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FLUORIDATION: A MODERN PARADOX IN SCIENCE AND PUBLIC POLICY

(Revised to Include Three Sets of Congressional Hearings).

CONGRESSIONAL RESEARCH SERVICE

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Preface to the Revised Edition

The purpose of this revision of the original CRS report of February, 1970 on "Fluoridation: A Modern Paradox in Science and Public Policy" is to restore the study to print and to expand it to include three different sets of Congressional Hearings on the fluoridation issue. Also included is a summary of the World Health Organization's 1970 monograph on "Fluorides and Human Health."

For the readers familiar with the original report, this revision (except for minor changes) contains that report in toto. The new materials consist of the following, as listed in the Table of Contents:

Appendix E. Fluorides and Human Health (WHO)

Appendix F. The Fluoridation Issue in the 82nd Congress (1952)

Appendix G. The Fluoridation Issue in the 83rd Congress (1954)

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A Final Comment

FLUORIDATION: A MODERN PARADOX IN SCIENCE AND PUBLIC POLICY

I. Introduction

This study was originally prepared to expedite responses to the many congressional and constituent requests for information on the hazards and benefits of fluoridation, and as a case study in science and public policy. In particular, it represents a phase of technology assessment in which the ultimate decision is often made by referendum to the voters of a community, yet in which the data for decision-making are commonly expressed in the relative terms familiar to scientists. Although the public is not trained in the use of these terms and is unfamiliar with the factual substance of the issue, nevertheless the public is expected to arrive at the best choice for its own welfare.

The paper is by no means a complete treatment of the topics it introduces. Nevertheless, an attempt is made to determine why fluoridation (which is only one of several chemical treatments utilized in processed water supplies and widely accepted scientifically as a safe and effective procedure in the reduction of dental disease) remains unexploited in so many communities of the Nation. This attempt re-

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Pages 1-69 are reproduced from Technical Information for Congress, a Report to the Subcommittee on Science, Research, and Development of the Committee on Science and Astronautics, U.S. House of Representatives, 92nd Congress, 1st Session, Prepared by the Science Policy Research Division of the Congressional Research Service, Library of Congress, April 15, 1971.

quired a search of the principal sources and nature of the public resistance to fluoridation and discussion of a small sample of the technical criticism and doubts raised among anti-fluoridationists.

New data on the effects of fluoride on older people are included in Section VII, and recent events with respect to advice and approval of fluoridation appear in the Summary. Section VIII and Appendix A represent the author's special emphasis on the question of long-term low-level effects of fluoride and on the question of fluoride levels in the natural water-cycle environment. Appendix B is a short review by an expert on the safety of fluoridation, and Appendix C is the story of fluoridation in Philadelphia in regard to the effectiveness of the treatment.

The conclusion of the study is one which the author finds to be almost compelling: namely that fluoridation is both safe and effective in the amounts recommended. The controversy as of now is "no contest" from the *strictly medical point of view.* The issue is clearly something else, no matter how frequently it is made to appear to be a matter of contrasting scientific opnion. This "something" involves the very important questions of religious freedom, individual rights, and self determination in matters of health. The paper deals with some of these difficult questions in the section on "Fluoridation in the Courts", but the reader is referred to the many sources cited for a more complete discussion.

Early in his administration, President Nixon abruptly disposed of fluoridation as a national political issue by declaring, February 2, 1969, that he "reaffirmed our goal of opening for all our children a ready access both to preventive measures such as fluoridation, and to a full regimen of personal dental care." As for water fluoridation, the President declared it "a highly effective method for the prevention of tooth decay."

II. What Is Fluoridation?

Fluoridation is the deliberate adjustment of the fluoride content of public water supplies to a level of approximately one part per million of fluoride for the purpose of reducing tooth decay. It is accomplished by adding to water, which usually already contains some natural fluoride, sufficient small amounts of additional chemicals to bring the fluoride ion content up to the desired concentration. The chemicals in common use for this purpose are sodium fluoride, sodium silico-fluoride and hydrofluosilicic acid.

The process is favored by medical and dental authorities in general and by the U.S. Public Health Service in particular. Some 10,000,000 Americans have a naturally fluoridated water supply, which with the addition of 5,000 communities now adjusting the fluoride content of their water, brings the total population using fluoridated water to 92,000,000 in the United States.

Although millions of people have been drinking naturally fluoridated water for generations and some at fluoride levels up to 8 mg or more per liter,* the artificial fluoridation of water remains a controversial matter. Objections have been made to it by persons who are persuaded that water so treated will be harmful. It is argued that since excessive amounts of fluoride are toxic, or at least produce some mottling of teeth, lesser amounts of the chemical may be dangerous to health in the long run. Other opponents of fluoridation, who may or may

* 8 ppm

not agree with either the demonstrated benefits or alleged risks, simply state that the procedure violates constitutional rights, that it represents unlicensed practice of medicine and dentistry, and that it is mass medication.

Controlled fluoridation is possible only where processed water is made available. Water departments provide it when State laws require it, when public officials are free to authorize it, or when a community referendum is conducted and the outcome favors it.

Referendum on a specific and predominately scientific issue like fluoridation may be an extraordinary way of reaching a policy decision, particularly on a question which has been so thoroughly evaluated in the public forum and by the scientific and medical community. Education of large numbers of voters on the efficacy and safety of fluoridation is difficult: people are often confused by information supplied by those determined to pass or defeat an issue at the polls. In the four States (Maine, Massachusetts, New Hampshire and Nebraska) which require a public referendum in every decision to fluoridate or not to fluoridate a community water supply, the percentage of the population on fluoridated public water is low. These States, however, are not the only ones where public sentiment against the process runs high, nor are they the only ones where the voter is confronted with the issue When the voter *is* confronted with the issue, either because of State or local laws or because opponents have initiated referendum petitions against fluoridation, the likelihood of adoption is less than 50 percent. According to Sapolsky, [1] in 952 referendums held on the issue from 1950 to 1966 fluoridation was rejected in 566 cases. Although time and experience continue to demonstrate the efficacy and safety of fluoridation, the voter's position is increasingly negative, having reached a rejection rate of 90 percent in 1960 for cities 10,000 and over in population.[2]

Of 22 communities voting on this issue on November 8, 1960, only six voted affirmatively while in 16 fluoridation of the community's water supply was rejected * * *. Fluoridation has proved to be more acceptable to the larger communities of this Nation. Thus by the end of 1959, 61 percent of all communities with populations over 500,000 had fluoridated water. The comparable percent in smaller communities were: 500,000–100,000, 35 percent; 100,000–10,000, 34 percent; under 10,000, 8 percent.[3]

III. The Origin of Fluoridation

The resistance of teeth to cavities as a result of adequate intake of fluorides was an accidental discovery. As early as 1901 observations were conducted on the cause of discoloration of teeth. By 1931 the cause of such tooth mottling was determined to be the ingestion of excessive fluorides in certain water supplies. It was observed, however, that these mottled teeth were also conspicuously resistant to cavities. This was in 1938, and there immediately followed a series of epidemiological studies which subsequently established the protective effect against caries of drinking water containing about 1 ppm of fluoride. The result of this series of studies, published by Dean *et al* in 1941

[1] Harvey M. Sapolsky. "Science, Voters, and the Fluoridation Controversy." Science (October 25, 1968), pages 427-432. See also: Harvey M. Sapolsky. "The Fluoridation Controversy: An Alternative Explanation." Public Opinion Quarterly (Summer 1969), pages 240-248.

[2] R. Crain. Social Forces (Volume 4, 1966), page 470.

[3] Monroe Lerner and Odin Anderson. "Health Progress in the United States: 1900-1960" (University of Chicago Press, 1963), page 200.

and 1942,[4] was based on 7,257 children 12 to 14 years old in 21 cities of four different states with a natural high or low fluoride content in the public water supply.

Following these early observations a half dozen communities in 1945 in the United States initiated water fluoridation. The communities were also selected for study in such a way that they were equivalent to a large scale clinical trial. By 1965 as a result of the outcome of the trials hundreds of communities and millions of Americans were using fluoridated water, together with 41 other countries, including Canada and Ireland. Long-range studies were conducted on many of these community populations and there is now a voluminous literature on fluoride ingestion as related to dental caries in man. Documented studies on thousands of children in the United States and Canada "have demonstrated without doubt that the low caries prevalence observed in children living in areas with fluoridated water persists during adult life." [5]

IV. How Serious and Extensive Is the Dental Caries Problem?

"Dental caries is one of the most prevalent and widespread diseases in the world * * *. In countries where dental surveys have been carried out, it has been found that almost the entire population is affected by dental caries and its consequences * * *. Numerous studies have been made on the prevalence of caries among children in many countries, and it has been shown repeatedly that the average child reaching school age has many carious teeth * * *. The carious lesions increase progressively in size, frequently leading to considerable suffering and eventual loss of teeth. * * * Secondary infection from the septic mouth may have far reaching effects on general health * * *. Throughout the world, dental decay represents an economic drain upon both health services and individuals * * *. As in the case of any disease, the ideal solution of the problem is prevention * * *. Drinking-water containing about 1 ppm fluoride has a marked caries-preventive action. Maximum benefits are conferred if such water is consumed throughout life. Controlled fluoridation of drinking-water is a practicable and effective public health measure." [6]

"Although not a contagious disease, dental caries—or tooth decay—presently constitutes one of the most challenging health problems in the United States."[7]

"It has been estimated that 180 million residents of the U.S. in 1960 may have had at least 700 million unfilled cavities." [8]. Probably 20% of the population has never even seen a dentist, and it is well known that half of the population over 55 years of age have no natural teeth whatsoever.[9]

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[4] H. R. Dean, et al. "Domestic Water and Dental Caries. V. Additional studies of the relation of fluoride domestic waters to dental caries experience in 4425 white children, aged 12 to 12 years of 13 cities in 4 States." Public Health Reports (Vol. 57, August 7, 1942), pages 1155-79, and "A study of white children, aged 12-14 years, of 8 suburban Chicago communities including Lactobacillus acidophilus studies of 1,761 children." Public Health Reports (Vol. 56, April 11, 1941), pages 761-92.

[5] Abraham E. Nizel. "The Science of Nutrition and Its Application in Clinical Dentistry," second edition. (Philadelphia, W. W. Saunders, 1966), pages 331-47.

[6] "Expert Committee on Water Fluoridation," (World Health Organization, Geneva, 1958), pages 1, 4, 21.

[7] George A. Strong. "Liberty, Religion and Fluoridation", Santa Clara Lawyer (Fall, 1967), page 37. (From Postgraduate Medicine (1960), page 647.)

[8] Lerner and Anderson, op cit, page 187.

[9] R. Roemer. "Water Fluoridation: Public Responsibility and the Democratic Process," American Journal Public Health (Vol. 55, 1969), page 1338.

In a recent survey of public schools in Oakland, California it was shown that 65 percent of the children between the ages of 5 and 12 had at least one decay in a permanent tooth.[10]

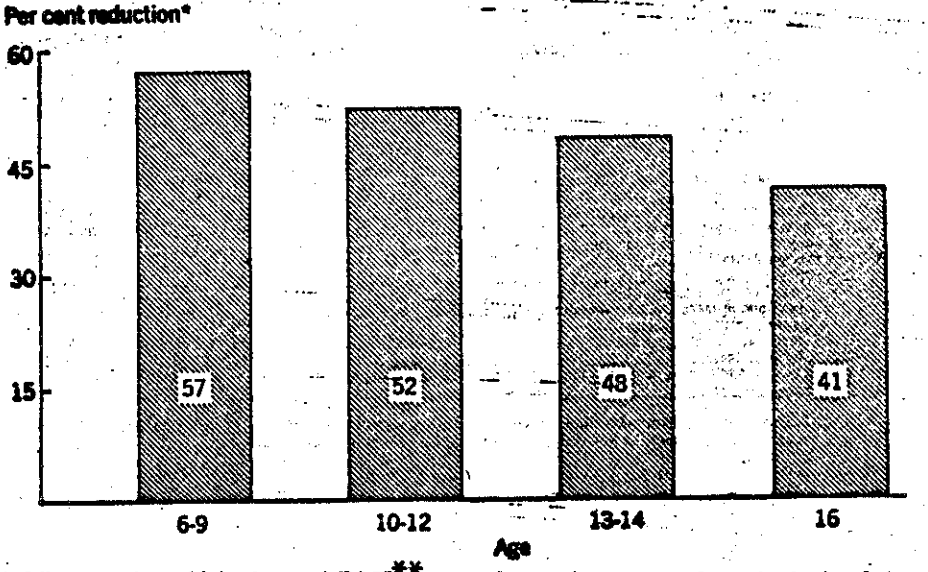
"The average child in Massachusetts at the age of 14 has lost 1 tooth from caries and has had 4 teeth filled with 7 others in need of filling." [11]

"A 1965 survey indicated that two-thirds of the Head Start children across the country were already in need of dental repairs." [12]

V. What Was the Newburgh-Kingston Study?

It is perhaps because of the aforementioned prevalence of dental cavities and the loss of teeth during middle age that the so-called "classical fluoride trials" were conducted. One of these trials is known as the Newburgh-Kingston study. Newburgh, New York, had been fluoridating (1–1.2 ppm.) its water supply since 1945, whereas nearby Kingston, New York had always had non-fluoridated water (0.05 ppm.). About ten years later (1954–55) it was decided to examine the teeth of children in these two communities and to compare the presence of caries. The results were published in 1956 and are shown in the chart below:

Reduction in DMF Rates, by Age, Due to Fluoridation, Newburgh, New York, 1954-55 13/



* Per cent by which observed DMF** rate was lower than expected on the basis of the Kingston experience.

[10] O. Natham and R. D. Scott. "Fluoridation in California: An Unresolved Public Policy Issue." University of California Public Health Reports (No. 2, 1966).
[11] J. M. Dunning. "Current Status of Fluoridation," New England Journal of Medicine (Vol. 30, 1965), page 84.
[12] Natham and Scott, op. cit, supra note 3.
** DMF means decayed, missing, or filled.
[13] David B. Ast, et al. "Newburgh-Kingston Caries-Fluorine Study . . . ." Journal of the American Dental Association (LII, March 1956), pages 314-25.

It will be noted that the children aged 6–9 benefited most from the use of fluoridated drinking water, but at the time this study was done this age group was the only one which had been using such water all their lives. The proportion of children in this "all their lives" (6–9 years of age) group with all 12 primary teeth present and caries-free was over five times higher in the fluoride community than in the non-fluoride community. These results have been verified and approximately duplicated by the data from many other studies conducted in other parts of the country.[14] The Newburgh studies (where water was being fluoridated) included an extensive pediatric research program.

The Newburgh and Kingston communities have also been used to compare dental costs for children in fluoridated and non-fluoridated areas. A six-year cost analysis, still in progress,* shows that the cost for providing initial dental care is over twice as high in the non-fluoridated city as in the fluoridated city.[15]

The Aurora-Rockford, Illinois study is one of the more recent ones and involved the comparison of 18 and 19 year olds on lifetime consumption in young adults of natural optimum and low fluoride water. The optimum fluoride water (Aurora) had approximately the same level of fluoride as in artificially or controlled fluoridation. The data table from this study is included below because it is believed that for some readers the results are not only more easily understood than in the Newburgh-Kingston study but also cover a wider spectrum of overall dental health:

DENTAL CARIES EXPERIENCE FOR 260 NATIVE RESIDENTS, AGED 18 AND 19 YEARS, OF AURORA (1.2 p.p.m. F), AND ROCKFORD (0.1 p.p.m. F) ILL. 1960-61[1]

Clinical exam only	Aurora	Rockford
Number of persons	160	100
Decayed teeth (per person)	0.45	
Missing teeth (per person)	0.11	
Filled teeth (per person)	5.55	10.43
D.M.F. teeth (per person)	[2] 6.11±0.36	11.90±0.40
D.M.F. tooth surfaces (per person)	9.70±0.72	25.30±1.50
Average number of teeth with open lesions (per person)	0.52	1.80
Percentage of persons:		
Caries free	12.5	0.0
With caries free upper anterior teeth	78.0	43.0
With loss of one or more first permanent molars	3.0	16.0
Clinical and roentgenographic exam:		
D.M.F. teeth per person	7.31	13.37
D.M.F. tooth surfaces	12.20	28.80
Average number of additional proximal lesions discovered with roentgenograms	2.5	3.5

[1] Harold R. Englander. The Aurora-Rockford, Ill. study I. Effects of water having naturally occurring fluoride on dental health of young adults, Journal of the American Dental Association November 1962, p. 618.
[2] Standard error.

VI. The Nature and Extent of the Scientific Consensus

The biological effects of fluorides have been described in over 3,000 clinical and experimental reports in the past 30 years. This work, as the World Health Organization states, has not been the monopoly of one science, but includes contributions of scientists from different disciplines—biologists, physiologists, toxicologists, chemists, veterinarians, pathologists, physicians, and dentists, in many countries of the world. This field of research, like all others, is not free of scientific

[14] Lerner and Anderson, op. cit, p. 197.
[14] Lerner and Anderson, op. cit., p. 197.
[15] David B. Ast, et al. "Time and cost factors to provide regular periodic care for children in a fluoridated and non-fluoridated area: Progress Report II." American Journal of Public Health (September 1967), pages 1635-1642. ("Final Report". Journal of the American Dental Association, April 1970, pages 770-6).

* now completed (see Ref 15, above)

controversy; however, the great majority of findings fit together in a consonant whole indicating both the efficacy and safety of fluoridation. The body of evidence is without precedence in public health procedures.[17] A sampling of statements drawn from the literature of this consensus is provided below:

Numerous studies indicate that, after ingestion of fluoride levels of 2 to 8 p.p.m. for about 5 years, intake and excretion approach a state of balance; therefore it can be stated without any reasonable doubt that the ingestion of water containing 1 p.p.m. of fluoride cannot cause osteofluorosis, even under the unrealistic assumption that only one-quarter of the fluoride is excreted.[18]

It is obvious that acute poisoning associated with fluoridation of water can be produced only if between 250 to 4,000 times the usual concentration of fluoride is added.[19]

The toxic hazard of the cumulative action of small amounts of fluoride taken over long periods of time is the principal question concerning the safety of fluoridation. Studies along these lines have been conducted on populations consuming both naturally and artifically fluoridated waters. Mortality data from these studies "show that there is no significant difference in the general death rates between areas where fluoride is present and those where it is absent. Similiarly, there is no significant difference in the risk of death from specific diseases such as heart disease, cancer, nephritis and diabetes." [20] As the reference indicates, this conclusion is based on mortality statistics in Illinois; however, similar conclusions have been reached in Michigan, Wisconsin, North Carolina, and Ontario.[21]

With respect to pediatric studies involving 2,050 children, "no consistent relation was observed between the skeletal development and the fluoride content of the water." [22]

In areas where large population groups have consumed flouridated water, the height and weight patterns of boys and young men are normal.[23]

Among several autopsy studies conducted in connection with fluoridation are those performed on 728 individuals who had been in residence in Colorado Springs for as long as 20 years or more. Colorado Springs has a community water supply in which there is a natural fluoride level of 2.5 p.p.m. The autopsies were performed between 1947 and 1953. The examinations showed "no significant difference which could be related to prolonged residence in this environment." [24]

"Medical studies on child and adult populations consuming water containing metabolically significant concentrations of fluoride do not reveal any systemic ill effects that may be attributed to ingestion of fluorides. No significant differences have been detected in the mortality data obtained from high-fluoride and low-fluoride areas. Necropsy studies do not show any significant differences between fluoride-exposed and control groups that could be related to fluoride intake. Adjustment of the fluoride content of water supplies to a level of 1.0

[17] "Expert Committee on Water Fluoridation (First Report)," WHO Technical Report Series No. 146 (Geneva, 1958), page 16.
[18] George H. Beaton and E. W. McHenry. "Nutrition." (New York, Academic Press, 1964), page 426.
[19] Ibid, page 43.
[20] Illinois State Department of Health, Bureau of Statistics, Special Release No. 20 (1952).
[21] Beaton, and McHenry, op. cit. p. 433.
[22] H. B. McCauley and F. J. McClure, Public Health Reports (vol. 69), page 671.
[23] W. A. Connell, "Medical and Dental Aspects of Fluoridation," (London, H. K. Lewis Co., 1960), page 58.
[24] E. F. Geever, et al. Journal of American Dental Association (Vol. 56, 1958), page 499.

p.p.m. of fluoride is beyond any reasonable doubt a medically safe procedure." [25]

"The results from many independent, controlled fluoridation studies confirm the beneficial relationship between fluoride and dental caries as originally observed in naturally fluoridated areas. The statistical importance of such corroborative evidence cannot be overemphasized. The trend of the studies in controlled and naturally fluoridated areas is toward approximately 60% reduction in caries for permanent teeth and somewhat less protection for deciduous teeth.[26]"

"It may be stated that no conclusive experimental evidence exists supporting the hypothesis that fluorine is essential in order to support life in man or in animals.[27]" However, whether or not fluorine is a dietary essential hinges on semantics. The body cannot synthesize fluorine and fluorine is known to be essential to the integrity of teeth. "Studies indicate beyond any reasonable doubt that fluorine in human and animal nutrition promotes a resistance of teeth to dental caries beyond that offered by an adequate diet." [28]

"Fluoride is present in small but widely varying amounts in practically all soils, water supplies, plants, and animals and thus is a normal constituent of all diets. Highest concentrations in mammals are found in bones and teeth. Fluoride is incorporated in the structure of teeth and is necessary for maximal resistance to dental caries. For these reasons, it is considered to be an essential nutrient. Its protective role is particularly evident during infancy and early childhood and persists through adult life. Some studies have suggested a possible function of fluoride in the maintenance of bone structure, but further investigation is required. The value of fluoride in the treatment of osteoporosis and Paget's disease is still under investigation."

"Standardization of water supplies by addition of fluoride to bring the concentration to 1 p.p.m. has proved to be a safe, economical, and efficient way to reduce the incidence of tooth decay—a very important nutritional public health measure in areas where natural water supplies do not contain this amount."

"Concentration of fluoride in public water supplies should be varied slightly to accommodate for differences in water consumption with seasonal temperature changes. The range of safety in fluoride intake is wide enough for safe accommodation of normal fluctuations in the fluoride content of foods without risk of inducing the first identifiable indication of an excess—slight mottling of the enamel. Extensive medical and public health studies have clearly demonstrated the safety and nutritional advantages that result from fluoridation of the water supply. In communities where fluoridation has been introduced, the incidence of tooth decay in children has been decreased up to 50 percent or more. The Food and Nutrition Board recommends fluoridation of public water supplies where it is needed because of low fluoride concentration." [29]

"One of the great scientific breakthroughs of our era was the discovery that the addition of fluoride to a community's supply of drinking water would materially lessen the total amount of dental decay

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[25] Beaton and McHenry, op. cit., page 436.
[26] Ibid, page 445.
[27] Ibid, page 454.
[28] Ibid, page 454.
[29] "Fluorine, Recommended Dietary Allowances." A Report of the Food and Nutrition Board. 7th ed., 1968. (Washington, D.C., National Academy of Sciences), page 55.

among children in both primary and permanent teeth. In addition, there can no longer be any doubt that this simple preventive measure is convenient, inexpensive, and safe * * *. The evidence is by now conclusive that fluoridation of a community's supply of drinking water substantially reduces the amount of dental decay in that community, particularly among children who have been drinking fluoridated water all their lives." [30]

"Small concentrations of fluorides in drinking water reduce the prevalance of dental caries. Excessive amounts of fluorides are definitely associated with the mottling of teeth. Fluorides, therefore, must be regarded as both a beneficial and a dangerous mineral * * *. Fluoridation has become firmly established as an effective and economical health measure. The process is recommended as a proven scientific procedure and as an accepted adjunct of water-treatment processes." [31]

"The caries prophylactic effect of fluoridated water ingested during the years of tooth development has been amply demonstrated. The evidence is incontrovertible that fluoride, at optimum concentration in potable water, will prevent the onset of dental caries by approximately 60 percent among children who ingest this water starting early in life. These benefits continue into adult life. The caries*, requiring fewer and less extensive filling and fewer teeth to be extracted and replaced with artificial teeth." [32]

"Experiments in controlling the fluoride content of water took an unexpected and significant turn when it was observed that children born at Bauxite, Arkansas, after a new water supply had been obtained, showed a much higher incidence of caries than those who had been exposed to the former fluoride-containing water * * *. It has now been definitely established on the basis of large-scale studies in a number of communities that the fluoridation of water to a concentration of 1.0 p.p.m. is a safe and practical public health measure that results in substantial reduction in the incidence of caries in permanent teeth." [33]

"Present knowledge of the relationships between fluoride and dental health stems from a noteworthy series of epidemiologic investigation commencing in 1908 with the investigation of the cause of *mottled enamel* by the Colorado Springs (Colorado) Dental Society * * *. It has been established that mottled teeth occur in persons who have drunk water containing in excess of 1.5 mg. of fluoride per liter during the years of tooth development. An important incidental finding has been that the occurrence of caries is minimal in those communities whose drinking water provides 0.9 mg. of fluoride per liter. The fluoridation of other communal water supplies to bring the fluoride content to 1.0 mg. per liter has resulted in a significant decrease in the incidence of dental caries * * *. Since the quantity of fluoride used is much too small to inhibit bacterial metabolism, it has been assumed that the fluoride in some manner increases the ability of the teeth to withstand the usual cariogenic influences.[34]

[30] Lerner and Anderson, op. cit., pages 187 and 198.
[31] John W. Clark and Warren Viessman, Jr. "Water Supply and Pollution Control." (Scranton, Pa., International Textbook Company, 1963), page 232.
[32] David B. Ast, et al. "Time and Cost Factors to Provide Regular, Periodic Dental Care for Children in a Fluoridated and Non-fluoridated Area." American Journal of Public Health (June, 1965), page. 811.
[33] Louis Goodman and Alfred Gilman. "The Pharmacological Basis of Therapeutics," third edition. (New York, Macmillan, 1965), page 817.
[34] Abraham, Philip Handler, and Emil Smith. "Principles of Biochemistry," third edition. (New York McGraw-Hill, 1964), page 786.

* insert: prophylactic effect results in fewer teeth which succumb to caries,

"Fluorine is a constituent of bone and the skeletal system. Small amounts of this halogen protect teeth to some extent against decay. This useful function now seems beyond doubt * * *. Fluorine in excessive amounts is toxic (fluorosis, enzyme toxicity) but the difference between the therapeutic and toxic amounts is great." [35]

"We know without question or doubt, that one part per million fluoride in a water supply is absolutely safe, is beneficial, and is not productive of any undesirable systemic effect in man.[36]

"There is a difference between systemic fluorine administration (by use of potable water) and topical fluoride application. In the pre-eruptive period, the water-borne fluorine is built into the tooth structure in the process of tooth development, and is permanently fixed as fluorapatite. The most benefit is derived from ingestion of fluoridated water from birth." [37]

"The results . . . appear to indicate conclusively that the addition to drinking water of fluoride to a concentration of 1 part per million is a safe procedure which is likely to result in a substantial reduction (65 percent) in the incidence of dental caries in permanent teeth." [38]

"As a practical matter, there's only one way to include it [fluoride] that is at once highly effective, fully safe and inexpensive for large-scale use—fluoridation of a community's water system. Children who drink fluoridated water for the first eight years of their lives average 60 percent less decay than those who grow up without benefit of fluoride. The resistance to decay continues throughout life, particularly for those who continue drinking fluoridated water. Evidence, already voluminous, continues to pile up that fluorides in the amounts needed for decay prevention are unquestionably safe for people of all ages and for the chronically ill as well as the healthy, and that community fluoridation is by far the best measure now available to bring a drastic cut in the incidence of a widespread disease." [39]

"A review of the literature on the effects of fluoride ingestion indicates that previous estimates of the factors of safety inherent in water fluoridation are still sound. Reinvestigation of some earlier studies reporting undesirable effects of low levels of fluoride has revealed that the reported ill effects were due to causes other than fluoride ingestion. The evidence still indicates that water fluoridation to reduce dental caries is a safe public health measure." [40]

"It is generally agreed that fluorine is the only known agent ordinarily included in food and water that is capable of exercising mass control of dental caries. It is effective during the period of calcification of the crown of the tooth and through the period of eruption. Among the authorities who have studied the problem it is agreed that the simplest, and cheapest and the most far-reaching method of ensuring adequate fluoride is through the fluoridation of the drinking water. This procedure will supplement, but not supplant, other dental health measures." [41]

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[35] Paul Beeson and Walsh McDermott. "Cecil-Loeb Textbook of Medicine." (Philadelphia, Asunders, 1967), page 1143.
[36] "Water Fluoridation: Facts, Not Myths." By Louis L. Dublin. Public Affairs Pamphlet No. 251B (1957), page 13.
[37] Jacob Yardeni. "Theory and Practice of Caries Prophylaxis." Dental Digest (February 1969), page 56.
[38] Arthur Ossal, Robertson Pratt, and Mark Altshule. "The United States Dispensatory," 26th edition Philadelphia, Lippincott Co., 1967), page 1047.
[39] "Tooth Decay and Pyorrhea." Consumer Reports (March 1969), pages 143-144.
[40] Frank A. Smith. "Safety of Water Fluoridation." Journal of American Dental Association November) 1962), page 598.
[41] Helen S. Mitchell, et al. "Cooper's Nutrition in Health and Disease," 15th Edition. (Philadelphia, Lippincott Co., 1968), page 233.

"In a nine-year survey of more than 500,000 recruits at the Great Lakes Naval Training Center in Illinois, a caries immunity frequency (no tooth cavities) of only two men per thousand was found, the largest proportion of these lucky men coming from Texas. According to Comdr. J. J. Keane of the Naval Dental Institute * * *. Texas, with many of its water supplies containing natural fluoride, is one of our best states and consistently provides us with more caries-free men each year than all the giant population areas of New England, New York, and New Jersey combined. Approximately 50% of cavity-free recruits, however, begin to develop one or more cavities during their first year of Navy life." [42]

VII. The Nature of the Opposition

"The fluoridation of public water supplies is opposed by many people on two accounts: (1) it introduces a hazard to health, and (2) as it is generally impractical to provide an alternative water supply, to which fluoride has not been added, it is impossible for an individual to opt out of a fluoridation scheme. The compulsion to drink the treated water is considered as an interference with a fundamental right of an individual to a choice in what he consumes...

"Nowhere in [some five national or international] reports is there any evidence to suggest that the addition of fluoride to the drinking water increased the incidence of any disease or indeed had any effect on the health of the people, *except for the benefit to the children's teeth.*

"This conclusion was tested in Dublin High Court in 1963. Eminent scientific medical and dental workers from many countries gave evidence in a case arising from a challenge to the position of fluoridation in the Irish Constitution. The hearing lasted 65 days. In his judgment the Hon. Mr. Justice Kenny commented on the passionate conviction, even fanaticism, of the witnesses opposing fluoridation, but stated that in his opinion fluoridation, as proposed, did not involve any element of risk to health.

"The opposition to fluoridation [said the Justice] comes from those who react emotionally to any suggestion of an enforced alteration in the natural quality of their food and drink." [43]

The authors quoted above state there are still many people in Britain vigorously opposing fluoridation and they express the hope that opponents may find a more creative outlet for their crusading zeal.

