIONIZING RADIANT ENERGY AS AN AGENT IN ALTERING THE INCIDENCE OF X-RAY-INDUCED CHROMATID ABERRATIONS. II. EFFECTS OF FAR-RED AND INFRA-RED RADIANT ENERGY ON TRADESCANTIA AND VICIA. R. B. Withrow and C. C. Moh. Radiation Research 6, 491-500(1957).

12350

EFFECTS OF IONIZING RADIATION ON THE IN VIVO INCORPORATION OF AMINO ACIDS INTO PROTEINS. J. A. V. Butler, P. Cohn and A. R. Crathorn. p.33 of PROGRESS IN RADIOBIOLOGY. Springfield, Ill., C. C. Thomas Co. 1957.

Rats (fasted) were irradiated (whole body) with a 500 r dose of x-rays and immediately after irradiation

injected intraperitoneally with C^{14} labelled phenylalanine. Livers were removed at selected times after exposure and the various subcellular constituents (nucleus, mitochondria, microsomes, fluid supernatant) were studied with respect to amino acid incorporation. Irradiation produced an increase in incorporation into tissue protein, the increase occurring first in the nuclear fraction, followed within an hour by the other fractions. This effect was not observed in fractions of kidney cells. Causes of the observed effects remained obscure.

12351

OBSERVATIONS ON RADIATION DAMAGE TO THE UPPER PORTION OF THE INTESTINE IN THE TREATMENT OF COLUMN CARCINOMA. K. Bock and W. Heyde. Zentralblatt für Gynäkologie 75, 642-50(1953). (In German).

Four human autopsy cases showed, in addition to damage in the sigmoid colon, severe damage in the small intestine and lower ileum. The changes in the small intestine were similar to those in the upper portion of the large intestine. Roentgenologically detected damage of the ileum that progressed to perforation is described.

12352

THE EFFECTS OF IONIZING RADIATIONS ON ENZYMES IN VITRO. W. M. Dale. p.25-37 of CIBA FOUNDATION SYMPOSIUM ON IONIZING RADIATION AND CELL METABOLISM. Boston. Little, Brown and Co. 1956.

A short review of radiation effects on enzymes in vitro in light of which the author proposes in vivo studies should be viewed.

12353

THE MORTALITY-REDUCING EFFECT OF POTENTIATED ANESTHESIA IN IRRADIATED GUINEA PIGS. R. L. Fonner and D. Laird. Compt. rend. 239, 832-34(1954).

The combined medications (a phenothiazine plus dimethylamino - 2 methyl - 2 ethyl - N- thiophenylamine hydrochloride or the ethyl ester of methyl - 11 phenyl - 4 piperidine-carboxylic acid) protected guinea pigs against lethal effects of a radiation dose that would have been lethal unless the animals were made hypothermic.

12354

EDUCATION AND TRAINING IN NUCLEAR SCIENCE AND ENGINEERING IN THE UNITED STATES. E. E. Anderson, F. C. Vonderlage, and R. T. Overman. p.463-70 of PROC. OF INTERNAT. CONF. ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955, VOL. 1. New York, United Nations. 1956.

12355

THE EFFECT OF FILTERED RADIUM RAYS ON THE ENDOMETRIUM. W. Von Massenbach and H. Czech. Geburtsh. Frauenheilk. 14, 317-22(1954). (In German)

The beta particle of "filtered radium" cannot penetrate the full thickness of the human endometrium. Curettage must be carried out if this agent is used to irradiate the basal layer of the endometrium.

12356

EDUCATION AND TRAINING IN HEALTH AND MEDICAL USES OF ATOMIC ENERGY. World Health Organization. p.471-76 of PROC. OF INTERNAT. CONF. ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955, VOL. 1. New York, United Nations. 1956.

12357

EARLIER MORPHOLOGIC CHANGES OF TISSUE CELLS CAUSED BY X-RAY IRRADIATION. (STUDIES WITH METHYL GREENPYRONIN). S. Nagai, H. Matsuda, K. Akita, and T. Kasue. Med. J. Osaka Univ. 5(4), 749-762 (1954). BA 30-494

12358

A STUDY OF RADIATION EFFECTS ON PRIMARY PHOSPHATE ESTERS IN AQUEOUS SOLUTION. R. W. Wilkinson and T. E. Williams. p.82 of PROGRESS IN RADIO-BIOLOGY. Springfield, Ill., C. C. Thomas Co. 1956.

12359

INCORPORATION OF CARBON¹⁴ INTO FAT AND GLYCOGEN OF THE LIVER OF IRRADIATED MICE AFTER RECEIVING AN INJECTION OF CARBON¹⁴-LABELED GLUCOSE. M. Loureau-Pitres. Arkiv. Kemi. 7, 211(1954). (In German).

12360

EFFECT OF HIGH SINGLE DOSES AND EFFECT OF FRACTIONATION OF THESE DOSES ON THE SKIN OF C57 BLACK STRAIN MICE. F. Kroning and R. Sigmund. Hautarzt 6, 127-29(1955). (In German).

12361

MORPHOLOGICAL CHANGES OF INTERCELLULAR STRUCTURES OF CONNECTIVE TISSUE AFTER ROENTGEN RAY EXPOSURE. A. Merli. Radioterap., radiobiol. e fis. med. 297-315(1954).

12362

CHRONOLOGICAL DEVELOPMENT OF VARIOUS HISTOCHEMICAL MODIFICATIONS OF THE SKIN IN THE REGION EXPOSED TO ROENTGEN IRRADIATION AS WELL AS IN ADJACENT AND DISTANT REGIONS. A. Romanini and S. Chippa. Boll. soc. ital. biol. sper. 30, 811-13(1954). (In Italian).

12363

INHIBITION OF THE ENZYME ACTIVITY OF ISOLATED MITOCHONDRIA BY SMALL X-RAY DOSES. H. Fritz-Niggli. Naturwissenschaften 42, 585(1955). (In German). BA 51-15, 677c

12364

X-IRRADIATION OF THE GIANT AMOEBA PELOMYXA ILLINOISENSIS. I. SURVIVAL AND CELL DIVISION FOLLOWING EXPOSURE. THERAPEUTIC EFFECTS OF WHOLE PROTOPLASM. E. W. Daniels. J. Exp. Zool. 130, 183-197(1955).

12365

SOME AFTER-EFFECTS IN FATS IRRADIATED WITH HIGH ENERGY ELECTRONS AND X-RAYS. R. S. Hannan and H. J. Shepherd. Trans. Faraday Soc. 49, 326(1953).

Irradiation of butter fat with large doses of 1.2 MeV cathode rays or 50 Kv x-rays produces organic peroxides, approximately equivalent in amount to the original O₂ content. Carotenoids and antioxidants are also destroyed. Similar changes are observed in fat extracted from beef perinephric tissue and to a greater extent in whole butter and intact perinephric tissue.

12366

INFLUENCE OF RADIATION ON THE METABOLISM OF ASCITES TUMOUR CELLS. A. Forssberg. p.212-24 of CIBA FOUNDATION SYMPOSIUM ON IONIZING RADIATIONS AND CELL METABOLISM. G.E.W. Wolstenholm and C. M. O'Connor, eds. Boston. Little, Brown and Co. 1956.

The author's studies on protein and nucleic acid synthesis in ascites tumor cells irradiated in vivo are reviewed.

12367

LIFE SPANS OF DIFFERENT STRAINS OF MICE AS AFFECTED BY ACUTE IRRADIATION WITH 1000 KVP X-RAYS. J. W. Gowen and J. Stadler. J. Exptl. Zool. 132, 133-55(1956).

12368

Brookhaven National Lab., Upton, N. Y. MUTATION. A REPORT OF SYMPOSIUM HELD JUNE 15 TO 17, 1955. Brookhaven Symposium in Biology No. 8. 240p. (BNL-350)

12369

Michigan State Univ., East Lansing. A CONFERENCE ON RADIOACTIVE ISOTOPES IN AGRICULTURE. HELD AT MICHIGAN STATE UNIVERSITY ON JANUARY 12, 13, AND 14, 1956. Jan. 1956. 420p. (TID-7512)

12370

THE EFFECTS OF EXTRANEIOUS AGENTS ON CELL METABOLISM. H. A. Krebs. p.92-105 of CIBA FOUNDATION SYMPOSIUM ON IONIZING RADIATIONS AND CELL METABOLISM. G. E. W. Wolstenholme and C. M. O'Connor, eds. Boston. Little, Brown and Co. 1956.

The cellular metabolic stages that are vulnerable to radiation are those controlling the rates of metabolic processes and are referred to as "pacemaker" reactions. In these systems, the amount of active enzymes is the critical factor modifying the metabolic process. Enzymes operating at other stages are present in excess of available substrate and partial enzyme destruction is incompatible with the normal rate of metabolism. Available evidence is considered to confirm the author's hypothesis that extraneous agents (e.g. radiation) more often than not interfere with pacemaker reactions.

12371

THE PROBLEM AND CONSTITUTION OF RADIATION-SENSITIZING AGENTS. R. Koch. p.170 of PROGRESS IN RADIOBIOLOGY. Springfield, Ill., C. C. Thomas Co. 1957.

Although α thiolamino acids are known to be radiation-protective substances, their analogues, the β thiolamino acids (β homocysteine and isocysteine) are shown to be radiation sensitizing agents in rats and mice.

12372

RADIOBIOLOGICAL INVESTIGATIONS ON THE HIBERNATING LOIR (GLIS GLIS). H. A. Kunkel, G. Hohne, and H. Maass. p.176 of PROGRESS IN RADIOBIOLOGY. Springfield, Ill., C. C. Thomas Co. 1957.

Hibernation at temperature of 4°C. resulted in delay of onset of symptoms of injury from a dose of 700 r x-ray in the dormouse until the animals returned to room temperature. Then, death rate at 30 days (subsequent to return to room temperature) was the same as that in non-hibernating irradiated animals. The hibernation period appeared only to delay radiation effects and did not appear to permit recovery. Cysteine protected the animals when administered 21 days after irradiation (when returned to room temperature). Apparently injury was not complete during hibernation.

12373

EFFECTS OF IRRADIATION ON DNA SYNTHESIS BY HUMAN BONE MARROW CELLS IN VITRO. L. G. Laytha, R. Oliver and F. Ellis. p.54 of PROGRESS IN RADIOBIOLOGY. Springfield, Ill., C. C. Thomas Co. 1957.

Small doses (150-300 rads) of x-irradiation inhibit DNA synthesis if delivered to cells prior to the beginning of DNA synthesis (cells in G₁ period) but have no inhibiting effect once synthesis has started. There appears to be a radiosensitive system in cells connected with the process of DNA synthesis. This process, however, is not identical with DNA synthesis.

12374

THE EFFECT OF X-IRRADIATION ON RAT THYMUS NUCLEIC ACIDS AT SHORT INTERVALS AFTER EXPOSURE IN VIVO. M. G. Ord and L. A. Stocken. p.65 of PROGRESS IN RADIOBIOLOGY. Springfield, Ill., C. C. Thomas Co. 1957.

A brief summary of previous physico-chemical studies on DNA from rat thymus glands irradiated in vitro is given. To check the results of in vitro irradiation, authors exposed rats (after injection with a labelling dose of P³²)

to 1000 r of x-rays. Other rats received the P^{32} immediately after irradiation. Nuclei were prepared as in the earlier *in vitro* studies and the incorporation of P^{32} into the nucleic acids was determined. Inhibition of P^{32} uptake was observed soon after exposure, by 24 hours had essentially ceased. Major effect is on DNA, much less on RNA. Failure to incorporate P^{32} probably is not due to altered DNA structure.

12375

RADIOBIOLOGY EMPLOYED IN PHYSIOLOGIC PATHOLOGY AND EXPERIMENTAL CANCER. J. Maisin, H. Maisin, A. Dunjic and P. Moldaque. *Bull. Schweiz. Akad. Med. Wiss.* 11, 247-273(1955).

12376

ACTION OF X-RAYS ON MAMMALIAN CELLS. II. SURVIVAL CURVES OF CELLS FROM NORMAL HUMAN TISSUES. T. T. Puck, D. Morkovin, P. I. Marcus, and S. J. Cieciura. *J. Exp. Med.* 106, 485-500(1957).

Dose-effect curves were determined for isolated cells in culture subjected to x-rays. Cells studied were HeLa cells, human embryonic lung cells and human fibroblasts from skin, spleen and ovary. The survival curve indicates at 2-hit mechanism of killing. Cytological aberrations are described.

12377

EVIDENCE FOR THE CELLULAR HYPOTHESIS IN RADIATION PROTECTION BY BONE MARROW CELLS. O. Vos, J. A. G. Davids, W. W. Weyzen and D. W. vanBekum. *Acta Physiol. et Pharmacol. Neerl.* 4, 482-486(1956).

12378

ENHANCED PRODUCTION OF ANTIBODIES BY LOCAL IRRADIATION. I. MEASUREMENT OF CIRCULATING ANTIBODIES. J. B. Graham, R. M. Graham, L. Neri and K. A. Wright. *J. Immunol.* 76, 103-109(1956).

Sheep erythrocytes were injected into the dermis of the lateral aspect of the proximal thigh of rabbits and the area was then irradiated with 1000 r, 30 minutes and again 1 week after antigen injection. This resulted in an elevated serum hemolysin response.

12379

CELL DIVISION AND NUCLEIC ACID SYNTHESIS IN THE REGENERATING LIVER OF THE RAT. D. B. Cater, B. E. Holmes and L. K. Mee. *Acta Radiol.* 46, 655-667(1956).

12380

EFFECTS OF X-RAYS ON *ACETABULARIA MEDITERRANEA*. Z. M. Bacq, F. Vanderhaeghe, I. Damblon, M. Ervare, and A. Herve. *Exptl. Cell. Res.* 12, 639-648(1957). (In French).

Survival of anucleate fragments of *A. mediterranea* is decreased below that of nucleate fragments following x-irradiation. Upon x-irradiation of the whole cell, cytoplasm furthest from the nucleus dies earliest and in a higher percentage of cases than that surrounding the nucleus, but the mortality rate of cells and fragments is not proportional to total dose. Growth and morphogenesis of surviving irradiated algae at all doses are equal to or better than in controls. Data on survival for as long as 20 days after 10^5 or 10^4 r are presented for stems, roots and anucleate fragments, also data on effect of partial shielding on survival following irradiation.

12381

INACTIVATION OF BACTERIA BY DECAY OF INCORPORATED RADIOACTIVE PHOSPHORUS. C. R. Faerst and G. S. Stent. *J. Gen. Physiol.* 40, 73-90(1956).

A thymineless strain of *E. coli*, differentially labelled with P-32 will not grow if the specific activity of the media is very high. Growth inhibition is due to P-32 disintegrations within the bacterial DNA. Thymine deprivation and P-32

effects appear to inactivate bacteria by a similar mechanism and their effects are additive. Growth characteristics of subcultures of thymineless and P-32 labeled cells are also described and discussed.

12382

HETEROPLASTIC TISSUE GRAFTING EFFECTED THROUGH ROENTGEN-RAY LYMPHOID DESTRUCTION.

J. B. Murphy. *J. Am. Med. Assoc.* 62, 1459(1914).

"Removal of the lymphoid barrier" by means of x-irradiation is shown to permit growth of heterologous tissues in rats, as predicted by the author on the basis of his earlier studies which showed that the lymphoid-deficient chick embryo accepts heterologous grafts but becomes resistant in the adult stage if supplied with a graft of adult chicken spleen or marrow.

12383

RADIOSENSITIVITY OF SALT UPTAKE IN PLANTS.

D. A. Barber, G. J. Neary and R. S. Russell. *Nature* 180, 556-557(1957).

12384

THE PROPERTIES OF X-RAY INACTIVATED BACTERIOPHAGE. II. INACTIVATION BY INDIRECT EFFECTS.

J. D. Watson. *J. Bacteriol.* 63, 473-485(1952).

BA 26-28583

12385

ACTION OF X-RAYS ON LIVING TISSUES *IN VITRO*. III. SUCCESSIVELY APPEARING MORPHOLOGICAL CHANGES IN X-IRRADIATED CULTURES. R. I. Gassoul. *Ann. Roentgenol. et Radiol. Leningrad* 2, 341-356(1926). (In French).

12386

IS IT POSSIBLE TO MODIFY THE RADIOSENSITIVITY OF VARIOUS CELLS? G. E. Meldolesi. *Arch. Radiol.* 29, 291-96(1954).

The metabolic state of individual cells influences their radiosensitivity. Emergence of a population of radioresistant cells from an irradiated population of cells of the same type but varying in radiosensitivity represents loss of the radiosensitive cells, not transformation.

12387

SYNTHESIS OF DEOXYRIBONUCLEIC ACID IN NORMAL AND IRRADIATED CELLS AND ITS REACTION TO CHROMOSOME BREAKAGE. A. Howard and S. R. Pelc. *Heredity, Suppl.* 6, 216(1953).