In the United States some fluoridation opponents associate fluoridation with communistic subversion. A characteristic rumor which may reinforce such fear is:

"In Russia fluorine was added to milk given babies in order to weaken their wills and make them more amenable to dictatorship when they grew up. This method was used following the revolution in 1917. Is the American Public going to be 'doped' into submission to dictatorship here? " [44]

It should, of course, be clear by now that dictatorships are not chemically induced. If chemicals were to be used in a dictator "take over," there is a long list of agents which would be more likely to succeed than fluoride, even if the latter were used in high concentrations.

[42] "Texas Teeth," Parade's Special Intelligence Report, Parade, The Washington Post (April 20, 1969), page 4.
[43] Sir Stanley Davidson and R. Passmore, "Human Nutrition and Dietetics,"(Baltimore, The Williams and Wilkins Co., 1969), pages 178–179.
[44] Herrstrom. Journal of American Dental Association, (Vol. 71, 1965), page 1158.

Many disorders or afflictions of human beings have been *alleged* to be caused or worsened by the consumption of fluoridated water. (The literature as of nearly a decade ago mentioned over a hundred conditions involving all of the systems of the human body.) One or more of these allegations has contributed to the defeat of fluoridation in hundreds of referendums and the discontinuation of fluoridation even after it was started. There were 143 such discontinuations as of March 1965, some perhaps for financial and technical reasons.[45] One discontinuation resulted from complaints of various symptoms before the engineers had actually gotten around to fluoridating the water. Also as of 1965, 32 communities had reinstated fluoridation after overcoming whatever objections or difficulties may have been involved. In one case, that of Antigo, [ ] fluoridation was reinstituted by vote after statistics showed a sharp increase in tooth decay in children over a three year period of nonfluoridation. Wisconsin

The objections to fluoridation based upon various disorders and afflictions attributed to fluoridated water have been examined in several scientific and medical articles. Most of these disorders together with other types of objections, are reviewed and answered by Elwell and Easlick of the University of Michigan in a document entitled, "Classification and Appraisal of Objections to Fluoridation" (1960). A similar treatment of the subject was published by the British Dental Association in 1969 entitled, "Fluoridation of Water Supplies: Questions and Answers." Another source is "The Role of Fluoride in Public Health", prepared by The Kettering Laboratory, University of Cincinnati, 1963.

Few of the summary materials by the proponents of fluoridation, identify or attack by name the individual scientist who has raised one or more objections to fluoridation. One exception to this practice was made in the case of Dr. Leo Spira, who according to the British Dental Association[46] reported damage to the teeth from natural fluoridation in England and claimed to show that fluoridation caused constipation, paraesthesia, boils, urticaria, alopecia, brittle nails and dermatosis. The British Dental Association, in the document cited above, stated that Dr. Spira examined 5,019 military personnel from all over Britain and that 1,099 had mottled teeth due to fluoride. The association states that this incidence of dental fluorosis is scientifically unacceptable because Dr. Spira did not establish a relationship between early residence in high and low fluoride areas and that he failed to make a distinction between true fluoride mottling and white spots on the teeth arising from non-fluoride causes. Also, while Dr. Spira reported that those 1,099 individuals who had white spots on one or more of their teeth also had a considerable list of other signs and symptoms (as identified above), he did not give the incidence of these disorders among the approximately 4,000 individuals who exhibited no tooth mottling. In other words, his conclusion that fluoridation caused these conditions is not valid, at least not from his data.

Another example of incorrect epidemiological conclusions advanced by antifluoridationists involves a number of published statements in 1961–62 which alleged that populations in the U.S. supplied with fluoridated water reveal an increased incidence of cancer. The con-

[45] Robert E. Clark, "Fluoridation: The Courts and Opposition" Wayne Law Review, (Vol. 13, 1966), page 339.
[46] "Question and Answers" op. cit, page 14.

clusions are based upon statistics purported to show that the incidence of cancer of the thyroid gland in San Francisco is 400 percent above the normal prevalence. The statistics are correct (that is the number of cases of diagnosed cancer of the thyroid in San Francisco from 1950 to 1953) but this information as it relates to fluoridation and normal prevalence of thyroid cancer is totally misleading. The facts are as follows:

> The San Francisco figures relate to hospital diagnosis of cancer of the thyroid for the years 1950–53 inclusive, *18 cases having been found in 1950, 26 in 1951, 29 in 1952,* and *36 in 1953*. Fluoridation of approximately two-thirds of the water supply did not begin until August 1952 and of the whole city water supply until 1955. The rise if indeed it was anything more than a chance fluctuation or a failure to find all the cases in 1950, therefore began before fluoridation commenced. The 400 percent is completely misleading since this refers to the average number of cases during the four years 1950–1953 being four times as great as a hypothetical expected number derived from studies in other cities.
>
> These figures obviously do not support the contention that cancer has increased as a result of fluoridation. The death rates in San Francisco from cancer of the thyroid and from cancer (all causes) have, when corrected for differences in the age of the population, shown no increase during the ten years of fluoridation.[47]

The ranks of antifluoridationists include a few columnists. A representative mix of controversial assertions including some related to fluoridation, appeared in a recent column by James J. Kilpatrick in *The Evening Star* (Washington). The column is entitled, "Fluoridated Water Enjoys Sanctified Status":

> Recent actions by the Government in regard to cyclamates and DDT remind me, somehow, of recent nonactions by the Government in regard to fluoridation of public water supplies. My train of thought also passes by a junction known as genetics. Stay aboard for a moment * * *.
>
> Now, it is a curious thing about the fluoridation of public water supplies. Over the last 20 years, 4,400 American communities with a population of 78 million have added a fluoride to their drinking water to reduce decay in children's teeth. Most dentists believe the additive is safe and effective. But this view is not universally held.
>
> In March, John Lear, science editor of Saturday Review, reported upon published papers by scientists of impeccable reputation, warning that fluoridation may have dangers after all. One paper came from Dr. Gerald Posen of Canada, citing the grave damage that results when fluoridated water is used in the dialysis baths of artificial kidneys.
>
> Relatively speaking, the fluoride that flows through a dialysis bath is like the cyclamate fed to laboratory rats; it is a massive proposition. But the reaction of U.S. health officials to Lear's article and Posen's paper was pooh-pooh. The American Dental Association will not even listen to such evidence.
>
> This transpired last month, when D. A. Allen London of Boonton, N.J., an expert in the field, sought a chance to speak at an ADA-sponsored symposium on fluoridation. There is mounting evidence, he said, showing the possibility of side effects from lifetime ingestion of fluoride-treated drinking water. He proposed to present a scholarly summary of these findings.
>
> On Oct. 3, he received this reply from Mary Bernhardt, secretary of the Council on Dental Health of the ADA:
>
> > "The type of presentation which you are suggesting might have been appropriate a generation ago when the early scientific studies on fluoridation were being carried out. The theme of the Symposium is not controversy, but additional documentation of the universality of experience of the safety and effectiveness of fluoridation, world over. Presentation of the type of paper you propose would be an insult to the scientific community today!"
>
> In brief, fluoridation of water must be accepted, like the intellectual equality of races, as absolute dogma, not ever to be examined by anyone. Cyclamates and DDT have no such privileged standing. Away with them! But fluoridation—a compulsory process of mass medication—has become an article of faith. What price consistency in the domain of Robert Finch? [48]

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[47] Ibid, pages 12–14.

[48] James A. Kilpatrick, "Fluoridated Water Enjoys Sanctified Status," The Evening Star (Nov. 20, 1969), page A–11.

With regard to the above article the following points may be noted:

1. The Public Health Service recommends that water used in hemodialysis not only be de-fluoriated but also be de-ionized generally.

2. Cyclamates and DDT have been subject to rulings primarily under the Food, Drug and Cosmetic Act concerning cancer in animals. The data on these and similar substances are in no way comparable to that on the effects of fluoridation on human beings.

3. Fluoridation is not a matter of "absolute dogma"; it is a matter of the great preponderance of scientific and medical evidence. This is how medical science progresses. It could be wrong—it has been wrong before—but it does not appear to be in this case. (See other sections of this study and also *Fluorine and Dental Health: the Pharmacology and Toxicology of Fluorine*, edited by Joseph Muhler and Maynard Hine, Indiana University Press, Bloomington, 1959)

On November 24, 1969, Congressman John R. Rarick introduced Mr. Kilpatrick's column in the *Congressional Record* and reminded the House of Representatives that he had introduced a bill (HR 10900) on May 5, 1969 to control the use of public funds in such mass medication (fluoridation).[49] On May 14, 1969 Congressman James J. Delaney (author of the so called Delaney amendment under which Secretary Finch acted on the cyclamates) also introduced an antifluoridation bill HR 11239).[50] Although the two bills are similar in intent, the differences are interesting enough to justify their reproduction here as follows:

H.R. 11239—By Mr. Delaney

To prohibit the expenditure of Federal funds by the Secretary of Health, Education, and Welfare to promote the fluoridation of public water supplies.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, notwithstanding any other provision of law, no part of any funds appropriated, or otherwise available, for expenditure by the Secretary of Health, Education, and Welfare shall be expended to promote, directly or indirectly, the fluoridation of public water supplies.

H.R. 10900—Mr. Rarick

A bill to prohibit the expenditure of Federal funds by the Secretary of Health, Education, and Welfare to promote the fluoridation of public water supplies.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress Assembled, That, notwithstanding any other provision of law, no part of any funds appropriated for research, or otherwise available, for expenditure by the Secretary of Health, Education, and Welfare shall be expended to promote, subsidize, or propagandize for fluoridation of public water supplies. Nor shall any such funds be expended to ridicule, dissuade, or disparage the opponents of fluoridation of public water supplies.

Many of the objections to fluoridation have appeared in campaign literature prior to a referendum on fluoridation. An example of the gamut of anti-fluoridation arguments in such campaigns is that circulated by the City Clerk of San Jose, California in 1964. It reads as follows:

Warning! Sodium fluoride used in artificial fluoridation is corrosive, deadly Class A poison; waste product from aluminum, steel, fertilizer manufacture;

[49] Congressional Record, (May 5, 1969), pages H 11350-51.
[50] Congressional Record, (May 14, 1969), page H 3669.

accumulative in the body; used as rat poison and insecticide. State Drug Act classifies it with arsenic and cyanide. United States Dispensatory (1950) reports it 'violent poison to all living tissues.'

Don't confuse fluoridation with chlorination. Chlorine purifies water. Fluoride treats bodies of consumers with a dangerous drug. Boiling increases danger. Don't give Public Health Service authority to add drugs to public water supplies. What would be next? * * *

Disfiguring dental fluorosis (mottled teeth) may occur in one out of five children. Some people are allergic to fluorine; others develop chronic symptoms of poisoning later. Experiments with mice show life span shortened by 9%. Increase in Mongoloid (idiot) births and retarded cell growth was recently proved due to fluoridation. Promoter's own statistics prove fluoridation does not prevent decay, merely delays onset; thereafter, decay same or worse. Then why fluoridate?

Saturday Review reports 170 cities which adopted fluoridation have discontinued programs as unsatisfactory. Last year's score: 43 fluoridation elections in U.S.: 4 acceptance, 39 defeats.

Fluorides accumulate in pipes—causing corrosion. Replacements costly. Extremely wasteful! For each $1,000 spent on fluoridation, less than 25¢ worth reaches children supposed to benefit. Children drink different amounts of water. How can each get intended dose? Tablets or drops added to children's milk are safer, cheaper, providing controlled dosage. Why force everyone to drink chemicals they neither need or want? Freedom of choice is precious! Let's keep it. Safe, pure water is priceless! Protect it! Vote "No." [51]

Apart from the propagandist tone of this piece, its purported factual content is largely irrelevant or unsupported. The fears it may engender are not warranted by circumstances to which it is addressed.

The inability of the voting public to resolve scientific questions on the basis of information supplied in such campaign literature can be seen in the antifluoridationist's comparisons of fluoride with arsenic. What is done here is to take advantage of the prevailing fearful attitudes toward arsenic, whereas actually the role and hazards of arsenic in living systems is an extremely complicated scientific subject. Arsenic, like fluoride, has been assigned sole blame for biochemical feats that no arsenical could really do. Indeed it may come as a surprise to many that organic arsenicals have been experimented with to improve health and well-being—that arsenic is present in seafoods and that such "high arsenic" foods are non-injurious to mammals and man—that nontoxic levels of arsenicals may have unrecognized beneficial effects in bone formation—and that in combination with other trace elements arsenicals may even have a hitherto unsuspected value in maximizing the integrity of teeth.[52] Trace element metabolism is regarded as being in a golden era of research, both because of suboptimal levels in the human diet (such as fluoride) and because of the accumulation of cadmium, lead, and mercury in the environment as a result of urbanization and industrialization.

The role of a host of mineral elements, in health and disease is under investigation.[53] Studies on the effects of soft and hard water, including its lithium content, on heart disease and death rate are also being intensified.[54] [55] [56] There can be little doubt that new results, conclusions,

[51] R. E. Clark, op. cit., page 344.
[52] Douglas V. Frost, "Arsenicals in biology—retrospect and prospect," Federation Proceedings, (January-February 1967), pages 194–208.
[53] "Trace Element Metabolism in Animals and Man," British Medical Journal (August 9, 1969), pages 352–3.
[54] T. W. Anderson, et. al. "Sudden Death and Ischemic Heart Disease." New England Journal of Medicine (April 10, 1969), pages 805–7.
[55] A. W. Voor. "Lithium Content of Drinking Water and Ischemic Heart Disease." New England Journal of Medicine (November 13, 1969), pages 1132–3.
[56] Paul H. Blackly. "Lithium Content of Drinking Water and Ischemic Heart Disease." New England Journal of Medicine (September 18, 1969), page 682.

and recommendations concerning the composition of public water supplies will eventually emerge from research of this type. And it can be expected, on the basis of the precedent set by the fluoridation controversy, that the layman will be forced to struggle his way through the over-simplified literature of opposition and the altogether too complex literature of controlled epidemiological experimentation. If the choices are considered too important to be left entirely in the hands of "experts", then the involvement of laymen will require more information than can be gleaned from the public media. And as Reif says, those who attain positions of leadership from which they are called upon to make decisions in scientific and medical matters must "have sufficient awareness of modern science to be free from misconceptions * * *." [57]

One misconception concerns prevailing notions of what and when a chemical substance may be regarded as a poison. Some substances possess toxic properties over a wide range of concentrations and are naturally poisonous (rattlesnake venom) or designed by man to be poisonous (nerve gas). With other substances the situation is a matter of quantitative relationships. For example, oxygen may be poisonous at high concentrations by volume (oxygen toxicity). Nitrogen, an otherwise biologically inert gas, is poisonous when its partial pressure exceeds that in the normal atmosphere (nitrogen narcosis). This quantitative relationship between a biological system and a chemical often yields surprising results, especially among some of the trace elements, like fluorine and manganese. With respect to the latter and the bean plant, 3,000 ppm will kill the plant, 1000 ppm will cause it to become diseased, 200 ppm is required for healthy growth of the plant, 30 ppm is too little manganese and will again cause the plant to become diseased, and complete absence of manganese will result in the death of the plant.[58]

Similarly, the fact that large concentrations of fluoride make it a metabolic poison or that large concentrations of fluoride are indeed used in rat poisons, does not justify the conclusion that fluoride, *per se* is a poison in the concentrations used for fluoridation of water. As a poison in water the concentration would have to be in the order of 250 to 4000 ppm; cumulative effects of fluoride can be beneficial, undesirable, or hazardous, depending on the concentration of fluoride present in the water or in food and water. The biological effects of ingesting different amounts of fluoride over long periods of time are summarized in the table below:

[57] F. Reif. "Science Education for Nonscience Students." Science (May 30, 1969), pages 1032-37. See also: "Medicine and the Laity." (Editorial.) Journal of the American Medical Association (August 25, 1969), page 1214.

[58] From an article by Dr. G. K. Kohn as introduced in the Congressional Record, (Sept. 8, 1969), page E 7234.

BIOLOGICAL EFFECTS OF FLUORIDE AT DIFFERENT CONCENTRATIONS [59]

Concentration of fluoride (p.p.m.)	Vehicle	Effect
1 and over	Water	Dental caries reduction (in man).
2 and over	do	Fluorosed enamel (in man).
8 and over	do	Osteofluorosis (in man).*
50 and over	Food or water	Thyroid changes (experimental animals).
100 and over	do	Growth retardation (experimental animals).
125 and over	do	Kidney changes (experimental animals).

[59] Source of table: Beaton and McHenry, op. cit., p. 431 (table modified from Smith and Hodge).
* (Osteofluorosis is discussed below in Section VIII.)

"Fluorosed enamel in man" in this table signifies white flecks or mottling of the teeth which may occur in some children (perhaps 20%) consuming water containing 2.0 ppm fluoride during the time that the crowns of the teeth are formed (about the first 8 years of life). When these flecks develop the effect is cosmetic, depending on how one feels about it,—not toxic. Even the osteofluorosis which occurs in man when exposed chronically*to excessive amounts of fluoride (8 ppm and over) develops in only 10% of populations so exposed.[60]

If fluoride is a poison irrespective of quantitative considerations or in amounts recommended for drinking water (as much of the anti-fluoridation literature states); then it is clear that those who hold this view must also be quite selective in the amount and types of foods which they eat. The average adult will consume about 0.3 ppm from dry food substances even if he should go out of his way to acquire fluoride-free drinking water. Assuming that the natural fluoride content of the drinking water is 0.7 ppm or more, as it is in some 2,630 mostly small communities in the United States, it would follow that the total for food and water is 1 ppm. This means (in antifluoridationist terms) that the entire Nation is being "poisoned" a little bit and 8 to 10 million people are being "poisoned" even more, without the intervention of the fluoridated water treatment process at all. The fluoride content of different foodstuffs grown in the United States is shown in the table below:

CONCENTRATION OF FLUORIDE IN VARIOUS FOODS [61]

(In parts per million (p.p.m.))

Food	Average	Range
Animal products:		
Beef	0.9	0.2–2.0
Pork	1.2	0.2–3.3
Chicken		1.4
Lamb		1.2
Cow's kidney, dry weight	7.7	6.9–10.1
Cow's heart muscle, dry weight	2.5	2.3–2.7
Cow's liver, dry weight	5.5	5.2–5.8
Mackerel (dried)	25.51	0.02–84.47
Salmon	8.55	4.16–19.34
Oysters	1.24	0.65–1.58
Sardines (canned)	9.2	7.3–12.5
Eggs	.4	0.00–1.48
Cow's milk	.17	0.07–0.55
Cow's milk (F in drinking water, 8 p.p.m.)	.30	0.2–0.5
Cheese		1.62
Butter		1.50
Vegetable products (fresh weight):		
Citrus fruit	.17	0.03–0.36
Noncitrus fruit	.34	0.00–1.32
Cereals and cereal products	.57	0.10–4.00
Wheat germ, commercial	2.8	1.7–4.0
White flour, wheat		0.3–0.4
Cotton seed meal		20.0–31.0
Soybeans		1.3
Beans	.13	0.11–0.15
Cabbage	.31	0.12–0.80
Potatoes	1.19	0.07–6.4
Spinach	.78	0.21–1.8
Miscellaneous Substances:		
Tea	55.51	3.2–398.8
Coffee	.90	0.2–1.6
Wine	.88	0.00–6.34

[60] Ibid, page 431.
[61] Ibid., p. 419 (table adapted from Cholak and from McClure).

*(many years)

Another misconception is that fluoridation benefits only the younger members of the population (age 1–12) at the possible risk of most of the older members who must drink the same water.

Part VIII of this report implies on theoretical grounds—evolution and adaptation to natural fluoride in the geochemical environment—that varied plants and animals, including human beings, are more likely to have found a beneficial use for fluoride through natural selection than to become sick from it. In fact, water-related fluoride intoxication is endemic only in certain regions of India and Arabia where the fluoride concentration and intake is extremely high. In the United States fluoride intoxication has occurred primarily from accidental ingestion of fluoride-containing insecticides or prolonged inhalation of industrial dusts such as those produced by the aluminum mining and phosphate fertilizer industries. This intoxication is not age-related except as a function of body weight.

A survey of 170,000 residents of Texas and Oklahoma who were ingesting water containing fluoride concentrations of about 8 ppm revealed only 23 persons with evidence of increased osseous radiopacity, but even those with such increased bone density were not ill. These geographic areas have never been known to be productive of an endemic fluoride disease in old people. Other parts of Texas where fluoride ingestion has been as high as 16 mg. each day for one to five decades did not increase the incidence of disease in people at any age. So far as can be determined, Texas is neither peculiarly endemic for a particular disease of aging nor does it show higher disease and death rates for any of the conditions which Steyn, [62] for example, attributes to fluoridated water. Among the conditions mentioned by this opponent of fluoridation are: heart disease, cancer, stroke, diabetes, arteriosclerosis, and embryological abnormalities (mongolism). The "DeBakey report" on heart disease, cancer and stroke [63] (and these are primarily though not exclusively associated with increased age) mentions differences in death rates in States and regions, but these in no way correspond to either natural or artificial fluoridated community water supplies.

What now appears to be "endemic" in drinking water containing relatively high levels of fluoride is not skeletal disease but rather improved skeletal integrity, especially that for older members of the population.[63a] Recent evidence strongly suggests that lifelong ingestion of fluoride at a level of 2–6 ppm may significantly reduce the incidence of crippling bone diseases which often accompany the aging process. This evidence thus far shows that there are fewer collapsed vertebrae, and fewer broken hips, limbs and deaths from falls among elderly individuals with a history of such levels of fluoride ingestion. Another observation in the same body of evidence, but still in need of confirmation, is that there are also fewer cases of calcification of the aorta in older men and women. Fluoride may assume an important role in

[62] Douw G. Steyn, "The Problem of Chronic Fluorine Poisoning with Special Reference to the Role Played by This Halogen in the Preservation and Destruction of Teeth and Bone," address delivered before the Annual General Meeting of the South African Dental Association, Pretoria, South Africa, April 21, 1961. (In this address Dr. Steyn states that "after having conducted both laboratory and field investigations into chronic fluorine poisoning for some 23 years, the speaker came to the conclusion that artificial fluoridation of public water supplies, in order to combat tooth decay, is wasteful, undemocratic, unscientific, illegal, immoral, unethical, and dangerous to human health, especially to children. Further, many millions of people seriously object to the drinking of artificially fluoridated water on religious grounds." He also notes that fluoridation of drinking water supplies is not practiced in the Soviet Union because it does not permit individual dosage, control of consumption by children according to age, and because of apprehension over its toxic effects. The author provides no data in this address to support his many and varied conclusions).

[63] "Report to the President: A National Program to Conquer Heart Disease, Cancer and Stroke," (Washington, D.C., U.S. Government Printing Office, December 1964.)

[63a] The number of persons aged 65 and over in the United States today is nearly 20 million.

the already complicated picture of atherosclerosis. Thus, the two main diseases of aging—osteoporosis (spongy bone) and hardening of the arteries—may be prevented in part by fluoridated water, and perhaps may be more completely prevented by additional fluoride ingestion in the form of selected foods, tablets, or simply drinking the water in naturally high fluoride areas.

The hypothesis that drinking water containing insufficient amounts of fluoride was associated with weakened bone structure in the adult population was advanced by Leone and associates in 1960.[64] The theory came from a comparison of radiographic evidence of osteoporosis in Framingham, Massachusetts (0.4 ppm fluoride) with similar observations in two communities in Texas where the water contained 8 ppm fluoride. The comparisons showed a much greater incidence of osteoporosis in Framingham.

However, all such associations are inconclusive, and even more so when other differences or factors exist as they did between the communities in Texas and Massachusetts. Therefore, a group of scientists and physicians from Harvard decided that additional comparisons were needed in areas where the population and environment were more nearly alike and where also there were marked differences in the fluoride content of the water supply. These conditions were found in North Dakota. Small towns were selected in northeastern and southwestern parts of the State where the natural fluoride levels in the water supply were 0.15–0.30 ppm and 4.0–5.8 ppm respectively. X-rays of the lumbar area of the spine were obtained from over 1000 subjects from these two regions who agreed to participate in the study. They were men and women over the age of 45.

Osteoporosis, and collapsed vertebrae were substantially higher in the low-fluoride area, especially in women. Bone density in women (which usually decreases with age, thus weakening the skeleton) was only about one half as prevalent in the high fluoride areas as in the low fluoride areas, where 85% of the women over 65 showed evidence of it. Collapsed vertebrae in women over 65 were over three times as prevalent among the low fluoride group as among the higher fluoride group.

Among men, collapsed vertebrae were prevalent in both groups with no significant difference between high and low fluoride intake. On the other hand, men showed a striking difference in calcification of the aorta (the main artery leading from the heart) in all of the age groups. This difference was also observed in the X-rays of women, but it was less pronounced. As Hegsted notes:

> In men, known to be more susceptible than women to atherosclerotic heart disease, calcification of the aorta was reduced in the high fluoride areas.[65]
>
> The data to date [he says elsewhere] appear to warrant the conclusion that fluoride is the most important etiologic factor in osteoporosis. Considering the estimates of the number of adults in our aging population with severe demineralization and assuming, according to the data from North Dakota, that appropriate intakes of fluoride can cut this number in half, fluoride deficiency is probably the primary nutritional deficiency in the United States. If one includes any estimate of the benefit derived from fluoride in preventing dental caries, there is no doubt of the truth of this statement.[66] [67]

[64] N. C. Leone, et al. "The effects of the absorption of Fluoride. II. A radiological investigation of five hundred and forty-six human residents of an area in which the drinking water contained only a minute trace of fluoride." AMA Archives of Industrial Health, (Vol. 21, 1960), pages 326+.

[65] D. M. Hegsted. "Osteoporosis and Fluoride Deficiency." Postgraduate Medicine, (January 1967), page A 50.

[66] Ibid., page A-53.

[67] See also: D. S. Bernstein, et. al. "Prevalence of Osteoporosis in High- and Low-Fluoride Areas in North Dakota," Journal of the American Medical Association, (October 31, 1966), pages 499-504.

As Shambough states:

With advancing years, fluorine appears more necessary to maintain the calcium content of bones.[68]

Patients with various types of metabolic bone disease also come into the fluoride picture. Those treated deliberately with 10 to 44 mg./day resulted in a lowering of urinary calcium excretion, induction of a modest positive calcium balance, reduction in bone pain, reduction in further vertebral collapse, and a larger and more perfect bone crystal.[69]

It is not proposed that community water fluoridation be increased to levels of 4–6 ppm to prevent the development of osteoporosis, aching backs, collapsed vertebrae, fractured bones, and calcified arteries among the older segment of our population; and certainly not increased to treatment levels of 10 to 44 ppm for metabolic bone disease. There are at least three reasons for not increasing the levels of fluoride to these higher amounts:

(1) The North Dakota studies must be rigorously confirmed by additional investigations.

(2) Such levels would produce mottled enamel in our children's teeth.

(3) The existing levels of fluoridation at 1 ppm may bring about these additional rewards, at least in part, and perhaps totally, depending on dietary habits which include other sources of fluoride. "We have only had fluoridation for twenty-three years, and in many communities for far fewer years, thus, we shall have to wait many more years to see * * *." [70]

Criticism of the North Dakota studies has been noted in the 1968 appropriations hearings for DHEW,[71] in a statement prepared by Elise Jerard.[70a] It simply alleged that the expert researchers did not conduct the studies correctly, hence the studies yielded a set of false findings regarding the effects of high fluoride on all older people. The statement also opposed fluoridation for all of the usual other reasons.

The same hearings record contains, in addition, a typical expose of scientific fluoridation fallacies, presented by a Mr. Clinton Miller; [72] an attempt by Dr. Robert Mick D.D.S. of Laurel Springs, New Jersey to attribute a below-average school performance of Philadelphia pupils to fluoridated water; [73] and a technical paper written in 1965 by antifluoridation scientist, Dr. Albert W. Burgstahler.[74]

Dr. Burgstahler's paper is a reasonably skillful piece of scientific argument. Nevertheless, it closes with a quotation which warns against any plan to add fluoride to public water supplies as a public health procedure; the quotation is from a scientific paper by Smith and Smith published 30 years ago (1940).

The nature and source of opposition of fluoridation came up in a

[68] G. E. Shambaugh. "Sodium Fluoride for Inactivation of the Otosclerotic Lesion," Archives of Otolaryngology. (February 1968), page 197.

[69] D. S. and C. D. Guri. "The Effects of Fluoride on Metabolic Bone Disease and on Normals." Journal of the Massachusetts Dental Society, (Fall, 1966), pages 227-8.

[70] F. J. Stare. "Fluoridation—1969", Worcester Medical News, (December 1969).

[71] U.S. Congress. House. Committee on Appropriations. "Departments of Labor and Health, Education, and Welfare Appropriations for 1968, Hearings," 90th Cong., 1st sess. Part 6. (Washington, U.S. Government Printing Office, 1967), page 675.

[70a] Self-described credentials of this correspondent are "pursued studies toward a doctorate in biological sciences."

[72] Ibid, pages 444–457. (Mr. Miller "is vice president of the National Health Federation—a national organization of aware and concerned citizens who are organized to fight for their right to exercise an informed responsible, freedom of choice in matters of health, if the exercise of that freedom will not endanger the health and safety of some other individual and thereby deny him an equal freedom.")

[73] Ibid, pages 511–528.

[74] Ibid, pages 461–481.

quite different manner during the recent appropriation hearings for DHEW in the Senate. It consisted of a series of questions and answers between Senator Alan Bible and Dr. Viron Diefenbach (Director, Division of Dental Health, NIH) as follows:

RESISTANCE TO USE OF FLUORIDE

Senator BIBLE. Do you still have resistance to the use of fluoridation?

Dr. DIEFENBACH. Yes, sir, we do. I don't think the resistance is quite as vehement as it has been in years past, but it is very definitely there and I might add, the character of it has changed very little over the last 15 years.

Senator BIBLE. We had a campaign on in the city of Reno to prevent fluoridation. I don't know where it all actually came from but it scared many people. I would think there are people probably in this country today who are skeptical about the use of fluoridated water. I don't know how you get that message across. Is that your job?

Dr. DIEFENBACH. That is a large part of our responsibility. We need universal fluoridation in this country. If we are going to accomplish that, part of the leadership I think should come from the Federal Government, and some should come from the organized dental profession, State and voluntary health agencies.

AREAS OF OPPOSITION

Senator BIBLE. Can't you break down the opposition group?

Dr. DIEFENBACH. It is a question of education over a long period of time. The claims that the opponents of fluoridation raise, the confusion they create, can probably be classified into five types. One is the attempt to create suspicion that there is corruption in high places, that somebody is making money on this whole business. Another claim is that fluoridation is a Communist conspiracy and a part of the international Communist movement to weaken the minds of Americans.

Senator BIBLE. That is one I have heard made.

Dr. DIEFENBACH. A third type is the claim that fluoridating water is not the true path to good dental health, that the way is through dietary control by using specially prepared health foods and the complete elimination of sugars.

Senator BIBLE. I suppose that group would be a pretty sincere group of people who don't believe in doctors at all. Christian Scientists don't believe in doctors and that is a question of faith.

Dr. DIEFENBACH. I don't question their sincerity either, I am merely describing the situation. Fourth is the group who keep saying we don't have all of the facts yet, more research is needed. Fluorides have been studied for well over 50 years. We actually know more about fluoride and the fluoridation of community water supplies than we know about any other comparable public health measure prior to its institution.

In the fifth category are those opposed to fluoridation because they consider it to be mass medication and can't accept it because of religious beliefs; others feel this is an infringement upon individual rights, and this is a step toward socialized medicine. Those are generally the five broad areas of opposition.

NATIONAL SUPPORT OF DENTISTS

Senator BIBLE. How many dentists are there in the United States?