V. faba roots received neutron doses of 1.1, 2.4, or 4.9×10^3 ergs/gm. and the number of cells synthesizing DNA thereafter was determined by autoradiography of squash preparations after incubation in nutrient containing P-32 as NaH_2PO_4 . The number of cells in DNA synthesis 12 hours after irradiation was not dose-dependent. Division delay was, however, related to dose and the relation is discussed with respect to chromosome reproduction and times of maximum vulnerability of chromosomes to injury by x-rays and other agents.

12388

STUDIES ON THE MECHANISM OF PROTECTION AGAINST IONISING RADIATION BY COMPOUNDS OF THE CYSTEAMINE-CYSTEINE GROUP. A. Pihl and L. Eldjarn. p.147 of *PROGRESS IN RADIOBIOLOGY*. Springfield, Ill., C. C. Thomas Co. 1957.

The authors present data on the kinetics of thiol disulfide interactions, based on studies using S^{35} labeled cystamine, cysteamine and N, N'-diacetylcystamine with glutathione, cysteine, bovine serum albumin and a commercial preparation of cytochrome C. The compounds were incubated in oxygen-free phosphate buffer and reactions stopped by rapid acidification. Amounts of mixed disulfides in reaction products were measured by scanning paper chromatograms. The results are presented as (1) interactions of disulfides with biological thiols, (2) inter-

action of thiols with biological disulfides, (3) interaction of thiols with aldehydes and ketones. It is shown that when protective agents of the cysteamine-cysteine group are administered to animals, the compounds exist to a considerable extent as mixed disulfides (with tissue constituents). Qualitatively there is a correlation between the ability of various compounds to form mixed disulfides and their protective effectiveness.

12389

RADIATION CATARACT. A. Pirie. p.18 of PROGRESS IN RADIOBIOLOGY. Springfield, Ill., C. C. Thomas Co. 1956.

A review of the author's studies on experimentally produced cataract in rabbit eyes. Findings support observations of other investigators showing that the lens of the young animal is far more susceptible than that of older animal and secondly that the effect depends on the particular area of the lens irradiated. Only when the dividing cells are injured does cataract result (when they form defective lens fibres later). Glutathione decreases before cataract is present clinically. Possibly high energy PO_4 bonds also decrease early. Other enzymes decrease later. The GSH changes may be related to depressed protein synthesis and growth in irradiated lens, and to decreased RNA and DNA synthesis.

12390

BIBLIOGRAPHY OF X-RAY LITERATURE AND RESEARCH, 1896-97. Charles E. S. Phillips. ("The Electrician" Printing and Publishing Co., Ltd., London).

Such a work as this has become almost a necessity. The vast and scattered literature of the x-ray was already beyond the ken of even its most industrious student. (From a review in Archiv. Roentgen Ray 2, 33(1897-98)).

12391

THE BIOLOGICAL EFFECT OF X AND γ RAYS. Paul Reiss. Chez Vigot, France (1935).

12392

RELATIONSHIP OF THE CILIARY BODY TO RADIATION CATARACTS. I. Puntenney and D. Schoch. Trans. Am. Ophthalmol. Soc. 51, 285-300(1953).

The authors investigated the role of the ciliary body in radiation-induced cataracts. The ciliary body was found to be necessary for cataract production. Partial shielding of lens prevents formation of complete cataract even after 12,000 r.

12393

EFFECTS OF LARGE OXYGEN PRESSURES ON THE X-RAY SENSITIVITY OF THE BROAD BEAN ROOT. J. Read. Brit. J. Applied Phys. 2, 331(1951)

12394

PROLONGATION OF THE CLOTTING TIME OF PERITONEAL FLUID AFTER X-IRRADIATION. E. S. Smith and Y. S. Lewis. p.73 of PROGRESS IN RADIOBIOLOGY. G. C. deHevesy, A. G. Forssberg, and J. B. Abbatt, eds. Springfield, Ill., C. C. Thomas Co. 1957.

A clotting defect observed in peritoneal fluid of x-irradiated rats and hamsters appeared to be due to increased amounts of a heparin-like substance and could be corrected by adding protamine to the fluid. The impaired clotting coincided in time with the period of widespread disruption of mast cells in the serous membrane of the peritoneal cavity.

12395

RADIATION CHEMISTRY OF ORGANIC COMPOUNDS IN AQUEOUS SOLUTION. J. H. Baxendale and D. H. Smithies. Z. Physik. Chem. (Neue Folge) 7, 242(1956). (In German)

The authors studied the kinetics of oxidation of formic acid by x-rays in aqueous solution containing Cu^{++} and/or Fe^{+++} . Results of the studies are presented and analysed.

12396

FORMATION OF LABILE PHOSPHATE FROM SOME ORGANIC PHOSPHATE ESTERS BY IRRADIATION WITH X-RAYS IN AQUEOUS SOLUTION. G. Scholes and J. Wiess. p.93 of PROGRESS IN RADIOBIOLOGY. Springfield, Ill., C. C. Thomas Co. 1956.

The authors studied the formation of labile phosphate from irradiated aqueous solutions of monoethyl phosphate, 1- and 2- glycerophosphates, ribonucleotides and nucleic acids. The post-irradiation release of phosphate in RNA ("after-effect") is discussed. A true "after-effect" occurs in DNA only if molecular oxygen is present during irradiation.

12397

CHANGES IN BLOOD GLUCOSE LEVELS WHEN ADRENALS ARE IRRADIATED. Q. Vischia. Riv. de Rad. e Fisica Medica, 71(1930) Jan. (In French)

Hyperglycemia that occurs in rabbits immediately after irradiation of the adrenals is felt to be due to an effect of the irradiated adrenal on the vegetative nervous system.

12398

GENETIC VARIATION IN THE ACUTE LETHAL RESPONSE OF FOUR INBRED MOUSE STRAINS TO WHOLE BODY X-IRRADIATION. D. Grahn and K. R. Hamilton. Genetics 42, 189(1957).

12399

THE INFLUENCE OF THE EXPOSURE TO X-RAYS UPON THE FORMATION OF ANTIBODIES. J. P. Simonds and H. M. Jones. J. Med. Research 33, 183-196(1915).

Single large doses of killed typhoid bacilli were administered intraperitoneally to rabbits after the termination of a 3-week course of daily 10-15 min. x-ray exposures. Production of agglutinins, opsonins and bacteriolysins by these rabbits was compared with production by control rabbits and by benzol-treated rabbits receiving identical doses of killed typhoid bacilli. Only agglutinin production was affected by x-irradiation, and benzol caused a greater depression than did x-rays.

12400

THYROID CANCER AFTER IRRADIATION IN CHILDHOOD. p. 146. Proc. of Internat. Conf. on Peaceful Uses of Atomic Energy held in Geneva, Aug. 8-20, 1955. Vol. 11, Biological Effects of Radiation. New York, United Nations, 1956.

12401

THE EFFECT OF WHOLE BODY X-IRRADIATION ON THE MEGAKARYOCYTIC SYSTEM IN RAT FEMUR. B. Lindell and J. Zajicek. p. 376. "Advances in Radiobiology." (Proc. of Fifth Conf. on Radiobiology, Stockholm, 1956). C. C. Thomas Co., Springfield, Ill. Publishers (1956).

The total number of megakaryocytes in the femur of the rat was determined before and after total body exposure to 100 to 600 r of x-rays. Using a microdiver method for quantitative determination of cholinesterase activity in single cells, the authors demonstrate that the synthesis of this enzyme is not impaired in cells developing within 48 hours after a dose of 600 r.

12402

PHYSICAL PRINCIPLES UNDERLYING PHOTOCHEMICAL, RADIATION-CHEMICAL AND RADIOBIOLOGICAL REACTIONS. James Franck and Robert Platzman. p.191-253 of RADIATION BIOLOGY, VOL. 1. Alexander Hollaender, ed. New York. McGraw-Hill Book Co., Inc. 1954.

12403

BASIC RADIATION BIOCHEMISTRY. Walter M. Dale. p.255-281 of RADIATION BIOLOGY, VOL. 1. Alexander Hollaender, ed. New York. McGraw-Hill Book Co., Inc. 1954.

12404

THE RADIOBIOLOGICAL IMPORTANCE OF LINEAR ENERGY TRANSFER. Raymond E. Zirkle. p.315-350 of RADIATION BIOLOGY, VOL. 1. Alexander Hollaender, ed. New York. McGraw-Hill Book Co., Inc. 1954.

12405

THE NATURE OF THE GENETIC EFFECTS PRODUCED BY RADIATION. H. J. Muller. p.351-473 of RADIATION BIOLOGY, VOL. 1. Alexander Hollaender, ed. New York. McGraw-Hill Book Co., Inc. 1954.

12406

THE MANNER OF PRODUCTION OF MUTATIONS BY RADIATION. H. J. Muller. p.475-626 of RADIATION BIOLOGY, VOL. 1. Alexander Hollaender, ed. New York. McGraw-Hill Book Co., Inc. 1954.

12407

LABORATORY STUDIES AND CLINICAL TRIALS OF SOME CHEMICAL RADIO-SENSITIZERS. J. S. Mitchell p. 170. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press, Inc. 1955.

The author reviews his studies aimed at finding chemical agents that act as radiosensitizers for possible use in cancer chemotherapy. Basic compound is tetra Na 2 methyl - 1:4 naphthoquinone diphosphate (Synkavite). Related quinone compounds are also under study. Mitotic inhibition cytological effects and radiosensitization generally are studied in tissue cultures of chick fibroblasts. Low acute and chronic toxicity of Synkavite have been demonstrated for rats, mice and rabbits. Therapeutic trials in a large series of Walker rat carcinoma animals are described and clinical trials in progress are also described briefly.

12408

AUGMENTATION OF HEMOGLOBIN SYNTHESIS BY RETICULOCYTES IN VITRO AFTER IRRADIATION. A. Nizet and A. Herve. p. 194. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug. - Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press, Inc., 1955. (In French).

Data relative to incorporation of C¹⁴ labeled amino acids (glycine and phenylalanine) by reticulocytes in vitro from whole body x-irradiated dogs (dose: 500 r) and by reticulocytes irradiated in vitro (1500 r, 20,000 r or 100,000 r) are presented.

12409

PHOSPHORYLATING ACTIVITY OF MITOCHONDRIA AFTER TOTAL BODY IRRADIATION. D. W. van Bekkum. p. 201. "Radiobiology Symposium - 1954." (Proc. of Sym held at Liege Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press Inc., 1955.

Mitochondria of rat spleen tissue or thymus 4 hrs or less after total body irradiation demonstrate greater depression of O₂ uptake than of phosphorylation. The minimal effective dose was 50 and 100 r for spleen and thymus respectively. Liver mitochondria were unaffected by a dose as high as 5000 r to the liver only. Spleen mitochondria were unaffected after in vitro spleen irradiation with 20,000 r. Possible role of ATPase as a mediator of the radiation effect is considered but the lesion is judged to be related to primary radiation injury.

12410

EFFECT OF SINGLE DOSE OF X-RAYS ON ACID SOLUBLE PHOSPHORUS FRACTIONS AND ON RESPIRATION OF THE SKIN OF THE RAT. P. Mandel, Ch. Gros and J. Rodesch. p. 210. "Radiobiology Symposium - 1954." (Proc. at Liege Aug.-Sept. 1954). Z. M. Bacq and P.

Alexander, Editors. New York Academic Press, Inc., 1955. (In French).

Wistar rats received total body exposure to 700 r, and at various times after irradiation, skin specimens were studied in vitro.

12411

DNA SYNTHESIS IN BONE MARROW STUDIED BY AUTORADIOGRAPHY. L. G. Lajtha, R. Oliver and F. Ellis. p. 216. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press, Inc., 1955.

Human bone marrow cell suspensions were studied in an in vitro system using P³² or C¹⁴ labeled precursors to evaluate synthetic processes. Radiation doses of 5000 r in vitro markedly inhibited DNA synthesis, results indicating that cells in the period of DNA synthesis are immediately and completely prevented from synthesizing DNA. Results with x-ray were contrasted with those after treatment with aminopterin.

12412

THE INHIBITION OF DNA SYNTHESIS BY IRRADIATION WITH SPECIAL REFERENCE TO IRRADIATION IN THE EARLY STAGES OF LIVER REGENERATION. Barbara E. Holmes and L. K. Mee. p. 220. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press, Inc., 1955.

Rate of DNA synthesis and mitotic index were studied in regenerating rat liver (after partial hepatectomy) following x-ray doses of 150 to 2200 r.

12413

INCORPORATION OF C¹⁴ INTO LIVER GLYCOGEN AFTER IRRADIATION. M. Louran-Pitres. p. 225. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press, Inc., 1955.

Mice received a lethal x-ray dose (total body, 2000-2500 r) and studies were carried out within 24 hours after exposure, using C¹⁴ labeled glucose as a glycogen precursor.

12414

OBSERVATIONS MADE ON THE HUMAN RESPONSE TO A SINGLE DOSE OF X-RAYS - THE LATENT PERIOD. W. M. Court-Brown and J. D. Abbott. p. 229. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press, Inc., 1955.

Authors present data on the length of the latent period prior to the onset of "radiation sickness" following single carefully measured doses of radiation (therapeutic) to various body regions of patients. Influence of body size and relationship between length of latent period and duration of acute symptoms suggest that symptoms are related to some circulating compound. Also supporting this is the longer latent period in patients with congestive failure.

12415

A NEW HYPOTHESIS FOR "CHROMATID" CHANGES. S. H. Revell. p. 243. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press, Inc. 1955.

Author reviews critically the previously proposed explanations for chromatid changes induced in V. faba root tip cells by irradiation and chemicals, and suggests an explanation for the aberrations that characteristically occur in cells about to undergo mitosis (exchange hypothesis for chromatid changes).

12416

EFFECT OF OXYGEN TENSION ON THE PRODUCTION OF CHROMOSOME BREAKAGE BY IONIZING RADIATIONS:

AN INTERPRETATION. C. P. Swanson. p. 254. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press Inc., 1955.

Chromosome breaks were counted in Tradescantia microspores after exposure to 50 Kvp, 100 Kvp, 250 Kvp x-rays or 1.1-3 MeV γ rays in (1) air, (2) N_2 , or (3) various mixtures of air/ N_2 .

12417

CHROMOSOME BREAKAGE BY DIEPOXIDE AND BY X-RAYS. G. Roy Lane. p. 265. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Eds. New York, Academic Press Inc., 1955.

Tradescantia roots in culture were exposed to an x-ray dose of 50r-100 r and fixed 6 hrs. - 4 days after exposure or treated with M/2000 diepoxide for 10, 20, 30 or 40 min. and fixed at intervals from 12-78 hours after treatment.

12418

STUDIES ON THE EXPERIMENTAL CONTROL OF THE MUTATION PROCESS. Ake Gustafsson. p. 282. "Radiobiology Symposium - 1954." (Proc. held at Liege, August - September 1954). Z. M. Bacq and P. Alexander, Eds. New York, Academic Press Inc., 1955.

Dormant or germinating seeds and pollen grains received single exposure to x-rays of varying hardness, fast and thermal neutrons, α rays or fission fragments. Living plants were irradiated over all or part of the vegetation period. This report is concerned with mutation process, the author pointing out that the problem of directed mutation is nearing solution in plants such as those included in the work presented.

12419

THE INFLUENCE OF POST-RADIATION FACTORS ON EFFECTS PRODUCED IN BARLEY. L. Ehrenberg. p. 285. "Radiobiology Symposium - 1954." (Proc. held at Liege, August - September 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press Inc., 1955.

Dormant barley seeds or seeds irradiated after the onset of germination were x-irradiated with one of several doses. The water content of seeds greatly influences radiosensitivity to sparsely ionizing rays (x-ray) but not to densely ionizing radiation, e.g. fast neutrons. Effect of germination temperature and of storage after irradiation were also evaluated.

12420

PATHOLOGY OF MICE IRRADIATED AFTER INJECTION OF CYSTEAMINE (β -MERCAPTOETHYLAMINE). M. A. Gerebtzoff and Z. M. Bacq. p. 290. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press Inc., 1955.

Mice of C_{57} strain received a 700 r total body x-ray dose with or without injection of 3 mg of cysteamine just before exposure. Histological findings in spleen, thymus, intestine and liver of the animals are described briefly. Cysteamine is believed to exert its effect on some factors concerned with glycogen metabolism.

12421

SOME FACTORS CONTROLLING THE HAEMATOPOIETIC REGENERATION IN WHOLE BODY IRRADIATED RATS. E. H. Betz. p. 292. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept. 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press Inc., 1955.

The author proposes that substances stimulating the anabolism of proteins are active in stimulating hematopoietic regeneration of rats exposed to single large whole-body x-ray doses. Adrenal hormones, growth hormone,

testosterone propionate and vitamin B_{12} tend to antagonize the anabolic effect.