Dr. DIEFENBACH. About 110,000 dentists, including those that are in dental education and research.

Senator BIBLE. What would a poll of 110,000 dentists show as to whether they supported fluoridation or not?

Dr. DIEFENBACH. Virtually unanimous support. I say virtually, because I don't think it is likely to get 100 percent agreement from any medical or scientific group on any subject.

Senator BIBLE. Or any other group on any subject. Would it run 90 percent?

Dr. DIEFENBACH. Much more than that. I would say 97 or 98 percent and that is probably an understatement.[75]

VIII. THE LONG-TERM, LOW-LEVEL EFFECTS OF EXPOSURE TO FLUORIDES HAVE ALREADY BEEN DETERMINED BY NATURE

The principal anti-fluoridation argument which always elicits an uncertain reaction is the question of long-term, low-level effects. But nature has already performed experiments on this question. Fluorides have not been synthesized by chemists and then dumped for the first time in the earth's history into an otherwise fluoride-free environment. On the contrary, fluorides are, and always have been, a natural part of the geochemical world. As Beeson and McDermott point out: "Fluoride is one of the more common constituents of the Earth's crust, occurring particularly in association with phosphates, silicates and calcium. It is abundant in sea water and in many fresh water supplies, and was undoubtedly a component of the environment in which life evolved." [76]

The average content of fluoride in the earth's surface is about 300 ppm by weight. It is widely distributed in nature—rivers, ground water, soil, oceans, plants, animals, and is an inevitable component of human nutrition. The amounts are often near or in excess of those recommended in fluoridation of community water supplies. The occurrence of fluoride in the more familiar sources is as follows:

Soil: 20 to 7,440 ppm (generally increasing with the depth—lower in sandy soils and higher in clay soils)

Plants: 0.1 to 26.9 ppm (commercial tea leaves contain about 100 ppm, 90% of which is extracted by hot water)

Foods: 0.2 to 0.3 ppm in the average diet (See table on page 631)

Sea Water: 1.2 ppm (Pacific and Altantic Oceans)

Rivers: Most U.S. rivers contain less than 0.3 ppm fluoride, but some sizeable rivers in areas such as western Texas may have fluoride contents up to 6.4 ppm

Streams: About 0.2 ppm

Lakes: About the same as for rivers (less than 0.3 ppm) but can be as high as 7.3 in saline lakes in North Dakota and elsewhere

Ground Waters: Around the world the fluoride content of water varies from near zero to levels as high as 67.2 ppm in the Rustenburg district, South Africa or 38 ppm, in Cochise County, Arizona. There are "enormous areas of the United

[75] U.S. Congress. Senate. Committee on Appropriations. "Departments of Labor and Health, Education and Welfare Appropriations for 1970, Hearings." 91st Congress, 1st session, Part 3. (Washington, U.S. Government Printing Office, 1969), pages 1927–8.

[76] Beeson and McDermott. Page 1144. *Op. cit.*

States in which some of the ground water contains more than 1.5 ppm. F." [77] (See the map of the U.S. which shows by the counties the *maximum* fluoride content recorded in each county). [78]

Although the addition of fluoride in waterworks practice was not begun until 1940–1945, natural fluoridation has been going on since the beginning of geological time. Naturally occurring fluoride in U.S. waters may exist from relatively low to quite high concentrations. One may avoid the use of fluoridated water and dissent or vote against treating water with fluoride but one cannot possibly avoid the ingestion of fluoride while living on this planet.

Some of the unusually high concentrations of fluoride in drinking water appear to be in connection with water pumped from very deep wells (1000 to 2500 feet). Regardless of water source, values reported in the past for certain American cities are: Galesburg, Illinois, 2 ppm; Colorado Springs, Colorado, 2.6 ppm; Amarillo, Texas, 4 ppm; Ennis, Texas, 6 ppm; Bartlett, Texas, 8 ppm; O'Donnell, Texas, 20 to 25 ppm; and Climax, Colorado, 35 ppm. The fluoride in Bartlett is known to have been reduced to 1.3 ppm by the use of defluoridation equipment, but prior to that time and for nearly fifty years the residents of that city were ingesting water containing 8 ppm of fluoride. The only endemic disease reported for this and other areas of Texas as a result of the prolonged ingestion of high fluoride is that of the expected tooth mottling [79] and osteofluorosis.

There are millions of people in the United States who have used water containing excessive amounts of fluoride. Since there are only a few water works plants designed for its removal (probably because of the high cost of such treatment), the people drink the water anyway. The result is mottled tooth enamel in individuals who are exposed to such water from birth to 8 or 10 years of age. The known areas of such dental fluorosis include sections of Texas, New Mexico, Arizona, Colorado, Nevada, California, Utah, Oklahoma, Arkansas, Mississippi, Tennessee, Kansas, Iowa, Illinois, the Dakotas, and scattered areas among some of the Atlantic Coast States. Neither fears of ill effects nor evidence of such effects appear in these populations. There is little if any controversy over the acute or chronic effects of fluoride in these areas, where nature provides it far in excess of that provided or proposed in artificial fluoridation systems. [80]

Parts of the Mississippi Valley contain 2–5 parts per million of fluoride in the drinking water, and as a result mottled tooth enamel is common in sections of this area. But health-defects due to this relatively high fluoride content of the drinking water have not been noted. [81]

As for the levels and periods of consumption in high fluoride regions such as Texas, *precise* data do not exist. But as Largent states "many persons in Texas experienced no ill effects from ingesting fluoride as high as 16 mg. each day for one to five decades." [82]

Of course, "five decades" is not a lifetime, and it therefore seems appropriate to quote from a statement in the British medical journal, The Lancet:

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[77] Michael Fleisher and W. O. Robinson, "Some Problems of the Geochemistry of Fluorine," Royal Society Canada Special Publication, (No. 6., 1963), page 88.
[78] U.S. Geological Survey, "Miscellaneous Geological Investigation," Map 1-387, (1962). See Appendix A.
[79] E. J. Largent, "Fluorosis," (Ohio State University Press, 1961), page 5.
[80] E. W. Steel, "Water Supply and Sewerage," 4th edition, (McGraw-Hill, 1960), pages 207 and 327.
[81] "The United States Dispensitory," 26th edition, (Lippincott, 1967), page 1047.
[82] Largent, op. cit, page 126.

* Insert: Brownfield, Texas, 4.1 ppm; Bardwell, Texas, 6.3 ppm; San Miguel, N.M., 9.4 ppm; Sterling, Oklahoma, 13.6 ppm.

A far more cogent argument is that the effects of long-term ingestion of low concentrations of fluorine are unknown, and will remain unknown unless experimentation is carried out on an impossibly large scale.[83]

The same article, however, closes on a quotation from R. A. Kehoe as follows:

* * * It is inevitable that fluoride is incorporated in the chemical composition of living organisms, including the human organism. Even if it were not involved usefully in certain processes of the living organism, the certainty of its presence within the organism establishes the fact that fluoride is * * * part of the internal environment of the human organism. It cannot, in this relationship, be, in itself, harmful. In appropriate concentrations it enters into specific reactions which are beneficial.[84]

In summary according to a 1968 statement of the Council of the Society of Toxicology:

WATER FLUORIDATION SAFETY STATEMENT

From a critical review of the voluminous and steadily growing literature on the biological effects of inorganic fluoride, no evidence has been found of an ill effect of water fluoridation at 1 ppm in temperate climates. In the United States, there are over 10 million people drinking naturally fluoridated water at near optimal concentration or higher. These waters have been consumed by large numbers of people for many years. *Therefore, an extraordinary and exceptional reliability is conferred on the safety of water fluoridation because nature in a sense has already made the demonstration in hundreds of communities where the drinking water naturally contains fluoride.* Under controlled conditions as recommended by qualified public health authorities, the Society of Toxicology finds water fluoridation to be a safe measure.

Approved by the Council of the Society of Toxicology, Inc., October 30, 1968. [Emphasis added.]

IX. Natural vs. "Unnatural" Fluoride

Many opponents of fluoridation oppose it on the grounds that it is artificial. In other words fluoride already in surface or well waters is regarded safe even if it is high, but introduction of fluoride at any level is unnatural and therefore unhealthful. Even some scientists and physicians insist that the Public Health Service use the term "artificial" rather than "controlled" on the grounds that the former term removes all hidden ambiguities. There is, of course, no such thing as "unnatural fluoride" in the strictly scientific sense, but in any event, water fluoridation in order to accomplish its health objectives and at the same time avoid the health hazards of a natural high fluoride content in drinking water must employ the concept of control just as it does in all other components and contaminants of potable water. Therefore standards are set for fluoride to which water systems used by carriers and others subject to Federal quarantine regulations must conform. A table giving optimum fluoride concentrations for certain ranges of annual average maximum daily air temperatures is published in *Public Health Drinking Water Standards*. The presence of fluoride in average concentration greater than twice the optimum values in this table constitutes grounds for rejection of the supply. If the latter were the case, and it often is, then a defluoridation system should be installed to make the water acceptable.

[83] "Medical and biological aspects of fluoridation," The Lancet (August 20, 1960), page 425.
[84] Ibid. page 428.

The engineering application of the control implied in upper and lower fluoride limits is shown in the following table from *Water Supply and Pollution Control* by Clark and Viessman, International Textbook Co., Scranton, Pa., 1963, p. 233:

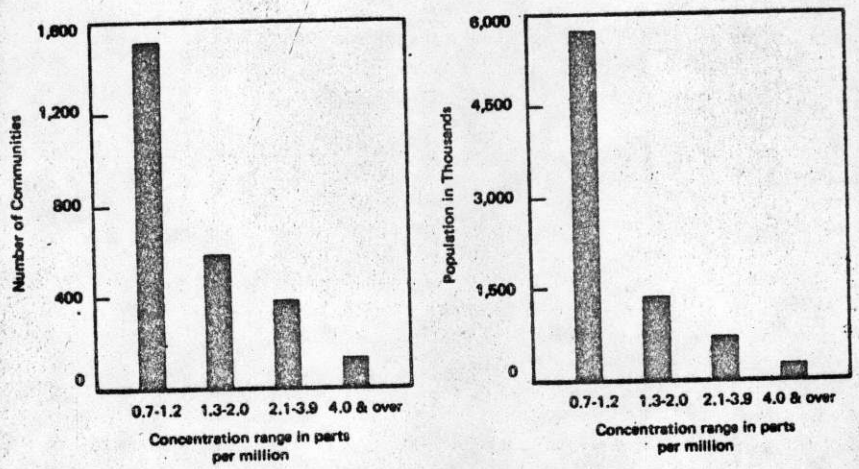
FLUORIDE CONTROL LIMITS, PUBLIC HEALTH SERVICE DRINKING WATER STANDARDS

Annual average of maximum daily air temperatures [1]	Recommended control limits—fluoride concentrations, mg/l (p.p.m.)		
	Lower	Optimum	Upper
50.0–53.7	0.9	1.2	1.7
53.8–58.3	.8	1.1	1.5
58.4–63.8	.8	1.0	1.3
63.9–70.6	.7	.9	1.2
70.7–79.2	.7	.8	1.0
79.3–90.5	.6	.7	.8

[1] Based on temperature data obtained for a minimum of 5 years.

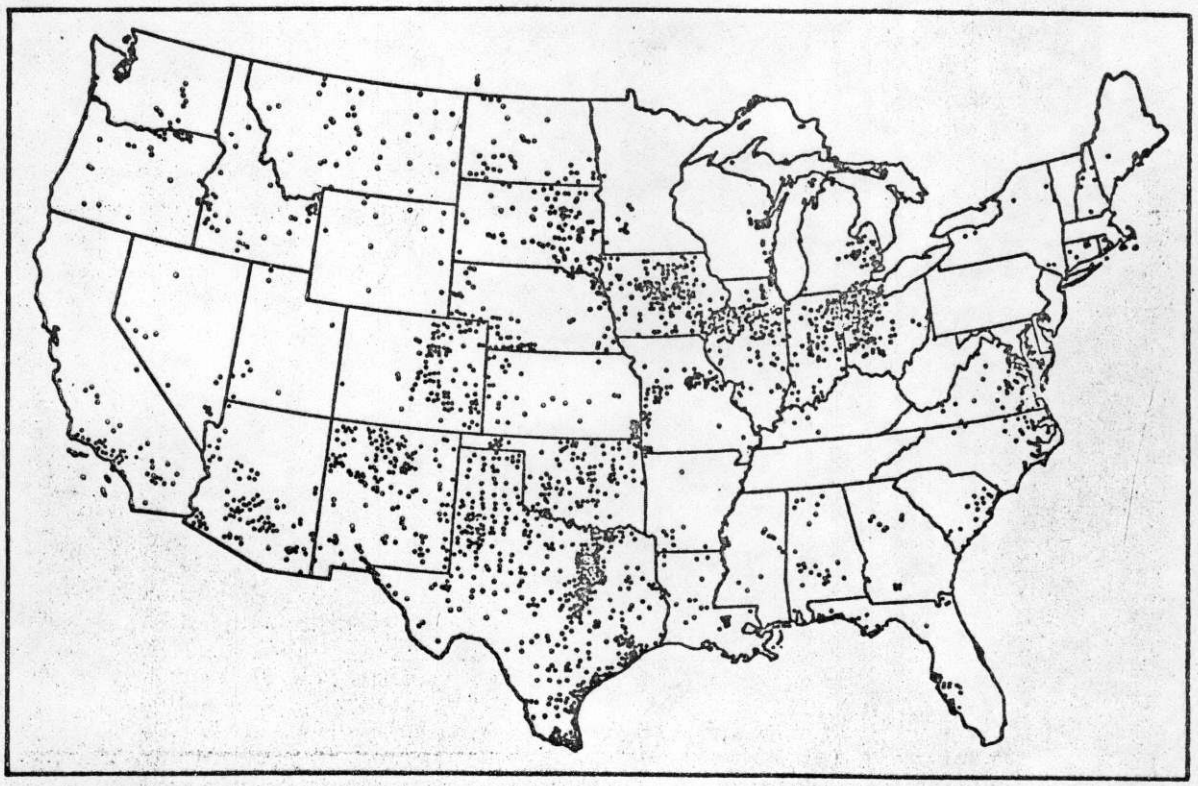
Fluoridation, then, is the redistribution of a natural trace element by means of water works engineers in accordance with scientific and medical guidelines. Such guidelines have been followed by the food industry to adjust the trace elements available to consumers, such as in iodized salt. The problem with water seems to be that it is a public utility with little or no consumer option. The irony of the situation is that while few municipal water supplies in the United States contain more than 6 to 8 parts per million of fluoride, those that do, seem to be receiving little attention from the antifluoridationists. In fact, a broad public movement packed by genuine scientific concern about the danger of fluoride-bearing water might plausibly extend its activities to defluoridation as well as to prevention of deliberate fluoridation. The accompanying charts and map illustrate the extent of the problem.

NUMBER OF COMMUNITIES WITH NATURAL FLUORIDE-BEARING WATER AND POPULATION SERVED ACCORDING TO RANGE OF FLUORIDE CONCENTRATION IN WATER SUPPLIES [85]



[85] U.S. Department of Health, Education and Welfare. "Natural fluoride content of community water supplies," (Department of Health, Education, and Welfare, 1969), page 9.

Distribution of Communities With 0.7 PPM or More Natural Fluoride in Community Water Supply Systems, 1969



While the community populations using naturally fluoridated water constitute only about 5% of the total U.S. population, both the number of communities and number of people using such water continue to increase. In addition, it must be remembered that the 0.7 ppm value is merely the lower optimum for dental caries prevention. There are waters now in use, both private and public, which are 0.6 ppm and below. These sources, together with 0.2 to 0.3 ppm average daily fluoride dietary intake, suggest that the entire population is exposed to some fluoride, yet no tolerance level has been vouchsafed as proper by those (scientifically or politically based) opinions opposed to artificial fluoridation. In a few communities the fluoridation controversy could, in fact, hinge on a mere fraction of a part per million—the small difference between the amount already present and the additional small amount required to meet the threshold level for prevention of dental caries.

Some communities are blending waters to achieve recommended levels of fluoride, a few are defluoridating, and others, like Dallas and Fort Worth, have changed from natural sources of high fluoride-bearing water to controlled fluoridation.

X. Fluoridation in the Courts

The overwhelming scientific and medical endorsement of fluoridation by professional organizations which include the American Dental Association, the American Medical Association, and the World Health Organization (perhaps 25 different specialties in all), has spread to various civic, business and labor groups. Some of the latter include the A.F.L.–C.I.O., the American Legion, the National Congress of Parents and Teachers, and the United States Junior Chamber of Commerce.

This scientific and civic consensus has not solved the controversy; it has simply placed a considerable segment of it in the courts for further dialogue and decision. In other words, the assertedly scientific arguments have been followed or accompanied by the constitutional position that people have a right to drink water untampered with by politico-scientific meddling. Why, constitutionally, this type of governmental paternalism in the absence of urgent necessity and in the presence of available alternatives? More specifically the arguments (not unlike those which earlier accompanied such public health measures as vaccination against smallpox, chlorination of water, and the pasteurization of milk) are that "fluoridation of the public water supply is an unconstitutional deprivation of the fourteenth amendment to the United States Constitution * * * is violative of the religious freedom guaranteed by the first amendment * * *; it denies the individual freedom of choice in a matter relating to his bodily care and health by compelling him to drink fluoridated water. The prevention and treatment of diseases of the teeth * * * is a matter of private health, not public health."[87]

According to Clark:

> The courts of ten States have held that fluoridation of public water supplies does not infringe on the constitutional or legal rights of an individual. These decisions were rendered by the courts of last resort in California, Louisiana, Ohio, Oklahoma, Oregon, Washington, and Wisconsin and by trial courts in Maryland,

[87] George A. Strong. "Liberty, Religion and Fluoridation," Santa Clara Lawyer, (Fall, 1967), p. 40.

Pennsylvania, and North Dakota. These decisions are strengthened by the fact that the U.S. Supreme Court has refused to review some of these decisions for the stated reason that no substantial Federal constitutional question is involved. Only one court has ever rendered an opinion adverse to fluoridation and in that case the decision was promptly reversed by the State supreme court, the U.S. Supreme Court refusing to review the case. Every conceivable legal and constitutional objection to fluoridation has been argued unsuccessfully in the courts.[88]

Strong addresses the liberty question under the 14th amendment as follows:

> Whereas the United States Supreme Court has not specifically addressed itself to the question of fluoridation, we do know with respect to the fourteenth amendment that "the constitution does not recognize an absolute and uncontrollable liberty [and that] liberty implies the absence of arbitrary restraint, not immunity from reasonable regulations and prohibitions imposed in the interests of the community."[89]

The decisions made by the various court cases often involve language and insight which scientists, dentists and physicians, of course, have not been qualified to bring to the issue. The subject is developped at length in the following articles:

"Fluoridation: The Courts and the Opposition" by Robert E. Clark and Michael M. Sophy in the *Wayne Law Review* Vol. 13, 338–375 (1967); and "Liberty, Religion and Fluoridation" by George A. Strong in the *Santa Clara Lawyer* Vol. 1, no. 1, pp. 37–58 (1967).

In addition there are some 52 earlier references cited in a bibliography on "Interference with Human Rights" which appear on pp. 64–66 of Elwell's and Easlich's *Classification and Appraisal of Objections to Fluoridation*, published by the University of Michigan in 1960. (A summary of the fluoridation court cases as of 1965 is provided in Appendix D to this chapter.)

The fluoridation policy of the American Civil Liberties Union was adopted in 1956. There is reason to believe that ACLU's Due Process Committee has recently re-opened the fluoridation issue and may be entertaining a possible change in policy. At the present time, however, the ACLU's original 1956 policy still remains in effect:

> "The fluoridation of public water supplies does not present an issue of due process unless in specific cases persons opposed to fluoridation are deprived of their right to present their views. Nor does it constitute an unconstitutional invasion of a person's beliefs, religious or otherwise, and therefore, does not violate principles of civil liberties."

Even if the above policy is retained by ACLU, one should not conclude that the civil liberties issues with respect to fluoridation are beyond revival. The unanimous support which fluoridation has won in the courts *has* resulted in a virtual cessation of litigation by anti-fluoridationists; but it has also resulted in a revival, or at least a re-emphasis, of arguments of a scientific nature. Indeed, it is probably more precise to state that the opponent literature has always and still does "pull out all of the stops." One is reminded here of the previously quoted statement by Steyn that fluoridation is "wasteful, undemocratic, unscientific, illegal, immoral, unethical, and dangerous to human health."

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[88] J. W. Clark and W. Viessman, Jr. "Water Supply and Pollution Control," (Scranton, Pennsylvania International Textbook, Co., 1966), page 223.
[89] Strong, op. cit., page 41.

In one fluoridation case a court took judicial notice of the eight compounds already added to the municipal water supply in question.[90] Depending on the nature and quality of the source water the following substances were among those which may be used in the chemical treatment of processed community water supplies: [91]

pH adjusters to control dissolution or deposits of calcium carbonate

Polyphosphates as corrosion inhibitors

"Chemicals" to produce films on water pipes

Nitrate salts to control the production of hydrogen sulfide in standing sewage waters

Lime and soda ash for water softening

Potassium permanganate and manganese dioxide—greensand for removal of iron and manganese

Aluminum sulfate and ferric sulfate for the coagulation of colloidal particles

Copper sulfate for algae control

Ammonia to control the chlorine break point

Ozone or chlorine for disinfection and for the elimination of tastes and odors

Bentonite or calcium chloride for the removal of radioactive materials

Not all of the above additives used in various water treatment plants reach the consumer. However, the possible effects of those that do have not been as thoroughly investigated as fluoride. Observations which have been made on at least two additives for drinking water, serve to demonstrate that even the things done to make water usable and to control water-borne disease are not safe for all the people all the time. According to Randolph,[92] for example, some people may become susceptible to softened water and "made unexplainably ill by it." Randolph also states that chlorinated water "is a common cause of chronic symptoms". He points out that "although testing of [susceptible patients] commonly has to be done with water that is both chlorinated and fluoridated, cases in which this combination has been incriminated have observed reactions from drinking water which has been chlorinated only".[93]

In this connection it is pertinent that one opponent of fluoridation[94] has quoted an AMA statement in a May 13, 1965 letter from the Department of Environmental Health of the American Medical Association: "The American Medical Association is not prepared to state that no harm will be done to any person by water fluoridation."

It appears to the author of this study that the AMA would have to make a similar cautionary statement today, not only about fluoridation, but also about almost everything.

XI. Alternatives to Water Fluoridation

In view of the resistance to mass caries prophylaxis by water fluoridation, whether such resistance be based on health risk or otherwise, a

[90] Missouri ex rel. Whittington v. Strahm 374 S.W. 2d 127 (Mo. 1963).
[91] Clark and Viessman, op. cit. Chapter 9 and Ernest Steel, "Water Supply and Sewage," (New York, McGraw-Hill, 1960), Chapter 11.
[92] Theron G. Randolph. "Human Ecology and Susceptibility to the Chemical Environment," (Spring field, Ill., Charles C. Thomas, 1967), page 81.
[93] Ibid., page 81.
[94] Allen A. London. "Have the Professions been Hoodwinked on Fluoridation?", Pakistan Dental Review, (October 4, 1967), page 129.

number of alternate possibilities have been considered. In a very recent review entitled, "Theory and Practice of Caries Prophylaxis", in *Dental Digest*, February 1969, pp. 54–57, author Jacob Yardeni, D.D.S. notes the following:

There is a difference between systemic fluorine administration (by use of potable water) and topical fluoride application. In the pre-eruptive period, the water-borne fluorine is built into the tooth structure in the process of tooth development, and is permanently fixed as fluorapatite. The most benefit is derived from ingestion of fluoridated water from birth. The incorporation of fluorine in the calcium hydroxyl moiety of the apatite crystal is thought to play a major role in stabilizing the enamel against dissolution.

DIFFICULTIES IN MASS PROPHYLAXIS

We must recognize all the obstacles on the road to mass prophylaxis by water fluoridation. According to Duckworth, only four of 204 local authorities in Britain fluoridated their waters. In considering alternate possibilities for supplying this much needed trace element to the teeth of the population at large, other practical means were presented for supplying fluoride to people who reside in non-fluoridated areas.

Embarrassment of Riches—It was not easy to decide which to choose: (1) *Topical application is individual. It has to be done expertly, placing a heavy burden on trained personnel and on the family budget. The net gain is small, so that this method has to be repeated frequently.*

The topical application of a phosphate-fluoride gel in wax trays is not an effective cariostatic procedure.

(2) *Administration of flavored fluorine tablets requires strict supervision. In the mind of the consumer a tablet is a drug to be taken when one is sick. Moreover, the acid suppression action of fluorine tablet is limited more to smooth surfaces of the tooth than to pits and fissues.*

(3) Brushing teeth with a fluoridated paste removes the very layer of the surface enamel upon which we wish to deposit the fluorine. Although many tooth pastes with fluorine have appeared on the market and compete for attention of the public, the brush is not the proper tool for impregnating the enamel with fluorine. A tooth brush is designed for cleaning teeth, for removal of debris, not for addition of fluorine. The patient has difficulty enough in learning its proper use; let us not burden him with more theories and let us not place additional demands on tooth-brush bristles, hard or soft, plastic, or otherwise. Moreover, according to Arnim and Darling, cleansing itself plays a significant role in the arrestment and subsequent control of dental caries. Arnim recommends daily mouth irrigation with an oral irrigator.

FLUORIDE CHEWING GUM

Evaluating the advantages and disadvantages of fluoride pastes and tablets, we find that both of them are inferior to chewing gum as a vehicle for fluorine.

Advantages—(1) Lack of patient cooperation is hardly to be feared, especially among the younger generation, because this group of the population which needs fluoride most likes to chew gum.

(2) The gum would assist the young teeth to be carried over the critical post-eruptive years until their maturation.

(3) Fluoridated chewing gum prolongs the exposure time and is both topical and systemic in its action if initiated early. It is usually chewed for 10 to 20 minutes, during which time it gradually releases its fluorine, which is mixed with a small quantity of salivary fluorine, is swallowed, and absorbed. During the time of chewing it remains in intimate contact with the teeth, and thus the proximal tooth surfaces, which are otherwise most difficult of access, have the best chance of getting their share of automatic prophylactic treatment. [Emphasis added in the above statement.]

The use of a pill or tablet containing fluoride has been considered more often than any other procedure as an alternative to fluoridation of city water supplies. A question and answer on this point in the *Journal of the American Medical Association*, March 24, 1969, p. 2292 is as follows:

Question. Fluoridation—Pill or Public Water Supply?

Our city council has asked for an authoritative opinion on whether the use of sodium fluoride pills would be as effective a public health measure for the prevention of dental caries as fluoridation of the city water supply. I would appreciate any information you have relative to the cost of such a program, its effectiveness, and any other aspects of its implementation.

Answer. Studies conducted in this country and abroad indicate that, although the sustained daily use of fluoride tablets throughout childhood can aid the development of decay-resistant teeth, the tablets are considerably less effective than fluoridated water. If tablets are used, the daily requirement must be determined in relation to the existing fluoride concentration in the drinking water, the optimum fluoride concentration recommended for the particular area, and the age of the child.

Thus far, community public health programs based on the use of fluoride tablets have met with little success, primarily because of the difficulties encountered in getting parents and children to maintain the strict long-term regimen required. Reports from several communities that have supplied fluoride tablets as a public health measure indicate that (1) the initial requests for the tablets have been only a fraction of the number required for an effective program; (2) individual participation in such programs has declined steadily with time; and (3) the cost of an effective long-term tablet program is relatively high when compared with the cost of community water fluoridation.

Even so, reported experience suggests that where a fluoridated water supply cannot be provided, the supervised use of tablets has merit as a public health measure. On the basis of the total experience with fluorides, however, there can be no doubt that water fluoridation is the most effective, economical, and safe procedure for the prevention of caries.

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XII. CAUSES OF DENTAL CARIES, AND DIETS LIKELY TO CAUSE OR PREVENT CARIES

Tooth decay, like many other nutritionally based diseases, appears to be caused by civilization. Primitive peoples as a rule show a much lower incidence of caries than do civilized populations. When native foods are replaced by processed foods, an increase in dental caries follows.

Caries disease is the most prevalent disease in the United States (only 2% of our population escapes it). And the fact of 11 decayed teeth in the average American by the age of 15 is regarded as both undesirable and unnecessary. This statistic distorts the situation somewhat but the "toothless" population of the United States, together with the continuing suspicion or proof of bad teeth as a source of body infections would appear to warrant consideration of of ways for reducing or eliminating the infectious disease of dental decay.

There is now general agreement among dental authorities that tooth decay is of bacterial origin; that sugar must be present for these bacteria to grow; and that teeth are more resistant to this bacterial action if adequate amounts of the fluoride ion are incorporated in the crystal lattice of the enamel and dentin.[9]

However, "tooth decay is not solely due to deficiency of fluorine. Vitamin A, C and D, protein, and oral hygiene are of great importance. Prevention of decay, therefore, demands an adequate diet, good care of teeth and mouth, and is enhanced by the intake of trace amounts of flourine during the growing period. Fluorine in excessive amounts

[9] "Cooper's Nutrition in Health and Disease," Fifteenth edition (Lippincott, 1958), pages 222-225.

is toxic * * * but the difference between the therapeutic and toxic amounts is great." [96]

In summary, tooth decay results from an interaction of three factors: (1) a susceptible tooth, (2) a deposit of sugar on or in between the teeth, and (3) acid-producing bacteria. The diet therefore which predisposes to dental caries will be low in fluoride and high in sugar, and high in sugar intake frequency. A diet resistant to caries will be adequate in fluoride, vitamins, protein, calcium and low in the content or frequency of sugar intake. The presence and particularly the actions of the decay-producing bacteria hinges on these factors.

XIII. Summary

Few issues in the area of science and public policy so markedly demonstrate public difficulty in the application of new knowledge as does the fluoridation of community water supplies. While it is true that about half of our population* now uses fluoridated water, 12 percent of that number is using water which is naturally fluoridated in the first place. Also within that population are thousands of people who voted against it and, of course a remaining unknown percentage of our population remain dubious of a technology which has been accepted and available for over 25 years.

The issue is generally free of those components which typically generate conflict—partisan politics, unacceptable cost-effectiveness ratios, and vested economic or industrial interests. Despite this, fluoridation has not only become a controversy; it has become an acute one. There have been thousands of referendums and hundreds of court cases; the dockets of State Legislatures rarely escape bills on the subject. Twenty-one States dealt with the fluoridation problem in one way or another in 1969. Even in Connecticut, which tried to settle the matter finally in 1965 by passing the Nation's first mandatory fluoridation statute, there was action in the 1969 General Assembly (Public Health and Safety Committee) disapproving numerous anti-fluoridation bills. The committee, apparently felt however, that it was taking little risk in reporting favorably on a bill that would allow an individual to be examined by the Health Department for alleged fluoride poisoning.

No issue in the history of public health has generated so much heat as has the possible hazards of fluoridation. The controversy long ago sank beneath rational argument on the science involved with an outpouring of misinformation in the mass media and in referendum campaign literature. This has had the effect of creating confusion, fear, and indeed even a wholesale mistrust of science and medicine. Although it appears that scientific facts have little to do with the contemporary fluoridation issue, a reasonably factual summary statement can nevertheless be made on the subject. That statement follows:

In spite of some statistical criticism of the early classical American trials on fluoridation, there now seems little doubt that the technique is safe and effective. The scientific consensus in America is now well established and appears to be based on independent evaluation of the results of fluoridation over the past many years, as well as on the

[96] "Textbook of Medicine," op. cit., page 1143.

* Insert: slightly more than half our population on public water supplies.

original trials. The composition of the tooth and the chemistry involved in its formation supports the role of fluoride in caries resistance. Biochemists, physiologists, pharmacologists, physicians and dentists repeatedly express their confidence in the efficacy and safety of water fluoridation. While mimicry or reproduction of error based upon the same set of observations may be involved here, it seems most unlikely that the highly developed state of these disciplines in America would permit this. A consensus such as obtains on fluoridation across the spectrum of scientific disciplines is not easy to come by. American science is both critical and cautious and, above all, competent. The attacks on its stance on fluoridation have been unsuccessful. The American scientific consensus is now shared by most other major nations whose views have been developed from independent evaluation of the facts.

Fluoridation is said to provide a simple, ready-made issue on which citizens can express their confusion, fear, anxiety, alienation or whatever it may be—and on which they can vote with immediate results.[97]

Those technical questions which remain to be resolved by further scientific investigation which could possibly lead to the discontinuation of fluoridation or the substitution of alternative and more beneficial practices are much more likely to derive from the scientific community than from the current and varied array of fluoridation opponents.

Public acceptance of fluoridated water supplies depends upon more and better educational information systems and upon the mounting evidence of safety and benefits from fluoridation programs already in operation. Should more general acceptance make the referendum impractical, the antifluoridationists might then bend their efforts to the real and growing problems in the chemical and biological pollution of water. For example, as the pollution of surface waters with sewage increases so does the need for disinfecting that water and/or sewage with chlorine. As of 1960 the annual consumption of chlorine in water and waste treatment in the United States was 130,000 tons.[98] No one knows what the overall effects of the more massive current and future amounts of chlorine on the environment would be. "There is little information in the literature on the effects on animals of high chlorine residuals in domestic water." [99] The point is that there is a growing need for a balanced concern for the quality of water before processing rather than against the use of chlorine. Geoffrey Edsall makes this case as follows:

> Chlorination and pasteurization—valuable though they are—are nevertheless actions in which man surmounts the threats of nature. Fluoridation, on the other hand, is an action in which man restores the benefits of nature. Fluoride is an essential trace element, found in many local water supplies but deficient in others. If government authorities assume the responsibility of supplying water—as the public would have them do—then they would be culpable if they did not supply the essential trace elements which under optimum circumstances are furnished by nature.[100]

Fluoridation may be less spectacular than other technological innovations in the field of public health, (vaccines, antibiotics, pasteurization), but in a *quantitative sense* it is a superior concept with no apparent risk of undesirable and uncalculated consequences.

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[97] Sapolsky, op. cit., pages 240-248 (article and references).
[98] Clark and Viessman, op. cit., page 466.
[99] Ibid. page 472.
[100] "Fluoride: Nature's Own," Letter to the Editor (quoted in part), Science (Vol. 164, 1969), page 14.

For those whose temperaments run in the direction of less technology, controlled fluoridation is simply not typical of the kind of technology which involves a large development scheme motivated by dubious arguments and uncertain costs. Except for the results of the upgrading of hygienic and working conditions generally over the past many years, few other techniques offer the assurance of so extensively and economically improving the health of all human beings along specific lines—the integrity of the teeth and skeletal structures. Moreover, fluoridation is a classical example of both the proper execution of the scientific method in the acquisition of reliable knowledge and of modern epidemiological investigations. There is good reason today to believe that some scientists and many laymen are becoming confused on these points.

As the fluoridation issue continues into the future, and particularly as the information and propaganda processes are employed in referendums, the issue presents an unusual opportunity for scientists, statisticians, physicians, and dentists to explain to the layman in layman's terms how the scientific method as a philosophy and system of acquiring facts works. Perhaps examples could be used to show the difference between genuine cause and effect mechanisms and mere correlations or associations (the *post hoc ergo propter hoc* fallacy).

A considerable majority of contemporary diseases are believed to be caused by environmental factors; degradation of the environment is a recognized fact in the scientific establishment, as well as among politicians and laymen. It would be a landmark in public education if a technical policy issue which is going directly before the people, as is fluoridation, were to serve as a means of teaching an objective approach to the identification and solution of environmental problems.

An educated public, like an educated scientist, is not merely in possession of facts and statements; it knows how to evaluate them reasonably in the perspective of risk and benefit in the reality of the total social complex. Our people live in an age of science and technology, which in spite of all efforts to the contrary, is here to stay. The depolarization of society on technological matters is a first order of business so that as a more homogeneous culture we can choose in concert what technologies to apply and at what rate.

It will be a most unfortunate turn of events if the techniques of persuasion across the broader spectrum of public involvement in future technological decisions are to get hung up on pre-conceptions, misunderstandings, miscalculation, fear, over-sell, and over-objection. These appear to be among the characteristics of those forces both pro and con which have prevented for nearly 25 years the nationwide application of fluoridation as a meritorious and safe public health program. If technical matters are to move more and more into the arena of the political process, then the "expert" and the layman must deal with these issues with more openness, mutual understanding, and wisdom than has been the case with fluoridation.

Discussions on how and how not to run a pro-fluoridation campaign are available in a number of articles and references thereto.[101] [102] [103] [104]

[101] Thomas F. A. Plant, "Community Organization and Community Education for Fluoridation in Newton, Mass.," Journal of the American Dental Association (November 1962), pages 622–629.
[102] F. G. Stare, op. cit.
[103] Bernard and Judith Mausner, "A Study of the Anti-Scientific Attitude," Scientific American (February 1955, Vol. 122, No. 2).
[104] Sapolsky, op. cit.

Those who wish to oppose fluoridation have available the objections identified and classified by Elwell and Easlick.[105] In addition, criticisms of fluoridation may be found in letters to editors.[106 107] Opposing scientists in particular may read the anti-fluoridation writings of Dr. George Waldbott,[108] Dr. Albert Burgstahler,[109] Dr. Frederick B. Exner,[110] Dr. Douw G. Steyn,[111] and Dr. L. Spira.[112] A general "Guide to Fluoridation Reading" may be obtained from the Spokane Public Library, Spokane, Washington. Statisticians may be interested in a paper-back book which is a critical review of the American experimental trials on fluoridation.[113] Finally, the Government Printing Office may be able to supply copies of hearings on an anti-fluoridation bill introduced in the House of Representatives in 1954.[114]

Last summer (July 1969) a new action of global dimension was taken on fluoridation during the World Health Organization's 22nd World Health Assembly. This recent development is described in *The Journal of the American Dental Association* as follows:

Boston: On July 23 in Boston, the General Assembly of the World Health Organization adopted a resolution calling on all WHO member states to introduce "where practicable" fluoridation of community water supplies in areas where fluoride intake is below optimal levels.

Proposed by Great Britain and co-sponsored by 36 other delegations, including the United States and the Soviet Union, the resolution pointed out that studies in several countries consistently have shown that the prevalence of dental caries is definitely low whenever optimal concentration of fluorides occurs naturally in water supplies.

The resolution also emphasized that the adjustment of the fluoride content of water supplies to an optimal level is a practical, safe, and efficient public health measure, and that scientific literature on the subject has revealed no valid evidence of any ill effects on human health from the use of fluoridated water.

OTHER METHODS

Where fluoridation of community water supplies is not practicable, the resolution recommended that other methods of using fluorides for the protection of dental health be studied.

In Czechoslovakia, that country's delegation reported, the use of fluoridated water resulted in a 70% reduction in the decay rate.

Donald J. Galagan, dean of the State University of Iowa College of Dentistry and a former assistant surgeon general of the Public Health Service, also spoke during the discussion before adoption of the resolution. Testifying on behalf of the Federation Dentaire Internationale, Doctor Galagan made a strong plea for WHO's support of fluoridation—particularly in view of the worldwide shortage of dentists.[115]

(The text of a concise summary of the WHO position on fluoridation is presented in Appendix E to this chapter.)

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[105] Elwell and Easlick, op cit.
[106] Science, (January 3, 1969), page 17.
[107] Saturday Review, (June 7, 1969), page 57 and in several other issues of this magazine. The science editor of SR periodically writes articles critical of fluoridation—SR, Dec. 7, 1964, pages 77–79; Jan. 4, 1964, pages 55–92; May 1, 1965, pages 54–55; and, March 1, 1969, pages 51–66, (in this same issue see also "Biography of a Bandwagon" by Michael Wollan, pages 58–59).
[108] George Waldbott, "Struggle with Titans," (Carlton Press, 1965).
[109] Burgstahler, A. W. "Better Diet vs Fluoridation." From a paper presented at the National Health Federation's Fourth Symposium on Flouridation held March 10 and 11, 1967, at Fresno, California.
[110] F. B. Exner, "American Fluoridation Experiment," (Devin-Adair Co., 1961).
[111] G. Steyn, op. cit.
[112] L. Spira, "The Drama of Fluorine, Arch Enemy of Mankind," (Lee Foundation for Nutritional Research, Milwaukee, Wisconsin).
[113] "Fluoridation: Errors and Omissions in Experimental Trials," by Philip R. N. Sutton (New York, Cambridge University Press, 1960).
[114] U.S. Congress. House. Committee on Interstate and Foreign Commerce. "Fluoridation of water." Hearings on H.R. 2341, a bill to protect the public health from the dangers of fluoridation of water. May 25, 26 and 27, 1954. 83d Congress, second session. (Washington, U.S. Government Printing Office, 1954.)
[115] "News of Dentistry—Fluoridation," Journal of the American Dental Association (September 1969), pages 606–607.

The favorable vote of the delegation from the Soviet Union on this resolution is particularly significant in view of the prior claims of non-practice of fluoridation in Russia. Authorities in the United States have informed us that in at least two cities in Russia fluoridation trials are now underway. One is Minsk, where high and low fluoride content waters are being mixed to obtain the acceptable level in the community drinking water. The other community where the drinking water is being fluoridated is Norilsk, in north Russia. Some American authorities are convinced that one or more larger cities in Russia are also fluoridating their public water supplies. It is also believed that the Soviet Union is proceeding with caution along these lines, that it will stay very close to the minimum effective fluoride concentration, and that it will rely largely on data gathered by Russian scientists rather than those acquired and published in the United States and other Western nations.

This note of what Russia may be doing in fluoridation is not provided because Soviet medicine and public health practices are worthy of emulation in the United States, but because a considerable but unmeasurable component of the fluoridation paradox appears to emerge from a very special set of preconceptions concerning Communist techniques for conquering the United States. This sentiment may be used whenever opponents of fluoridation think it persuasive; it may be held with sincerity in some anti-fluoridation strongholds.

During the proceedings of the World Health Assembly a member of the United Kingdom delegation made a strong statement concerning the low toxicological risk of fluoridation. The delegate, Dr. G. Wynne Griffith, stated that "his government is so confident of the safety of water fluoridation that it is prepared to give an unlimited indemnity to any local authority for actions for damages based on alleged harm to health resulting from fluoride." [116]

The most recent highlight in formal action with respect to fluoridation was its approval by the National Health Council in a meeting in New York City on December 10, 1969. The Journal of the American Dental Association summarized the action as follows:

> The Board of Directors of the National Health Council, meeting December 10 in New York City, endorsed fluoridation of public water supplies as an effective preventive measure against dental disease. The Board adopted a resolution which also urges the application of fluoridation to all sources of public water supplies where the natural content of the water is not sufficient to assure proper protection against dental disease.
>
> According to the resolution, the research underlying the safety and efficacy of the measure in improving dental health is supported by the experience of approximately 75 million persons in some 4,000 communities in the U.S., including New York City, Chicago, San Francisco, and Miami. Legislation for mandatory fluoridation has been enacted in seven states, and the World Health Organization indicated its approval at a meeting in Boston last July 23.
>
> The resolution also stated that, although fluoridation has been approved by all major qualified health and scientific groups in this country, including many members of the NHC, about 120 million Americans continue to be deprived of these benefits. Fluoridation marks its 25th anniversary in the United States in 1970.[117]

[116] "The WHO spells out the case for fluoridation," New Scientist (December 4, 1969), page 496.
[117] "National Health Council Approves Fluoridation," The Journal of the American Dental Association (January 1970), page 1.

APPENDIX A

MAP OF THE UNITED STATES SHOWING MAXIMUM FLUORIDE CONTENT OF WATERS BY COUNTIES [118]

The map of the coterminous United States, divided into 4 sections on the following pages, is based upon thousands of analyses of the fluoride content of ground waters. The data are from a number of sources but are primarily those in the Water-Supply Papers of the U.S. Geological Survey and in the publications of State Surveys. The counties and regions are coded on the basis of the maximum fluoride content recorded (not the average of all analyses conducted). The data do not reflect the fluoride content in the drinking water supplies of the counties, States, or regions; the plotting represents the highest recorded fluoride measurement of all ground waters analyzed and recorded, whether used as sources of drinking water or not. [119]

The fluoride content of surface waters depends on the fluoride content of ground waters, and, of course, on the amount of precipitation and runoff. The fluoride content of surface water is generally higher during dry periods.[120]

This map is not presented as a basis for political concern or action with respect to fluoridation. Indeed it does not show the fluoride content of drinking waters obtained from rivers and lakes, except perhaps indirectly, nor does it show the extent to which counties, communities, or States should have or have adjusted the fluoride content of drinking water.

The purpose of presenting the map here is twofold:

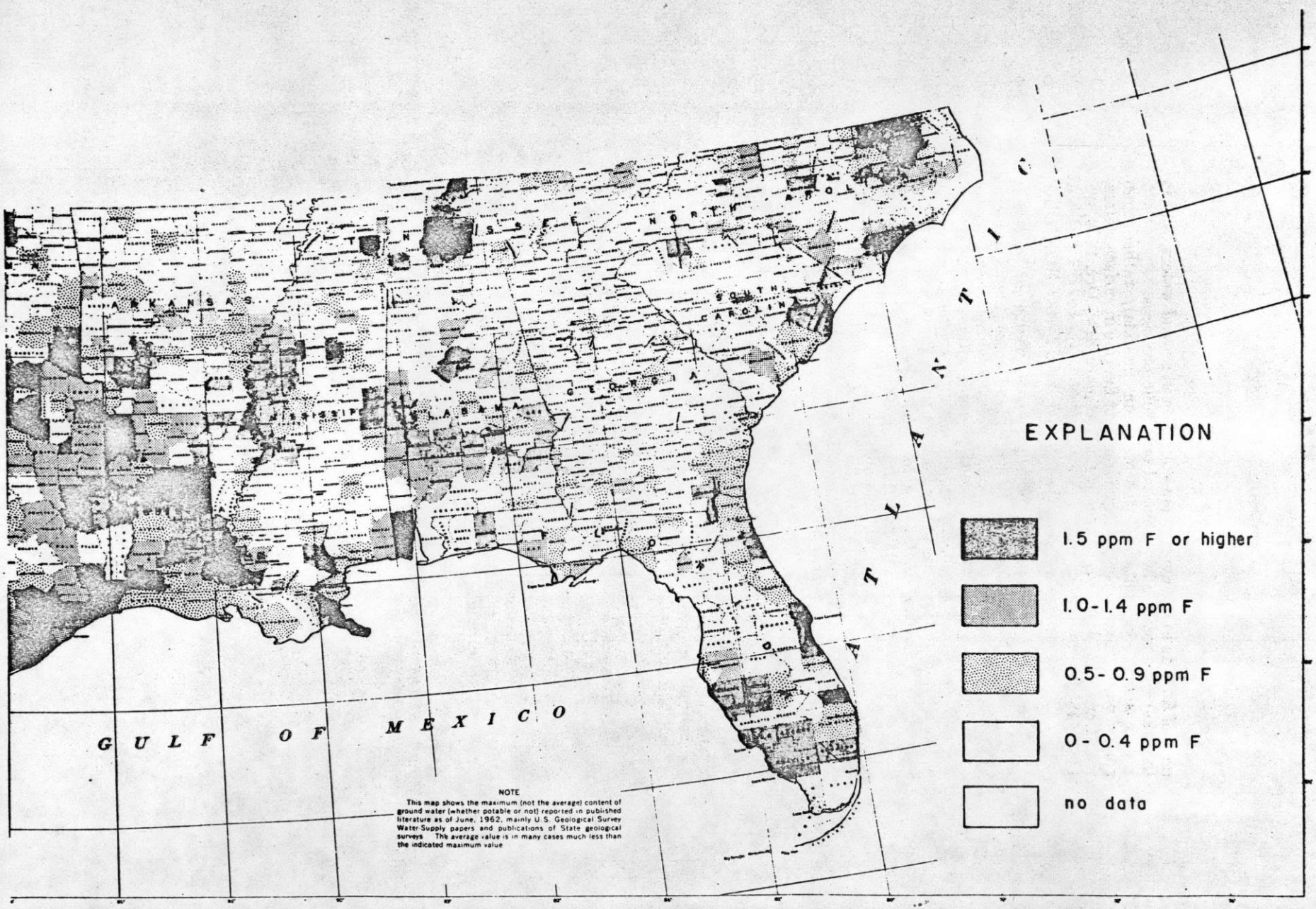
First, to the extent that ground waters are the source of drinking water supplies, there are enormous sections of the United States where such water contains 1.5 ppm of fluoride or more (often much more). And in numerous isolated spots and regions, such as along the southeastern Atlantic and gulf coasts of the United States, the ground waters also show high contents of fluoride. Therefore, as we have stated repeatedly in this study, millions of Americans are exposed to fluoride at or in excess of that recommended in the fluoride treatment of drinking water.

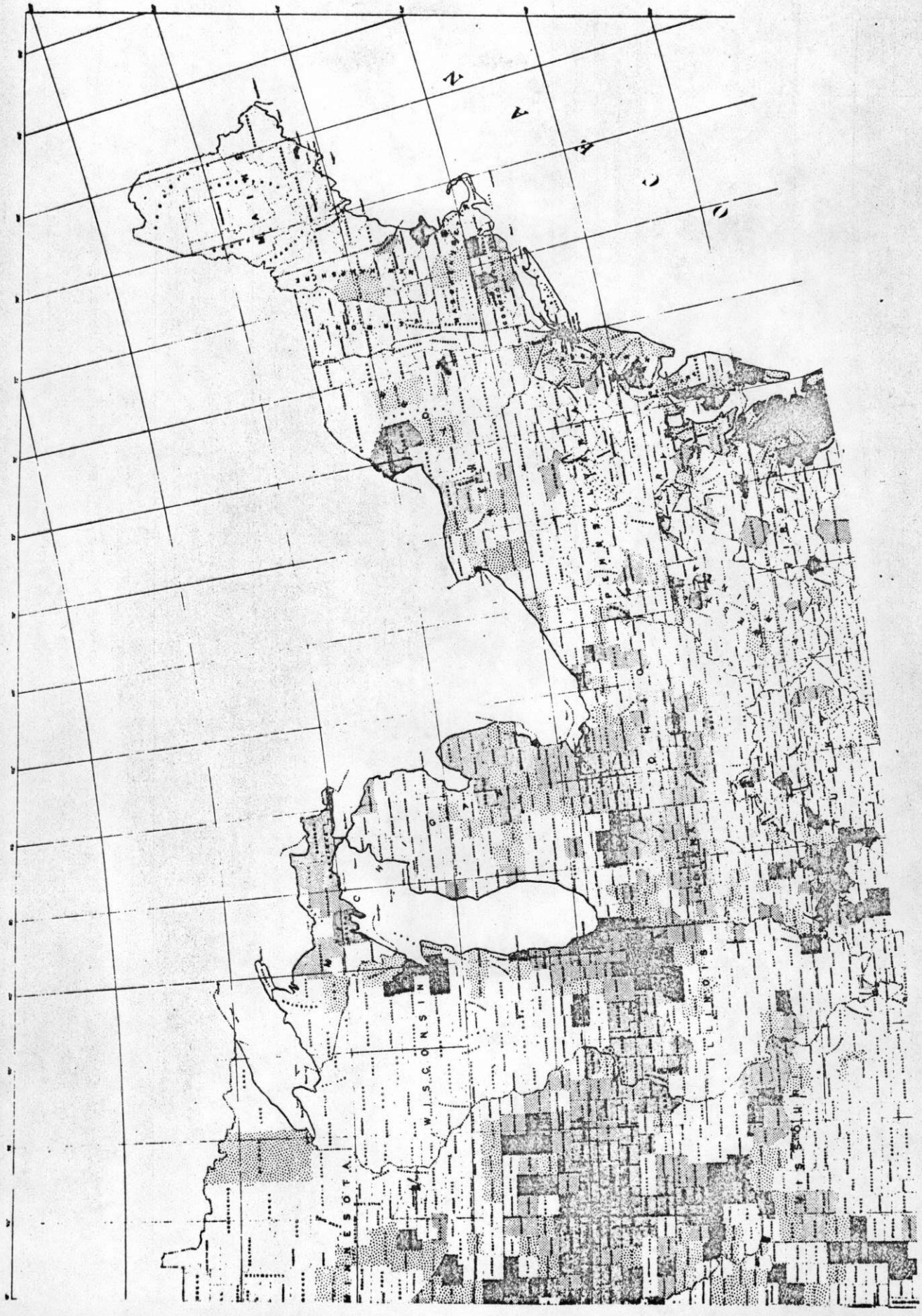
Secondly, the map shows that varied though it may be, the fluoride content of ground water is sufficiently high in so many places to suggest that life has adapted to it generally and has found use for it specifically. Ground water is an intimate part of the water cycle and environment for living things and there is no way for the biota of the earth to escape the contents of such water, including fluoride. While too much and too little of any element in the earth's crust may be found in various geographic locations, it is unlikely that life could have evolved, diversified, and prospered biologically in a ubiquitous fluoride environ-

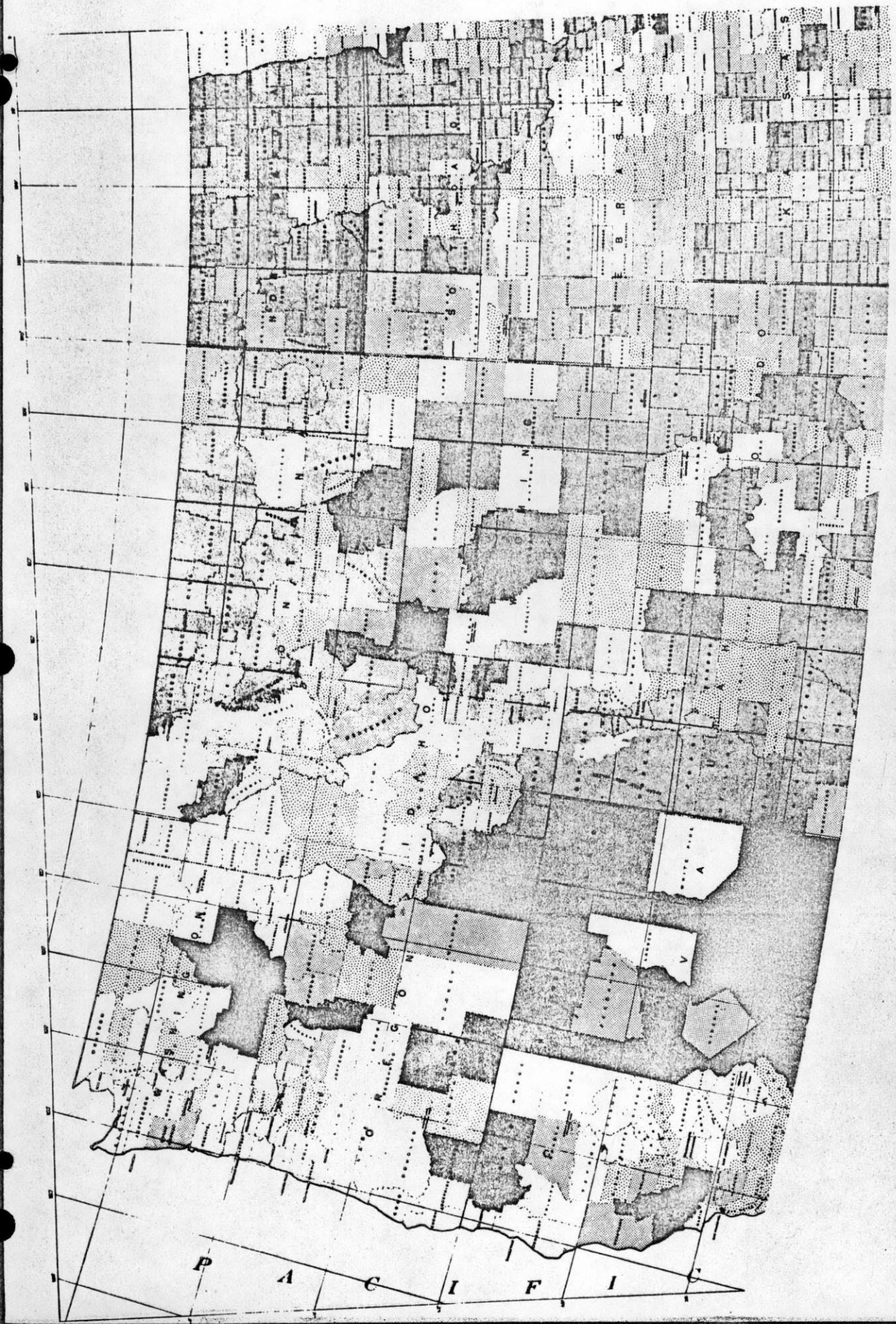
[118] "Fluoride Content of Ground Water in the Coterminous United States," Map 1-387, compiled by Michael Fleischer (U.S. Geological Survey, 1962).
[119] Michael Fleischer, and W. O. Robinson, "Some Problems of the Geo-chemistry of Fluorine." Royal Society of Canada Special Publication (No. 6 (1963)), page 68.
[120] Ibid., page 70.

ment if fluoride in the average amounts seen in ground waters (and in the seas) were toxic to fundamental metabolic processes.

Atmospheric precipitation (0.0–0.8 ppm fluoride), rather than ground water, may be the principal source of fluoride in surface waters, (See Carpenter, Roy. *Geochimica et Cosmochimica Acta*, Oct. 1969, pp. 1153–1167).


ARKANSAS
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
ALABAMA
MISSISSIPPI
LOUISIANA
GULF OF MEXICO
ATLANTIC
EXPLANATION
1.5 ppm F or higher
1.0-1.4 ppm F
0.5-0.9 ppm F
0-0.4 ppm F
no data
NOTE
This map shows the maximum (not the average) content of ground water (whether potable or not) reported in published literature as of June, 1962, mainly U.S. Geological Survey Water-Supply papers and publications of State geological surveys. The average value is in many cases much less than the indicated maximum value


MINNESOTA
WISCONSIN
ILLINOIS


PACIFIC


COLORADO
KANSAS
NEW MEXICO
OKLAHOMA
TEXAS
PACIFIC OCEAN

APPENDIX B

"MEDICAL ASPECTS OF FLUORIDATION"

The following summary of the health (physiological) effects of fluoride ingestion appeared in the *British Dental Journal*, Sept 19, 1967 (pp. 276–278). It is reproduced in total here with the permission of the publisher and of the author, Dr. Yngve Ericsson of the Karolinska Institute, Stockholm, Sweden:

This subject could be taken in a very wide sense but the present review will concentrate on one crucial point: the safety of the fluoridation of drinking water. In the following text, F stands for physiologically available fluorine, i.e. simple fluoride ions plus physiologically hydrolysable fluoride complexes.

The distribution and metabolism of F in mammals have been thoroughly studied, which is a fundamental requirement in assessing the physiological effects of F. The field experience is also large since F is widely distributed in nature and extensively used or released in industrial processes. In the earth's crust F is estimated to be no. 13 in the order of abundance of the elements. In the oceans, which form the constant environment of the majority of living organisms including several mammals, concentrations between 0.8 and 1.4 p.p.m. F have been determined. In organic nature F is generally a trace element, with the exception in some cases of teeth, bones and shells. Of the plants used for human food, tea is noteworthy for its high F content.

ABSORPTION AND DISTRIBUTION

Ingested F is absorbed to a high degree, generally about 90 per cent, but the absorption is slower than that of both chloride and water. In experimental animals F ingested with water or solid food is absorbed to a similar degree, apparently owing to the normal rapid mixing in the stomach. A high concentration of calcium salts in the food reduces the absorption, particularly at higher concentrations of F used experimentally. Normal variations of salt content of drinking water have no significant influence on the absorption of F in the dosage that is optimal for caries prevention.

Absorption of larger doses of F increases the blood F content temporarily, but the plasma has a remarkable homeostasis for F owing to rapid excretion and rapid uptake in the bone salts. Other body fluids have an equally low and apparently even more stable F content than the blood plasma, generally below 0.1 p.p.m. (with the exception of the urine).

An accumulation of F occurs only in normally or pathologically calcified tissues, mainly the skeleton. This accumulation is enhanced by a rich vascularisation and by accretion and is thus most pronounced in young individuals. Other things being equal, the uptake is proportional to the F supply. Cartilage does not accumulate measurable F until mineralisation is histologically observable.

The placental transfer of F is low and the foetus is thus protected against moderately toxic doses; at the same time pre-natally mineralised teeth do not derive as much benefit in the form of caries resistance as is the case postnatally.

EXCRETION

It has been known for a long time that the main part of the absorbed F that is not retained in skeleton and teeth is rapidly excreted with the urine. The kidney clearance of F is considerably more rapid than the corresponding clearance of sodium, chloride or phosphate: in the dog, the F clearance has been found to be up to 180 times more rapid than the simultaneous clearance of chlorine. Urinary F concentrations 30 times that of plasma have been found. An increased diuresis, for example, in experimental alloxandiabetes has been shown to increase the urinary excretion of F.

A consequence of the excretion of F with the urine is that urinary tract stones containing calcium phosphate are always rich in F, in contrast to gallstones which have always a low F content. The frequency of urinary stones has shown no correlation with urinary F excretion.

PHYSIOLOGICAL MECHANISMS

Much work has been directed to the clarification of the physiological mechanisms of F. Efforts to determine whether F is an essential trace element are impeded by the fact that it is nearly impossible to produce a diet for animal experiments that is completely free from F and at the same time adequate regarding all other substances. At present it appears most probable that F is non-essential for life but essential in very small quantities for normal apatite formation in the skeleton and the teeth. It has been demonstrated both *in vitro* and *in vivo* that F improves the crystallinity of bone salts and reduces their solubility. The last point is at present of great interest in research on several forms of osteoporosis, which may be counter-acted by F.

Several investigations have been devoted to the question whether F may have a competitive effect on the thyroid uptake and metabolism of iodine. The extreme electro-negativity of F and its great chemical differences from the other halogens make such a competitive effect improbable theoretically, and it has been shown in investigations with radioactive F (F^{18}) that this isotope is not accumulated in the thyroid. In experiments with increased F dosage to human and experimental animals no influence on the normally used parameters for thyroid function has been observable.

It has appeared natural to expect F interactions with enzymes in the body since F compounds have been used as enzyme poisons in many biochemical experiments. Of the numerous investigations on effects on enzymes, only those appear to be relevant which concern the effects in biological environment, on cells, tissues or body fluids. It has repeatedly been found in such experiments that the F concentrations that are necessary to produce an enzyme inhibition in such biological environments are far above those occurring in the blood and other body fluids, with the exception of the high concentrations sometimes found in the urine. Among relevant experiments *in vivo* it may be mentioned that Sievert and Philips (1959), feeding rats with 400 to 600 p.p.m. F in the ration, found a strong reduction of the fatty acid oxidase activity of kidney mitochondria but no influence on the corresponding process in the liver.