12422

THE EFFECT OF CYSTEAMINE ON GRAFTED TUMORS IRRADIATED *IN LOCO*. S. Neukomm, Mme. L. Peguiron and A. Herve. p. 298. "Radiobiology Symposium - 1954." (Proceedings held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press Inc., 1955. (In French).

Mice bearing a subcutaneously grafted mammary adenocarcinoma received local contact radiation therapy to the tumor and some animals received the protective agent intraperitoneally either before or after irradiation. Doses of x-ray were 1500 or 3000 r. Cysteamine proved protective for the tumor against x-ray doses, best effects being observed when the agent was given 1-2 hours before irradiation.

12423

HISTOLOGICAL STUDY OF INTESTINAL REPAIR PROCESSES IN RATS IRRADIATED UNDER DIVERSE "PROTECTIVE" CONDITIONS. H. Maisin and C. Fievez. p. 304. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press Inc., 1955. (In French).

Rats were exposed to 700 r (total body) of x-rays with (1) no protection, (2) with lower abdominal lead shield or (3) after intraperitoneal injection of 7.5 mg of becapant per 100 g. body weight. Histological studies were done on animals sacrificed during the first 10 post exposure days.

12424

CYTOLOGICAL EFFECTS OF CHRONIC GAMMA IRRADIATION AND THE PROTECTIVE PROPERTY OF CERTAIN CHEMICALS AGAINST THE RADIATION INDUCED CHROMOSOME ABERRATIONS. Knut Mikaelson. p. 316. "Radiobiology Symposium-1954." (Proceedings held at Liege, Aug.-Sept. 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press Inc., 1955.

The author studied cuttings of Tradescantia in nutrient solution at time when they showed good primary roots. In one experiment plants received 12.5, 25, 50 or 100 r per dose. In a second experiment the same dose rates were applied during a 48 hour exposure (2x dose used in first experiment). Observed: chromosome aberrations and effect of various protective agents in nutrient solution.

12425

THE EFFECT OF RADIATION ON FROZEN TUMOR CELLS. Ilse Lasnitzki. p. 321. "Radiobiology Symposium - 1954." (Proceedings held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press Inc., 1955.

Ehrlich ascites tumor was frozen and stored at -79° for 7 days prior to exposure in vitro to 1500 r of x-rays at 75 r/min. or to the same dose of γ rays prior to freezing. Growth after grafting was evaluated in terms of the mitotic index of the transplant and volume of tumor mass.

12426

MECHANISMS OF MUTATION PRODUCTION IN MICRO-ORGANISMS. Howard B. Newcombe. p. 326. "Radiobiology Symposium 1954." (Proceedings held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press, Inc., 1955.

Induced mutations affecting colony morphology and color were studied in *Streptomyces* exposed one or more times to 8000 r. Results are interpreted in light of previous studies with U-V.

12427

THE EFFECT OF LARGE DOSES OF METHYL-BIS (2-

CHLOROETHYL) AMINE ON THE OVARY OF THE ADULT RABBIT WITH OR WITHOUT PRIOR TREATMENT WITH BETAMERCAPTOETHYLAMINE. Paul Desai. p. 340. "Radiobiology Symposium - 1954." (Proceedings held at Liege, Aug.-Sept. 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press Inc., 1955. (In French).

The toxicity of HN_2 on the ovary was studied histologically with particular attention to its radiomimetic effect.

12428
HISTOLOGICAL CHANGES IN MAN AND RABBITS AFTER PARENTERAL THORIUM ADMINISTRATION. Charles Johansen. p. 358. "Radiobiology Symposium - 1954." (Proceedings held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press, Inc., 1955.

A series of 250 patients who had received colloidal thorium dioxide (0.5-5 μg radium-equivalent) suspension intravenously as a contrast medium is reviewed. Four patients died of blood diseases. There appeared to be no increase in non-hematopoietic tumors. Observation periods ranged from 3-16 years after injection.

12429
SOME ASPECTS OF RADIATION CHEMISTRY WHICH ARE RELEVANT TO SOME RADIOBIOLOGICAL PROBLEMS. F. S. Dainton. p. 19. "Advances in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology in Cambridge, 14-17 August, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. Publishers 1956.

12430
THE EFFECT OF X-RADIATION ON METABOLISM AND ON ENZYMES. H. Pauly and B. Rajewsky. p. 32. "Advances in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology, Cambridge, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. Charles C. Thomas Co., Springfield, Ill., U.S. 1956.

12431
COMPARISON OF THE INACTIVATION OF THE ESTERASE AND PROTEASE ACTIVITIES OF α -CHYMOTRYPSIN SOLUTION WITH X-RAYS. D. Aronson, Lorna Mee and C. L. Smith. p. 61. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., 1956.

12432
THE EFFECT OF OXYGEN IN THE PRODUCTION OF CHROMOSOME ABERRATIONS BY CHEMICALS AND X-RAYS. B. A. Kihlman. p. 336. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. 1956.

The author compared the effectiveness of x-rays, 8-ethoxycaffeine and nitrogen mustard in producing chromosome aberration in *V. faba* root tip cells. The cytochrome oxidase inhibitor, sodium azide, was tested in one series of experiments. Production of aberrations by N mustard is independent of oxygen tension during exposure, in contrast to the marked oxygen effect when cells are exposed to EOC and x-rays. In contrast to x-rays, EOC has almost no effect in the absence of oxygen or in presence of cytochrome oxidase inhibitor.

12433
THE EFFECT OF ANOXIA ON THE RATES OF X-RAY-INDUCED MUTATIONS IN *DROSOPHILA MELANOGASTER*. K. G. Luning. p. 350. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes

and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. 1956.

Muller -5 male *Drosophila* 0-1 or 3-4 days old were irradiated with 3,240 r x-ray dose in air or in a nitrogen atmosphere and mated to normal females. The F_1 offspring were analyzed for yellow mutations and hyperploid males. Groups of F_1 females were tested for recessive lethals.

12434
THE DEPENDENCE OF THE OXYGEN EFFECT ON THE INTENSITY OF GAMMA IRRADIATION IN *VICIA FABA*. G. J. Neary. p. 355. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. 1956.

12435
DEVELOPMENT OF A RADIO-RESISTANT STRAIN OF EHRLICH CARCINOMA IN MICE. W. Dittrich, G. Hohne and G. Schubert. p. 381. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. 1956.

Ehrlich carcinoma cells were transplanted into each hind leg of mice and allowed to grow for 10 days. One of the implants was then irradiated and cells from both irradiated and shielded tumors were transplanted in the same fashion to the hind legs of another mouse. This was repeatedly done, irradiating always the same tumor. Increased radioresistance and glycolytic activity were observed in the serially irradiated tumors and may represent selection of resistant cells.

12436
EFFECTS OF IONISING RADIATIONS ON THE GROWTH OF THE MAMMALIAN REPAIR BLASTEMA (IN VIVO) STUDIES IN SANDISON-CLARK EAR CHAMBERS. H. A. S. van den Brenk. p. 386. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. 1956.

12437
STUDIES ON DIFFUSIBLE FACTORS IN IRRADIATED SKIN WITH GRAFTING EXPERIMENTS. B. Jolles and S. G. Greening. p. 410. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. 1956.

A dose of 1,200, 2,500 or 3,000 r was delivered to a 3 cm diameter area of the clipped skin on the flank of rabbits. Small grafts were taken from the center of the area and placed on normal (non-irradiated) graft site nearby. Normal skin was grafted to the center of the irradiated area. Other grafts of normal skin to normal skin areas on the animals flanks served as controls. Observations on normal grafts in the irradiated area support the idea of a centripetal diffusion of factors from the irradiated tissue.

12438
THE EFFECTS OF WHOLE BODY IRRADIATION ON THE MELANOPHORES OF THE COMMON FROG (*RANA TEMPORARIA*). Margaret Ashton. p. 419. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. 1956.

12439
PRELIMINARY REPORT ON LESIONS IN THE SKELETON OF YOUNG RABBITS FOLLOWING A SINGLE INTRAVENOUS

INJECTION OF Sr^{90} (500-1,000 $\mu\text{c/kg.}$) J. Vaughan and J. Jowsey. p. 429. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. 1956.

Observations include abnormal growth patterns and tumor formation.

12440

DEVELOPMENT OF TUMOURS IN ANIMALS UNDER THE INFLUENCE OF PENETRATING RADIATION M. N. Pobedinsky. p. 433. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. 1956.

Abnormalities observed in rats injected with various doses of Sr^{90} include bone necrosis, fibrosis of marrow, atypical proliferation of marrow, dystrophic and proliferative changes in epiphyseal cartilage.

12441

EXPERIMENTAL STUDY OF THE EFFECT OF LOCAL IRRADIATION ON BONE GROWTH. H. A. Sissons. p. 436. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. 1956.

Young male rats received 0, 400, 800, 1200 or 1600 r of x-rays to the growing region of the upper end of the right tibia. Bone growth was measured radiographically over a period of about 100 days. Some animals were killed for histological studies.

12442

THE USE OF THE GROWING MOUSE TAIL AS A TEST OBJECT IN RADIOBIOLOGY. E. A. Wright and P. Howard-Flanders. p. 449. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas, Springfield, Ill., U.S. 1956.

Tails of 7 day old mice were irradiated and growth during the ensuing 3 weeks was measured. The entire tail or the midportion only was irradiated to evaluate possible effects of injury to proximal blood vessels on growth of tail distal to them. The effect of oxygen tension was evaluated by having mice breathe gas mixtures with various partial pressures of oxygen. Irradiation was either 190 KV x-rays or fast neutrons.

12443

PRODUCTION OF CANCERS IN RATS BY THE LOCAL APPLICATION OF β -RAYS AND OF CHEMICAL CARCINOGENS. J. W. Boag and A. Glucksmann. p. 476. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. 1956.

Circumscribed areas of skin of black-hooded rats were irradiated with β rays from a Van de Graff generator, or treated with a weak or a potent chemical carcinogen, or both irradiated and treated with a carcinogen. Effects of irradiating multiple and single fields were compared. A non-carcinogenic dose of β rays was carcinogenic if 1:2 dibenzanthracene (itself not producing tumors) was applied.

12444

RESPONSE OF HUMAN BEINGS ACCIDENTALLY EXPOSED TO SIGNIFICANT FALL-OUT RADIATION (SUMMARY). R. A. Conrad. p. 491. "Progress in Radiobiology." (Proc.

of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. Publishers, 1956.

The author summarizes blood count and skin changes in Marshallese islanders exposed to fall-out radiation following detonation of a thermonuclear device. (Observations during the year following exposure.)

12445

ACUTE LEUKEMIA AND OCCUPATIONAL RADIUM AND RADON EXPOSURE. J. D. Abbatt. p. 494. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. Publishers 1956.

Clinical, hematological and post mortem findings on a 74 year old man with a 35+ year history of relatively high level occupational radiation exposure are presented briefly. Death was due to acute myeloid leukemia. Estimates of internally deposited radium are given.

12446

SOME OBSERVATIONS ON THE OCCURRENCE OF LEUKEMIA IN AN IRRADIATED HUMAN POPULATION. W. M. Court Brown. p. 501. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. Publishers 1956.

12447

EFFECTS OF X-RAY IRRADIATION ON IRON METABOLISM IN HUMAN BONE MARROW. H. D. Suit, L. G. Laytha, F. Ellis and R. Oliver. p. 506. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. Publishers 1956.

Uptake of Fe^{59} *in vitro* by nucleated red cells of marrow was not affected by 300-5000 r *in vitro* x-ray dose or by 1000 r locally to the manubrium sternum just prior to marrow aspiration or by 100 r total body irradiation 1-4 days before obtaining marrow. Tracer studies *in vivo* indicated that 25-50 r total body irradiation 24 hrs. before giving Fe^{59} did not delay appearance of the tracer in peripheral blood rbc, nor did 100 r total body dose if tracer was given 2 hrs. after irradiation. If given 24-72 hrs. post exposure, appearance of Fe^{59} in peripheral blood rbc's was delayed.

12448

PERIPHERAL BLOOD CHANGES FOLLOWING INTERNAL CONTAMINATION WITH RADIOACTIVE MATERIAL (COLLOIDAL THORIUM DIOXIDE). O. G. Backer. p. 519. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. Publishers 1956.

A group of 222 patients who had received colloidal thorium dioxide for cerebral arteriography was compared with (1) patients with similar clinical conditions and medications but no angiography and (2) normal persons, with respect to peripheral blood picture.

12449

NEW COMPARATIVE DATA ON THE NORMAL RADIUM CONTENT OF THE HUMAN BODY. H. Muth, A. Schraub and K. Aurand. p. 525. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. Publishers 1956.

Radium content of cremation ashes was measured for 10 human bodies. Results and implications of such studies are discussed briefly.

12450

INDUCTION OF DIFFERENTIATION IN CANCER CELLS WITH COBALT⁶⁰. S. Mitra and P. K. De. p.539. "Progress in Radiobiology." (Proc. of Fourth Internat. Conf. on Radiobiology held in Cambridge, Aug. 14-17, 1955). J. S. Mitchell, B. E. Holmes and C. L. Smith, Editors. C. C. Thomas Co., Springfield, Ill., U.S. Publishers 1956.

Histopathological studies were done on tissues from the growing edges of epidermoid carcinoma from 54 patients before and after 7000 γ r from Co⁶⁰, from 19 patients after 14000 γ r and from 10 patients after 21,000 γ r. Tissues were collected 7 days after 7000 γ r, 21 days after the second 7000 γ r and 3 months after the third. Results are considered in light of similar studies on patients treated with radium.

12451

THE PROTECTIVE ACTION OF PHENOLIC DERIVATIVES IN THE LETHALLY IRRADIATED MOUSE. A. Lacassagne, J. F. Duplan and N. P. Buu-Hoff. p.64. "Radiobiology Symposium - 1954." (Proceedings held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Eds. New York, Academic Press, Inc., 1955. (In French).

12452

INFLUENCE OF OXYGEN ON DAMAGE TO MICRO-ORGANISMS BY IONIZING IRRADIATION. H. Laser. p.68. "Radiobiology Symposium - 1954." (Proceedings held in Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Eds. New York, Academic Press, Inc., 1955.

Studies with bacteria and yeast exposed to several doses of x-rays demonstrate changes in O₂ uptake and CO₂ production, anaerobic and aerobic fermentation or acid production and utilization of H₂, and changes in growth rate. All growing cells showed an "O₂ effect" on irradiation. Respiratory inhibitors tended to abolish the oxygen effect.

12453

THE ACTION OF IONIZING RADIATION ON ENZYMES AND VIRUSES. Ernest Pollard. p.70. "Radiobiology Symposium - 1954." (Proceedings held at Liege Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Eds. New York, Academic Press, Inc., 1955.

The author presents a brief review of studies with enzymes, bacteria and viruses using high energy particles to produce effects in the biological systems.

12454

RADIOACTIVITY IN TERRESTRIAL ANIMALS NEAR AN ATOMIC ENERGY SITE. W. C. Hanson and H. A. Kornberg. p.385-88 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

The authors present results of extensive analyses of terrestrial animals and waterfowl near Hanford Works. The environmental radioactive contaminants came from various reactors (radioactive byproducts) including river water used to cool the reactors. Amounts of P³² in various adult and young birds, their food, and the ratio of amounts in the birds relative to the amount in their foods are presented in tabular form. Transfer of radioactive contaminants from the environment to animals and selective concentration of some contaminants by animal tissues are discussed briefly and illustrated with data from the extensive studies. The authors emphasize the potential hazard implicit in the transfer of released radioactive wastes among various forms of terrestrial life.

12455

ON THE DISTRIBUTION OF RADIOACTIVITY IN THE

NORTH PACIFIC OCEAN IN 1954-1955. Yasuo Miyake. p.381-84 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

Radioactivity of the sea in the area around Bikini Atoll was measured several times during the year following a hydrogen-bomb test. Vertical and horizontal distribution of radioactivity is presented in charts showing relationship of radioactivity to the ocean currents.

12456

NUCLEAR SCIENCE AND OCEANOGRAPHY R. Revelle, T. R. Folsom, E. D. Goldberg and J. D. Isaacs. p.371-380 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

12457

BIOLOGICAL CYCLE OF FISSION PRODUCTS CONSIDERED FROM VIEWPOINT OF CONTAMINATION OF MARINE ORGANISMS. Yoshio Hiyama. p.368-70 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

The amounts and distributions of radioactive fission products in the bodies of fish and various other forms of marine life taken from parts of the ocean contaminated by fallout from a hydrogen bomb test were determined in order to study the biological cycle of fission products.

12458

THE ACCUMULATION OF RADIOACTIVE SUBSTANCES IN AQUATIC FORMS. R. F. Foster and J. J. Davis. p.364-367 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

The paper explains how aquatic forms become radioactive and describes conditions found in the Columbia River below the Hanford Reactors

12459

BIOLOGICAL CYCLES OF FISSION PRODUCTS IN AGRICULTURE IN JAPAN. R. Sasaki. p.357-59 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

The author summarizes results of extensive surveys on radioactive contamination and its effects on rainwater, soil, cereals, vegetables, tea, fruits, silkworms, farm animals and their products

12460

THE BEHAVIOUR OF I¹³¹, Sr⁸⁹ AND Sr⁹⁰ IN CERTAIN AGRICULTURAL FOOD CHAINS. A. C. Chamberlain, J. F. Loutit, R. P. Martin, and R. S. Russell. p.360-363 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

12461

THE RADIOACTIVE SURVEY OF THE AREA SURROUNDING AN ATOMIC ENERGY FACTORY. D. R. R. Fair and A. S. McLean. p.329-32 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

Naturally occurring radioactivity was measured in the area surrounding the Windscale Works in England before radioactive operations commenced. Values for soil, roots and vegetation and for α and β airborne radioactivity are presented.

12462

HEALTH PROTECTION IN CHEMICAL PROCESSING PLANTS. H. M. Parker and J. M. Smith. p.324-28 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

12463

THE DANGERS PRESENTED BY URANIUM IRRADIATED IN NUCLEAR REACTORS. H. Jammet and H. Joffre. p.319-23 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

12464

SAFETY CRITERIA IN ATOMIC ENERGY. F. R. Farmer. p.315-18 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

Major aspects of the control of radiation exposure in atomic energy operations are reviewed and examples of accumulated personnel exposure records are presented to show the feasibility of operating well within permissible exposure limits.

12465

THE CRITICALITY SAFETY OF CHEMICAL PLANT PRODUCING FISSILE MATERIALS. H. A. C. McKay and C. M. Nicholls. p.311-14 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

12466

RADIATION EXPOSURE FROM ENVIRONMENTAL HAZARDS. H. M. Parker. p.305-10 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

The author classifies and discusses briefly the potential radiation hazards beyond the confines of nuclear reactor installations and radiochemical processing plants.

12467

ENVIRONMENTAL ASPECTS OF THE ATOMIC ENERGY INDUSTRY. Arthur E. Gorman. p.298-304 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

The author reviews the problems of disposing of toxic and radioactive waste from atomic industry, and some of the economic considerations related to these problems.

12468

APPROACHES TO TREATMENT OF POISONING BY BOTH RADIOACTIVE AND NONRADIOACTIVE ELEMENTS ENCOUNTERED IN ATOMIC ENERGY OPERATIONS. J. Schubert. p.274-297 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

12469

CONTROL OF RADIATION HAZARDS IN THE OPERATION OF MEDIUM-POWERED EXPERIMENTAL REACTORS.

W. G. Marley and B. S. Smith. p.270-73 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

12470

RADIATION EXPOSURE EXPERIENCE IN A MAJOR ATOMIC ENERGY FACILITY. H. M. Parker. p.266-269 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

12471

HEALTH AND SAFETY ACTIVITIES IN REACTOR OPERATIONS AND CHEMICAL PROCESSING PLANTS. A. J. Cipriani. p.263-65 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

12472

HEALTH PROTECTION OF URANIUM MINERS AND MILLERS. S. E. Miller, D. A. Holaday and H. N. Doyle. p.242-47 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

12473

USE OF RADIOISOTOPES IN STUDIES OF HEALTH HAZARDS IN THE URANIUM MINING INDUSTRY. E. C. Tsvoglou. p.237-41 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

The use of radioisotopes in a series of experiments designed to evaluate health hazards associated with the inhalation of atmospheric mixtures of radon and its daughters is described.

12474

RADIATION DOSAGE TO LUNGS FROM RADON AND ITS DAUGHTER PRODUCTS. W. F. Bale and J. V. Shapiro. p.233-36 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

The authors present a brief review of the problem and summarize results of measurements and estimates of doses received by rats, dogs and humans.

12475

INDUSTRIAL HYGIENE OF URANIUM PROCESSING. M. Eisenbud and J. A. Quigley. p.222-28 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

12476

THE PROBLEM OF RADON IN URANIUM MINES. H. Jammet and J. Pradel. p.219-221 of PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, HELD IN GENEVA, AUG. 8-20, 1955. Vol. 13. New York, United Nations. 1956.

12477

THE PATHOPHYSIOLOGICAL MECHANISM OF DEATH IN LETHALLY X-IRRADIATED RATS. J. Maisin, H. Maisin and A. Dunjic. p.154. "Radiobiology Symposium - 1954." (Proc. held at Liege, August-September, 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press, Inc., 1955. (In French).

The effects of: 1. shielding various regions of the body, 2. injection pre-exposure with mercaptoethylamine and 3. treatment with marrow suspensions on lethality due to the gastrointestinal syndrome were studied in rats.

12478

A SKIN TEST IN RADIOBIOLOGICAL STUDIES. B. Jolles. p. 151. "Radiobiology Symposium - 1954." (Proc. of Sympos. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, editors. New York, Academic Press, Inc., 1955.

12479

EFFECT OF X-RAYS ON THE RESORPTION RATE OF INJECTED $\text{NaH}^{14}\text{CO}_3$ IN MICE. A. Forssberg and G. Hevesy. p. 148. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press, Inc., 1955.

Mice receiving total body exposures to 2000 r show a depression of carbonate resorption immediately after exposure and slower exhalation of CO_2 from injected C^{14} labeled bicarbonate.

12480

THE MODIFICATION OF THE RADIATION RESPONSE BY SHIELDING PROCEDURES. L. F. Lamerton and E. H. Belcher. p. 136. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press, Inc., 1955.

12481

SPLEEN PROTECTION: THE CELLULAR HYPOTHESIS. D. W. H. Barnes and J. F. Loutit. p. 134. "Radiobiology Symposium - 1954." (Proc. at Liege, Aug.-Sept. 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press, Inc., 1955.

Mice were irradiated (whole body) with 950 r and treated with heterologous spleen cells.

12482

OBSERVATIONS ON THE EFFECT OF SPLEEN-SHIELDING AND THE INJECTION OF CELL SUSPENSIONS ON SURVIVAL FOLLOWING IRRADIATION. L. O. Jacobson, E. K. Marks and E. O. Gaston. p. 122. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Editors. New York, Academic Press, Inc., 1955.

12483

RELATIVE BIOLOGICAL EFFICIENCY OF FAST NEUTRONS AND GAMMA RADIATION FOR CHRONIC IRRADIATION OF MICE. R. H. Mole, R. J. Munson and G. J. Neary. p. 104. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Eds. New York, Academic Press, Inc., 1955.

This is a one-paragraph report of studies carried out at Harwell. The biological effects mentioned are: sterilization of male and female mice and reduction of weight of testes.

12484

ACTION OF IONIZING RADIATIONS ON CELL CONSTITUENTS. Maurice Errera. p. 93. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Eds. New York, Academic Press, Inc., 1955.

The author reviews work (by many investigators) designed to study the immediate effects of ionizing radiation on cells and concludes that the only clearly apparent immediate effect is on DNA metabolism.

12485

RADIATION DEATH IN MAMMALS. B. Rajewsky. p. 81. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Eds. New York, Academic Press, Inc., 1955.

The author summarizes a large series of studies designed to indicate the nature of the lethal injury in heavily irradiated mice, guinea pigs, and rats with particular attention to the relative importance of various organ systems. Dosage range: 250-200,000 r.

12486

BACTERIOPHAGE INACTIVATION UNDER VARYING CONDITIONS OF IRRADIATION. Tikvah Alper. p. 39. "Radiobiology Symposium." (Proceedings held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, editors. New York, Academic Press, Inc., 1955.

Studies on the inactivation of a bacteriophage by high dose rate irradiation under various gas treatments are reported. Results suggest that one mechanism by which oxygen may enhance radiation effects is by "storing" radicals which later become available for reaction with sensitive systems.

12487

HYDROGEN PEROXIDE PRODUCTION UNDER VARYING CONDITIONS OF IRRADIATION. M. Ebert. p. 30. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, editors. New York, Academic Press, Inc., 1955.

12488

THE NATURE OF THE PEROXIDE-LIKE SUBSTANCES FORMED IN MICE BY X-RAYS. V. J. Horgan and J. St. L. Philpot. p. 26. "Radiobiology Symposium." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, eds. New York, Academic Press, Inc., 1955.

Butanol extracts of lethally x-irradiated mice oxidize cuprous-catalyzed leuco-brilliant cresyl blue more readily than do extracts of control mice. Mean ionic yield is approximately 80. Authors suggest that the precursors of the oxidizing material in the extracts may be squalene and related metabolic compounds.

12489

X-RAY INACTIVATION OF THE PNEUMOCOCCUS TRANSFORMING AGENT. H. Ephrussi-Taylor and R. Latarjet. p. 79. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Eds. New York, Academic Press, Inc., 1955. (In French).

12490

IRRADIATION OF VIRUS. P. Bonet-Maury. p. 75. "Radiobiology Symposium - 1954." (Proc. held at Liege, Aug.-Sept., 1954). Z. M. Bacq and P. Alexander, Eds. New York, Academic Press, Inc., 1955. (In French).

12491

THE EFFECT OF CHOLINE AND ROENTGEN RAYS ON THE COURSE OF PREGNANCY. Dr. Fried von Neuman and Dr. Otfried O. Fellner. *Muenchener Med. Wochenschrift* 54, 1131-32(1907). (In German).

Pregnant rabbits were exposed to x-rays over the whole body, upper body or lower body and the course of pregnancy as well as the occurrence of fetal eye damage were observed. The paper is written in response to a paper by von Hippel and Pagenstecher comparing the effects of x-rays and choline.

12492

CROSS REACTIVATION OF GENETIC LOCI OF T2 BACTERIOPHAGE AFTER DECAY OF INCORPORATED RADIOACTIVE PHOSPHORUS. G. S. Stent. *Proc. Nat. Acad. Sci.* 39, 1234-1241(1953).

12493

A STUDY OF ANTIGEN LOCALIZATION AND DEGRADATION AND THE HISTOLOGIC REACTION IN THE SPLEEN OF NORMAL, X-IRRADIATED, AND SPLEEN-SHIELDED RATS. F. W. Fitch, P. Barker, K. H. Soules and R. W. Wissler. *J. Lab. Clin. Med.* 42, 598-620(1953).

12494

FACTORS EFFECTING X-RAY INHIBITION OF ANTIBODY

FORMATION. L. O. Jacobson and M. J. Robson. *J. Lab. Clin. Med.* **39**, 169-175(1952).

12495

FURTHER OBSERVATIONS ON THE EFFECTS OF ROENTGENIZATION AND SPLENECTOMY ON ANTIBODY-PRODUCTION. L. Hektoen. *J. Infectious Diseases* **27**, 23-30(1920).

12496

ANTIBODY PRODUCTION IN EXPERIMENTAL ROENTGEN RADIATION INJURY OF THE HEMATOPOIETIC SYSTEM. E. Benjamin and E. Sluka. *Wien. Klin. Wochschr.* **21**, 311-13(1908). (In German).

Precipitin titres were depressed and serum antibody disappearance was retarded in rabbits that had received several daily doses of x-rays shortly before the injection of bovine serum albumin. Non-irradiated rabbits and rabbits irradiated after injecting the antigen did not show these changes.

12497

ON THE ROLE OF LEUKOCYTES AND THE SPLEEN IN THE PRODUCTION OF ALEXIN, HEMOLYSINS, AGGLUTININS AND BACTERIOLYSINS. I. I. Manoukhine. *Compt. rend. soc. biol.* **74**, 1221-22(1913). (In French).

12498

ATTENUATION OF EXPERIMENTAL TUBERCULOSIS BY ROENTGEN RADIATION. L. Lortet and P. Genoud. *Franc. gazette hospital* **69**, 787-88(1896). (In French).

12499

EFFECT OF X-RAYS UPON HEMOLYSIN PRODUCTION IN THE RAT. H. I. Kohn. *J. Immunol.* **66**, 525-533(1951).

12500

THE TIMING OF ANTIGEN INJECTION RELATIVE TO WHOLE BODY X-IRRADIATION AND THE DEVELOPMENT OF CIRCULATING ANTIBODY AND THE SPLENIC HISTOLOGIC REACTION IN THE RAT. F. W. Fitch, R. W. Wissler, M. Lavia and P. Barker. *J. Immunol.* **76**, 151-160(1956).

12501

CHANGES IN DEOXYRIBOSIDE, DEOXYRIBOSIDE AND NUCLEIC ACID CONTENT OF RABBIT APPENDIX AND THYMUS AFTER X IRRADIATION. C. W. Bishop and J. N. Davidson. *Brit. J. Radiol.* **30**, 367-370(1957).

12502

NUCLEIC ACID METABOLISM IN REGENERATING LIVER. IV. THE EFFECT OF X-RADIATION OF THE WHOLE BODY ON NUCLEIC ACID SYNTHESIS *IN VIVO*. R. E. Beltz, J. van Lancker and V. R. Potter. *Cancer Research* **17**, 688-697(1957).

12503

CIRCULATING RAT PLATELETS IN LETHALLY X-RADIATED MICE GIVEN RAT BONE MARROW. L. H. Smith, T. Makinodan and C. C. Congdon. *Cancer Research* **17**, 367-369(1957).

12504

EFFECT OF HOMOLOGOUS BONE MARROW INJECTIONS IN X-IRRADIATED RABBITS. K. A. Porter. *Brit. J. Exp. Pathol.* **38**, 401-412(1957).

12505

FURTHER CYTOLOGICAL OBSERVATIONS ON RADIATION CHIMERAS. C. E. Ford, P. L. T. Ilbery and J. F. Loutit. *J. Cell. Comp. Physiol.* **50**, 109-121(suppl. 1, (1957)).

A chromosome marker was used to identify donor cells in the hematopoietic tissue of radiation chimeras (mice).

12506

PRESENCE OF HOMOLOGOUS CELLS IN THE MARROW OF MICE PROTECTED FROM THE EFFECTS OF IRRADIATION BY HOMOLOGOUS MARROW. R. M. Merwin and C. C. Congdon. *Federation Proc.* **15**, 129(1956).

12507

THE EFFECT OF HOMOLOGOUS BONE MARROW EMULSION ON RABBITS AFTER TOTAL-BODY IRRADIATION. M. F. Hilfinger, Jr., J. H. Ferguson and P. A. Riemschneider. *J. Lab. Clin. Med.* **42**, 581-91(1953).

12508

ENHANCED PRODUCTION OF ANTIBODIES BY LOCAL IRRADIATION. II MEASUREMENT OF LOCAL ANTIBODIES. J. B. Graham and S. Leskowitz. *J. Immunol.* **76**, 110-111(1956).

Diphtheria toxin was injected into the lateral surface of the thigh 45-60 min. after 1000 r local x-ray exposure to the area. Antitoxin level in the injected site and circulating antitoxin levels were elevated above levels in control animals 20 days later, and authors interpret this as representing a stimulating effect of x-rays on antibody-producing activity of cells.

12509

REACTIVATION OF IRRADIATED BACTERIOPHAGE BY TRANSFER OF SELF-REPRODUCING UNITS. S. E. Luria. *Proc. Nat. Acad. Sci. U. S.* **33**, 253-264(1947).

12510

THE RADIO-PHYSIOLOGICAL PARADOX. H. Zwaardemaker. *Compt. Rend. Soc. Biol.* **84**, 704(1921). (In French).

Changing the composition of a fluid used to perfuse an isolated frog heart from a solution containing thorium to one in which thorium is replaced by potassium, or vice versa, causes a 30-34 sec. cardiac arrest. This is believed to be due to the presence of equal amounts of α and β rays at the moment of change, the two radiations neutralizing one another.

12511

GENERALIZED ACTION OF X-RAYS. E. Woenckhaus and W. Munzel. *Arch. Exper. Path. u. Pharmacol.* **160**, 19-28(1931). (In German).

Blood cells and defibrinated blood of rats exposed to large x-ray doses cause changes in the blood of rats receiving them intravenously. The changes are similar to changes produced in irradiated animals (leukopenia). The effect is considered to represent (probably) results of severe destruction of blood cells in the irradiated donor animal and release of lytic substances.

12512

GENERALIZED ACTION OF X-RAYS. E. Woenckhaus and W. Munzel. *Arch. Exper. Path. u. Pharmacol.* **165**, 145-60(1932). (In German).

The blood of heavily irradiated rabbits injected into normal rabbits causes 1. a fall in lymphocyte count and 2. hypoglycemia. Defibrinated dog blood irradiated *in vitro* does not produce this effect. Guinea pigs were found to be extremely sensitive.

12513

THE CAUSE OF INHIBITION OF CELL DIVISION BY X-RAYS. Kurt Erdmann. *Pflug. Arch. ges. Physiol.* **235**, 470-85(1935). (In German).

Yeast cells were irradiated in media containing different ions and capable of inhibiting cell division. The laws governing the inhibition were similar to those relating the action of ions to swelling of proteins and the author concludes that growth inhibition results from a decrease in the swelling power of living tissue, a property necessary for growth.