TOXIC EFFECTS

As regards toxic effects of F, it has been natural to feel some concern about the fact that already the low caries-prevention F dosage of 1 p.p.m. in drinking water causes a small number of barely visible changes in the formation of the dental enamel, while double this dosage may cause objectionable changes appearing as white or brown flecks. It has been natural to ask, are these changes limited to the dental enamel or are they just a sign of more generalised disturbances, for example, in the skeleton? This question is well justified since the quantities of F ingested depend not only on the concentration in the water consumed, which is known to vary considerably.

There is strong evidence that the early reaction of the enamel organ to F is specific for this organ. It is the only epithelial organ that is mineralised, and its mineralisation is much more complete and occurs through a quite different mechanism than in other hard tissues. Experimental fluorosis of the enamel can easily be provoked in several animals without any accompanying disturbances in other hard tissues. Certain fish which have a mesodermal formation of enamel analogous to the formation of dentine and bone in the human, have an F content in their enamel that is of the order of magnitude 100 times that which is found in human enamel; this F accumulation still does not lead to any disturbances in the mesodermal enamel formation of the fish. Last and most important: even in cases of severe disturbances of enamel formation in areas with excessive natural water F content no disturbances have been found in dentine or bone.

Second to the enamel organ the bones show the earliest reaction to over-dosage of F. Following a supply in a temperate climate of 5 to 10 mg. of F daily for some years, a particular coarse trabecular structure can be observed radiographically and histologically. With a still greater F supply for longer periods of time, manifest pathological changes appear: exostosis, calcifications of cartilage and ligaments and in some cases also osteoporosis. Such damage has generally been caused by

industrial dusts or fumes rich in F, but there are also several reports from India showing that a combination of high water F content, high water consumption owing to the hot climate, and chronic malnutrition have led to crippling osteosclerosis with, *inter alia*, constrictions of the spinal canal and paralytic changes.

Investigations in American and European areas with a water F content up to 8 to 10 p.p.m. have failed to demonstrate any cases of crippling osteosclerosis; the sclerosis that has been found in the most F-rich areas has almost always been free from symptons in spite of the fact that the F content in the bone has sometimes exceeded 5,000 p.p.m.

In experiments with many different animal species, inhibition of growth has generally been found when the F content of the solid food has exceeded 100 p.p.m. Pregnancy and lactation make the animals somewhat more sensitive but it has been found, for instance, that dairy cows with repeated calfings have been able to sustain 50 p.p.m. F in the fodder for over 7 years without any symptoms except slight exostoses; under 30 p.p.m. F in the fodder and 4,500 p.p.m. F in the skelton no symptoms have been found in these animals with the exception of the change in enamel formation starting at 10 to 15 p.p.m.

As it is to be expected, the kidneys are the soft organs that show the earliest pathological reaction to excess F. However, rats need be given about 200 p.p.m. F in the solid food in order to obtain incipient epithelial damage to the tubuli, but after several weeks on this F supply the damage is still reversible. It should be mentioned that in the rat, a supply of 200 p.p.m. F with solid food corresponds to about 100 p.p.m. in drinking water.

CONCLUSION

This brief review has given only the outline of the picture produced by many thousands of experimental investigations on the physiology of F. In addition we have now the clinical experience from over 100 million people all over the world who have been using artificially fluoridated water for various lengths of time up to 20 years, without one single demonstrated case of health damage. Statements about allergy to F, which have been made, must be regarded as inaccurate; for example, allergy to F is unknown among the world's billions of consumers of the F-rich tea. Statements of other damage from F at drinking water concentrations of 1 to 1.5 p.p.m. have also been made, but they have not been well founded and have been contradicted by well-established data. Complete agreement is of course no more to be expected in F research than in other fields: not only biological variation must be regarded as natural but the possibility of experimental errors and misinterpretations must be acknowledged. Research in this field will be continued in still greater detail, but it can be stated that our present knowledge on the physiology of F is a safe foundation for the practice of drinking water fluoridation.

APPENDIX C

FLUORIDATION—THE PHILADELPHIA STORY

(An Experience in Effective Community Action)

The material presented below describes the procedures by which fluoridation was adopted in a large American city and the effectiveness of the treatment after a use period of ten years. The source of the material (which is quoted in full except for the tables), is an article by David Soricelli, DDS, published in the *Archives of Environmental* Health, May 1964, pp. 752–754. Dr. Soricelli is director, Division of Dental Health, Philadelphia Department of Public Health:

On Sept. 22, 1954, Philadelphia city and health department officials participated in a simple public relations ceremony dedicating a procedure designed and destined to alter radically the level of dental health of the citizens. The first of seven fluoridators, which scientifically control the fluoride ion content of the water supply, was put into operation on that date. By April of 1955 all seven units were operating. The fluoride concentration of the water supply in Philadelphia has been maintained since at a constant average of one part fluoride ion to one million parts of water.

The act was simple, the cost and maintenance insignificant, and the results rewarding in overt improvement in oral health as well as in potential savings of millions of dollars each year on dental bills. It is difficult to conceive that there still exists any community which has not yet taken advantage of this procedure. It is correctly stated that fluoridation is a controversial subject though not scientifically controversial. All international, national, state, and local health organizations of any merit agree that all dental, medical, engineering, chemical, and legal aspects have proved beyond any measure of doubt, by qualified scientific personnel in these fields, that in all areas where fluoridation exists optimally, either naturally or as a result of human control, consistent beneficial results are obtained. The procedure is safe, inexpensive, and effective.

Shortly after the early controlled demonstration studies began in 1945 at Grand Rapids, Mich. and Newburgh, N.Y., as well as other selected areas, the dental profession in the City of Philadelphia, having actively followed the national picture and evaluated fluoridation in anticipation of local action, assumed leadership through its dental societies leading to the appointment, by the Commissioner of Health, in January, 1951, of a committee to study water fluoridation for Philadelphia. On this committee were members of the faculties of both The University of Pennsylvania and Temple University dental schools, representatives from the local dental society, the medical services of the public and parochial schools, and the women's club as well as officials from the health and water departments. After months of intensive investigation this committee presented to the Health Commissioner a report favoring fluoridation for Philadelphia. The Commissioner referred the report with supporting data to a special advisory committee consisting of medical authorities from several local medical schools and the medical society. This advisory committee approved the report and added its support. The Commissioner then presented to City Council the proposal to fluoridate the water supply. The measure was supported by the incumbent mayor, the City Council, and representatives of the citizenry; the ordinance authorizing fluoridation of water was passed by City Council.

The cost of this program, including initial equipment, installation, fluoride compound, laboratory analyses, and maintenance, average approximately ten cents per person per year for the first year. Subsequently and currently the cost averages approximately eight cents per person per year.

The results of this outlay are maximal only for those who have drunk fluoridated water from the time of birth. The most significant and lasting benefits are reaped

during the first eight years of life though there are beneficial effects on children beyond that age as well as on adults. These benefits are not maximal, however.

In evaluating the results of fluoridation in Philadelphia the data collected annually by the dental examiners of the Board of Education were utilized. The School Health Act of the state of Pennsylvania (March 10, 1949) required that school children be given dental examinations during selected grades in school in order to determine the needs and status of dental health among Pennsylvania school children. This amended act still requires such examinations, and so similar data are now and will subsequently be available. The examinations are performed with the use of universal definitions, criteria, and methods of recording dental caries, and are uniformly done by mouth mirror and explorer. Since our comparisons are within and between age groups, the grade attended during examination is of no significance in the collection of data. The data of both (and intervening) years include children from all social, geographic, and economic levels represented in Philadelphia since all children in these grades were examined.

The number of children examined in each study year, by age, is of such magnitude that differences in "sample" size are insignificant for purposes of this evaluation. As a matter of fact, the groups are hardly considered samples since the numbers represent the total population in each age group by grade.

Evaluation of these data shows in 1954 in Philadelphia, before fluoridation, there was approximately one decayed, missing, or filled (DMF), permanent tooth for every two six-year-old children; today the ratio is one DMF tooth for every ten six-year-olds, a 77% reduction in dental caries in the group who have received full benefit. A ten-year-old child in 1954 averaged 4 DMF teeth; today a child of this age has less than 2.5 DMF teeth, or 40% less, despite the fact that current ten-year-old Philadelphians missed three years of fluoridation in the first important years of their life. Fourteen-year-olds today, whose teeth were completely formed in 1954, nevertheless now record a 31% reduction in dental caries over their respective counterparts of 1954, having only six DMF teeth compared to nine for the 1954 group. Other age groups have benefited proportionately in relation to the age when fluoridation was started. The ultimate outcome is an average two-thirds reduction in dental caries for those receiving fluoridated water from birth.

If teeth do not decay they will probably not be lost since almost all teeth lost prior to age 30 are lost as a direct result of dental decay. The decrease in decayed teeth frees dentist hours to provide care for people whose teeth decay despite preventive procedures.

Increasingly, since fluoridation began, more Philadelphian children at all ages are completely free from dental caries; 28% of the six-year-olds had no caries experience in 1954 while in 1961 47% were free of dental caries. The trend is constant, and the proportion of caries-free children in all age groups continues to increase annually. The physical, mental, and social beneficial results of fluoridation are obvious.

The actual and potential savings realized from fluoridation are impressive. In Philadelphia last year it is estimated that fluoridation reduced the number of decayed permanent teeth by about 360,000, representing a potential financial saving in dental care of about two million dollars to residents for 1960 alone. This amount will increase to a near maximum figure by 1972.

Fluoridation is not the answer to all problems of dental health. There is still need to stress other factors such as restriction of refined carbohydrates, proper home care, sound nutritional and dietary habits, etc. Such activities are complementary to a basic program of fluoridation in the prevention of dental caries. The fluoride ion has proved effective in reducing dental caries wherever it has been used and is undoubtedly the greatest single preventive procedure currently available to prevent dental caries.

This presentation is added to the somewhat voluminous accumulating literature as a record of the implementation of a public health program by adequate consultation and consideration of all interested groups. The success of fluoridation in Philadelphia may contribute toward increasing confidence in Philadelphia's public health authorities.

APPENDIX D

FLUORIDATION OF PUBLIC WATER SUPPLIES

Summary of Court Cases—October 1, 1965

(By Sidney Edelman, Assistant Chief, Public Health Division, Office of the General Counsel)

The following cases involve the addition of fluorides to public water supplies to aid in the prevention of tooth decay. Such measures have, in each case decided on the merits, been upheld against a variety of attacks on constitutional and other grounds.

The summaries of these cases, which arose in 21 States and 2 foreign countries, are arranged for ease of reference in the following categories; A. Cases denied review by the Supreme Court of the United States; B. Cases decided by the highest State Courts; C. Lower court decisions; D. Decisions in other countries.

A. CASES DENIED REVIEW BY THE SUPREME COURT OF THE UNITED STATES

Note: Cases arising in State Courts may reach the United States Supreme Court by two avenues—by writ of certiorari and by appeal. The writ of certiorari is addressed to the discretion of the Court and the denial of certiorari, as Mr. Justice Frankfurter pointed out in *Maryland* v. *Baltimore Radio Show, Inc.*, 338 U.S. 912, 918, "carries with it no implication whatever regarding the Court's views on the merits of a case which it has declined to review."

Although there is not unanimity of opinion on this score, the dismissal of an appeal for want of "a substantial federal question", as distinguished from a denial of certiorari, however, has long been viewed by legal authorities as a decision on the merits and as having the force of precedent. Frankfurter and Hart, *The Business of the Supreme Court at October Term 1934*, 49 Harvard Law Review 68, 77 (1935); Note, *The Insubstantial Federal Question*, 62 Harvard Law Review 488, 489 (1949); *Steinbeck* v. *Gerosa*, 4 N.Y. 2d 302, 313 (1958).

In any event, whatever effect is ascribed to the action of the Supreme Court, the fact remains that the cases cited in this (and the following) section stand for the law of the State involved unless and until they are overruled.

(For a detailed discussion of cases under this and the following heading, see Note 43 A.L.R 2d 453, 459 entitled "Validity construction and effect of statute, ordinance, or other measure involving chemical treatment of public water supply.")

1. *California. De Aryan* v. *Butler*, 119 Cal. App. 2d 674, 260 P. 2d 98 (1953): cert. den. 74 S. Ct. 863, 347 U.S. 1012 (1954). Action by taxpayer to enjoin fluoridation of the public water supply which

had been authorized by action of the city council. In upholding a non-suit granted in the Superior Court, the District Court of Appeals (4th District) held that San Diego had not exceeded its authority under its charter or violated the State Health and Safety Code. It also held that the addition of fluoride to the municipal water supply was a valid exercise of city police power, so long as it was not unreasonable or an abuse of discretion. There was no allegation in the petition that the city council had acted unreasonably in directing fluoridation, and the court found no invasion of constitutional rights.

The California Supreme Court denied a petition for a hearing.

2. *Illinois. Schuringa* v. *City of Chicago*, 30 Ill. 2d 504, 198 NE. 2d 326 (1964) cert. den., 85 S. Ct. 655 (1965). Suit by taxpayers to enjoin the City of Chicago from fluoridating its water supply. On appeal from the lower court dismissal of the suit for want of equity, the Supreme Court of Illinois held that fluoridation, being reasonably related to public health and being a reasonable method of achieving objectives pursuant thereto, constituted a proper exercise of the police power of the City and was not violative of due process as a denial of liberty, nor invalid either as class legislation, irrespective of its particular benefit to a specific and limited age group, or because unnecessary for the protection of the public against infectious diseases.

3. *Louisiana. Chapman* v. *City of Shreveport*, 225 La. 859, 74 So. 2d 142 (1953); app. dismissed for want of a substantial Federal question, 75 S. Ct. 216, 348 U.S. 892 (1954). Suit brought by plaintiffs as taxpayers and users of water for injunction against Shreveport to prevent fluoridation with public funds under a resolution of the city council. The trial court granted an injunction, apparently on the grounds that the city had no power to fluoridate under the city charter or under the police power. The Louisiana Supreme Court reversed the decision holding that it was within the power of the city to fluoridate, both under its charter and as an exercise of its police power and held that the legislation bore a reasonable relation to the public health. The claim that the city charter, if it gave power to fluoridate, violated the 14th amendment, was rejected, the Court saying that the 14th amendment does not deprive State and subdivisions of authority to protect public health by reasonable means.

4. *Missouri, Ready* v. *St, Louis County Water Company*, 352 S,W. 2d 622 (1961), cert, den., 371 U.S, 8 (1962), rehearing den, 371 U.S, 906 (1962). In reversing a lower court order enjoining the fluoridation of the St. Louis County water supply, which was to have been effectuated pursuant to an ordinance enacted by the county council, the Missouri Supreme Court held that the County Council had the power and authority under local and State law to enact ordinances designed to protect the public health though they affected incorporated municipalities within the county. The Court declared that it could not be concluded, though substantial evidence was produced on both sides of the question, that the ordinance did not bear a reasonable relation to the public health, and found that the council's action in adopting the ordinance was a reasonable exercise of the authority of the county to protect the public health. The Court rejected the claims that the ordinance infringed religious freedom, and violated the Fourteenth Amendment as an infringement of liberty and as class legislation.

5. *Ohio. Kraus* v. *City of Cleveland*, 163 Ohio St. 559, 127 N.E. 2d 609 (1956); app. dismissed for want of substantial Federal question,

76 S. Ct. 833, 351 U.S. 935 (1956). Suit by taxpayers to enjoin the city and others from expending money to fluoridate the municipal water supply as authorized by action of the city council. The Supreme Court of Ohio affirmed the opinions of the lower courts, 55 Ohio Ops. 6, 116 N.E. 2d 779 (1953), and 55 Ops. 36, 121 N.E. 2d 311 (1954) dismissing the petition for an injunction.

The Ohio Supreme Court provides this syllabus of its opinion:

1. Prevention and control of dental caries, a common disease of mankind, is a proper subject, in relation to public health, for legislation enacted pursuant to the police power vested in municipalities by the general laws and the constitution of the state of Ohio.

2. The enactment of legislation by the city council of Cleveland providing for fluoridation of the Cleveland water supply, by the introduction of inorganic fluoride chemicals therein, constitutes neither an infringement of the constitutional liberties of the citizens of such municipality nor an exercise of power in contravention of the general laws in relation to adulteration or the practice of medicine.

6. *Oklahoma. Dowell* v. *City of Tulsa* (Okla. ,1954), 273 P. 2d 859; cert. den. 75 S. Ct. 292, 348 U.S. 912 (1955). Action by taxpayer to enjoin fluoridation of city water supply as authorized by the city ordinance. Decree denying injunction affirmed. The Oklahoma Supreme Court said municipalities may in the exercise of the police power adopt reasonable measures that are necessary to protect and improve the public health even though no epidemic is imminent or contagious disease is involved. In holding that fluoridation is a proper exercise of police power and therefore not contrary to the 14th amendment, the Court said that the evidence showing that fluoridation reduced the incidence of dental caries sufficiently established it also as a proper subject for the exercise of police power. To the argument that it was not a public health measure because beneficial only in preventing caries in persons under 16, the Court pointed out that this segment of the population will in a few years comprise a very large percentage of the population. The Court also rejected contentions that fluoridation as authorized would violate the constitutional right of freedom of religion or constitute the practice of medicine within the meaning of State licensure laws.

7. *Washington. Birnel* v. *Town of Fircrest*, 335 P. 2d 819 (Wash., 1959), app. dismissed for want of a substantial Federal question, 80 Sup. Ct. XXX (1959). Action to have ordinance declared unconstitutional and to enjoin town from adding a source of fluoridation to its water supply. Judgment dismissing complaint with prejudice was affirmed without opinion on the authority of *Kaul* v. *City of Chehalis*, 45 Wash. 2d 616, 277 P. 2d 352 (1954). (See under following heading.)

B. CASES DECIDED BY THE HIGHEST STATE COURTS

1. *Connecticut. New Haven Water Company* v. *City of New Haven* (S. Ct. of Errors), 210 A. 2d 449 (May 1965). Judgment of trial court holding invalid ordinance of city requiring water company to fluoridate water supplied to city residents affirmed. The court pointed out that the water company served 11 communities through an integrated water system and that to supply fluoridated water to New Haven alone would cost about $4.5 million dollars, compared to $79,600 for fluoridating the entire system. Since the water company was a public service corporation serving more than one community, subject to

regulation by the State, the court held the ordinance invalid as an attempt to regulate the corporation in a matter of more than local concern and hence inconsistent with the State regulatory scheme.

NOTE: After the decision in this case, the Connecticut State legislature enacted P. A. 156, approved May 28, 1965, which requires water utilities serving twenty thousand or more persons to provide fluoridated water by October 1, 1967.

2. *Florida. City Commission of Fort Pierce* v. *State*, 143 So. 2d 879, (1962); app. dismissed 154 So. 208 (1963). Suit to enjoin the fluoridation of the City's water supply pursuant to a municipal ordinance and under the direction of the State Board of Health. The District Court of Appeals of Florida, reversing a lower court decision, ruled that the provisions of the City charter which granted to the City the power to do "whatever may be deemed necessary or proper" for the legislature to enumerate specifically", expressly conferred upon the City the authority to fluoridate its water supply. Though in so holding the court accepted as logically valid the distinction asserted by plaintiff between preserving health on the one hand and improving it on the other, it did not consider this to be determinative as to whether a particular public health measure is or is not a reasonable exercise of the power to legislate in the public interest on the State or local level.

3. *Indiana. Teeter* v. *City of La Porte*, 236 Ind. 146, 139 N.E. 2d 158 (1956). Suit to enjoin fluoridation of the Municipal water supply and to declare void the ordinance authorizing it. Plaintiff alleged that fluoridation would have a cumulative toxic effect on the population. The Indiana Supreme Court, in reversing the trial court's dismissal of the suit and remanding it for further proceedings, held that under the present state of scientific experience and opinion, it could not, without receiving evidence on the proposition, hold as a matter of law that the allegation was untrue.

4. *Iowa. Wilson* v. *City of Council Bluffs* (Iowa 1961) 110 N.W. 2d 569. Taxpayer's suit attacking the validity of the city ordinance directing the fluoridation of municipally supplied water as beyond the authority of the city and as directing the sale of poison. Reversing the trial court, the Iowa Supreme Court dismissed the petition, holding that the prevention of dental caries by fluoridation was clearly related to the protection of the public health and hence within the authority of the city. The plaintiff's second argument was summarily rejected by the court in the absence of any claim that the fluoride to be added would poison the water or make it less potable. The court also observed that much of the water in Iowa had, in its natural state, a fluoride concentration equal to or in excess of that proposed to be added.

5. *Michigan. Rogowski* v. *City of Detroit*, 374 Mich. 408, 132 N.W. 2d 16 (1965). Class action brought by residents of Detroit to enjoin operation of city ordinance for the fluoridation of the municipal water supply. On appeal from summary judgment for defendant, the Supreme Court of Michigan, taking judicial notice of the "common knowledge or belief" that fluoridation is beneficial in preventing dental caries and thereby improves the public health, held that the case was properly dismissed since the factual proofs plaintiffs may have presented as to the merits or demerits of fluoridation with respect to public health presented questions for legislative not judicial determination and could not be "decisive of whether the police power was properly exercised within constitutional limitations." In reaching this

result, the court rejected plaintiff's argument that fluoridation of the city's drinking water was an improper exercise of the police power of the city because it was directed at protecting the public from a health hazard which was not of a contagious or infectious nature. The court also dismissed as without merit plaintiff's contention that fluoridation of the public water supply constituted the practice of medicine or dentistry or the treatment of children by health officers.

6. *North Dakota. McGurren* v. *City of Fargo* (N.D. 1954) 66 N.W. 2d 207. Plaintiff, a resident and taxpayer of Fargo, brought suit to enjoin fluoridation, which was authorized by a city resolution. Plaintiff argued that there was an implied contract between the water users and the city for the city to furnish pure wholesome water, and that fluoridation would make water unwholesome, also that fluoridation exceeds the police power and is contrary to the State and the United States Constitution. The trial court sustained the city's demurrer. The State Supreme Court reversed this decision and directed the city to answer the complaint, stating that if the allegations were liberally construed, they support a conclusion that an implied contract exists between the plaintiff and the city to supply a certain type of water, which contract may be breached if fluoridation is allowed. (See under following heading for result on remand.)

7. *Oregon. Baer* v. *City of Bend*, (Oreg. 1956) 292 P. 2d 134. Suit by taxpayer to enjoin city officials from fluoridating city water supply. The Court confirmed the decree of the Circuit Court which had sustained a demurrer to the complaint.

In answer to the contention that fluoridation would deprive the plaintiff of liberty without due process of law secured by the Fourteenth Amendment and encroach on freedom of religion secured against Federal intrusion by the First Amendment and similarly secured against State intrusion by the Fourteenth Amendment, the Court, noting the various cases and other authorities (and the express concession of the plaintiff that dental health is a proper field for the exercise of State authority), held that the fluoridation measure of the City of Bend was a reasonable law for the protection of the public health and did not violate any religious or other liberties guaranteed by the Constitution.

8. *Washington.* (a) *Kaul* v. *City of Chehalis*. 45 Wash. 2d 616, 277 P. 352 (1954). The plaintiff here challenged the validity of a city ordinance authorizing fluoridation. The Supreme Court upheld a lower court decision dismissing the suit. The Court held that, while dental caries is neither infectious nor contagious, as a common disease of mankind its prevention and extermination come within the police power of the state. It rejected the contention that fluoridation is *ultra vires* because the police power is exercised through a municipal agency operated by the city in its proprietary capacity, also the contention that constitutional rights were invaded by the proposed treatment of the municipal water supply.

(b) *Exner* v. *Chehalis Fluoridation League*, 51 Wash. 2d 445, 319 P. 2d 543 (1957). Plaintiff brought suit to recover a $1,000 reward that had been offered by the defendant to anyone who could prove that fluorides in one part per million concentration had caused any ill effect to any person anywhere. The Washington Supreme Court affirmed judgment for defendants on the ground that the evidence did not preponderate in favor of the plaintiff.

9. *Wisconsin. Froneck* v. *City of Milwaukee,* 269 Wis. 276, 69 N.W. 2d 242 (1955). Suit for injunction by taxpayers to prevent fluoridation of municipal water supply as authorized by a city council resolution. The State Supreme Court, in upholding a summary judgment by the lower court in favor of the city, stated that it was within the police power to enact measures which bear a reasonable and substantial relation to the public health, that fluoridation, although not directed against an infectious, contagious or dangerous disease, is a valid and reasonable exercise of the police power, and that it involves no unreasonable invasion of rights of residents with respect to private health.

C. LOWER COURT DECISIONS

(Reported from miscellaneous sources. Unless otherwise indicated, these cases have not been officially reported.)

1. *California. City of Oroville and County of Butte* v. *California Water Service Company* (California Public Utilities Comm.); Henderson v. Public Utilities Comm. (California S. Ct., Aug. 13 1957). In the case of *Henderson* v. *Public Utilities Commission,* the California Supreme Court sustained the order of the Commission (Decision No. 5444, dated January 29, 1957) entered in the City of Oroville case requiring the California Water Service Company to fluoridate its water supply. The proceedings before the Commission arose out of a joint request by the City of Oroville and the County of Butte that the Commission require the water company to fluoridate water supplied to residents of the city and county.

The company had rejected prior requests by the complainants, alleging that fluoridation of the water it supplied was a matter within its discretion and insisting that an election be held to determine whether the water users desired fluoridation. Henderson and others were permitted to intervene in the proceedings as interested parties opposed to fluoridation.

The Commission determined that fluoridation would be beneficial to consumers of the water and would not cause any injury to them. It rejected the argument that fluoridation would violate guaranties of religious freedom in the First and Fourteenth Amendments to the United States Constitution and ruled that no election was required to authorize fluoridation.

2. *Florida. Parker* v. *City of Pensacola, Florida* (The Court of Record, Escambia County, Fla., Feb. 27, 1964). Action to enjoin fluoridation of municipal water supply as beyond the authority of the city was dismissed.

3. *Maryland. McFarlane* v. *Mayor and Council of Baltimore City* (Cir. Ct. of Balt., 1952). The Daily Record, Baltimore, Dec. 4, 1952, p. 3. Suit to enjoin city officials from proceeding with proposed fluoridation of city's public water supply. The court, after a full hearing on the merits, denied relief. The Court in its decision found that the health of the water users would not be injured by the ingestion of fluoride in the city water supply in limited quantities proposed and held that no constitutional right of the plaintiff to freedom of religious belief would be invaded. The court also held that the city council and mayor had authority under the city charter to authorize the program.

4. *Massachusetts. Herbert* v. *Gare, Mayor of Northampton, Massachusetts* (Superior Court of Hampshire County, Decree filed June 27,

1952, Equity No. 8853). Taxpayer's suit to enjoin expenditure by Board of Water Commissioners of balance of an appropriation authorized by the city council for purchase of necessary material for fluoridation of city water supply. A preliminary injunction issued but was dismissed after a hearing on the merits. The decision turned largely on the questions of whether the program had been duly authorized under the general provisions of the city charter and the public health laws of the Commonwealth.

5. *Missouri. State of Missouri* v. *Straham* (Mo. S. Ct. 1963). The Missouri Supreme Court granted a writ of mandamus directing that a referendum be held on the fluoridation ordinance of Kansas City, Missouri, in accordance with a referendum petition duly filed, on the ground that the ordinance was legislative in character and under the city charter, subject to a referendum.

6. *New York.* (a) *Paduano* v. *City of New York* (New York 1965) 257 N.Y. S. 2d 531. (Motion for leave to appeal to Court of Appeals denied, 9/21/65). Taxpayer's suit to enjoin the City of New York from fluoridating the public water supply. In granting the motion of the City for summary judgment dismissing the complaint, the court recognized the efficacy of fluoridation in combatting dental caries in the young, and held it to be an appropriate health measure within the authority of the City. In the absence of scientific evidence as to the alleged deleterious effect of fluoridation, the court held that the question of the desirability of fluoridation was a legislative one for the City, and not the court, to decide. The arguments that the fluoridation program was class legislation and violated the Fourteenth Amendment to the Constitution of the United States were rejected.

(b) *Galusha* v. *City of Fulton* (S. Ct. of Fulton County, N.Y., 1953). Temporary injunction to enjoin city from continuing with fluoridation of the city water supply denied.

7. *North Carolina.* (a) *Scott* v. *Bagnal and City of Statesville, North Carolina* (Superior Ct., Iredell County, March 1965). In denying a petition for a temporary injunction against the fluoridation of the City water supply, the court held that the decision of the City in ordering fluoridation was a legislative judgment within the Council's authority and that it could not, as a court of law, consider the merits of fluoridation. The claim that fluoridation violated the plaintiff's religious freedom was rejected.

(b) *Asheville City Council* v. *Asheville and Buncombe County Pure Water Association* (N.C. S. Ct. 1964). The State Supreme Court reversed the judgment of the trial court and directed the dismissal of the suit seeking to enjoin fluoridation of the city water supply, holding that since fluoridation was a controversial issue, the question was one of policy for decision by the City Council rather than one of law for the courts.

8. *North Dakota. McGurren* v. *City of Fargo*, District Court of North Dakota, First District (1956). (For earlier action in this case see "Cases in Highest State Courts", *McGurren* v. *City of Fargo* (N.D., 1954), 66 NW 2d 207.) On remand and trial on the merits in this case, the District Court held that action by the city in fluoridating the water did not violate plaintiff's implied contract with the city water department to furnish pure potable water, because in fluoridating the water the city was acting in a governmental capacity, and as such "has power to cause inconvenience, interference with the rights of and expense to

citizens in order to promote a health measure coming within its police powers." The court held that fluoridating the city water supply did not violate any constitutional rights of the plaintiff, either Federal or State, and further that there was no merit to the contention that fluoridation constituted enforced mass medication.

9. *Pennsylvania.* (a) *Genkinger, etc.* v. *City of New Castle Water Co.* (Court of Common Pleas for Lawrence County, Penn., 1955). Preliminary order restraining fluoridation was denied in an opinion reported in 13 Lawrence Law Journal 75. After a full hearing on the merits, a permanent order also was denied. The court found that the defendant water company was acting as an agent of governmental bodies in adding fluoride to the water supply under regulations promulgated by the State Department of Health and that such regulations were a proper exercise of the police power of the Commonwealth.

(b) *Newcomb* v. *City of Philadelphia* (Court of Common Pleas for the County of Philadelphia, Penn., 1954). Bill for preliminary injunction to enjoin city from introducing fluosilic acid into water supply denied for failure to show irreparable harm to the plaintiff in the proposed action of the city.

10. *South Carolina. Wyatt* v. *Beattie* (Court of Common Pleas of County of Greenville, S.C., 1953). Bill to enjoin the Commissioners of Public Works of the City of Greenville from adding fluorine to the water supply dismissed for failure to prove allegations of the complaint. Such allegations must be inferred from the tenor of the opinion in which it was found that fluoridation was a beneficial health measure duly adopted by City Ordinance.

D. DECISIONS IN OTHER COUNTRIES

Canada

The following Canadian cases turn on narrow questions of law and have limited relevance to the general problem. They are, however, cited for the purpose of the completeness of this report.

1. *Village of Forest Hill* v. *Municipality of Metropolitan Toronto*, 1956 Ontario Reports 367. (Ontario, 1956). Application by area member of the Metropolitan Council for the Municipality of Metropolitan Toronto to quash a by-law passed by the Council authorizing fluoridation of the water supply on the grounds that the by-law was ultres vires. The Court of Appeal reversed the lower court's dismissal of the suit and quashed the by-law on the grounds that the statutes relied upon by the Council could not be construed to authorize the passage of the by-law. The merits of fluoridation were not involved in the suit.

2. *Regina* v. *City of Fredericton*, 2 D.L.R. 2d 551 (New Brunswick, 1956). Writ of Certiorari to Court of Appeal to quash a resolution of a city council respecting fluoridation of municipal water supply. The court granted the relief demanded on the grounds that the resolution was passed prior to the implementation of the provincial Public Health Act authorizing fluoridation.

Ireland

Ryan v. *Attorney General* (The High Court, Dublin 1963) 1962 No. 915 P. Plaintiff challenged the validity of the Fluoridation of Water Supplies Act of 1960, which requires every health authority to arrange for the fluoridation of public water supplies, as violating her right to "bodily integrity" under Article 40 of the Irish Constitution,

and contended that the fluoridation of public water supplies endangered the health of consumers. The Court held that if the statute "imposed" the consumption of fluoridated water on citizens which could endanger their health, the statute would violate the Constitution. In upholding the constitutionality of the statute and dismissing the action, however, the Court declared that on the basis of the evidence presented it was satisfied beyond the "slightest doubt" that the fluoridation proposed would not only be of benefit in reducing caries but would not cause any damage or injury to the health of anybody and further, that there was no risk or prospect that it would. Even if fluoridation were dangerous, the Court observed that the plaintiff was not required to drink the water, and that she had no right to a supply of water which had not been fluoridated.

Note: Compare the recently enacted Connecticut statute requiring water utilities serving populations of 20,000 or more to provide fluoridated water by October 1, 1967 (Public Act No. 156, Feb. 1965 Special Session).

APPENDIX E

FLUORIDES AND HUMAN HEALTH*

A Summary

The widespread confidence in both the safety and the efficacy of water fluoridation as a prophylactic measure in the control of dental caries is reflected in a resolution of the Twenty-second World Health Assembly (Boston, 1969)[1] recommending that Member States should introduce fluoridation of community water supplies in areas where the total intake of fluorides by the population is below the optimal levels for protection against dental caries.

In view of the widespread use of this measure, it is of paramount importance to have a thorough understanding of the part played by fluorides in human physiology and pathology.

In order to present the known facts about fluorides in human physiology, a monograph [2] covering the whole range of fluorine metabolism has been published by WHO. It contains contributions from 29 experts [3] from 11 countries and was circulated in draft form to 93 specialists in various countries, whose comments were taken into account in preparing the final version. The monograph is thus representative of informed dental and medical opinion throughout the world.

THE OCCURRENCE AND IMPORTANCE OF FLUORINE

Fluorine, being the most electronegative of the chemical elements, is so highly reactive that it is never encountered in its elemental gaseous form except in some industrial processes, but only in the combined form. It is the seventeenth most abundant element in the earth's crust (approximately 300 parts per million), being about four times more abundant than copper. It occurs mostly as fluorspar (CaF_2), cryolite (Na_3AlF_6), and apatite ($Ca_5FP_3O_{12}$) and to a lesser extent in several other minerals. It is also present in sea-water (0.8–1.4 ppm), in many drinking-water supplies, and in surface dusts close to some mineral deposits.

The widespread occurrence of fluorine in the earth's crust and its high reactivity naturally raise the question whether it is an essential element in animal (including human) metabolism. Surprisingly, the answer is not known with any certainty; it has not yet been possible to produce an otherwise adequate fluorine-free diet for experimental animals. Nevertheless, as fluorine yields the most active physiological elemental ion, its metabolic function has aroused considerable interest and there is now a vast literature on the subject. From all this work it

*As published in the WHO Chronicle (June 1970), pages 271–282.

[1] *Off. Rec. Wld Hlth Org.*, 1969, 176, 12 (WHA22.30).

[2] *Fluorides and human health*, by various authors, 1970, Geneva (*World Health Organization: Monograph Series, No. 59*). Price: £3, $10.00, or Sw. fr. 30.—.

[3] P. Adler, W. D. Armstrong, Muriel E. Bell, B. R. Bhussry, W. Buttner, H.-D. Cremer, V. Demole, Y. Ericsson, I. Gedalia, H. C. Hodge, G. N. Jenkins, S. S. Jolly, E. J. Largent, N. C. Leone, T. G. Ludwig, A. E. Martin, G. Monoguchi, J. C. Muhler, E. R. Schlesinger, A. H. Siddiqui, L. Singer, A. Singh, F. A. Smith, G. K. Stookey, D. R. Taves, P. Venkateswarlu, J. C. Weatherell, S. M. Weidmann, and I. Zipkin.

is clear that a certain quantity of fluorine is essential for the formation of caries-resistant dental enamel. Moreover, traces of fluorine appear to be necessary for the normal process of mineralization in hard tissues, and they may also play a part in reproduction. This last aspect has been inadequately investigated and is extremely controversial, but in several experimental studies no viable offspring were produced by female rats fed on a diet very poor in fluorine. It is also known that the presence of fluoride ions may either inhibit or stimulate the activity of certain enzymes, though the processes involved are largely obscure.

While it is often assumed that fluorine is metabolized from electrovalent compounds as the simple fluoride ion, F^-, there is evidence that several complex ions (e.g., CaF^+, MgF^+) are sometimes formed and metabolized in the body. Moreover, fluorine is not always ionized—in some organic fluorides, the fluorine is held by strong covalent bonds and the ion is not liberated in the body. In these cases the fluorine plays no part in any metabolic process and is usually excreted in the faeces.

Probably the most important property of fluorine, from the physiological point of view, is its great affinity for calcium phosphate. It is this property that causes it to accumulate in all tissues exhibiting either physiological or pathological calcification. However, even high levels of ingested fluoride have never been shown to aggravate the frequency or severity of pathological calcification outside the skeletal system.

In bones, low fluoride concentrations are beneficial, since they increase the size of apatite crystals and reduce their solubility, thus stabilizing the whole skeletal system. Fluorides have been administered to astronauts to counteract the loss of skeletal calcium due to physical inactivity and weightlessness. In high doses, however, fluorides can cause damage to bones. In the optimum amounts, fluorides are beneficial to teeth and reduce the incidence of dental caries by up to 60%; in high doses they can be injurious, disturbing enamel formation and causing the condition known as mottled enamel.

The Supply of Fluorine to Man

The principal sources of fluoride available to man are drinking-water, food and drugs (including dentifrices, mouthwashes, etc.), and airborne dusts and industrial contaminants.

Fluorides in drinking-water

Drinking-water is by far the most important source of fluorine, which is present usually in the form of dissolved fluorides but occasionally in the form of suspended fluoride particles. Fluorides are present in nearly all potable waters owing to the solvent action of water on rocks and soil. A very small proportion of the fluoride in drinking-water enters directly from the sea or from atmospheric contamination, fluorides being present in coal smoke and volcanic steam. Surface waters are generally low in fluorides (less than 1 ppm), while underground or subsoil waters, which have a greater opportunity to contact fluorine-bearing rocks, usually contain higher levels. Table 1 gives the maximum fluoride levels found in natural waters in a number of countries.

TABLE 1. MAXIMUM FLUORIDE LEVELS IN THE NATURAL WATERS OF VARIOUS COUNTRIES

Country:	Fluoride level (ppm)	Country:	Fluoride level (ppm)
Argentina	1. 6	Japan	20. 0
Australia	13. 5	Kenya	2800. 0
Austria	0. 8	Korea	10. 0
Canada	1. 2	New Zealand	0. 9
Chile	1. 5	Nigeria	6. 2
Cuba	0. 4	Norway	2. 7
Czechoslovakia	28. 0	Poland	1. 1
Denmark	3. 3	Portugal	22. 8
England	5. 8	South Africa	53. 0
Ethiopia	0. 9	Spain	6. 3
Finland	5. 0	Sweden	10. 0
France	7. 0	Tanzania	95. 0
India	6. 4	USA	16. 0
Iran	1. 0	USSR	7. 0

Obviously the amount of fluoride ingested from water depends both on the fluoride content of the water and the quantity consumed. The former can be measured; the latter can only be estimated. For drinking-water with a fluoride content of 1 ppm, it has been estimated that the fluoride ingested per day is 0.39–0.56 mg for children aged 1 to 3 years, and 0.81–1.165 mg for children aged 10 to 12 years (see Table 3). Allowance must of course be made for the variation in water consumption with the climatic temperature.

The recommended level of fluorides in drinking water in temperate climates is now accepted as 1.0–1.2 ppm.

Fluorides in food

Foods almost always contain traces of fluorides, and this fact must be taken into account when calculating the extent to which drinking-water should be fluoridated. Although the quantity of fluoride absorbed by the body is usually more closely related to the amount in drinking water than to the amount contained in diet, in some local situations the reverse may be true—for instance, when there is a very high consumption of sea fish.

Table 2 gives representative figures for the range of fluorine contents of some foods. Sea fish, some offal, and tea are rich in fluorine; citrus fruits are particularly poor in the element.

TABLE 2. FLUORINE CONTENT OF VARIOUS FOODS

Food	Fluorine content (ppm)
Meats	0. 2–2. 0
Offal	2. 3–10. 1
Fish	5. 8–26. 9
Shellfish	0. 7–2. 0
Eggs	1. 2
Milk	0. 07–0. 22
Cheese	1. 62
Tea (average, dry weight)	97. 0
Coffee	0. 2–1. 6
Citrus fruits	0. 03–0. 36
Non-citrus fruits	0. 11–1. 32
Cereals *	0. 1–0. 7
Vegetables	0. 1–1. 0
Wine and beer	0. 07–0. 24

* Except for cottonseed, which contains 12 ppm.

Table 3 shows the combined estimated daily intake of fluorine from food and fluoridated water (1 ppm of fluoride (for children in the USA. Other estimates for the total daily intake of fluorine from food (including low-level fluorides in drinking water) are;

Canada—0.18–0.3 mg
England—0.6–1.8 mg
Norway—0.22–3.1 mg
Switzerland—0.5 mg
USSR—0.6–1.2 mg

TABLE 3.—ESTIMATED DAILY INTAKE OF FLUORINE BY CHILDREN IN THE UNITED STATES

Age of child (years)	Daily fluorine intake (mg.)		
	From water (1 p.p.m. fluoride)	From food	Total
1 to 3	0.39–0.56	0.027–0.265	0.417–0.825
4 to 6	0.52–0.745	0.036–0.360	0.556–1.105
7 to 9	0.65–0.93	0.045–0.450	0.695–1.380
10 to 12	0.81–1.165	0.056–0.560	0.866–1.725

Fluorides are also available to man in the form of drugs—either those specifically designed to liberate the fluoride ion in the body or those administered for other purposes, in which case the fluorine is usually covalently bonded and therefore physiologically inactive.

In general, fluoride tablets have proved to be only partially successful in controlling caries. In one research project, young adults who took a daily tablet containing 1 mg of sodium fluoride were found to excrete 10% of the fluoride in the faeces and 61.7% in the urine. The remaining 28.3% presumably found its way into the skeleton, soft tissues, and body fluids. With children, a higher proportion (up to 72%) of the absorbed fluoride is retained in the body. These results seem to be fairly typical, and it may be that the daily ingestion of a fluoride tablet provides a greater amount of fluorine for metabolism than that derived from fluoridated water. The trouble is that it is difficult to persuade people, particularly children, to take these tablets regularly over a long period.

Fluoridated toothpastes have been available for the past twenty years; they usually contain 1 mg of fluoride per gram of toothpaste. These dentifrices do not consistently alter the fluoride content of the urine, but a small amount may be retained by the dental enamel. Results of experiments are conflicting, and reports have been made giving retentions varying from 15 to 400 micrograms per brushing. The effectiveness of these fluoride toothpastes in controlling caries is thus not yet settled—even though some clinical tests have suggested caries reductions of 20%–30% in schoolchildren.

Very little is known of the efficacy of fluoridated chewing gum and mouthwashes; more research is required on these subjects.

Airborne fluorides

Airborne fluorides from dusts and gases are a potential health problem in several parts of the world, as the fluoride ions are almost completely absorbed from the lung.

The world consumption of fluorspar (for steel making and other uses) is more than 2 million tons per year. Cases of industrial fluorosis due to the inhalation of fluoride dusts occur during the mining and

processing of fluoride minerals, and precautions have to be taken to protect workers in these industries. However, no ill effects from the inhalation of airborne fluorides have been reported outside mining or industrial plants. This is true even in those parts of the world in which the soil has a very high fluorine content. For example, in parts of Tennessee the soil contains more than 7000 ppm of fluorides, derived from outcroppings of apatite. Dust from this soil can cause very high fluoride contamination of local vegetation; in this case ingestion is likely to be more of a hazard than inhalation.

Elemental gaseous fluorine and hydrogen fluoride are extremely dangerous if inhaled, but fortunately neither of these substances is found in nature. Some 200,000 tons of hydrogen fluoride are produced in the USA alone and, as even 25–30 ppm can be lethal if exposure is continued for any length of time, this chemical has to be handled very cautiously in industry.

ABSORPTION OF FLUORIDES

The extent to which inorganic fluorides are absorbed depends on their solubility. The absorption of soluble fluorides by the gastro-intestinal tract is rapid and nearly complete, whereas less soluble fluorides are more slowly and less completely absorbed. Absorption takes place both through the gastric membranes and through the intestinal tract by the normal process of diffusion.

In principle, the extent of the absorption is the same whether the fluorides are ingested in water or in food. But there is one important exception to this principle. If the diet contains high proportions of calcium, magnesium, or aluminum, complex fluoride ions of low solubility may be formed. In these circumstances the faecal excretion of fluoride increases and the absorption decreases. As fluoride absorption from sodium monofluorophosphate (Na_2PO_3F) is less influenced by the presence of calcium ions, it has been suggested that this compound may be more suitable than sodium fluoride in the manufacture of fluoridated salt. With sodium fluoride, the fluoride absorption may be reduced by the presence of foods rich in calcium.

DISTRIBUTION OF FLUORIDES IN THE BODY

Modern analytical techniques have revealed that fluorides are always present in mammalian body fluids and tissues to some extent, and that relatively large amounts occur in calcified tissues. Blood plasma is the most convenient and reliable indicator of fluoride concentrations in body fluids, and it has been shown that the mean fluoride content of plasma is in the range 0.14–0.19 ppm, even when the drinking-water content of fluorides varies from 0.15 to 2.5 ppm. This indicates the existence of a homesotatic mechanism for maintaining a relatively constant plasma fluoride content. However, when the fluoride content of drinking-water is as high as 5.4 ppm, this regulatory mechanism is to some extent overwhelmed, and mean plasma fluoride contents of 0.26 ppm have been observed. Further evidence of this homeostatic effect has been obtained when large doses of sodium fluoride have been administered in the treatment of metabolic bone disease. With doses of 50–100 mg of fluoride per day, there is usually a transitory rise in plasma fluoride, but it subsequently settles down to a level near to the pretreatment figure.

From studies using radioactive fluoride it has been found that there is a rapid and widespread distribution of fluorides to soft tissues. The normal level for most fresh human soft tissues is in the range 0.5–1.0 ppm and, as with plasma, there seems to be a homeostatic mechanism keeping this level constant. However, fluoride intakes that produce acute intoxication will cause substantial increases in the fluoride level in most soft tissues.

No matter how little fluoride is ingested, up to about half the total quantity is incorporated in hard tissues. The mode of incorporation appears to be by one of two processes:

By exchange, the fluoride ion replacing other ions or groups in the hydroxyapatite crystallites without seriously disrupting the apatitic structure; and

By accretion during crystal growth.

The relative importance of these two processes has not been established, but both are believed to occur at maximum rates during bone growth or tooth development.

The incorporation of fluorides in teeth can be regarded as occurring in three stages:

During formation, when the fluoride is probably taken up uniformly throughout the tissue;

During mineralization, when the uptake is greatest in the areas in which mineralization is actually taking place; and

In the post-mineralization period when the teeth are fully formed, the uptake then being confined to marginal regions of both the enamel and the dentine.

The average fluoride concentration in dentine is two or three times that in enamel, the highest concentration being at the pulpal surface, with a steady decrease as the enamel is approached. In the enamel, the fluoride is concentrated at the outer surface, decreasing exponentially with depth from the surface. The outer 100–200 microns of enamel continue to acquire fluorides from the oral fluids after the tooth has erupted.

In both teeth and bones, the fluorine level is directly related to the availability of the element (i.e., to the amount ingested), and it tends to increase with age. It is to be hoped that, with improved techniques of fluoride estimation and tissue sampling, the exact amounts of fluoride distributed and incorporated in hard tissues will be determined in the next few years.

EXCRETION OF FLUORIDES

Because prolonged exposure to excessive quantities of fluorides can lead to ill effects, their excretion from the body is of great importance. Fluorides are excreted in faeces, urine, sweat, and to a small extent by skin which is shed. Traces may also be lost in milk, saliva, hair, and tears, though it is probably not exhaled in the breath.

Faecal excretion usually accounts for the loss of some 10% of the daily intake, but when the diet includes relatively insoluble fluorides (e.g., bone-meal, cryolite, and insoluble calcium salts) the proportion may be as high as 30%.

Sweat probably does not contain appreciable amounts of fluoride for individuals living in comfortable environments, but under conditions of profuse sweating it may account for as much as 50% of the

total fluoride excreted. Also, there is some evidence that sweating can act as a regulator in maintaining the body's fluoride balance—the fluoride concentration in sweat is higher when additional fluorides are ingested.

Although fluorine is a natural constituent of human milk (with concentrations ranging from less than 0.1 to about 0.2 ppm), the proportion of the daily intake secreted in the milk is negligible. It is not known whether this small amount of fluorine in mothers' milk is significant in the development of teeth and bones in infants.

The fluorine content of saliva is similar to that of blood, but the loss of fluorine from the body by this route is obviously very small indeed. However, the small amount present in the saliva may be of importance in the accumulation of fluorides in the surface enamel of the teeth.

In normal circumstances, fluorides are excreted principally in the urine. They appear in urine very rapidly after ingestion (about 20% after three hours), and generally the level reflects the daily intake. It is convenient to discuss urinary secretion as it occurs in two groups of people.

(1) *Persons with a fairly constant intake.* In these individuals the fluoride content of the urine is usually equal to that of the drinking-water (at least up to 8 ppm). This leads to the conclusion that people who have lived for a long period in one area with a steady fluoride water content are in a state of fluoride equilibrium. Each day they excrete roughly the same amount as they ingest. A part of the daily intake is stored in the skeleton, but this is ultimately matched by the fluorine mobilized from the skeletal store. This process of mobilization occurs by replacement of fluoride ions by hydroxyl ions, presumably both from the surface and from the interior of crystals of bone mineral.

(2) *Persons exposed irregularly to high fluoride levels.* In these individuals when the low normal dose is temporarily and substantially exceeded, up to half of the additional fluoride is likely to be acquired by the skeleton, the balance being rapidly excreted in the urine. In fact, this very rapid excretion is one of the body's defence mechanisms in the event of fluoride poisoning. If the absorbed dose is overwhelming, the patient will die within four hours; if it is not, the fluoride level will be rapidly reduced either by absorption into the skeleton or excretion in the urine. If the patient does not die within four hours, these rapid means of reducing the fluoride level will usually ensure his recovery.

PHYSIOLOGY OF SMALL FLUORIDE DOSES

During the controversy over the fluoridation of public water supplies, a number of questions concerning potential health hazards have been raised, in spite of the copious and impressive experimental evidence for the safety of fluoridation. There is absolutely no evidence that a fluoride level of 1 ppm in drinking-water has any harmful effects on the metabolism of food, the function of vitamins, or the activity of either hormones or enzymes.

As far as body fluids and soft tissues are concerned, more research is needed to understand the part played by low concentrations of fluoride in biochemical mechanisms. But reports that modest doses of fluorides can cause a lowering of blood pressure in dogs and renal changes and urinary calculi in rats have never been substantiated.

Fluorides in bones

As about 96% of the fluoride in the body is deposited in hard tissues, it is obviously of the utmost importance to know as much as possible about the function of fluoride ions in the structure, morphology, and physiology of bone.

The fluoride ion is unique in that it continues to be deposited in calcified structures after other bone constituents (calcium, phosphorus, magnesium, carbonate, and citrate) have reached a steady state. Even if large amounts of these other constituents are administered, their concentrations, which reached their maximum early in life, remain essentially unchanged. Fluorine in bone, on the other hand, increases very rapidly with higher fluoride levels in drinking-water. However, age is an important factor in the extent to which fluorine is incorporated into the skeleton. When 1 ppm of fluoride was introduced into a municipal drinking-water supply, it was found that it took about three years for the urine of children (5–14 years) to reach a level of 1 ppm, whereas the urine of adults reached this level in one week. The adults' skeletons clearly reached equilibrium very rapidly, while the children's skeletons went on absorbing fluorine for three years before a steady state was reached.

Bone formation

The current theory of bone formation postulates that collagen (the chief protein of bone fibre) forms a matrix for a nucleation process in which calcium and phosphorus are deposited. This is followed by the formation of the mineral phase—called hydroxyapatite, $Ca_{10}(PO_4)_6(OH)_2$. Thus the collagen fibres act as a template for the deposition of the hydroxyapatite crystals. As fluorine ions are much the same size and shape as the hydroxyl ions, they are able to replace hydroxyl ions, either partially or totally, in the apatite crystals; so that hydroxyapatite and fluorapatite are able to coexist in the mineral phase.

When fluorine is present, a definite improvement in crystal texture has been observed. The reasons for this are not certain, and unfortunately X-ray diffraction techniques are only of limited use in examining the small and imperfect crystals formed in bones. Present methods cannot definitely establish the position of an individual ion, but it is generally agreed that sodium, potassium, and citrate ions do not occupy positions in the lattices of biological apatites. Whether or not magnesium does is still undecided. Recent evidence suggests that carbonate can replace the phosphate group, at least to some extent. When it does so, it is known to disturb the crystal structure. Although citrate is not incorporated into the lattice, it is believed to be absorbed on the crystal surface, and this also disrupts the structure.

The beneficial effect of fluorine ions in these apatite crystals could be due to either or both of the following processes:

A direct effect on the nucleation process causing larger crystals of hydroxyapatite to be formed;

A displacement of such ions as carbonate and citrate, which are known to disturb crystallization.

Support is given to the second alternative by the observation that as the fluoride content of bones increases, there is a corresponding decrease in carbonate and citrate.

These aspects of the role of fluorine in the skeleton are not completely understood, but from the work that has been done it is clear

that the physiology of the human skeleton is not adversely affected by fluorides, at least up to a level in drinking-water of 8 ppm. Indeed, small quantities of fluorides may be essential for the formation of healthy apatitic structures.

Fluorides in teeth

The concentration of fluorine in teeth follows a similar pattern to that in bone. The age of the individual and the fluoride intake in food and water are the chief factors. But in dental enamel, which has no cells and no circulation, the uptake almost ceases after the age of about 30 years.

The mechanism by which fluorides give protection against dental caries is not yet settled. The two most likely theories at present are: that the presence of fluorine reduces the solubility of enamel in acid; and that fluorides inhibit the activity of the bacterial enzymes that produce the enamel-attacking acids. Other explanations have been proposed but have not been adequately investigated.

Enamel solubility. It is easy to show that when enamel is shaken *in vitro* with a fluoride solution (even as dilute as 1 ppm), and subsequently washed, it has a lower solubility than untreated enamel. Also, the solubility of enamel is reduced if the acid attacking it contains 1 ppm of fluoride. Evidently, fluorine reduces the solubility of enamel, whether it is present in the enamel itself or in the solvent. This does not, however, definitely settle the practical issue of whether or not 1 ppm of fluoride in drinking-water (which is known to reduce caries substantially) will provide sufficient fluorine in the enamel or the oral fluids to influence solubility significantly.

It is possible that this reduction in the solubility of enamels containing fluorides is due to the formation of fluorapatite in place of hydroxyapatite, since it is known that the former is less soluble than the latter. The suggestion has also been made that it is due to the formation of a protective layer of calcium fluoride on the dissolving crystals of fluorapatite.

An alternative theory is that apatite is formed only in the presence of fluorine; in its absence the more soluble crystals of brushite, $CaHPO_4$, or octacalcium phosphate, $Ca_8H_2(PO_4)_6.5H_2O$, are formed.

Bacterial activity. Since fluorides inhibit some enzyme processes, the possibility must be considered that they could control caries by reducing the amount of acid produced by the bacteria in saliva or in the layer of bacteria suspended in a protein matrix that deposits on teeth (known as "dental plaque").

It has been found, however, that 2 ppm of fluoride in saliva has only a small effect on acid production, and much higher concentrations are required to influence bacterial growth. As the fluoride level in saliva is usually in the range 0.1–0.2 ppm (of which only about 20% is likely to be in the form of free ions), it seems improbable that fluorides in the saliva are responsible for controlling caries.

On the other hand, the fluoride level in plaque is surprisingly high. An average of 66.9 ppm was found in the plaque from adults in a town without fluoridated water. However, some 95% of the fluorine appears to be in bound form, and ion concentrations in plaque do not generally exceed 1–2 ppm. In spite of this relatively low content of free ions, the fluorine in plaque is probably implicated in some way in the process of caries control. If pure cultures of bacteria isolated from plaque are

grown in a medium containing fluorides, they will produce acid from sugar more slowly than fluorine-free controls. Moreover, they will store the fluoride. This suggests that much of the fluoride in the plaque is actually inside the bacteria, where it exerts an inhibitory effect.

Where does the fluorine in plaque come from? It is unlikely to come from the enamel. The incorporation of fluorides by the apatite of enamel is known to be a virtually irreversible process. The enamel could only be a source of fluorides for the plaque if the plaque dissolves the apatite in the enamel. But this could only occur to a very small extent, if at all, otherwise the fluorides of the enamel surface would decrease with age when in fact they increase. If the fluorine in plaque is not derived from the enamel, it must come from the slow trickle of saliva, from the larger but intermittent washes with drinking-water and other fluoride-bearing liquids, or from food.

Probably all these factors contribute to the cariostatic effect of fluorides, though which of them is predominant is not yet known. The experimental results give considerable support to the solubility theory but are not conclusive, and the mechanism of solubility reduction is still controversial. There may also be other effects that have not yet been discovered.

THE TOXIC EFFECTS OF LARGE FLUORIDE DOSES

The toxic effects of fluorides may be acute, resulting from a single massive dose, or chronic, resulting from large doses spread over a number of years.

The acute lethal dose for man is between 2.5 and 5 [grams], depending on the solubility of the compound and the susceptibility of the individual. Acute fluorine poisoning is very rare but, in view of the wider use of fluorides in industry, agriculture, and the home, cases may occur more frequently in future. Symptoms are diffuse abdominal pain, diarrhea, and vomiting, accompanied by excessive salivation, thirst, perspiration, and painful spasms of the limbs. Emergency treatment is to provoke vomiting and then to make the patient drink large volumes of milk.

It must be stressed, however, that the relatively minute doses from natural sources or the amounts absorbed from industrial contamination over long periods do not cause these acute toxic effects.

Chronic effects on dental enamel

The condition known as "mottled enamel" was first described in 1901 and first associated with fluorides in drinking-water in 1931. The permanent teeth are particularly affected, though it occasionally affects primary teeth. The severity of the mottling seems to bear a quantitative relationship to the fluoride level in drinking-water, though regional climatic conditions influence water consumption and hence the total fluoride ingested.

In a temperate zone of the USA it was found that, with a fluoride concentration of about 1 ppm in drinking-water, a small number of spots were discernible on a limited number of teeth in scattered individuals, but these spots were not noticeable to the layman and were in no way disfiguring. In areas where the fluoride level exceeded 1.4–1.6 ppm, some of the teeth of some members of the population

showed light yellow to brownish spots. Where the fluoride level exceeded 2 ppm, brownish spots were observed on numerous teeth in most of the community. In areas where the level exceeded 2.5 ppm, the enamel was seen to have lost its smoothness, and dark discolorations had affected several teeth of many people.

The cause of this type of fluorosis is not understood, but it seems to bear a relationship to calcium metabolism, and fluorides appear to influence both the organic and the inorganic phase during the development of enamel. Specific causes suggested are: an exchange of fluoride with hydroxyl ions of the apatite of the enamel; an alteration of the precipitation of mineral from saturated solutions of calcium phosphate; and inhibition of the activation of enzymes.

There is considerable evidence to support each suggestion, but none is conclusive and further work is required in order to arrive at the true cause of mottling.

Chronic effects on the skeleton

Chronic toxic effects on the skeleton have since 1937 been linked with excessive amounts of natural fluorides in drinking-water or with industrial exposure to fluorides. The precise dosage that causes these effects has not been evaluated, but no evidence of abnormal bone density has ever been demonstrated with a daily intake of less than 2 mg of fluoride. It has been reported that a daily ingestion of twice this amount is possible without an appreciable hazard. However, in association with certain aggravating conditions, a daily ingestion of 2–8 mg may cause some dental and skeletal fluorosis. In geographical areas in which fluorosis is endemic, a fluoride ingestion from food and water of over 8 mg per day is common. The advanced stage of skeletal deformity and crippling results from continuous exposure for 10–20 years to a daily intake of 20–80 mg of fluoride (usually associated with at least 10 ppm of fluoride in the drinking-water).

While dental fluorosis is easily recognizable, skeletal fluorosis does not become clinically obvious until crippling occurs, although radiological changes are discernible at a much earlier stage. Early symptoms include pains in the small joints of the hands and feet, in knee joints, and in the joints of the spine. In later stages there is stiffening of the spine and limitation of movement, followed by curvature of the spine.

In cases of skeletal fluorosis, the bones are heavy and irregular and have a dull colour. The sites of muscle and tendon insertions are abnormally prominent, irregular bone may be seen along the attachment of muscles and tendons, there is thickening and calcification in most of the ligaments and in many capsular attachments, and the thyroid cartilage is often calcified. Apart from these gross changes, fluorotic bones increase in weight; the fluorotic skeleton may be more than twice as heavy as a normal skeleton of similar proportions. The chemical composition is also altered, with a marked increase of fluorine in the bone-ash, lower carbonate and citrate contents, and a slightly higher magnesium content. The calcium and phosphorus contents, however, remain normal.

Having described some of these serious symptoms of fluorosis, it is most important to emphasize that there is absolutely no evidence to show that the amount of fluoride likely to be ingested from artificially fluoridated water could produce any of these toxic skeletal effects.

Other chronic effects

While there is no evidence that artificially fluoridated water has any adverse effects on normal kidneys, its use has been questioned in cases of renal disease and in haemodialysis in cases of renal failure. These fears have proved to be unfounded, but in view of the limited amount of work that has been done on the subject, those who use fluoridated water for dialysis are advised to watch the bone status and serum fluoride concentrations of their patients.

The effect of fluorides on the thyroid gland has also been thoroughly investigated, and it can be stated that fluorides have no specific toxic effects on this gland. Fluorine neither accumulates in the thyroid nor interferes with the uptake of iodine from normal dietary sources.

Fluoridated water has been blamed for a large number of chronic conditions ranging from constipation to brittle nails and from gonadal conditions causing "feminized males" to manic depression. It is also quite common for health officers to receive complaints from local citizens about digestive disorders and other disabilities caused by fluoridated water—even before the fluoridation has taken place. No evidence, however, has ever been provided to substantiate any claims for symptoms arising from chronic fluorosis except the dental and skeletal symptoms described.