12514

POSSIBLE BIOLOGICAL EFFECTS OF PENETRATING RADIATIONS. V. Ducceschi. *Arch. Fisiol.* **33**, 461-7(1934).

The activity of various animals in unshielded and partly shielded boxes (lead walls) was studied to determine whether γ rays and cosmic rays affect living processes.

Systems studied (yeast fermentation, movement of bees, ants and silkworms) were found not to vary after exposure.

12515

THE BIOLOGICAL EFFECT OF ROENTGEN RAYS ON HEALTHY AND DISEASED SKIN. G. A. Rost. *Strahlentherapie* 44, 521-40(1932). (In German).

12516

EARLY CYTOLOGICAL CHANGES IN THE LYMPHOCYTE AND MYELOID COMPONENTS OF MOUSE SPLEEN FOLLOWING X-RAY IRRADIATION. M. Praslicka and M. Hill. *Folia Biol. (Praha)* 3/1, 37-48(1957). (Russian Text with English Summary).

Mice were exposed to a 500 r x-ray dose, some animals being-anesthetized prior to exposure. Degeneration of lymphocytes and erythroblasts after irradiation are described as is the series of histological and cytological changes in the spleen. Anesthesia (several agents used) appeared to retard the appearance of the phenomena, which is interpreted as a change of neurohumoral reaction due to the effect on the central nervous system.

12517

Brookhaven National Laboratories.

BIBLIOGRAPHY ON THE EFFECTS OF IONIZING RADIATIONS ON PLANTS, 1895-1955. A. H. Sparrow, J. P. Bennington and V. Bond. (1958). (BNL-504; L-103)

This bibliography contains 2586 references to literature on effects of ionizing radiation on plants, arranged alphabetically according to author, as well as a detailed subject index.

12518

EXPERIMENTS WITH SCREW-WORM FLIES STERILIZED BY X-RAYS. R. C. Bushland and D. E. Hopkins. *J. Econ. Ent.* 44, 725-731(1951).

12519

EFFECTS OF IRRADIATION ON THE SCREW-WORM, CALLITROGA HOMINIVORAX (COQ.). Gail Kaufman and M. Wasserman. *Studies in the Genetics of Drosophila IX. Articles on Genetics, Taxonomy, Cytology and Radiation* 5721, 246-259(1957).

12520

National Academy of Sciences - National Research Council APPENDIX I. REPORT OF THE SUBCOMMITTEE ON ACUTE AND LONG TERM HEMATOLOGICAL EFFECTS. Eugene P. Cronkite, Chairman. p.I-1-21 of PATHOLOGIC EFFECTS OF ATOMIC RADIATION. 1956. (Publication-452) \$1.00(NAS)

12521

National Academy of Sciences-National Research Council APPENDIX IV. REPORT OF THE SUBCOMMITTEE ON PERMANENT AND DELAYED BIOLOGICAL EFFECTS OF IONIZING RADIATIONS FROM EXTERNAL SOURCES. Henry E. Blair, Chairman. p.IV-1-27 of PATHOLOGIC EFFECTS OF ATOMIC RADIATION. 1956. (Publication-452) \$1.00(NAS)

12522

National Academy of Sciences-National Research Council APPENDIX II. REPORT OF THE SUBCOMMITTEE ON TOXICITY OF INTERNAL EMITTERS. Austin M. Brues, Chairman. p.II-1-16 of PATHOLOGIC EFFECTS OF ATOMIC RADIATION. 1956. (Publication-452) \$1.00(NAS)

12523

National Academy of Sciences-National Research Council APPENDIX III. REPORT OF THE SUBCOMMITTEE ON ACUTE AND CHRONIC EFFECTS OF RADIOACTIVE PARTICLES ON THE PULMONARY TRACT. Ralph Wager, Chairman. p.III-1-14 of PATHOLOGIC EFFECTS OF ATOMIC RADIATION. 1956. (Publication-452) \$1.00(NAS)

12524

MEDICAL RADIATION BIOLOGY. F. Ellinger. C. C. Thomas, Publisher, Springfield, Ill., 1957.

12525

Division of Civilian Application, AEC THEORETICAL POSSIBILITIES AND CONSEQUENCES OF MAJOR ACCIDENTS IN LARGE NUCLEAR POWER PLANTS. March 1957. 114p. (WASH-740)

12526

MEDICAL CARE OF WOUNDS CONTAMINATED WITH RADIOACTIVE MATERIALS. A. J. Finkel and E. A. Hathaway. *J. Am. Med. Assoc.* 161, 121-26(1956).

12527

DANGEROUS PROPERTIES OF INDUSTRIAL MATERIALS. N. I. Sax. Reinhold Publishing Corp., New York, 1953.

12528

Atomic Energy of Canada, Ltd. Chalk River Project, Chalk River, Ont.

THE ACCIDENT TO THE N.R.X. REACTOR. PART II. D. G. Hurst. Oct. 23, 1953. 33p. (GPI-14; AECL-233).

Problems which faced the operating staff as a consequence of the NRX accident are discussed. These include containment of active water, cooling of broken rods, and assessment of damage. Information is given concerning the state of the fuel rod assemblies and calandria. It appears that the major damage followed boiling of cooling water. Explanations are presented of some of the observed phenomena, in particular a sudden rise of the gas-holder, and some details of fuel rod behavior.

12529

Hanford Works, General Electric Co., Richland, Washington.

BIBLIOGRAPHY OF TRACER APPLICATIONS OF DEUTERIUM TO BIOCHEMICAL STUDIES. R. C. Thompson. (Feb. 13, 1951). (HW-20283)

12530

Atomic Energy Commission, Technical Information Services.

A BIBLIOGRAPHY OF SELECTED AEC REPORTS OF INTEREST TO INDUSTRY. PART 9. HEALTH AND SAFETY. (1953). 24p. (TID-3050)

12531

Army Medical Library.

THE PITUITARY-ADRENOCORTICAL FUNCTION; ACTH, CORTISONE AND RELATED COMPOUNDS. A BIBLIOGRAPHY. Karl A. Baer and M. Spencer. 1950. 366p. (U-19510).

12532

Atomic Bomb Casualty Commission, National Academy of Science.

BIBLIOGRAPHY OF A-BOMB MATERIAL COLLECTED THROUGH APRIL 17, 1952. (1953). 27p. (NYO-4452)

12533

THE EFFECT OF IONIZING RADIATIONS ON THE BROAD BEAN ROOT. PART X. John Read. *Brit. J. Radiology* 25, 154-9(1952).

The author describes results of experiments designed to clarify the role of oxygen in the production of x-ray effects on growth of the broad bean root. NSA 6-3160

12534

ANALYSIS OF THE NON-RECOVERABLE INJURY RESULTING FROM X-IRRADIATION. J. S. Krebs, R. W. Brauer and H. Kalbach. Paper presented before Radiation Research Society, New York, May 1955. *Radiation Research* 3, 334(1955).

12535

POSSIBILITIES OF PROTECTION AGAINST MASSIVE DOSES OF IONIZING RADIATION. J. F. Loutit. *Biological Hazards of Atomic Energy*, Oxford University Press, London, (1952).

12536

TIME INTENSITY FACTORS AND WHOLE BODY

IRRADIATION. Edith Paterson, C. W. Gilbert and J. Mathews. *Brit. J. Radiol.* 25, 427-433(1947).

12537

RADIOACTIVE FALLOUT III. R. E. Lapp. *Bull. Atomic Scientists* 11, 206-9, 230(1955).

12538

LONG-TERM SURVIVAL FOLLOWING X-IRRADIATION AND THE IRRADIATION OF THE ALPHA PARTICLES FROM RADON AND ITS DECAY PRODUCTS. J. Hollcroft, E. Lorenz, M. Mathews, and C. C. Congdon. *J. Natl. Cancer Inst.* 11, 1-16(1950).

12539

Joint Commission for the Investigation of the Effects of the Atomic Bomb in Japan and Army Institute of Pathology.

MEDICAL EFFECTS OF ATOMIC BOMBS. April

1951. Individual volumes abstracted separately in this bibliography. See abstracts 2173, 2174, 2175, 2176 and 2178.

12540

EFFECT OF ROENTGEN RADIATION ON SOLUTIONS OF TYROSINE AND CYSTINE. W. Stenstrom and A. Lohmann. *J. Biol. Chem.* 79, 673-8(1928). CA 23-1618

12541

NATURE AND EXTENT OF INTERNAL RADIOACTIVE CONTAMINATION OF HUMAN BEINGS EXPOSED TO FALLOUT MATERIAL IN OPERATION CASTLE. S. H. Cohn, J. S. Robertson, and W. H. Chapman. *Radiation Research* 3, 218(1955).

12542

THE CHARACTERISTICS OF FALLOUT MATERIAL AND THE EFFECTS OF FALLOUT RADIATION ON HUMAN BEINGS. E. P. Cronkite, N. R. Shulman, C. A. Sondhaus, E. A. Sharp, and V. P. Bond. *Radiation Research* 3, 221(1955).

12543

HEMATOLOGICAL CHANGES IN THE HUMAN BEINGS EXPOSED TO FALLOUT RADIATION. V. P. Bond, E. P. Cronkite, R. S. Farr and H. H. Hechter. *Radiation Research* 3, 215(1955).

12544

BIOLOGICAL DAMAGE INDUCED BY DIFFERENT TYPES OF IONIZING RADIATION. L. H. Gray. p.7-18 of BIOLOGICAL HAZARDS OF ATOMIC ENERGY PAPERS READ AT CONFERENCE CONVENED AT INSTITUTE OF BIOLOGY AND THE ATOMIC SCIENTIST ASSOCIATION OCT. 1950. A. Haddow, ed. London, Oxford Univ. Press. 1952. 235p.

12545

RELATIVE EFFECTIVENESS OF GAMMA, BETA AND NEUTRON RADIATIONS FOR PRODUCTION OF BIOLOGICAL RESPONSE IN MAMMALIAN SYSTEMS. P. S. Harris, W. Langham and J. Furchner. *Radiation Research* 3, 232(1955).

12546

MODIFICATION OF ACUTE AND CHRONIC IRRADIATION INJURY IN EXPERIMENTAL ANIMALS BY INJECTION OF BONE MARROW AND TISSUES ORIGINATING FROM HEMATOPOIETIC ORGANS. E. Lorenz and C. C. Congdon "Proceedings of the Fourth International Congress of the International Society of Hematology." Crune and Stratton, N. Y. (1954).

12547

FALLOUT: SOME MEASUREMENTS AND DAMAGE ESTIMATES. A. H. Rosenfeld, E. J. Story and S. D. Warsaw. *Bull. Atomic Scientists* 11, 213-16(1955).

12548

MODIFICATION OF LETHAL RADIATION EFFECTS IN RATS BY SHORT INTERVAL FRACTIONATION OF DOSE J. P. Storaasli, K. S. Rosenberg, J. S. Krohmer and H. L. Friedell. *Radiation Research* 3, 351(1955).

12549

EFFECTS OF MASSIVE RADIATION IN THE RAT. S. Koletsky. *Radiation Research* 3, 333(1955).

12550

ON REDUCING THE EFFECTS OF LOCAL RADIATION RESPONSE. L. M. Sherman. U. S. Joint Publications Research Service-5649. *Med. Radiol.* 1, No. 6, 61-5(1956). (In Russian). NSA 11-3314

12551

THE DETERMINATION OF RADIUM IN EXCRETA. E. R. Russell and G. W. Reed, Jr. 1947. 18p. (MDDC-226(Vol. 20B-6)

12552

THE EFFECT OF RADIOACTIVITY ON FATTY ACIDS. C. W. Sheppard and V. L. Burton. *J. Am. Chem. Soc.* 68, 1636-1639(1946).

Fatty acids were irradiated with α particles and the following chemical changes were observed: dehydrogenation, decarboxylation, formation of low molecular weight water soluble acids, formation of methane and higher hydrocarbons and production of CO_2 and H_2O .

12553

CALCIUM METABOLISM IN RUMINANTIA INVESTIGATED WITH AID OF Ca^{45} . A. I. Salntsev and G. V. Filatov. *Zhivotnovodstvo* (Cattle Breeding). No. 12, 53-55(1956). (In Russian).

12554

DISTRIBUTION AND EXCRETION OF BERYLLIUM SULPHATE USING Be^7 AS A TRACER. James K. Scott and William Neuman. (U. Rochester, N. Y.). *Fed. Proc.* 8(1), 331(1949).

12555

THE ACTION OF RADIUM RAYS ON CANE SUGAR AND AGAR. A. Fernau. *Biochem. Z.* 102, 246-250(1920).

Inversion of cane sugar, after exposure to Ra rays, is probably a primary radiation effect, not secondary to H_2O_2 or O_2 formation. Radiation of 4 cc. of a 0.1% sugar solution for four days caused decreased viscosity and rendered the sugar capable of reducing Fehling's solution.

12556

STUDIES ON THE METABOLISM OF ZINC WITH THE AID OF ITS RADIOACTIVE ISOTOPES. G. E. Shelme, I. L. Chaikoff, H. B. Jones and M. L. Montgomery. *Journal of Biological Chemistry* 147, 409-414(1943).

12557

THE ACTION OF X-RAYS ON THYMUS NUCLEIC ACID. B. Taylor, J. P. Greenstein and A. Hollaender. *Cold Spring Harbor Symposia Quant. Biol.* 12, 237-246(1947).

The decrease in viscosity of sodium thymus nucleate (TNA) was proportional to x-ray dose up to 56,000 r and was independent of temperature. A progressive and presumably indirect effect occurred at higher temperatures but not at 0°C . The x-ray effect appeared not to involve breaks of primary leakages or rearrangement of the spatial configurations that render it susceptible to enzyme action.

12558

EFFECTS PRODUCED BY THE IRRADIATION OF PROTEINS AND AMINO ACIDS. L. E. Arnow. *Physiol. Rev.* 16, 671-685(1936).

Major subheadings in this review article are 1. Denaturation Process and 2. Physical Changes, including a review of changes in optical rotation and dispersion coefficients, in U-V absorption spectra and in viscosity. The action of radiations is compared with that of heat, alcohol, acetone and oxidizing agents.

12559

EFFECTS OF X-RADIATION ON SODIUM THYMUS NUCLEATE. B. Taylor, J. P. Greenstein and A. Hollaender. *Arch. of Biochem.* 16, 19-31(1948).

12560

THE ROENTGEN PHOTOLYSIS OF H_2O_2 . D. den Hoed and C. W. F. Spires. *Z. physik. Chem.* A173, 412-14(1935). CA 29-7797¹

12561

THE INFLUENCE OF IRRADIATIONS ON ADRENALIN. II. THE ACTION OF IRRADIATED ADRENALIN ON SMOOTH MUSCLE ORGANS. B. Therata and R. Ito. *Folia Pharmacol. Japan* 12 (No. 2), 125-36(1931).

The action of adrenalin on intestine and uterus are increased when adrenalin has been previously irradiated with X- or U-V radiation. CA 25-5709¹

12562

EFFECT OF ROENTGEN RADIATION ON SOLUTIONS OF TYROSINE, PHENOL AND TRYPTOPHAN. H. Stenstrom and A. Lohmann. *Radiology* 17, 432-14(1931). CA 25-5839³

12563

THE EFFECT OF X-RAYS ON THE BACTERICIDAL ACTION OF TISSUES. G. Antoniol. *Strahlentherapie* 41, 496-509(1931). (In German).

12564

MECHANISM OF THE CHEMICAL ACTION OF X-RAYS IN AQUEOUS SOLUTIONS. O. Risse. *Strahlentherapie* 34, 578-81(1929). (In German). CA 25-2366¹

12565

ANTIRACHITIC ACTIVATION OF ERGOSTEROL BY SOFT X-RAYS. E. Shelow and J. R. Loofburow. *Bull. Basic Sci. Research* 3, 47(1931). CA 25-1878⁴

12566

COMPARISON OF ANTIRACHITIC POTENCY OF ERGOSTEROL IRRADIATED BY U V LIGHT AND BY EXPOSURE TO CATHODE RAYS. A. Knudson and C. N. Moore. *J. Biol. Chem.* 81, 49-64(1929). CA 23-1939⁸

12567

IRRADIATION REACTION OF ALBUMIN. B. Rajewsky. *Strahlentherapie* 33, 362-74(1929).