* * *

It is now widely accepted by public health authorities that fluoridation is beneficial to the teeth. Nevertheless, there is still a great deal to be learned about the basic physiology of fluorides in the human body, and the desirability of further research was embodied in the resolution of the World Health Assembly mentioned at the beginning of this article. In this resolution, the Assembly requested the Director-General of WHO "to continue to encourage research into the etiology of dental caries, the fluoride content of diets, the mechanism of action of fluoride at optimal concentrations in drinking-water, and the effects of greatly excessive intake of fluoride from natural sources".

APPENDIX F

The Fluoridation Issue in the 82nd Congress (1952)

In May, 1952, the Congress appropriated funds to the District of Columbia for the purpose of fluoridating its water supply. Just prior to this development, and probably in anticipation of it, a Select Committee of the House set up to investigate chemicals in food and cosmetics was taking an opposite view in hearings during February and March, 1952. The Committee's transition from subject materials on foods and cosmetics to drinking water and fluoride was abrupt; the connection, however related to teeth as follows:

> "Mr. Kleinfeld: Mr. Chairman, before going into the question of the fluoridation of water, you will recall that last year Dr. McCay, of Cornell University, as part of his statement, referred to the allegedly deleterious effects of cola beverages upon teeth." 121/

Letters in disagreement with Dr. McCay were introduced into the record including several pages of other materials related to chemical additives to foods. The first witness on fluoridation was then sworn in and there follow in the hearings record 311 pages of statements for and against fluoridation and an interesting dialogue between the witnesses and members of the committee, mostly Representative A. L. Miller (M.D.), a recent convert from supporter to opponent of fluoridation. Representative Delaney, Chairman, also an opponent of fluoridation and still so, left the questioning of witnesses to Dr. Miller who was one of the most devout antifluoridationists present at the hearings, even including the seven witnesses who testified against fluoridation to varying degrees.

121/ "Chemicals in Foods and Cosmetics", Select Committee to Investigate the Use of Chemicals in Foods and Cosmetics, House of Representatives, 82nd Congress, 2nd Session, Part 3, Feb. 13, 19, 21, 26, 28, March 4, 1952. Government Printing Office, p. 1463.

An evaluation of these hearings is that they were a valuable contribution to the fluoridation issue. The committee selected technically qualified witnesses on both sides of the question, some of whom were prime sources of the then available data. Reservations were honestly and calmly expressed. These reservations included insufficient data on long term effects, on old people, on individuals with kidney disease, on the mottling of teeth in a part of the exposed population, on differences in climate, and on virtually all the variables involved in determining the safety and effectiveness of fluoridated waters. The fundamental point of disagreement, as it still is, was a scientific and medical recommendation based upon "reasonably adequate evidence" versus rejection of safety unless supported by conclusively demonstrated evidence of safety for all people of all ages under all conditions. There was the usual demand for "conclusive" data from an "un-impeachable" experiment, rarely within the requirements for other policy measures, but considered essential here because of difficulties of obtaining acceptance of the similarities of naturally "fluoridated" city populations and city populations deliberately "fluoridated." The proponents got around to this point eventually but even when they did it came off poorly.

At the time of hearings it does appear that public health officials had moved too rapidly in the promotion of fluoridation, at least strategically if not scientifically. There were frank admissions in the hearings that experiments and observations underway were not yet complete and that new studies were being designed to provide answers to legitimate technical questions. The Newburgh experiments, planned for 10 years, still had five years to go; and there was a strong feeling in the committee and among the witnesses opposing fluoridation that the proponents were over-anxious, in a hurry, "jumping the gun," in implementing the measure without appropriate caution. Dr. Porterfield's answer to this was:

> "The original proposition to have the Newburgh study go 10 years does not necessarily bind it to that time to produce its results," 122/

and

> "since we have not found in all of the areas in the United States where our engineering division has observed the presence of fluorides in more than 1 part per million, and sometimes considerably higher, any difference in the physical condition of the inhabitants of those communities, in the way of dying earlier or of having diseases or conditions in any greater degree than they do in other communities, we have then considered only the question of the dental problem. And we feel that if we do have the amount of caries that we have in our community today, and if this device, which is the safest of which we can conceive, will reduce it to some degree, whether it be 30 percent or 65 percent, it is worth it without waiting for five more years of caries experience." 123/

Similiar explanations were offered by Dr. Ast, Director of the Newburgh-Kingston caries-flourine study:

122/ Ibid., page 1703.

123/ Ibid., page 1704.

> I haven't changed my mind entirely, since the study is still progressing and will continue for the 10- to 12-year period. But after 4 years of fluoride experience, when we noted the continuing downward trend in the dental caries experience rate in Newburgh, and when we had corroborating evidence from Grand Rapids, Michigan, and Sheboygan, Wisconsin, and Brantford, Ontario, it was deemed advisable then to take advantage, if we could, of this caries prophylactic, since the dental caries picture is of such magnitude that it would not be considered fair to deprive our new generation of children of such benefits which would accrue. Also, since our medical examinations do indicate no reason why this should not be done from a toxic point of view. 124/

Dr. Ast made it clear as does the final report of the Newburgh study, published in 1956, that the assumption of safety for all age groups was based upon extensive studies of populations using for many years water containing natural fluoride in the amount equal to or greater than that recommended for controlled fluoridation:

> That is based on the fact that we have such a wonderful human laboratory in which to study the effect of water-borne fluoride, and our data from these human laboratories in areas of the United States give us no reason to question the safety factor. 125/

and

> At the time the Newburgh-Kingston study was first proposed, however, the body of evidence related entirely to information obtained from regions in which the drinking water at its source already contained amounts of fluoride at optimal or excessive levels. Persons growing up in these regions and regularly drinking water containing even several times the optimal amount of fluoride appeared to be no different in general proportion of physical defects, other than possible dental mottling, than did persons in nearby regions who drank fluoride-deficient water. There was no reason to believe that fluoride, when added to the drinking water as a routine part of the water treatment process, would act

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124/ Ibid., pages 1752-3.

125/ Ibid., page 1751.

> differently from fluoride present in the water at the source. Nevertheless, it was considered desirable to test this remote possibility by periodic medical examination of groups of children under carefully controlled conditions. 126/

Later, Dr. Ast pleaded with Dr. Miller not to hold him to his earlier views and that his later statement be used as the authoritative one concerning the satisfactory trends in the fluoridation data as a basis for recommending the procedure for additional communities at that time. This point is made here because of the loss of valid argument which may result in the use of old materials, obsolete data, early positions, etc. An example, originating in these hearings are the cases of Professor Howard V. Smith* and Dr. Margaret Smith, who opposed fluoridation during the hearings. Shortly thereafter the Smiths reversed their stand on fluoridation. Nevertheless, antifluoridationists continue to use and introduce into Congressional hearings a 1965 paper by Dr. Albert Burgstahler, which closes on a resounding statement made by Smith and Smith in 1940 warning against any plan to add fluoride to public water supplies as a public health measure. The following is what Smith and Smith had to say about fluoridation in 1954 after a visit to Newburgh for first-hand observation of children's teeth in that fluoridated city:

126/ "Newburgh-Kingston caries-fluorine study: final report" The Journal of the American Dental Association, March 1956, page 296.

* Codiscoverer of the role of fluorine in dental fluorosis.

> For the past several years we have advocated a "go slow" attitude on the basis that if too much fluorine is ingested by way of water or foods that mottled teeth will result. Mottled teeth result in southern Arizona when children drink water containing 0.9 p.p.m. of fluorine and we have felt that the fluoridation of water to 1.0 or 1.2. might be excessive. However, while on a recent sabbatical leave, I made it a point of traveling to Newburgh, New York, to get a first-hand picture of the fluoridation experiment being conducted there. An examination of representative members of each class in the grade school revealed no mottled teeth. The apparent reason why mottling occurs in Arizona with a lower fluorine concentration than in more northerly states can apparently be explained by differences in water consumption as related to climate.
>
> As a result of our Newburgh investigation we have decided to withdraw our objection to fluoridation provided careful preliminary studies are made to determine a safe amount of fluorine to use and that frequent checks are made to make certain the fluoridating equipment is working properly. 127/

An article in Missouri Medicine, February 1954, states that open-minded scientists were impressed by the presentation of scientific evidence in the Delaney Report. The report was "not bad" but did fail to evaluate evidence. It also sought for certainties not demanded in other health related activities. While its failure to approve the principle of fluoridation is emphasized by opponents, the report also does not condemn fluoridation. "The report itself is. . . very fair in intention. It reflects a clearly expressed sense of responsibility on the part of the members of the Committee not to reach a hasty conclusion nor one which might conceivably result in harm to the population of any community of the United States. The Report, however, is different in tone

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127/ Letter of September 17, 1954 from H. V. Smith to Mr. Robert J. Munch, 11 Orchard Place, Greenwich, Connecticut.

than was the atmosphere of the Hearings." 128/ For example, Committee members, Paul C. Jones and Walt Horan protested the "prosecuting" attitude of Mr. Miller and the Chief Counsel towards witnesses from the Public Health Service. 129/

128/ Comments on Opponents of Fluoridation, JADA, November, 1965, page 1164.

129/ Ibid.

APPENDIX G

The Fluoridation Issue in the 83rd Congress (1954)

As momentum for fluoridation was gathering in public health circles in the United States, so was an opposite force to squelch it before it became common practice. This force was sufficient to provoke proposed legislation and hearings. Thus, the so-called Wier Bill (Representative Roy W. Wier) went all the way to prevent fluoridation by Federal law. No legislation of the "ban" variety has ever been so total and uncompromising in its intent:

> . . . no agency of the Government of the United States (including the government of the District of Columbia and of each territory and possession of the United States) and no agency of any State or of any municipality or other political subdivision of a State shall treat any public water supply with any fluoride compound or make any water so treated available for general use in any hospital, post office, military installation, or other installation or institution owned or operated by or on behalf of any such agency. 130/

Mr. Wier introduced this bill*, H.R. 2341 in the 1st Session of the 83rd Congress. Hearings were held by the House Committee on Interstate and Foreign Commerce during the 2nd Session (May 25, 26, & 27, 1954).

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* Mrs. Peder P. Schmidt, from Mr. Wier's district testified that he "did not want to introduce this bill" and that even after changing his mind had worked against her ever since. (Ibid, page 165)

130/ McClure, Frank J. Water Fluoridation: the Search and the Victory, USDHEW, 1970, page 278.

Mr. Wier stated that he had introduced the bill on behalf of the National Committee Against Fluoridation. He was not a member of the Committee on Interstate and Foreign Commerce, nor did he remain at the hearings to listen to or participate in the debate. The management of the proponents of this anti-fluoridation bill was apparently left with Miss Vera Adams of the National Committee Against Fluoridation and with Mr. Claude Palmer, a member of the board of directors of the District of Columbia Committee Against Fluoridation. 131/

The first witness in opposition to the bill was Representative Gerald R. Ford, Jr.,* whose district includes the city of Grand Rapids, Michigan which was in the forefront of the fluoridation program. Selections from Mr. Ford's testimony follow:

> "Grand Rapids started using fluorine in its water supply on January 1, 1945 ... The decision was made by the governing fathers of the community. No effort was made in Grand Rapids to stir up a problem with the electorate. It was purely an administrative decision based on factual data

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131/ Fluoridation of Water, Hearings Before the Committee on Interstate and Foreign Commerce, House of Representatives, 83rd Congress, 2nd Session, on H.R. 2341, page 7.

* Along with Mr. Ford, Senator Lester C. Hunt and Representative George S. Long also testified against the bill.

presented to the proper city authorities. We have had no trouble whatsoever in that community as a result of this program being initiated... I might say that it would be most unjustifiable for anyone to allege that responsible officials in any community would seek to undertake a program that would be harmful and detrimental to the health of the people of that community." 132/

"I do not think the Public Health Service or any other agency should be a propagandizing agency for any pet project that they have, but I think they have a responsibility to make what scientific data that they have available, available for communities which express an interest." 133/

132/ Ibid, pages 10-11.

133/ Ibid. page 13.

Other Selections and Comments from the Hearings

Mr. Claude N. Palmer, National Committee Against Fluoridation:

"The previous witness said that this is a matter for the States and local communities to decide. We would agree with this wholeheartedly if it were not for the fact that as some members of this committee have said, the Federal Government is already into that problem, up to its neck. The Public Health Service seems to be the sparkplug that generates the desire for fluoridation in communities throughout the country as far away as Alaska"[134]

"We find that most of the reports of the brilliant results of fluoridation on children's teeth are not based on a very scientific basis... I am not a scientist. "[135]

Mr. Derounian: Mr. Palmer, I was interested in that part of your statement, "when metal bursts into flame." Do you think that is a fair representation of the effect of fluorine on water?

Mr. Palmer: Not fluorine and water: no; not one part to a million. I was giving there only the nature of the element itself; not the effect of long ingestion of one part per million.[136]

Mr. Derounian: Do you think that they would openly advocate anything that was detrimental to the health of the people of the United States?

Mr. Palmer: They might sir. They advocated iodine at one time.[137]

As in the Delaney hearings, witnesses presented evidence that fluoridation had not worked in Canada; that the proponents had not established experimentally the long term effects of fluoridation;

134/ Ibid, page 16.

135/ Ibid, pages 16-17.

136/ Ibid, page 26.

137/ Ibid, page 27.

that endorsements of fluoridation were being undertaken without independent investigation; that the water treatment was for a minor non-contagious disease and aimed at only a small part of the population; that the hazards of fluorine toxicity had not been honestly considered; that information concerning the attitude of the public was being withheld; that the Public Health Service was moving the fluoridation program forward with propaganda techniques and doing so at risk to the public health.

Others referred to the fluoridation experiments as illegal experimentation on human beings like those performed by Nazi criminals without consent of the subjects;138/ as "a gigantic steamroller fabricated by the Public Health Service;" the " greatest hoax in history";139/ as "Operation Rat Poison"; as compulsory medication; as an example of "let the experts decide" and "the government knows best"; as "blanket medication infringing on the right of individuals who depend on prayer rather than drugs to maintain health"140/

Dr. Exner's criticism of fluoridation was broad, intensive, and convincing. In the hearings he conveyed the idea that the fluoridation experiments and statements were deliberately designed

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138/ Miss Florence Birmingham, Massachusetts Women's Political Club.

139/ Antifluoridationist, Frederick B. Exner.

140/ J. Watt, Washington Office of the Christian Science Committee on Publications.

to deceive. He referred to "faulty methods", "unreliable examinations", "meaningless experiments", "fluoride damage", "no proof of safety of fluorides", etc. 141/ These terms appear frequently in scientific debate and Dr. Exner backed them up with what appear to be valid arguments. Other statements by Dr. Exner, however, give a different impression, depending on one's initial bias or philosophy:

> "Fluoridation is totalitarian medicine, in that it is compulsory... Its only purpose (except for the secondary one of providing jobs and "empire") is to serve as precedent for compulsory medicine." 142/
>
> "Fluoridation is no isolated aberration in the public-health movement. You will find the same things going on in the fields of tuberculosis, of cancer, of polio, of mental disease, and even of nutrition." 143/
>
> "In this connection it is clear that the so-called experiments at Newburgh and Grand Rapids are in flagrant violation of the most sacred laws of God and man. It is also in violation of our God-given right to make our own mistakes instead of having self styled experts empowered to make worse ones for us without our consent." 144/
>
> "I believe, however, that this (anti-fluoridation bill) is just a start on what needs to be done. I have extensive evidence of similar activities in many other areas of so-called public health, and I am convinced that we need a thorough-going investigation of all such activities. I ask this committee to do all in its power to bring about such investigation." 145/

141/ Hearings, op cit., pages 62-86.

142/ Ibid, page 87.

143/ Ibid, page 87.

144/ Ibid, page 83.

145/ Ibid, page 84.

The summary statement* by this veteran opponent of fluoridation as presented in person before the committee on May 25, 1954 follows below:

(Statement begins on next page)

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* The full statement is 23 pages long (63 to 86). Other "in person" statements by consistent opponents of fluoridation with technical background begin on pages 198 (Paul Manning, D.D.S.), 185 (Leo Spira, M.D., Ph.D.), 86 (Dr. Charles T. Betts), 190 (Max Ginns, D.D.S.), 141 (Charles A. Brusch, M.D.), 173 (E.K. Palmer, R&D engineer)

SUMMARY

In 1944, McClure told the American Association for the Advancement of Science that children up to age 12 years drink 1⅔ pints of water a day and weigh 44 pounds. Of course he didn't say it in those words, but that is the way what he says figures out. And what he said is an important part of the foundation for all you are told by the fluoridizers.

He said nothing about averages, but if he had it would still be just as silly. Averages don't drink water, nor do they get mottled teeth or softened bones. It is people, each an individual and every one different, who do these things.

McClure wrote the section on fluorides for the second edition of the American Medical Association Handbook of Nutrition. In it he states that even where water fluorides are highest, people will rarely get more than 8 to 10 milligrams of fluoride daily. But if you allow for the different concentrations, you will find that the average intake of inactive subjects in one of his own experiments was the equivalent of from 2 to 6 times this amount, depending on the climate. If they had been active, the amounts would have been much higher.

In the same Handbook he tells of some experiments he performed, from which he concludes that—

upward of 90 percent of waterborne fluoride (in concentrations of 0.5 to 4.5 parts per million) is eliminated in the daily urine of teen-age boys and young men.

What his experiment actually showed was that less than half the fluoride in that range was eliminated.

Evidence on these matters is given in detail in my written testimony. We have only time here for a sketch summary. But it is important to remember that these statements of McClure's, and those by Arnold and Dean which I shall cite, form the basis of the case for fluoridation. They are accepted at face value, enlarged, embroidered, and paraphrased, and are repeated so often they are accepted as truer than truth.

Now, as to Arnold. In January 1948 Arnold misstated the findings in his own work. His statement is a little ambiguous, but by the most generous interpretation he understated the number of disfigured front teeth of Aurora children by 65 percent. This was in the most widely read dental magazine of all.

The mainstay of the fluoridators, however, is H. Trendley Dean, formerly with the United States Health Service. He has long represented the American Dental Association in matters pertaining to fluorine. With Anold he wrote an official American Dental Association report on mottled enamel in 1943.

He was adviser to the committee of the American Water Works Association that recommended "endorsement" of fluoridation. He was a member of the ad hoc committee of the National Research Council that endorsed fluoridation.

He was a member of the committees that put out books on fluorides for the American Association for the Advancement of Science in 1942 and again in 1946. He wrote chapters on fluorides in Gordon's Dental Science and Dental Art (1938) and in Pelton and Wisan's Dentistry in Public Health (1949), as well as dozens of articles.

In everything he writes, and in everything based on his writings, it is stated or implied that the effects of fluoride are dependable determined by the concentration in the water—that certain things occur at 1 part per million, and quite different things occur at 0.6 part, or 2 parts or 5 parts per million.

For example, he assures us that no harm will be done at a concentration of 1.0 to 1.5 parts per million, but that whatever effect waters with over 2.0 parts per million have on dental caries is largely of academic interest because the resultant permanent disfigurement of many of the users far outweighs any advantage from the standpoint of reducing tooth decay.

Now, it is true that the dose of fluoride depends to a degree on the concentration, in much the same way as the interest you pay depends on the rate. But in the one case you must know how much money you borrowed and in the other how much water you consume.

You are told that the differences in water consumption are trivial, which we all know just isn't true. You are further told that McClure has proved that everybody on the average consumes about a quart of water a day and will get about 1 milligram of fluoride per day from water with 1 part per million of fluoride. Believe it or not, this is told you in all seriousness by learned dentists and scientists; and if you question it, or the conclusions they draw therefrom, you are uninformed, a crackpot, and lack proper respect for the voice of authority.

But, as we have seen, McClure's own work proves it untrue, as if we didn't know it already. And, as I have pointed out in my written testimony, differences of 10 to 1 in individual water consumption are very ordinary. Disregarding all other factors, these offset the difference between 1 part per million and 10 parts per million, and Dean's distinction between complete safety at 1.0 to 1.5 parts per million and disaster at 2.0 parts per million is, as we said before, just plain silly.

Actually, the complete safety that Dean talks about has nothing to do with what happens to individuals. He has repeatedly said that his epidemiological studies relate to groups, and not to individuals, and that prognosis with respect to any individual is obviously impossible. His original meaning of the word "safe" was that it would not cause obvious disfigurement of more than 10 percent of children. He has since learned that more than that will be damaged by his recommended one part per million, and has revised his definition of safety to allow for damage to 15 to 20 percent.

Moreover, Dean's work was concerned with children up to age 14, and Dean knows that, although the primary damage occurs while the teeth are being formed, before they erupt, it becomes increasingly evident with age; and that if he examined the same group a few years later he would find worse damage and to more individuals.

Furthermore, and whether Dean knew it or not, it is generally recognized that the damage done by fluoride, both to the teeth and to the system generally, depends greatly on the diet, and especially on how much calcium the body gets.

I have also cited evidence that 9 of the famous 21 cities on which the case for fluoridation rests fail to meet Dean's own requirements for reliability. Water histories proving this were included in the original reports, but have not been mentioned since.

Either the water supply was changed during the critical period while the teeth were being formed, or changed later in such a way that we cannot know the fluoride concentration when the teeth were formed. The 9 include all but 1 of the cities in the important range of concentrations. Consequently all conclusions are void, and the whole case for fluoridation falls apart.

Furthermore, I have shown that Dean knew that Galesburg did not meet his requirement when he used it to prove that fluoride would produce a 65-percent reduction in decay; and when he used it to prove that protection from decay exists even in the absence of visible fluorosis; and later, when he selected it as 1 of his 21 cities.

The city of Aurora is of critical importance, so its water history has been consistently misrepresented. It is the city used for comparison in the artificial fluoridation experiments. But its real importance lies in the fact that it is the city always quoted to prove that mottled enamel attacks only the back teeth when the concentration is low.

Of course, this is not true, and is proved untrue by all observations everywhere. There are places where it appears to be true, both at high and at low concentration. The reason is known, and has to do with the period at which different teeth develop.

Children born where there is no fluoride, but who change in early childhood to a water with fluoride, end up with teeth like those in Aurora. The water history makes it clear that this is exactly what happened, but Dean has covered up by saying that Aurora has had the same type of water supply for more than 50 years.

So far we have seen that the so-called experimental basis for fluoridation is faulty. My testimony next showed that all the talk about 65 percent, or any other specified reduction in tooth decay, is nonsense for two reasons: First, because there can be no unit for quantitative estimate of decay (the so-called D. M. F. rate makes no more sense than when children count up pennies, dimes, and quarters to see which has the most money); and, second, because the margin of error in recognition of decay is so great that 65-percent differences are not significant.

Because of these unavoidable factors, and also because of gross faults in the methods, the so-called experiments at Newburgh, Grand Rapids, and elsewhere can never prove anything about tooth decay.

They can, on the other hand, be expected to damage the teeth, and probably the bodies, of countless children, although it is still far too early for the worst damage to be manifest, and, contrary to the promises of Dean and others, we can confidently expect the worst damage on the upper front teeth.

So much for the dental effects of fluorides. The nondental effects are far more to be feared. In spite of McClure's so-called experiments, it is a fact that fluoride does accumulate in the body and that it does do important damage. It is a further fact that damage can occur at 1 part per million of fluoride. A Public Health Service study, where the fluoride was only 2.6 parts per million, showed some 23 times as many third molar teeth lost because of malposition than in a nearby fluoride-free city.

It is also known that fluoride damage is greatly increased whenever, for any reason, the ability of the kidneys to put out fluoride is impaired.

I can find no evidence of any serious attempt by the Public Health Service to find evidence of fluoride damage. The work they have done seems directed solely toward proving that none occurs and the proofs are not impressive. There has been some very sketchy work on the bone-hardening effects (osteosclerosis) of fluorides.

I find no mention of the bone-softening effects (osteomalacia), although they are probably far more common. A report from South America estimates that there are some 10,000 cases in the Argentine. It is the commonest form in animals, both experimentally and naturally, and was described by Bartolucci in 1912, some 20 years before either the dental effects or the bone-hardening effects were known.

Neither have the other known effects of cumulative poisoning been sought. I can't even find record of any wide-scale blood-calcium or calcium-retention determinations.

The so-called epidemiological evidence put out by the Public Health Service is wholly without value. First, there is no water history of the cities, and few cities have had an unchanged water supply for 30 years, which is the time needed for certain effects to appear; second, there is no attempt to eliminate persons who have lived elsewhere or used other water; third, most of the effects of fluorides are not reported in vital statistics; and, fourth, the known effects of chronic fluoride poisoning can all be duplicated by other causes.

The plain fact is that no respectable evidence for the safety of fluoride has ever been offered, while there is abundant evidence of danger; and when something is to be added to a public-water supply, the burden of proof should certainly rest on those who claim it safe rather than on those who say it isn't.

There are abundant and compelling reasons why, even if everything we are told about the safety and effectiveness of fluorides were true, it should still not be put in the water supply. As I have pointed out in my written testimony, it is medically insane. But, far more important, it violates our inalienable right to final decision as to what shall be done to our own bodies except when exercise of that right creates a clear and present danger to the right of others. In this connection it is clear that the so-called experiments at Newburgh and Grand Rapids are in flagrant violation of the most sacred laws of God and man.

It is also in violation of our God-given right to make our own mistakes instead of having self-styled experts empowered to make worse ones for us without our consent.

We are now confronted with a gigantic steamroller, fabricated by the Public Health Service, powered with unlimited Federal funds, and directed from Washington. It is designed to put over the greatest hoax in history, and to destroy, once and for all, the constitutional protections of the citizens. It gives control over our bodies to a group of men who believe that "physical fitness is a duty owed the Nation," that they are under no obligation to tell the truth but should rather tell people whatever will lead them to do as they "ought"; to men who think fuzzily in term of "average people," and are willing to sacrifice up to 20 percent of individuals to improve something they call "the public health" and can't define.

In my written testimony I have given some indication of how the steamroller works, and the results are manifest everywhere we look.

I believe that H. R. 2341 is needed to stop all this, and respectfully request the committee to bring it out with a recommendation of "do pass."

I believe, however, that this is just a start on what needs to be done. I have extensive evidence of similar activities in many other areas of so-called public health, and I am convinced that we need a thoroughgoing investigation of all such activities. I ask this committee to do all in its power to bring about such investigation.

And, finally, I wish to request that my entire written testimony, with its documented refutation of the Public Health Service pseudoscience, be included in the record to serve as source material, and to help counteract the mountains of misinformation that have been published on this subject at Government expense.

BRIEF VERBAL DESCRIPTION OF FIGURES I, II, AND III, SUBMITTED IN EVIDENCE BY F. B. EXNER, M. D.

Figure I: This consists of two graphs. The first represents Dean's 21 (selected) cities, and shows the relationship between fluoride concentration in the water and "dental caries experience." It has been reproduced many times all over the world as proof of an alleged relationship between concentration and freedom from tooth decay; and as proof that the protection can be obtained at one part per million of fluoride in the water.

The second graph shows how the first graph would look if we eliminated the nine cities that fail to meet the Public Health Service's own requirements for reliability. The nine are eliminated because of changes in the water supply during the lives of the children examined. The second graph makes clear that there is no factual basis for the conclusions which have been drawn from the first.

Figure II: This is a graph that shows that Dean's 21 (selected) cities are in no sense representative. The 9 cities with fluoride concentration of 0.2 parts per million or less have an average of only 2 percent of children with no decayed teeth, whereas the average of 17 other places with the same amounts of fluoride finds 14 percent of children without tooth decay. (Tristan da Cunha was not included or the difference would be much greater. There the fluoride concentration is 0.2 parts per million, and there is no tooth decay in children up to age 14).

Figure III: This graph shows the lack of any reliable relationship between concentration of fluoride and the number of children with fluoride damage to the teeth. It also shows that in this respect, again, Dean's 21 (selected) cities are far from typical.

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Dr. Exner appears to be sincere about the deleterious effects of fluoridation on teeth. In 1952 he testified in a court case against fluoridation, but the court upheld the measure. Again, on February 4, 1957 in the Superior Court for Lewis County of the State of Washington, in an attempt to collect the $1,000 reward from the Chehalis Fluoridation League for anyone who could prove fluoridation harmful, Dr. Exner was denied. Judge John S. Langenbach accepted the testimony of Dr.

146/ Ibid, pages 80-86.

Frederick S. McKay of Colorado Springs and Dr. Robert Downs of Denver that the water, supposed to have produced mottled enamel on the teeth of the two patients which Dr. Exner presented as evidence, contained fluoride in excess of 1 ppm.147/ How much more fluoride in excess of 1 ppm we do not know, but to get back to the 1954 hearings it is important to note that Dr. H. Trendly Dean, at least at that time, indicates a rather narrow range between optimum fluoride concentration and a concentration which should not be exceeded so far as assurance against undesirable teeth mottling is concerned -- "I would say 1½ (ppm) should not be exceeded" 148/ The dialogue on this point between Dr. Dean and Representative Robert Hale was as follows:

(dialogue starts on next page)

147/ "Washington Court Rejects Antifluoridationists Claim" JADA, April 1957, pages 551-2.

148/ Hearings, op cit., page 282.

Mr. HALE. Doctor, I wanted to ask one question with reference to this mottling of the enamel which is produced by an excess of fluorine. Does that affect the teeth in any other manner? That is to say, does the mottling cause decay or anything of that kind?

Dr. DEAN. No, they are relatively free of decay. Of course, they have some, but it is low. But it is very objectionable from an esthetic standpoint. They represent a defective structure.

In the lower amounts, around 2 parts to a million, it is largely a lack of calcification of the outer surface, a dull chalky white. If you get up around 4 or 5 parts to a million, this lack of calcification also gets into hypoplasia, a sort of defective structure, and you start picking up a brown stain, which you can see in places like Amarillo and Lubbock, Tex.

Mr. HALE. I cannot hear you, Doctor.

Dr. DEAN. Getting to places like Amarillo or Lubbock or all of west Texas, where they have these fluorides, they have the moderate or severe amount characterized by brown stain, which is quite disfiguring. There is nothing you can do for it. It is a permanent disfigurement in the enamel. That is due to quite high fluorides which we think should be removed from the water.

Mr. HALE. Which are natural?

Dr. DEAN. They are natural and they should be removed. They are too high.

Mr. HALE. If I understand the testimony correctly, one part of fluoride to one million is safe?

Dr. DEAN. It is quite a safe level. You may have a few white flecks on them, largely in the back teeth, in a small percentage. To all practicable purposes it is a very, very safe, satisfactory amount.

Mr. HALE. And that is enough to be effective?

Dr. DEAN. Quite effective in reducing dental caries.

I would like to modify that statement like I did in this talk: When we get into an area like Arizona, New Mexico, southeast Georgia or some of the Southeastern States, we have the long, hot summers and the high mean average temperatures. Probably we would consider six-tenths of a part to one million about the optimal amount, because they have increased their intake of water and, of course, increased their fluorine a little bit. In other words, in southeast Georgia, around six-tenths is just about what you see with about 1 around Chicago, 1 or 1.2.

Mr. HALE. Where do you pass the danger line? Is five parts per million too much?

Dr. DEAN. I would say a lot lower than that. I would say 1½ should not be exceeded. At 1.8 you start picking up a little too much of this white opacity.

Mr. HALE. You should never get beyond 1.8?

Dr. DEAN. I would not go that high. I think one is ample.

Mr. HALE. One is ample?

Dr. DEAN. One is pretty close to the right amount under average conditions.

Mr. HALE. If you go above one you run into a risk factor?