The author compares the mechanism of action of x-rays and of U-V in causing coagulation of albumin. CA 24-5046⁸

12568

PHOTOGRAPHIC EFFECT OF ANTIRACHITIC SUBSTANCES. J. Cluzet and J. Kofman. *Compt. Rend. Soc. Biol.* 100, 666-8(1929). (In French). CA 24-4809³

12569

STUDIES ON X-RAY SENSITIZATION I. MECHANISM OF THE SENSITIZING EFFECT OF IODIDES. D. L. Rubinstein. *Zhur. exptl. Biol. Med.* 11, 22(1929). CA 24-1875³

12570

EFFECTS OF X-RAYS ON TYROSINE, CYSTINE, CHOLESTEROL, ACETYLENE AND PROPANE. W. Stenstrom. *Radiology* 13, 437(1929). CA 24-1578²

12571

EFFECT OF X-IRRADIATION ON CRYSTALLINE AND DISSOLVED SUCROSE. M. C. Reinhard and K. L. Tucker. *Radiology* 12, 151-3(1929). CA 23-3408⁴

12572

THE ACTION OF U. V. LIGHT AND X-RAYS ON THE SPECTRUM OF PURE AND ACTIVATED ERGOSTEROL. R. R. Morrison and L. H. Clark. *Brit. J. Radiol.* 2, 307-15(1929). CA 23-5221⁶

12573

THE IRRADIATION OF LIQUIDS. F. L. Hopwood. *Brit. J. Radiology* 13, 221-226(1940).

Neutrons produced the same types of effects as β or γ rays on proteins, organic and inorganic colloids, electrolytes and H_2O , but were far more effective than γ rays. The importance of activation of water in causing the observed effects is emphasized. The author suggests

chemical dosimetry for neutrons as a possible alternative to conventional dosimetry.

12574

A NOTE ON RADIATION SICKNESS. T. D. Spies, W. B. Bean and R. W. Vilter. *Am. J. Med. Sci.* 208, 46-54 (1944).

Vitamin B complex alleviated radiation sickness in radiation therapy patients irradiated over the left upper abdomen if the patients were depleted of the vitamin (due to dietary deficiency). Well nourished patients did not develop radiation sickness following the same radiation exposures.

12575

SOME FURTHER EXPERIMENTS ON THE EFFECT OF RADIATION ON DISSOLVED SUBSTANCES. M. C. Reinhard and K. L. Tucker. *J. Cancer Research* 12, 289-93(1928).

12576

EFFECT OF X-RAYS ON ERGOSTEROL. M. Sumi. *Bull. Inst. Phys. Chem. Research (Tokyo)* 8, 640-4(1929). CA 25-1875¹

12577

STANDARD VALUES IN BLOOD. E. C. Albritton, ed. National Research Council. 1951. 199p. (AF-TR-6039).

This paper includes tables on effects of ionizing radiation in blood and hematopoietic tissue of man and various experimental animals.

12578

Div. of Technical Information Extension, AEC. URANIUM AND ITS COMPOUNDS: A BIBLIOGRAPHY OF UNCLASSIFIED LITERATURE. Robert E. Allen, comp. June 30, 1953. (TID-3041)

This bibliography contains 838 annotated references to unclassified literature on U and its compounds. References included in this compilation cover the period from January 1951 to May 1953 and were taken entirely from *Nuclear Science Abstracts and Chemical Abstracts*. This compilation is a supplement to "Uranium and Its Compounds" (K-295; Part 2) by Fred E. Croxton. NSA 7-6432

12579

RADIOACTIVITY IN CERTAIN PELAGIC FISH. IV. SEPARATION AND CONFIRMATION OF RADIOIRON IN SKIPJACK. K. Amano, H. Toxawa and A. Takase. *Nippon Suisangaku Kaishi* 21, 1261-8 (1955-56).

12580

RADIOACTIVITY IN THE PELAGIC FISH. I. DISTRIBUTION OF RADIOACTIVITY IN VARIOUS TISSUES OF FISH. K. Amano, K. Yamada, M. Bito, A. Takase and S. Tanaka. *Bull. Japan. Soc. Sci. Fisheries* 20, 907-15 (1955).

12581

RADIOACTIVITY OF PEOPLE AND FOODS. E. C. Anderson, R. L. Schuch, W. R. Fisher, and W. Langham. *Science* 125, 1273-78 (1957).

12582

APPLIED RADIOBIOLOGY ECOLOGICAL RESEARCH. R. M. Anderson, S. I. Auerbach, D. A. Crossley, Jr., C. Crauth, C. J. Ronde, Jr., A. Broseghini, H. Conner, M. D. Engelmann, E. R. Graham, H. F. Howden and J. B. Lackey. Health Physics Division Annual Progress Report for Period Ending July 31, 1957. (ORNL-2384)

12583

THE QUANTITATIVE EFFECT OF X-RAYS ON ASCORBIC ACID IN SIMPLE SOLUTION AND IN MIXTURES OF NATURALLY OCCURRING COMPOUNDS. R. S. Anderson and B. Harrison. *J. Gen. Physiol.* 27, 69-75 (1943).

The presence of serum albumin and plasma do not materially effect the disappearance of ascorbic acid in an inorganic solvent when x irradiated. The presence of rat muscle reduces the effectiveness of the x rays.

12584

THE MECHANISM OF CAROTENOID ACTION,

CAROTENOIDS AND SULFUR METABOLISM. S. D. Balakhovsky and I. V. Kuznetsova. p. 189-97 of Conference of the Academy of Sciences of the USSR on the Peaceful Uses of Atomic Energy, July 1-5, 1955. Session of the Division of Biological Science. (Translation). 9 p. (AEC-TR-2435 (Pt. 4))

12585

THYROID FUNCTION IN FETAL SHEEP. C. M. Barnes, S. Marks and L. K. Bustad. *Endocrinology* 60 325 (1957).

12586

RADIATION AND SUSCEPTIBILITY TO INFECTION.

Robert D. Boche. 1954. 67p. (AD-108849)

12587

THE USE OF C¹⁴ FOR STUDYING THE PRIMARY PRODUCTS OF PHOTOSYNTHESIS. E. A. Boichenko and N. I. Zakharova. p. 121-6 of Conference of the Academy of Sciences of the USSR on the Peaceful Uses of Atomic Energy, July 1-5, 1955. Session of the Division of Biological Science. (Translation) 6 p. (AEC-TR-2435 (Pt. 4))

12588

PRODUCTION OF H₂O₂ IN X IRRADIATED WATER. P. Bonet-Maury and Marcel Frilley. *Compt. Rend.* 218 400-2 (1944).

The quantity of H₂O₂ produced per unit of x-ray energy absorbed was determined with an accuracy reported to be 5%. CA39-2928

12589

RADIOSTRONTIUM AND RADIOCAESIUM MEASUREMENT IN BIOLOGICAL MATERIALS TO DECEMBER 1956. D. V. Booker, F. J. Bryant, A. E. Chamberlain, A. Morgan, and G. S. Spicer. 1957. 11p. (AERE-HP/R-2182)

12590

AUTORADIOGRAPHY IN BIOLOGY AND MEDICINE. George A. Boyd. New York, Academic Press, Inc. 399p. 1955.

12591

GENERAL REPORT ATOMIC BOMB CASUALTY COMMISSION. A. M. Brues and P. S. Henshaw. 1947. 137 p. (KZ-874)

12592

THE THYROID. REPORT OF SYMPOSIUM HELD JUNE 9-11, 1954. Brookhaven Symposia in Biology No. 7, Brookhaven National Laboratory. 278 p. (BNL-305)

12593

DENATURATION CHANGES IN EGG ALBUMIN WITH UREA, RADIATION AND HEAT. J. H. Clark. *J. Gen. Physiol.* 27 101-112 (1944).

12594

SELECTED ABSTRACTS OF ATOMIC ENERGY PROJECT UNCLASSIFIED REPORT LITERATURE IN THE FIELD OF RADIATION CHEMISTRY AND BIBLIOGRAPHY OF THE PUBLISHED LITERATURE. PART I. THEORY, INTERPRETATIONS, WATER AND AQUEOUS INORGANIC SYSTEMS. R. W. Clark. Jan. 1956. 98 p. (AERE-C/R-1575 (1))

12595

SELECTED ABSTRACTS OF ATOMIC ENERGY PROJECT UNCLASSIFIED REPORT LITERATURE IN THE FIELD OF RADIATION CHEMISTRY AND BIBLIOGRAPHY OF THE PUBLISHED LITERATURE. PART 2. ORGANIC COMPOUNDS (INCLUDING POLYMERISATION REACTIONS). Mar. 1956. 226 p. (AERE-C/R-1575 (5))

12596

SELECTED ABSTRACTS OF ATOMIC ENERGY PROJECT UNCLASSIFIED REPORT LITERATURE IN THE FIELD OF RADIATION CHEMISTRY AND BIBLIOGRAPHY OF THE PUBLISHED LITERATURE. PART 5. BIOCHEMISTRY AND RADIOBIOLOGY (EXCLUDING ANIMAL STUDIES). 93 p. (AERE-C/R-1575(5))

12597

STRONTIUM-90. BIBLIOGRAPHY. Marjorie Comstock. Brookhaven National Laboratory. Dec. 31, 1957. 10 p. (M-6472)

12598

GENETIC CONSIDERATIONS IN ESTABLISHING MAXIMUM RADIATION DOSES. J. F. Crow. *Radiology* 69 18-22 (1957).

12599

THE EXISTENCE OF FREE ATOMS AND RADICALS IN WATER AND AQUEOUS SOLUTIONS SUBJECTED TO IONIZING RADIATION. F. S. Dainton. *J. Phys. and Colloid Chem.* 52 490-517 (1948). CA 42-4455

12600

THE EFFECT OF X RAYS ON ENZYMES. W. M. Dale. *Biochem. J.* 34 1367-1373 (1940).

The effect of x rays on crystalline carboxypeptidase and on partly purified polyphenoloxidase was determined. Per cent inactivation was a function of enzyme concentration for a given radiation dose. A given amount of radiation absorbed by carboxypeptidase corresponded to a constant amount of enzyme inactivated; inactivation dose decreasing with decreasing enzyme concentration to levels far lower than those used in radiotherapy. Effect of radiation of enzyme with and without substrate are described.

12601

EFFECT OF X RAYS ON AQUEOUS SOLUTIONS OF BIOLOGICALLY ACTIVE COMPOUNDS. W. M. Dale. *Brit. J. Radiol.* 16 338-9 (1943).

Radiosensitivity of a given substance depends on conditions under which it is irradiated. In solutions of carboxypeptidase, 50r of x rays inactivated 30% of a dilute solution while 100,000r were required to produce the same effect in a solution 345 times as concentrated. If the same enzyme is irradiated together with its substrate the radiosensitivity is decreased. Similar protection is provided by numerous substances, e.g., nucleic acids and sugars, varying according to the concentration of the protecting substance. Explanation proposed radiation acts primarily on the water, forming intermediate products which then react with the solute.

12602

SLOW-ELECTRON REACTIONS. J. D. Devins. (Natl. Research Council, Ottawa, Ont.). *Proc. Conf. Nuclear Chem., Chem. Inst. Canada (Ottawa)* 200-204(1947).

Chemical reactions induced by slow neutrons are discussed. The theoretical background and limitations of methods used are considered. Primary processes producing reactive ions or molecules by means of slow electrons, and secondary processes involving chemical reactions of these ions and molecules are reviewed. NSA 1-198

12603

EQUIPMENT AND PROCEDURES USED IN THE STUDY OF THE EFFECTS OF RADIATION OF FISH WITH X-RAYS. L. R. Donaldson. Washington Univ. Seattle, Applied Fisheries Lab. Oct. 1945. 36 p. (UWFL-1)

12604

SYMPOSIUM, SHORTER-TERM BIOLOGICAL HAZARDS OF A FALLOUT FIELD DECEMBER 12-14, 1956. G. M. Dunning and J. A. Hilcken. Washington, U. S. Government Printing Office. 1958. 236 p. \$1.75.

12605

TOXICITY OF RADIOSTRONTIUM IN MONKEYS. G. M. Edington, J. M. Judd and A. H. Ward. *Nature* 172 122-3 (1953).

12606

BONE AND RADIOSTRONTIUM. A. Engstrom, R. Bjornerstedt, C. J. Clemenson and A. Nelson. New York, John Wiley and Sons, Inc. 1957.

12607

ACTION OF X-RAY IRRADIATION ON THE NUCLEO-PROTEINS OF CELL NUCLEI. M. Errera. *Bull. Soc. Chem. Biol.* 28: 472-7 (1946).

Upon irradiation, nucleoproteins from chicken erythrocytes and carp sperm, normally in the form of stiff gels, undergo liquifaction whether treated before or after preparation of the nucleoproteins. Gels gradually liquified if the intact cells were first irradiated with 50,000r from W_0 anticathode, 200KV, and the nucleoproteins then extracted were in liquid form.

12608

INCIDENCE OF LEUKEMIA IN SURVIVORS OF THE ATOMIC BOMB IN HIROSHIMA AND NAGASAKI, JAPAN. J. H. Folley and others. *Am. J. Med.* 13 311-21 (1952).

12609

ACTION OF X-RAYS ON CATALASE AND ITS BIOLOGICAL SIGNIFICANCE. Arne Forssberg. *Arkiv. Kemi. Mineral Geol.* 21A (No. 7) 1-15 (1945).

Certain effects of ionizing radiation on living material, such as the frequent reversibility of action and deviations from the Bunsen-Roscoe law, may be explained by the action of x rays on catalase. CA 40-6509

12610

MECHANISM OF THE ACTION OF X RAYS ON ENZYMES IN WATER SOLUTION. A. Forssberg. *Nature* 159 308-9 (1947).

Pure crystalline catalase was irradiated in an aqueous solution, concentration 3.7×10^{-5} g/ml. The x ray dose was 12,400r. Inactivation of the enzyme when in pure solution and when various compounds were added to the solution was measured. Compounds evaluated for their protective effect succinic, malonic, pyruvic, levulinic, fumaric and maleic acids, oxidized and reduced glutathione and cysteine. A possible mechanism of x ray effect based on generation of H ions is discussed.

12611

DENATURATION OF PROTEINS BY X RAYS. H. Fricke. Cold Springs Harbor Symposium Quant. Bio. 6 164-70 (1938).

Radiation discussed includes x rays and α -, β -, and γ - from Ra. Chemical effects produced by β - and γ - rays, and the usual types of x-rays are determined solely by the absorbed energy, but this may not be true for α rays and very long x-rays. The most obvious effect of the radiations on proteins is flocculation. Activation of the aqueous phase may be an important factor in the action of radiation on living cells. Proteins investigated include: pepsin, trypsin, oxyhemoglobin, complement and egg albumin.

12612

EFFECTS OF X RAYS ON THYMUS NUCLEIC ACID. J. P. Greenstein et al. *Science* 105 263-4 (1942).

Authors irradiated dialysed solutions of 0.7% sodium thymus nucleate from calf thymus. After radiation, products were still acted upon by specific enzymes.

12613

MODIFICATION OF THE DEPTH DOSE CURVES OF VARIOUS RADIATIONS BY INTERPOSED BONE. L. L. Haas and G. H. Sandberg. *Brit. J. Radiol.* 30 19-26 (1957).

12614

EFFECTS OF X RAYS AND γ RAYS ON INDOPHENOL OXIDASE. R. E. Harvard. *Brit. J. Radiology* 7 296-304 (1934).

Mixed x rays (doses up to 10,000r) and γ rays (from 18,000 mg-hours of radium at a distance of about 1.5 cm) have no destructive effect on the activity of indophenol oxidase of yeast when irradiated at body temperature, at 0° C or at room temperature.

12615

RADIOISOTOPE UPTAKE IN MARINE ORGANISMS WITH SPECIAL REFERENCE TO THE PASSAGE OF SUCH ISOTOPES AS ARE LIBERATED FROM ATOMIC WEAPONS THROUGH FOOD CHAINS LEADING TO ORGANISMS UTILIZED AS FOOD BY MAN. Hawaii Marine Lab., Univ. of Honolulu. Annual Report for 1954-1955. Sept. 1, 1955. 47 p. (AECU-3079)

12616

INACTIVATION OF CHORIONIC GONADOTROPHIN BY X-RAYS. A. Hochman, R. Black, G. Goldhaber and F. Sulman. *J. Endocrinol.* 5 99-102 (1947).

A 2 per cent chorionic gonadotropin solution is inactivated almost completely following an x-ray dose of 6×10^6 r. This same dose also inactivated half the activity of a 40 per cent solution. The activity can be protected, however, if serum or serum proteins are added prior to irradiation. CA 41-69581.

12617

ON DESSAUER'S POINT-HEAT HYPOTHESIS. H. Holthusen. *Strahlentherapie* 19 285 (1925). (In German).

12618

SOME FACTORS INFLUENCING THE GASTRO-INTESTINAL ABSORPTION OF STRONTIUM IN RATS. Paper 6. H. G. Jones. Atomic Energy Research Establishment, Harwell. July 1955. 4 p. (AERE-SPAR-6)

12619

RADIOLOGIC CONTAMINATION OF FISH. III. RADIO-CHEMICAL STUDIES OF CONTAMINATED FISH.

Toshiharu Kawabata. *Japan. J. Med. Sci. and Biol.* 8 359 (1955).

12620

BIOLOGICAL FACTORS DETERMINING THE DISTRIBUTION OF RADIOISOTOPES IN THE SEA. B. H. Ketchum and V. T. Bowen. Woods Hole Oceanographic Institution, Mass. 12 p. (A/CONF. 15/P/402)

12621

THE EFFECTS OF EDTA-NA (NA ETHYLENEDIAMINE-TETRAACETATE) UPON THE METABOLISM OF RADIO-STRONTIUM AND RADIOYTRIUM IN MICE. T. Kikuchi, G. Wakisaka, T. Kono, H. Akagi, T. Yamamasu and I. Sugawa. *Bull. Inst. Chem. Research, Kyoto Univ.*, (Suppl. Issue) 106-11 (1954).

12622

ON THE BEHAVIOR OF RADIOACTIVE FISSION PRODUCTS IN SOIL. THEIR ABSORPTION BY PLANTS AND THEIR ACCUMULATION IN CROPS. V. M. Klechkovsky, ed. Publication of the Acad. of Sci., U.S.S.R. (1956). 227 p. (AEC-tr-2867)

12623

FURTHER STUDIES ON THE ANTIRACHITIC ACTIVATION OF SUBSTANCES BY CATHODE RAYS. A. Knudson. *Science* 66, 176-8(1927).

Commercial cholesterol exposed to cathode rays for 30 sec. is effective in healing rickets in rats in doses of 1-2 mgm. per day. Cholesterol purified by the dibromide method could not be rendered antirachitic by either cathode rays or ultraviolet radiation. Yeast, starch, and cottonseed oil were also activated by exposure to cathode rays. Dry yeast exposed for 30 sec. healed rickets in rats in doses of 1 mgm. daily. Extracting dried yeast with ether in a Soxhlet apparatus did not entirely remove the substance which is rendered antirachitic when irradiated. CA 21-3636⁶

12624

STUDY OF THE BIOCHEMICAL BASIS OF NERVE EXCITATION AND INHIBITION PROCESSES WITH THE AID OF ISOTOPES. Kh. S. Koshtoyants, T. M. Turpaev, and D. E. Ryvkina. p. 173-80 of CONFERENCE

OF THE ACAD. OF SCI., USSR, on the Peaceful Uses of Atomic Energy, July 1-5, 1955. Session of the Division of Biological Science. (AEC-TR-2435)

12625

REACTIONS IN AQUEOUS SOLUTIONS. F. H. Krenz. (National Research Council, Chalk River, Ont.). Proc. Conf. Nuclear Chem., Chem. Inst. Can. (Ottawa), 192-97 (1947).

Values are summarized of the results of irradiation of H_2O with different types of radiation. In general, the heavier alpha and beta particles are more effective per Mev than are either x rays or gamma rays in producing a chemical change in water. CA 42-3255d

12626

THE FALLOUT OF THE RADIOACTIVE SUBSTANCES ON ANIMALS, FOOD, AND MAN. K. Lang. Berlin u. Munch. tierarztl. Wochschr. 72 (9): 175-82 (1959). (In German).

12627

HUMANITARIAN H-BOMB. Ralph E. Lapp. Bull. Atomic Scientists 12: 261-4 (1956).

12628

MECHANISMS OF THE ACTION OF IONIZING RAYS ON WATER. R. Latarjet. Comp. Rend. 214: 73-5, 76-8 (1942).

Hydrogen peroxide was formed in amounts 50 times greater when oxygen was present than when it was absent following irradiating of water with x-rays. It is believed that a dissociation occurs and with free electrons available that the 2 mols of H_2O_2 are produced as an end product. CA 37-2988⁴

12629

RADIOACTIVE FALL-OUT. Willard F. Libby. Bull. Atomic Scientists 11: 256-60 (1955).

12630

INEXPENSIVE BOOKS AND PAMPHLETS ON ATOMIC ENERGY. BIBLIOGRAPHY NO. 4. EDUCATIONAL IMPLICATIONS OF ATOMIC ENERGY. I. Light. Federal Security Agency, Office of Education, Washington, D. C. May 1949.

12631

TEACHING AIDS IN ATOMIC ENERGY: BIBLIOGRAPHY FOR TEACHERS. BIBLIOGRAPHY NO. 3 - EDUCATIONAL IMPLICATIONS OF ATOMIC ENERGY. I. Light. Federal Security Agency, Office of Education, Washington, D. C. Mar. 1949.

12632

INTRODUCTORY BIBLIOGRAPHY ON ATOMIC ENERGY. BIBLIOGRAPHY NO. 2. EDUCATIONAL IMPLICATIONS OF ATOMIC ENERGY. I. Light. Federal Security Agency, Office of Education, Washington, D. C. Mar. 1949.

12633

BIBLIOGRAPHY OF BIBLIOGRAPHIES ON ATOMIC ENERGY. BIBLIOGRAPHY NO. I - EDUCATIONAL IMPLICATION OF ATOMIC ENERGY. I. Light. Federal Security Agency, Office of Education, Washington, D. C. Feb. 1949.

12634

INCREASE IN VISCOSITY AND REFRACTIVE INDEX OF WATER SUBJECTED TO THE ACTION OF X-RAYS. J. Louiseleur and C. Crovisier. Compt. Rend. Soc. Biol. 136: 739-40 (1942).

The viscosity and refractive index of twice distilled water exposed for considerable periods showed increased values in cases. H_2O_2 formation occurred if dissolved oxygen was present in the water. CA 39-2928

12635

ACTIVATION OF H BY X-RAYS. J. Louiseleur and C. Crovisier. Compt. Rend. Soc. Biol. 137: 10708 (1943).

Further studies on the irradiation of water by x-rays revealed that both hydrogen and oxygen are activated by x-rays. (For previous work see abstract 11024). CA 39-2029³

12636

FORMATION OF PEROXIDES IN AQUEOUS SOLUTIONS OF ORGANIC COMPOUNDS IRRADIATED WITH X-RAYS. J. Louiseleur, R. Latarjet and C. Crovisier. Compt. Rend. Soc. Biol. 136: 57-60 (1942).

When 0.01-0.00001 M solutions of crotonic, succinic and fumaric acids, HCHO, AcH, BzH, MeOH, and EtOH were irradiated with x-rays, H_2O_2 and organic peroxides were formed. (In French).

12637

RADIONUCLIDES IN PLANKTON NEAR THE MARSHALL ISLANDS 1956. Frank G. Lowman. Feb. 14, 1958. 34 p. (UWFL-54)

12638

BIBLIOGRAPHY ON USES OF RADIOACTIVE AND STABLE ISOTOPES IN INDUSTRY. J. A. McCormick. Division of Technical Information Ext., Oak Ridge. July 1957. 27 p. (TID-3511)

12639

HISTOLOGICAL CHANGES INDUCED IN BARLEY PLANTS BY RADIATION FROM P^{32} . R. W. Mackie, J. M. Blume and C. E. Hagen. Am. J. Botany 39: 229-37 (1952).

12640

LEUKEMIA IN ATOMIC BOMB SURVIVORS. II. OBSERVATIONS IN EARLY PHASES OF LEUKEMIA. W. C. Maloney and R. D. Lange. Blood 9: 663-85 (1954).

12641

SECOND AUSTRALIAN CONFERENCE ON RADIATION BIOLOGY. J. H. Martin. The Australian J. Sci. 21, No. 7: 214-215 (1959).

12642

EFFECTS OF X-RAYS ON ENZYMES OF MALIGNANT TUMORS. H. Migosi. J. Japanese Obst. Gynecol. 23: 264 (1940).

- 6 parts:
- I. Effect of X-ray Irradiation on Amylase in Tumor Tissue.
 - II. Effect of X-ray Irradiation on Esterase and Lipase in the Tumor Tissue.
 - III. Effect of X-ray Irradiation on Phosphatase in the Tumor Tissue.
 - IV. Effect of X-ray Irradiation on Peptidase in the Tumor Tissue.
 - V. Effect of X-ray Irradiation on Autolysis in the Tumor Tissue.
 - VI. Effect of X-ray Irradiation on Cathepsin in the Tumor Tissue. CA 36-549⁶

12643

A SELECTED READING LIST ON RADIOLOGICAL PROTECTION AND LABORATORY DESIGN. R. J. Millett. Atomic Energy Research Establishment, Harwell. Apr. 1957. 5 p. (AERE - I/M-43)

12644

ACTION OF RADIOSTRONTIUM IN THE HOUSEFLY AND GERMAN COCKROACH. N. Mitlin and F. N. Babers. J. Econ. Entomol. 49: 714-5 (1956).

12645

PHOTOPHARMACOLOGY. IV. EFFECT OF RADIATION ON DIGITALIS. D. I. Mocht and J. C. Krantz, Jr. Proc. Soc. Exptl. Biol. Med. 23: 340 (1926).

Destructive changes in digitalis were observed after its exposure to UV, x rays and radium. Glass container afforded some protection. CA 21-1165

12646

RADIOACTIVITY OF FISHES CONTAMINATED BY NUCLEAR BOMB TEST EXPLOSIONS WITH SPECIAL REFERENCE TO

THE NUCLIDES. T. Mori and M. Saika. Nippon Nogelkagaku Kaishi 31: A79-A86 (1957).

12647

CHARACTERISTICS OF THE INACTIVATION OF MICRO-ORGANISMS IN RADIATION STERILIZATION. M. N. Neisel, T. S. Remezova, R. D. Galtsova, G. A. Medvedeva, N. A. Pomoshchnikova, M. N. Shalnova, and V. M. Alekseeva. p. 79-88 of CONFERENCE OF THE ACADEMY OF SCIENCES OF THE USSR ON THE PEACEFUL USES OF ATOMIC ENERGY, JULY 1-5, 1955. SESSION OF THE DIVISION OF BIOLOGICAL SCIENCE (Translation) 10 p. (AEC-tr-2435 (Pt 4) (p. 79-88))

12648

BIBLIOGRAPHY OF SYNTHESIS WITH CARBON ISOTOPES. J. C. Nevenzel, R. F. Riley, D. R. Howton and G. Steinburg. California Univ., Los Angeles. Atomic Energy Project. Dec. 6, 1954. 175 p. (UCLA-316)

12649

TESTS OF NUCLEAR WEAPONS. L. W. Nordheim. Bull. Atomic Scientists 11: 253-55, 272 (1955).

12650

USE OF RADIO-ISOTOPES FOR BLOOD DISORDERS; TRACER ELEMENTS BIBLIOGRAPHY NO. 2. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Sept. 15, 1947. 7 p. (NP-475)

12651

USE OF RADIO-ISOTOPES FOR BLOOD DISORDERS; TRACER ELEMENTS BIBLIOGRAPHY NO. 2A. T. H. Oddie. Council for Scientific and Industrial Research, Australia. May 11, 1948. 3p. (NP-476)

12652

APPLICATION OF RADIO-ISOTOPES TO THE THYROID GLAND; TRACER ELEMENTS BIBLIOGRAPHY NO. 3. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Sept. 19, 1947. 9p. (NP-477)

12653

APPLICATION OF RADIO-ISOTOPES TO THE THYROID GLAND; TRACER ELEMENTS BIBLIOGRAPHY NO. 3A. T. H. Oddie. Council for Scientific and Industrial Research, Australia. May 11, 1948. 3p. (NP-478)

12654

APPLICATIONS OF RADIOELEMENTS IN GENERAL BIOLOGY, BACTERIOLOGY, AND PARASITOLOGY; TRACER ELEMENTS BIBLIOGRAPHY NO. 4. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Oct. 27, 1947. 9p. (NP-479)

12655

USE OF RADIOELEMENTS IN BOTANY AND AGRICULTURE, TRACER ELEMENTS BIBLIOGRAPHY NO. 5. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Oct. 31, 1947. 7p. (NP-480)

12656

USE OF RADIOELEMENTS IN ZOOLOGY; TRACER ELEMENTS BIBLIOGRAPHY. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Oct. 31, 1947. 2p. (NP-481)

12657

USE OF RADIOELEMENTS FOR STUDY OF BLOOD, CIRCULATION, AND RESPIRATION; TRACER ELEMENTS BIBLIOGRAPHY NO. 7. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Oct 31, 1947. 8p. (NP-482)

12658

RADIOELEMENTS IN ABSORPTION AND NUTRITIONAL

INVESTIGATIONS; TRACER ELEMENTS BIBLIOGRAPHY NO. 8. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Nov. 3, 1947. 25p. (NP-483)

12659

APPLICATIONS OF RADIO-ISOTOPES IN BIOCHEMISTRY; TRACER ELEMENTS BIBLIOGRAPHY NO. 9. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Nov. 3, 1947. 3p. (NP-484)

12660

USE OF RADIO-ISOTOPES IN GENERAL PATHOLOGY AND CANCER; TRACER ELEMENTS BIBLIOGRAPHY NO. 11. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Dec. 7, 1947. 7p. (NP-486)

12661

RADIOELEMENTS IN THE STUDY OF THE DIGESTIVE, EXCRETORY AND GLANDULAR SYSTEMS; TRACER ELEMENTS BIBLIOGRAPHY NO. 12. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Dec. 18, 1947. 8p. (NP-487)

12662

RADIOELEMENTS IN HYGIENE, TOXICOLOGY AND PHARMACY; TRACER ELEMENTS BIBLIOGRAPHY NO. 13. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Dec. 17, 1947. 3p. (NP-488)

12663

STUDY OF BONE WITH RADIOELEMENTS; TRACER ELEMENTS BIBLIOGRAPHY NO. 14. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Jan. 28, 1948. 5p. (NP-489)

12664

THERAPY WITH ARTIFICIAL RADIOELEMENTS; TRACER ELEMENTS BIBLIOGRAPHY NO. 15. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Jan. 28, 1948. 5p. (NP-490)

12665

STUDY OF TEETH AND SALIVA WITH RADIOELEMENTS; TRACER ELEMENTS BIBLIOGRAPHY NO. 16. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Mar. 24, 1948. 5p. (NP-491)

12666

RADIOISOTOPES IN EMBRYOLOGY; TRACER ELEMENTS BIBLIOGRAPHY NO. 17. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Feb. 16, 1948. 3p. (NP-492)

12667

STUDY OF MUSCLE WITH RADIOELEMENTS; TRACER ELEMENTS BIBLIOGRAPHY NO. 18. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Feb. 16, 1948. 3p. (NP-493)

12668

APPLICATION OF RADIOELEMENTS OF BRAIN, NERVE, AND SENSE ORGANS, TRACER ELEMENTS BIBLIOGRAPHY NO. 19. T. H. Oddie. Council for Scientific and Industrial Research, Australia. Feb. 16, 1948. 2p. (NP-494)

12669

THE GENETICALLY SIGNIFICANT RADIATION DOSE FROM THE DIAGNOSTIC USE OF X-RAYS IN ENGLAND AND WALES. S. B. Osborn and E. E. Smith. Lancet 270: 949-53(1956).

12670

EFFECTS OF REACTOR ACCIDENT ON PLANT AND COMMUNITY. H. M. Parker. Arch. Ind. Health 13: 441-2(1956).

12671

PROBABLE ACTIVATION OF H IN AQUEOUS

SOLUTIONS BY X-RAYS. C. Piffault. Bull. Soc. Chim. Biol. 24: 211-13 (1942).

Irradiation of water by x rays results in the production of H_2O_2 and activated hydrogen. The hydrogen in turn may react with O_2 to form additional H_2O_2 or may escape as molecular hydrogen. CA 39-2927⁸

12672

RADIATION TOLERANCE AND GENETIC EFFECTS. H. H. Plough. Nucleonics 10: 16-20 (1952).

12673

GENETIC EFFECTS OF FAST NEUTRONS FROM NUCLEAR DETONATIONS. H. H. Plough and C. W. Sheppard. (AEC, Div. of Biol. and Med.) Jan. 1954. 66 p. (WT-820)

12674

THE USE OF RADIOACTIVE ISOTOPES IN STUDIES OF PLANT FERTILIZATION. I. M. Polyakov. p. 139-44 of CONFERENCE OF THE ACAD. OF SCIENCES, USSR, ON THE PEACEFUL USES OF ATOMIC ENERGY, JULY 1-5, 1955. SESSION OF THE DIVISION OF BIOLOGICAL SCIENCE (Translation) 6 p. (AEC-tr-2435 (Pt. 4) (139-44))

12675

THE USE OF C^{14} IN STUDIES OF THE PHYSIOLOGY OF OIL-STORING PLANT FRUITS. V. E. Pontovich. p. 155-62 of CONFERENCE OF THE ACAD. OF SCIENCES, USSR, ON THE PEACEFUL USES OF ATOMIC ENERGY, JULY 1-5, 1955. SESSION OF THE DIVISION OF BIOLOGICAL SCIENCE. (Translation) 8 p. (AEC-tr-2435 (Pt. 4) (155-62))

12676

MEDICAL ASPECTS OF THE CONTROL OF RADIOLOGIC HEALTH PROBLEMS. Clinton C. Powell. Am. J. Public Health 47: 179-83 (1957).

12677

IONIZING RADIATIONS. THEIR PRODUCTION, EFFECTS AND UTILIZATION (WITH SPECIAL REFERENCE TO FOOD AND PACKAGING TECHNOLOGY). BIBLIOGRAPHIC SERIES NO. 4. Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill. May 1954. 218 p. (NP-5214)

12678

IONIZING RADIATIONS THEIR PRODUCTION, EFFECTS AND UTILIZATION (WITH SPECIAL REFERENCE TO FOOD AND PACKAGING TECHNOLOGY). Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill. Bibliographic Series No. 4. Suppl. 1 and 2. Subject Index. Aug. 1955. 536 p. (NP-5792)

12679

IONIZING RADIATIONS: THEIR PRODUCTION, EFFECTS, AND UTILIZATION (WITH SPECIAL REFERENCE TO FOOD AND PACKAGING TECHNOLOGY). Quartermaster Food and Container Institute for the Armed Forces, Chicago, Ill. Bibliographic Series No. 4. Suppl. No. III June 1956. 251 p. (NP-6088)

12680

H-BOMBS WITHOUT FALLOUT. E. Rabinowitch. Bull. Atomic Scientists 12 (7) 234 and 264 (1956).

12681

APPLICATION OF MATHEMATICS TO THE EVALUATION OF BIOLOGICAL EFFECTS OF X RAYS. J. A. Reboul. Amer. J. Cancer 37: 273-287 (1939).

Summary. A theory is given of the action of x rays upon biological elements (populations, in general) taking into account the fact that in certain cases all the hits may not be effective. This leads to the introduction of a correction term into Crowther's formula. This correction term has been studied and curves are presented showing the importance it may have in certain cases. The few experimental works available fit the theory.

12682

SELECTED BIBLIOGRAPHY ON ANALYSIS OF CERTAIN RADIOACTIVE ELEMENTS IN BIOLOGICAL MATERIALS. David Revinson. New York Operations Office, AEC. Health and Safety Lab. Dec. 7, 1956. 19 p. (NYO-4702)

12683

United Kingdom Atomic Energy Authority. Research Group, Atomic Energy Research Establishment, Harwell, Berks, England.

AN ASSESSMENT OF THE HAZARDS RESULTING FROM THE INGESTION OF FALLOUT BY GRAZING ANIMALS. R. S. Russell, R. P. Martin and G. Wortley. Sept. 17, 1956. 29 p. (AERE-ARC/RBC-5)

12684

ON THE RADIOELEMENTS OF FISHES CONTAMINATED BY THE NUCLEAR BOMB TEST. M. Saiki. Japan Analyst 7 (7) 443-9 (1957).

12685

EXTERNAL RADIATION - THE RELATIONSHIP OF ACUTE AND DELAYED EFFECTS AND A SUGGESTED METHOD OF TREATMENT. Crawford F. Sams. (California Univ. Richmond. Inst. of Engineering Research) Aug. 30, 1957. 213 p. (NP-9488)

12686

RADIOACTIVE CONTAMINATION OF FISH IN WATER CONTAINING STRONTIUM. M. M. Saurov. Trudy Vsesoyuz. Konf. po Med. Radiol., Voprosy Gigeny i Dozimetrii, 66-73 (1957). 14 p. (AEC-tr-3746)

12687

EFFECT OF ROENTGEN AND RA RADIATION ON THE FE METABOLISM WITH SPECIAL REFERENCE TO THE BEHAVIOR OF ADENOCARCINOMA. J. Schuck. Arch. Gynakol. 172: 521-46 (1942).

Serum Fe level was 30% below the average for normal women in 44 patients with adenocarcinoma. Author suggest that low Fe levels may be due to migration of Fe into the R-E system and perhaps to increased Fe demand (demonstratable histochemically) of the growing tumor. A small rise in serum Fe usually occurred after Ra therapy and a marked rise to levels about 25% above the initial value, after x ray therapy. After 3 months of combined Ra and x ray therapy, serum Fe content was elevated above normal. Four rabbits also showed a rise in serum Fe after x irradiation.

12688

THE EXPOSURE OF MAN TO IONIZING RADIATION, WITH SPECIAL REFERENCE TO POSSIBLE GENETIC EFFECTS. R. M. Sievert. WHO Report on Genetic Effects of Radiation, paper submitted to a Study Group on the Effect of Radiation on Human Heredity, Copenhagen, August 7-11, 1956.

12689

THE STATUS OF LENTICULAR OPACITIES CAUSED BY ATOMIC RADIATION. R. M. Sinskey. Am. J. Ophthalmol. 39: 285 (1955).

12690

USE OF C^{14} AND P^{32} IN THE STUDY OF THE SYNTHETIC FUNCTIONS OF ISOLATED CHLOROPLASTS. N. M. Sisakyan. p 113-20 of CONFERENCE OF THE ACAD. OF SCI., USSR, ON PEACEFUL USES OF ATOMIC ENERGY, JULY 1-5, 1955. SESSION OF THE DIVISION OF BIOLOGICAL SCIENCE. (Translation) 8 p. (AEC-tr-2435 (Pt. 4) (p. 113-20))

12691

RADIOACTIVITY IN MAN AND HIS ENVIRONMENT. F. W. Spiers. Brit. J. Radiology 29: 409-417 (1956).

12692

THE QUANTITY OF RADIATION RECEIVED BY THE REPRODUCTIVE ORGANS OF PATIENTS DURING

ROUTINE DIAGNOSTIC X-RAY EXAMINATION. R. W. Stanford and J. Vance. *Brit. J. Radiol.* 28: 266-73 (1955).

12693

A STUDY OF CARBOHYDRATE METABOLISM IN ANIMAL ORGANISM WITH THE AID OF RADIOACTIVE CARBON. B. N. Stepanenko. p. 181-8 of CONFERENCE OF THE ACAD. OF SCI., USSR, ON THE PEACEFUL USES OF ATOMIC ENERGY, JULY 1-5, 1955. SESSION OF THE DIVISION OF BIOLOGICAL SCIENCE. (Translation) 8 p. (AEC-tr-2435 (Pt. 4))

12694

THE RADIOLOGICAL DOSE TO PERSONS IN THE U.K. DUE TO DEBRIS FROM NUCLEAR TEST EXPLOSIONS. N. G. Stewart, R. N. Crooks and E. M. R. Fisher. (Atomic Energy Research Establishment, Harwell, Berks, England. June 1955. 27 p (AERE-HP/R-1701))

12695

THE ROLE OF MUTATION AND OF SELECTION IN THE FREQUENCY OF MUTANTS AMONG MICRO-ORGANISMS GROWN ON IRRADIATED SUBSTRATE. W. S. Stone et al. *Proc. Nat. Acad. Sci. U.S.* 34 (No. 4) 142 (1948).

Organism *Staphylococcus aureus*. Mutations mutants are penicillin resistant and streptomycin resistant from stock strain grown in irradiated broth.

12696

EDUCATION IN RADIATION PROTECTION. Lauriston S. Taylor. *Am. J. Roentgenol., Radium Therapy Nuclear Med.* 73 193-202 (1955).

12697

PRELIMINARY NOTES ON THE EFFECT OF RONTGEN RAYS ON THE SULFONIMIDES *IN VITRO*. I. C. C. Tchaperoff. *Radiology* 41, 61-3(1943).

Solutions of sulfanilamide and sulfathiazole (1 mg. in 10 ml. to 20 mg. in 10 ml. of water) were irradiated with x-rays of 200 kV without filtration. For the detn. of the sulfonamides the Marshal method was used. Both compounds were altered by irradiation in such a way that the pink color of the Marshal test was prevented to develop. The exact nature of the compounds produced by irradiation has not been elucidated according to the author. CA 37-5549⁸

12698

STUDY OF THE NITROGEN NUTRITION AND METABOLISM OF PLANTS WITH THE USE OF N¹⁵ ISOTOPE. F. V. Turchin, M. A. Guminskaya, and E. G. Plyshevskaya. p. 145-54 of CONFERENCE OF THE ACAD. OF SCI., USSR ON THE PEACEFUL USES OF ATOMIC ENERGY, JULY 1-5 1955. SESSION OF THE DIVISION OF BIOLOGICAL SCIENCE (Translation). 10 p. (AEC-tr-2435 (Pt. 4))

12699

EFFECTS OF SOFT X-RAYS ON UREASE AND CATALASE. A. A. Tytell and H. Kersten. *Proc. Soc. Exptl. Biol. Med.* 48 521-5 (1941).

Effects of soft x-rays on crude urease, crystalline urease, crude catalase and crystalline catalase are described. Sensitivity of the enzymes to the irradiation is dependent upon purity and concentration. Results are given which are in accordance with the observations of Dale on the effects of hard x-rays on polyphenol and carboxypolypeptidase. CA 36-787⁹

12700

SOME PAPERS ON THE EFFECTS OF RADIATIONS OF BACTERIA AND MOULDS. United Kingdom Atomic Energy Authority. AERE-Inf./Bib. -51, 50p. (1949).

12701

RADIOACTIVITY IN THYROID GLANDS FOLLOWING NUCLEAR WEAPONS TESTS. L. VanMiddlesworth. *Science* 123 982-83 (1956).

12702

C¹⁴ IN THE STUDY OF THE METABOLIC RATE IN YEAST AND LACTIC ACID BACTERIA. I. Y. Veselou, V. M. Levacheva, and E. G. Frolova. p. 163-72 of CONFERENCE OF THE ACAD. SCIENCES, USSR ON THE PEACEFUL USES OF ATOMIC ENERGY, JULY 1-5 1955. SESSION OF THE DIVISION OF BIOLOGICAL SCIENCE. (Translation) 10 p. (AEC-tr-2435 (Pt. 4))

12703

DETERMINATION OF Sr⁹⁰ AND Ba¹⁴⁰ IN BONE, DAIRY PRODUCTS, VEGETATION AND SOIL. H. L. Volchok, J. L. Kulp, W. R. Eckelmann and J. E. Gaetjer. *N. Y. Acad. Sci. Ann.* 71 (2) 293-304 (1957).

12704

Division of Technical Information Extension, AEC. RADIATION SHIELDS AND SHIELDING, A BIBLIOGRAPHY OF UNCLASSIFIED REPORT LITERATURE. Hugh E. Voress. Dec. 1, 1954. 16p. (TID-3032(Suppl.1))

12705

Division of Technical Information Extension, AEC. ZIRCONIUM. A BIBLIOGRAPHY OF UNCLASSIFIED REPORT LITERATURE. Hugh E. Voress and T. W. Scott, comps. Sept. 1955. 41p. (TID-3010(Suppl.2))

12706

THE EFFECT OF MOMENTARY X-RAY EXPOSURE IN A SMALL DOSE UPON THE PERIPHERAL BLOOD PICTURE. M. Wakabayashi and F. Kawamura. (Hokkaido Univ., Sapporo Japan). 8 p. 1956. (A/AC.82/G/R-43)

12707

THE 1948 RADIOLOGICAL AND BIOLOGICAL SURVEY OF AREAS IN NEW MEXICO AFFECTED BY THE FIRST ATOMIC BOMB DETONATION. PARTS I AND II. Stafford L. Warren. California Univ. Los Angeles. Atomic Energy Project. Oct. 12 1949. 99 p. (UCLA-32)

12708

BIOLOGICAL CONCENTRATION BY KILLER CLAMS OF COBALT-60 FROM RADIOACTIVE FALLOUT. H. V. Weiss and W. H. Shipman. *Science* 125 695 (1957).

12709

DISTRIBUTION OF CARBON AMONG THE ORGANIC SUBSTANCES FORMED BY PHOTOSYNTHESIS. O. V. Zalensky. p. 127-38. CONFERENCE OF THE ACAD. OF SCIENCES, USSR ON THE PEACEFUL USES OF ATOMIC ENERGY, JULY 1-5, 1955. SESSION OF THE DIVISION OF BIOLOGICAL SCIENCE. (Translation) 12 p. (AEC-tr-2435 (Pt. 4))

12710

ACTION OF RADIATIONS ON THE EXCITABILITY OF SYMPATHETIC AND VAGAL NERVES STUDIED BY MEANS OF CLINICAL TESTS. A. Zimmern and P. Charlley-Bert. *C. R. Soc. Biol.* 100 717 (1929). (In French).

12711

RADIOACTIVITY OF FISHES. IV. ANALYSIS OF FISH ASHES. F. Obo, Chikanori Wakamatsu and Y. Hiwatashi. *Medicine and Biol. (Japan)* 36 32-5 (1955).

12712

REACTOR SAFETY BIBLIOGRAPHY. Atomic Energy Commission, Div. of Reactor Devel. May 1957. 24 p. (AECU-3589(Rev))

12713

ISOTOPES, AN EIGHT YEAR SUMMARY OF U.S. DISTRIBUTION. Atomic Energy Commission. Washington, U. S. Government Printing Office (1955).

12714

REFERENCE ON THERAPEUTIC AND TRACER USES OF RADIOISOTOPES. A BIBLIOGRAPHY OF USEFUL AND SIGNIFICANT PAPERS IN THIS FIELD. Atomic Energy Commission. 1950. 66p. (DD-5)

12715

MAJOR ACTIVITIES IN THE ATOMIC ENERGY PROGRAMS, JANUARY-JUNE, 1952. U. S. Atomic Energy Commission. U. S. Government Printing Office, Washington 25, D. C. , 131p. (1952).

12716

MAJOR ACTIVITIES OF THE ATOMIC ENERGY PROGRAMS, JANUARY-JUNE, 1953. U. S. Atomic Energy Commission. U. S. Government Printing Office, Washington 25, D. C., 116p. (1953).

12717

MAJOR ACTIVITIES IN THE ATOMIC ENERGY PROGRAMS, JULY-DECEMBER, 1953. U. S. Atomic Energy Commission. U. S. Government Printing Office, Washington 25, D. C., 159p. (1954).

12718

MAJOR ACTIVITIES IN THE ATOMIC ENERGY PROGRAMS, JANUARY-JULY, 1954. U. S. Atomic Energy Commission. U. S. Government Printing Office, Washington 25, D. C., (1954).

12719

MAJOR ACTIVITIES IN THE ATOMIC ENERGY PROGRAMS, JULY-DECEMBER, 1955. U. S. Atomic Energy Commission. U. S. Government Printing Office, Washington 25, D. C. (19th semiannual report to Congress by the U. S. Atomic Energy Commission) (1955).

12720

MAJOR ACTIVITIES IN THE ATOMIC ENERGY PROGRAMS, JANUARY-JUNE, 1957. U. S. Atomic Energy Commission. U. S. Government Printing Office, Washington, D. C. (1957).

12721

RADIOACTIVE FALLOUT PROBLEM (WITH LIST OF

REFERENCES). U. S. Federal Civil Defense Administration. U. S. Government Printing Office, Washington, D. C. 1955. 3p. (FCD-19-1)

12722

RADIATION PRESERVATION OF FOOD. Army Quartermaster Corps, Washington, D. C. U. S. Army Research and Develop. Series, No. 1, 461p. (1957).

12723

DAMAGE FROM POINT MUTATIONS IN RELATION TO RADIATION DOSE AND BIOLOGICAL CONDITIONS. (World Health Organization, Geneva). Feb. 5, 1957. 50 p. (A/AC.82/G/R.58/Add. 1)

12724

EFFECT OF RADIATION ON HUMAN HEREDITY' REPORT OF A STUDY GROUP. (World Health Organization, Geneva). Jan. 24, 1957. 150 p. (A/AC.82/G/R.58). Presented at the International Congress of Human Genetics held at Copenhagen in August 1956.

12725

RADIOBIOLOGICAL RESURVEY OF RONGELAP AND AILINGINAE ATOLLS, MARSHALL ISLANDS, OCTOBER-NOVEMBER 1955. (Washington. Univ., Seattle. Applied Fisheries Lab.). Dec. 30, 1955. 91 p. Contract AT(45-1)-540. (UWFL-43)

The radiobiological survey showed a great variability in the materials contributing to the radioactivity of various samples. In coconuts and marine animals, no traces of Sr^{90} have been found; in other land plants the Sr^{90} constituted 2 to 5% of total activity, and in the skeletal salts of land crabs up to 50%. Only small amounts of radioactive cesium were found in marine animals, but in some of the land plants it contributed up to 100% of the total activity; however, the marine animals contained more Ce^{144} than the land plants.

12726

PRELIMINARY REPORT CONCERNING X-RAY EFFECTS UPON CHINOOK SALMON (ONCORHYNCHUS TSCHAWYTSCHA WALBAUM) OBSERVED THROUGH MORE THAN ONE GENERATION. (University of Washington Applied Fisheries Laboratory). (nd). 46p. (UWFL-6)

Observations upon irradiated adult chinook salmon and their young before planting and observations upon the returned spawners and their offspring.