Dr. DEAN. Maybe it is possible if you get into a place like North Dakota or South Dakota or eastern Montana it might go up to 1.4 or 1.5 which might work like 1 around Chicago, or six-tenths in the Southeast States. Dr. Galagan of the Public Health Service has recently done extensive work on the influence of mean average temperatures and climatological factors on this condition.

Mr. HALE. You would readily agree when artificial fluoridation is done it has to be done with extreme care and accuracy?

Dr. DEAN. There is no doubt about that.

Mr. HALE. And if it is not done with extreme care and accuracy then the result may be very unfortunate?

Dr. DEAN. Fortunately, they have extremely accurate machinery for water treatment. Mr. Harris, who is coming down from Grand Rapids, can explain that to you in much better detail. He has been doing that for 9 years. I think he collects 5 or 6 samplings a day.

I think this machine is accurate to about one-tenth of a part a million.

Mr. HALE. When you have a water supply which comes from a lake I can understand how you can be extremely accurate in putting the fluorine in, but as in the case of many cities, when you have water supply coming from a river, how do you manage the fluoridation?

Dr. DEAN. It depends on the fluorine content of the river and whether there is a seasonal change. If you have three- or four-tenths part a million in a river you obviously would only have to add about five- or six-tenths to bring it up to a part per million.

Mr. HALE. I believe that Washington gets it water supply from the Potomac River, does it not?

Dr. DEAN. That is correct, sir.

Mr. HALE. I do no know where the intake is, but I assume it is upstream. If you inject fluorine into the Potomac, where do you put it in?

Dr. DEAN. At the water plant, with the treatment.

Mr. HALE. At the plant itself?

Dr. DEAN. Right at the plant where you treat the water.

Mr. HALE. I should think you would have an element of danger there, because the stream flow would fluctuate. I should not think the percentage of fluorine to water would be constant.

Dr. DEAN. You are quite right. Obviously you would have to run chemical analyses of a river so as to know what amount you should put in. You have about one-tenth of a part to a million, or zero, in the Potomac, we will say, for Washington.

At St. Louis you have about three-tenths in the Missouri. Half of St. Louis city is on the St. Louis County side. You would not have to go over about seven-tenths there.

I think you have four- or five-tenths in Omaha, on the same Missouri. Again, you would have to adjust the amount you put in based upon your chemical analysis.

Mr. HALE. What is the mechanical process of putting fluoride in? Do they inject it with a syringe?

Dr. DEAN. I think probably what we ought to do is wait until tomorrow, when Mr. Harris is here. He is the chief chemist at Grand Rapids and he has been doing it now for between 9 and 9½ years every day. He can describe in detail just how it is done and what is the degree of accuracy. 149/

149/ Ibid, pages 282-283.

There were a large number of witnesses at these hearings, most of whom were not selected by the committee. The committee heard 35 statements presented in person, and admitted to the record hundreds of additional statements, letters, documents, etc. on both sides of the issue. Except for the brief testimony of Representatives Ford and Long and Senator Hunt, the first 244 pages of the hearings record are devoted to the arguments of opponents of fluoridation; the last 245 pages are devoted to proponents of fluoridation. Seventy pages of the latter were prepared and submitted by the American Dental Association at the request of Representative Fogarty. 150/

While the entire conglomerate of arguments against fluoridation was opened in these hearings, the fear, or alleged fear of it as an instrument of world enslavement and conquest was frequently mentioned. A sampling of sentiments along these lines from the hearings shows that both scientists and laymen indulged the point:

Dr. Charles Brusch: (final paragraph of his statement)

> "We must realize that this is just a wedge and that if we adopt or submit to this type of experimentation, it will be only a forerunner of other measures interfering with our professional, industrial, and ordinary American way of life. If we fail to pass H.R. 2341, known as the Wier Bill, we shall be following the customs and experiments of dictators and the Communists" 151/

Citizens Committee Against Fluoridation and the Connecticut Pure Water Association:

> "Whereas fluoridation is a potential danger from sabotage..!152/

150/ McClure, op cit. page 280.

151/ Hearings, op cit. page 150.

152/ Ibid, page 115.

Mrs. Hugo Franzen quoting: the Shreveport Journal, Dr. H.M. Greene, the Los Angeles Times, the Daily Palo Alto Times, The Springfield Union, Dr. Leo Spiro, and Dr. Francis Bull:

> Why has there been complete silence in all United States Public Health Service "scientific" literature and news items regarding the "brain-washing" aspects of sodium fluoride?
>
> I quote from the Shreveport Journal, Shreveport, La., October 5, 1953:
>
> Dr. Joe D. Nichols, newly elected president of the Tri-State Medical Society, said Sunday in a radio interview here, that he suspected Communist agents of being behind the move to put inorganic fluorine in municipal water systems. Nichols said that endorsement of the fluoridation program by reputable organizations is merely chain reaction. The Lions endorse it, then the Rotary, then the Jaycees, and so on in every community, because they have heard that the others have done it. Communist agents, I have heard, have infiltrated the United States Public Health Service. The United States Public Health Service has mothered this thing and a lot of good doctors have been duped into endorsing it. He added that if Shreveport puts fluorine in its drinking water, he would "either skip the town or bring my own jug of water with me."
>
> That physician dares to tell the truth, but it reaches so few of our citizens.
>
> I quote from H: M. Greene, M. D., from The Reminder of our National Heritage.
>
> Dangers of poison in artificial fluoridation by government are the danger in mass medication by Soviet communism. We require license for doctors, nurses, and druggists to give poison drugs. But, artificial fluoridation, for which there is no antidote, is put in drinking water for children and agents of Malenkov, now at liberty in the United States, can give poison to our children.
>
> Perhaps the reason Dictator Ana Pauker was deposed in Red Rumania was because she "let two cats out of the bag" when she boasted to Princess Ileana of Rumania just how the United States is to be taken over. Princess Ileana's book, I Live Again, quotes Ana Pauker as stating that the take-over will be accomplished by taking over (note—not destroying) of the utilities and by poisoning the water supplies. Could she not be questioned concerning this statement?

153/

153/ Ibid, page 104.

Quoting from the Los Angeles Times, January 7, 1954:

Six of nine public utility employees who appeared yesterday before the State senate fact-finding committee on un-American activities here refused to answer questions about Communist Party affiliation on constitutional grounds.

The Daily Palo Alto Times, December 21, 1953, recorded as follows:

Among those receiving the Stalin Peace Prize was Prof. Singh Sokhey, member of the Indian Parliament and Chairman of the World Health Organization's Plague Committee.

Would Prof. Sokhey have received that Communist award if he had not been furthering the cause of Soviet communism? I think not. And I understand our United States Public Health Service cooperates with the World Health Organization.

Quoting from the Springfield Union, February 24, 1954:

Asks help for bills against fluoridation. Representative Gray's measures to be heard in Boston next Tuesday. Mr. Gray was a member of the fluoridation study commission which looked into the question last year. * * * "We know for sure," Mr. Gray said, "that whoever the men, the powers, behind the fluoridation scheme are, a number of them are operating worldwide." He says he has evidence to prove that numbers of citizens of Australia, England, Germany, New Zealand, and Scotland "are fighting the fluoridation scheme as hard as the citizens of Massachusetts and the rest of the United States are fighting it. * * * Certainly," he said, "all those people don't fear and fight without cause, particularly those who have been close enough to the Red menace to recognize the danger signs."

A reading of Dr. Leo Spira's works indicate that medical personnel rarely are able to recognize the effects of trace poisons, including fluorides, and are prone to cover up—blaming other causes.

Only those we trust implicitly can betray us. Three whole professions—the medical, dental, and public health—stand indicted, because the few who control those organizations are, we feel, either uninformed, misinformed, dishonest, or subversive. Into which category do they belong?

Quoting Francis Bull, D. D. S., from his address at their convention:

When they take us at our own word they make awful liars out of us.

Fortunately, ever-increasing numbers of citizens are learning the truth—that the proponents are, by their own words "awful liars" and protect themselves in the poisoned cities by purchasing unpoisoned bottled water.

I have stated repeatedly—and I reiterate—that anyone who has anything to do for fluoridation, is displaying a treacherous attitude for one of four reasons—either because he is uninformed, misinformed, dishonest, or subversive. Unquestionably, practically everything in this Nation is infiltrated by Communists, subversives, and their dupes or tools.

Seventeen million Americans, more or less, at the mercy of Soviet Communists. Invasion and sabotage, by remote control, through the water mains. What could be more clever or effective? Our enemies take over—city by city.

I know that fluoridation is a Communist scheme—frankly, the master plan—but I cannot prove it, for those who have informed me, cannot testify—they would be liquidated, if they did. I believe you are in a position to prove it, however, by having Princess Ileana and others testify under oath.

154/

154/ Ibid, page 107.

Dr. C. T. Betts (quoting from the Toledo Blade:

"Russia has the know how" * 155/

Mrs. Peder P. Schmidt:

"This person told me a great deal to remember as long as I live, about world conquest, enslavement, etc. ...

Fluoridation is supposed to be the weapon that will be used to take us.

Dr. Nicholas Nyaradi, former Minister of Finance in Hungary's postwar coalition government, an escapee to America states that Comrade Zhuchovitsky, Legal Adviser of the Soviet Ministry of Foreign Trade in the United States, told him of the plan to poison the water reservoirs of this country.

It has been publicized time and time again. We are very close. It is coming very close to home. You do not have to worry about the atomic bomb. They won't be here. They will be taken over, the water reservoirs. 156/

Dr. Paul Manning:

"Whether fluoridation is not in fact a three-pronged attack, gleefully watched by the enemies of America... to divide the unity of our people in the most critical hour of our history... Whether there is one single subversive or enemy agent or indoctrinated fellow traveler who is not head over heels in favor of fluoridation, as the saying goes? Whether this is because he has been ordered to endorse the fluoridation scheme? Whether the storage of multi-ton lots of compounds of fluorine, the essential ingredient of the nerve gas which all nations fear but which several are stockpiling, in ill-defended areas adjacent to main aqueducts of great water supplies, is wise and prudent, or foolhardy and criminal to a degree never before attained in history" 157/

155/ Ibid, page 91.

* Extrapolates from nerve gas to fluorine.

156/ Ibid, pages 165-166.

157/ Ibid, page 215.

Although a considerable number of antifluoridation letters and statements were inserted in the hearings record on the final day of testimony in favor of the Wier bill, the last words the Committee heard from the foes of fluoridation were those of Dr. C. T. Betts of Toledo, Ohio. There were just three sentences, following which the Chairman interrupted. Dr. Betts said:

> "I get reports from all over the country, and I find men like my Senator Taft died after drinking this water 1 year. I find Supreme Court Justice from Kentucky also buried after drinking the water 1 year. Many of our Senators and Representatives have gone since this town has been fluorinated." 158/

158/ Ibid, page 221.

Summary

The objective of these hearings so far as the committee was concerned appears to have been to permit the opponents of fluoridation to present their case before the Congress. There was some but not much dialogue between the committee and the pro and con witnesses. The hearings constitute, unlike the Delaney hearings, a public record of objections of all types from all types of people. The record is balanced by the data in favor of fluoridation from the American biomedical and public health establishment.

The legal and constitutional aspects of a Federal statute which would forbid States and Communities from utilizing fluoridation as a public health measure, and its implications to other public health measures were not extensively deliberated. However, Harry E. Jordan, Secretary and Chief Executive Officer of the American Water Works Association, provided the Committee with his opinion on the propriety of the matter near the close of the hearings:

> However, speaking for the public water-supply industry which today serves 110 million persons in the United States, I wish to state my opinion that the Congress cannot with propriety legislate what material may not be used in the treatment of a public water supply. Similarly, I doubt that it could with reason legislate what is to be used in water treatment.
>
> The Federal Government today includes a large group of agencies upon which Congress has conferred the duty of acting in areas assigned to each and controlling procedures and practices, in their respective fields. The Congress has established among others, the Department of Health, Education, and Welfare and has granted it powers, which among other things, cover dental health and quality of water used in interstate commerce. Consistent with the authority given by the Congress, staff members of the Health, Education, and Welfare Department have, with full professional competence, investigated fluoridation and have announced their opinion that controlled addition of fluorides to public water supplies is proper and highly desirable.
>
> Unless the Congress has available to it a mass of professional evidence which shows that the Government's own agents are professionally incompetent, it is not proper for legislation to run counter to the opinion of the Government's own experts.
>
> I wish, however, to object on broader grounds to a legislative enactment which will forbid the use of a water-treatment material recommended by competent professional authority. The water works industry now uses widely two chemicals in purification to which objections were once made by persons presumably well informed.

The Army engineers, who about 1900 recommended purification of the Washington, D. C., water supply by means of coagulation with alum followed by filtration, was opposed in a hearing before a Senate committee by a group representing the District medical society. The water treatment plant, was, therefore, built so as to operate without coagulant. But in less than 5 years after the plant was built it was found necessary to use alum. It had been learned that the system could not function satisfactorily without alum. Its use continues to this day--with results satisfactory to the operators, to the medical profession, and to the public. Today there are more than 2,000 cities in the United States using water treated with alum or its functional equivalent.

In 1910 the use of chlorine as an agent to destroy bacteria in water was being widely considered. Dr. Harvey W. Wiley, then Chief Chemist of the Department of Agriculture, when asked a question about the propriety of using chlorin, stated (without studying the question carefully) that "chlorine in water is as much an adulterant, as formaldehyde in milk." Fortunately, for the public good, Dr. Wiley's comment gained little attention. The use of chlorine spread and the evidences of its great benefit grew. Today more than 3,500 communities in the United States drink safer water because chlorine is used to remove the last bacteria which may have polluted it.

If your committee had been in existence in 1902 and the opposition to alum as a coagulant had led you to recommend that alum or its equivalent not be used in water purification, you would have been in error—as history now shows.

If your committee had been faced with the opposition to chlorination in 1910, you might have been led to recommend legislation forbidding the use of chlorine in water treatment. You would have been in error—as history now demonstrates.

In the last 50 years, improvements in the quality of public supply—improvements made possible because valid progress was not hampered by adverse legislation—have saved the lives of at least 5 million persons who would have died of waterborne diseases if the water-supply industry had not kept in step with the advances in scientific knowledge.

I therefore appeal to you—as reasonable and intelligent public servants—not to recommend legislation forbidding the fluoridation of public water supply. Let the decision to fluoridate or not to fluoridate be left to the State and local authorities and let them base their action upon the advice of the medical and dental professions.

159/

Congressman George S. Long, a former dentist from Louisiana, stated that the matter was one to be settled by various states and communities. The Committee apparently agreed with this view; the Wier bill died with the adjournment of the Eighty-third Congress. [See The Fight for Fluoridation by Donald R. McNeil, Oxford U. Press, New York, 1957, page 190].

159/ Ibid, pages 410-411.

APPENDIX H

The Fluoridation Issue in the 92nd Congress (1971)

On May 14, 1971 Mr. Magnuson introduced a bill (S. 1874) in the Senate of the United States to amend Section 2 of the Public Health Service Act by adding a new title (Title X) to provide for the establishment of certain projects for the dental health of children. The "fluoridation" provision of the bill is Section 1002, entitled "grants for water treatment programs", and reads as follows:160/

> "SEC. 1002. (a) There are hereby authorized to be appropriated $2,000,000 for the fiscal year ending June 30, 1972; $3,000,000 for the fiscal year ending June 30, 1973; $4,000,000 for the fiscal year ending June 30, 1974; $4,000,000 for the fiscal year ending June 30, 1975; and $2,000,000 for the fiscal year ending June 30, 1976; which

160/ Children's Dental Health Act of 1971, Hearing Before the Subcommittee on Health of the Committee on Labor and Public Welfare, United States Senate, 92nd Congress, 1st Session, on S. 1874, July 12, 1971, U.S. Government Printing Office, Washington, D.C., pages 5-6.

shall be used by the Secretary to make grants to States, political subdivisions of States, and other public or nonprofit private agencies, organizations, and institutions to assist them in initiating, in communities or in public elementary or secondary schools, water treatment programs designed to reduce the incidence of oral disease or dental defects among residents of such communities or the students in such schools (as the case may be).

"(b) Grants under this section may be utilized for (but are not limited to) the purchase and installation of water treatment equipment.

"(c) Grants under this section shall not exceed—

"(1) in the case of a grant to any person who has received a grant under section 1001, 80 per centum of the cost of the treatment program with respect to which such grant under this section is made; and

"(2) in the case of a grant to any person (other than a person referred to in paragraph (1), 66⅔ per centum of the cost of the treatment program with respect to which such grant is made.

This provision stimulated anti-fluoridationist, Dr. Robert Mick, in direct testimony before the Subcommittee to "cite" S. 1874 as the "Public Health Service Act" and to suggest that moneys allocated to other sections "can be used for every type of fluoridation propaganda." 161/

Thus was launched, as anticipated, a typical attack and defense of the proposed legislation, and of fluoridation already in current practice. The pros and cons of fluoridation as deliberated before the committee and materials subsequently submitted for the record are as follows (selected):

161/ Ibid., page 80.

Senator Kennedy (quoted in part)

Water fluoridation is accepted by all major health organizations as an effective and inexpensive means of decreasing the incidence of tooth decay. Many communities have already fluoridated their water supplies and many more are planning to do so.

In some cases, lack of public funds is delaying this action. Only a few days ago an article in the Boston Globe stated that 31 communities in my home State of Massachusetts, having completed all the legal steps to accomplish fluoridation are now only waiting to raise the funds needed to install the necessary equipment. Federal grants are needed to assist communities to provide this important public health measure.[162]

Senator Magnuson (quoted in part)

Mr. Chairman, the second section of my bill would make it possible for the American people to save a sizable proportion of the nearly $4 billion which they are spending every year on corrective dental care. That section would provide $15 million for Federal matching grants to schools or communities wishing to fluoridate their water supplies.

This $15 million would make it possible for up to 7,000 communites with 45 million residents to obtain substantial Federal assistance to fluoridate their water. The 1969 census showed that 13,000 communities containing 57 percent of the Nation's population do not now have fluoridated water desipte the fact, as Dr. Deines will show, the effectiveness and safety of fluoridation in preventing tooth decay has been demonstrated again and again.

If you will compare this $15 million which I propose to spend over the next 5 years for the prevention of dental disease with the $4 billion that the public spends every year for corrective dental care, then I think you will agree with me that an ounce of prevention is not only better than a pound of cure—but that it is also much cheaper.

Before I go, Mr. Chairman, I wish to emphasize that this bill would not require any school or community to fluoridate its water. What the bill would do is assist those schools and communities which decide—on their own—that they wished to fluoridate their water.[163]

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[162] Ibid., page 2.

[163] Ibid., page 17.

Dr. Deines (quoted in part)

MATCHING FLUORIDATION GRANTS

So far as the dental profession is concerned, one of the most exciting stories in this Nation's public health history is the discovery of fluoridation. That discovery has paid immense dividends over the years. Children living in fluoridated communities benefit by a reduction of tooth decay that runs as high as 65 percent.

Obviously, that is a lifelong benefit. The safety and efficacy of this public health measure has been endorsed by every well-known scientific and health organization that has investigated the subject. Presidents Eisenhower, Kennedy, Johnson, and Nixon have all, during their tenures of office, urged the Nation's communities to fluoridate.

The subject, as we well known, has occasioned political controversy in some places. We regret that deeply. We know that the massive documentation science has assembled over the years proves that such controversy is ill-founded. The dental profession has invested much time, effort, and money into urging fluoridation and will continue to do so.

We do, however, recognize that Senator Magnuson is being commendably prudent in writing section 1002 of S. 1874 in such a way as to make it absolutely clear that there is no intent to coerce or even to persuade any community or school district to initiate fluoridation. The decision is left squarely and entirely in local hands. What this section of S. 1874 would do, however, is offer one-time, matching grants to help communities to begin fluoridation if they desire to do so.

There is ample evidence that such communities exist. A recent article in the Boston Globe newspaper, for example, said that there are 31 Massachusetts communities that want to begin fluoridation but haven't yet found the funding to begin. Nationally, we estimate that the authorizations under section 1002 would permit some 7,000 communities to begin this effort.

As I have already noted, the focus of dental practice must shift from repair of disease to prevention of it if we are to bring oral disease under control. Fluoridation is the single, most potent public health measure known to science for preventing tooth decay, the repair of which currently costs about $2 billion a year in private sector payments. If viewed only from the standpoint of dollars, it is fiscal madness not to fluoridate. 164/

164/ Ibid., page 26, from Statement of Dr. John M. Deines, President, American Dental Association.

Dr. Eddie S. Smith, Jr. (quoted in part)

The fluoridation section of S. 1874 is, as well, one that the National Dental Association particularly prizes. As has already been said by Senator Magnuson and Dr. Deines no one is suggesting—and section 1002 would clearly prohibit—forcing fluoridation on any community or school district.

Indeed, there isn't a penny authorized for propagation of fluoridation or even information on it.

Given all the factors involved, I would accept the necessity of so writing the section. But I would not hide the regret of the profession that this is necessary.* If there is any public health measure known that has been more thoroughly scrutinized from every possible scientific perspective, I am not aware of it.

The thoroughness of the documentation bearing on fluoridation's safety and efficacy has been the subject of congressional interest more than once. I can particularly recall one time involving the House Appropriations Subcommittee. The late John E. Fogarty, one of the greatest health leaders this Nation ever had, initiated a discussion with representatives of the dental profession on this matter. He wanted, he said, to allay any remaining concern anyone might have about fluoridation. The profession's witness told him that we would be glad to supply some 6,000 references from the scientific literature, references of studies that had been conducted on the safety and efficacy of fluoridation. Mr. Fogarty said, and I quote, "I would like to have you do it . . . I think we ought to lay this thing at rest."

Not all of the submissions were printed in the record of that hearing; they were too voluminous. The selected excerpts, however, run for 72 pages of small type. They make, we think, interesting and informative reading. Even the excerpts that were printed do what Mr. Fogarty wanted. They lay the question to rest.

There is much, justified concern in this Nation—not least of all within Congress—about the gap between discovery and application in the health field. Senator Magnuson raised it pointedly earlier today in his testimony.

The beginning of the discovery of fluoridation dates back to the early years of this century. It was nearly 50 years later—years filled with exploration and careful investigation—before responsible health bodies began to endorse the measure. Section 1002 simply says we should not stand in the way of enlightened communities wishing to fluoridate and that, if needed, we should respond to their call for a modest amount of financial assistance. We think that is a minimum gesture on the part of the Federal Government.165/

165/ Ibid., pages 68-9, Statement of Dr. Eddie S. Smith, Jr., vice president, National Dental Association.

*emphasis by author of this report

Dr. Robert J. Mick 166/
(Complete with dialogue with Senator Kennedy)

Mr. MILLER. I would like to introduce Dr. Mick to the committee. I am Clinton Miller, legislative advocate and vice president of the National Health Federation.

I have with me a letter which was composed an hour ago to you, sir. It says:

To the Honorable Edward M. Kennedy. This letter is being presented for your consideration concerning Section 1002 of Senate bill 1874. The National Health Federation representing over 45,000 Americans concerning the matter of health freedom have asked Dr. Robert Mick to represent us in urging that Section 1002 of S. 1874 be amended to specifically prohibit any federal funds being appropriated for the purchase of fluoridation water supply equipment and/or fluorides.

In addition to Dr. Mick, we will have here a young lady who lives within a block of the Senate Office Building who has had the questionable opportunity of consuming fluoridated water throughout her whole lifetime. This young lady is Terry Diane Glover. We wish to make it clear that the National Health Federation is strongly in support of you and the 40 sponsors of this bill, in doing all that we can to having as perfect dental health in this country as we can possibly have.

When Senator Magnuson complimented the chairman because the subcommittee has moved so quickly, that I had just a little feeling of apprehension. It seems to us, sir, that perhaps the subcommittee has moved a little too quickly.

I was notified during my vacation at 2:30 last Friday that the hearing would be held today.

I was notified today by a staff member that the record would be closed in about 1 week. We would like to register at this time, sir, the very strongest possible protest to closing the record in 1 week, or in limiting the testimony to those witnesses who have appeared today. We would like you to keep the hearings open until other great scientists who have taken strong positions against fluoridation of public water supplies have a chance to appear before the committee.

At this time, I would like to turn the microphone over to Dr. Mick for his testimony.

Dr. MICK. Would you mind if I stood? I am more comfortable.

Senator KENNEDY. You proceed whichever way you desire. However, just for the record, I would like to say that the notice about this hearing was placed in the Record last Tuesday.

We can't notify people all over the country about the times of these hearings. But we publish it in the Congressional Record, that is the procedure which has been followed for as many years as this great democracy has existed.

So we apologize and regret that you didn't have other personal knowledge of it. Just for the record, I wanted to make that clear.

166/ Ibid., pages 77-97, Representative, American Academy of Nutrition; accompanied by Clinton Miller, Vice President, National Health Federation (anti-fluoridationists).

Mr. MILLER. For the record, is there any intent to close the hearings as of today or will there be a chance for other witnesses to appear?

Senator KENNEDY. I expect the record would be open for several days for statements.

Mr. MILLER. That is not my question. Will other witnesses be allowed to appear?

Senator KENNEDY. I don't expect that we will have additional hearings.

Mr. MILLER. We wish to protest that very strongly. I don't think that is a fair way to conduct this hearing.

Dr. MICK. Senator Kennedy, and the other honorable Senators, my name is Dr. Robert Mick. I have been in the dental profession for more than 35 years. During the last 27 years I have been involved in experimental animal research and research studies on waters and foods as to their effect on animals and humans in the area of dental decay, perfect teeth, normal and malformed dental arches, cleft palate, et cetera. My research studies on humans was conducted in both equatorial Africa and the United States.

The testimony I present will be on S. 1874. It is my hope that I may provide you gentlemen with some information to influence you to not vote for this bill, whether you have already sponsored it or not.

Senator Kennedy, you made an observation in Chicago that you had seen so many children in need of dental care. I do not know if you were informed that Chicago has had the benefits of fluorides for approximately 16 years.

Washington, D.C., has had the fluorides added to their water since 1952.

The city of Pittsburgh has had it since the early 1950's. The report from Pittsburgh (and you made your own findings in Chicago) were that 17 years after fluoridation, plans for a $1½ million, 5-year program, with teeth in it for thousands of lower side Pittsburgh children and 16 elementary schools had been unveiled by Allegheny General Hospital. The program, which will be added by Federal grants, totaling more than $1 million will be the largest of its kind to date in the United States and unique in many respects, said the U.S. Health, Education, and Welfare Department officials.

Senator Kennedy, I feel like many other people do. I have spent my life on this particular subject and I happen to be one of the first promoters in this world of fluoridation. And at one time, I sat, not on that honorable bench, but before people and pleaded and pleaded. I was one of the first ones in New Jersey. I wanted to do the best for them and for my children.

In 1948, I learned how I had willingly—as you gentlemen will learn some day—willingly but unknowingly become involved in what was to become the biggest scandal of its particular type.

Senator, just about a quarter after one, Mr. Miller said, "Doctor, I think that there are some folk within 2 blocks of here and within a period of 5 minutes."

We found a group of children. I would like to introduce to you Terry Glover, 7 years old, of 211 C Street NE.

Terry has had the benefits of fluorides since she was born. We also

saw her mother. She was working in another home. She was going to try to be here. Her mother had a beautiful set of teeth.

She came from outside of Washington, D.C. But Terry here has some teeth that have had the full effects of fluorides that are decayed to the gum line. But on the front of her tooth there is also, and you may care to see it for your own interest, a white mark. It doesn't hurt the tooth. It is only a sign of what is called fluorosis.

This sign did not come directly from the mouth, Senator. It has to come by ingestion, and then through the body, and that which is in the tooth is only an outward sign of that which takes place in the body.

The following is not in my prepared testimony:

When you take a telephone pole, and I use a lot of fluoride in my dental practice on teeth, because fluoride and many other elements are one of the finest enbalmers, the same as you take a telephone pole and you place it in creosote and then you can put it in the ground and then the bacteria in the ground will not attack that pole for a long. long time.

You can't put a drop of creosote or any other deadly chemical along side of that growing tree and have the tree turn black and grow beautifully. You must attack it after it is formed. You can't add anything in your mouth, go through your stomach, and only go to the tooth.

No doubt you partake of foods and vitamins. It is a mystery how a vitamin is used for our benefit, for our eyes and the rest of our body and the fluoride can only go to our teeth.

Senator Kennedy, before you is a model showing mottling of teeth. I happen to be fortunate enough to be a lieutenant colonel in the military. I have done research work even there.

Senator KENNEDY. Excuse me. Is this Miss Glover?

Miss GLOVER. Yes.

Senator KENNEDY. Are you in school? Maybe you can answer yourself.

Miss GLOVER. We have a vacation.

Dr. MICK. She is on vacation.

Would you like to ask Terry?

Senator KENNEDY. No; I was just interested.

Dr. MICK. I looked at their teeth. Her cousin also had teeth that were also eaten off at the gum line.

Senator, before you is a model that I was able to obtain of one of the soldiers. If you will pick it up, you will see every type of mottling that you can ever imagine. On this model you will see the dental decay that you are led to believe cannot occur. If I could have you to look at this bottle, you would see the minerals that one partakes in approximately 600 quarts of water. These are the precious body building minerals that make up the food and which makes the animals, as they are supposed to be, the finest.

I happen to be involved in water analysis and distillations and each of these bottles contains the various types of minerals that you personally are partaking of in 1 gallon or 7 gallons of water.

If the commitee were to see this bottle they would realize that you can't add one mineral to this material without having something take place.

I have volunteered to represent the millions of voters in this country who oppose fluoridation. I am one of the original promoters of

fluoridation in the United States. I learned in 1948 how I had willingly but unknowingly became involved in what was to become the biggest international scandal ever to be promoted in the name of a health program.

I have spent the last 23 years exposing the promotion of fluoridation by employees of the U.S. Public Health Service and defeating fluoridation at referendums. I believe, I personally have a 100-percent average of wins by just telling the truth to the voting audience. Fluoridation, when allowed by city and State legislators to go to referendum, is the biggest voter interest issue that has ever been voted upon.

S. 1874 is cited as the "Children's Dental Health Act of 1971" but, on page 10 of the bill, this act may be cited as the "Public Health Service Act." The children, poor children, are used as a mask for S. 1874.

The doubletalk and unknowns for which graduated grants are sought in sections 1001, 1003, and 1004 is beyond comprehensions. The "poor children" will receive but a trace of the grants that are being sought.

Every section of S. 1874, except section 1002 "Grants for Water Treatment Programs," can do no physical harm.

Senator KENNEDY. I am interested in the child. Is she supposed to have lived here in the District?

Dr. MICK. Yes. Her name is Terry. You live just 2 blocks away. We just went up on C Street.

Senator KENNEDY. Terry, how long have you been here?

Miss GLOVER. All of my life, since I was born. I was born in Washington.

Senator KENNEDY. You have always lived in Washington?

Miss GLOVER. Yes.

Senator KENNEDY. Have you ever visited North Carolina? Do you have some friends down there?

Miss GLOVER. Cousins.

Senator KENNEDY. Have you ever visited down there?

Miss GLOVER. No.

Senator KENNEDY. We are very glad to have you here. You have been our youngest witness.

Dr. MICK. I will proceed. I would love to be able to be of some service.

Every section of S. 1874, except section 1002, entitled "Grants for Water Fluoridation," can do no physical harm and a lot of good. and if the same Government interest in dental decay was taken as in the cigarette problem and if the USPHS used the radio, the TV and the printing of articles on food that help accelerate dental decay and other body problems, the program would be truly fantastic.

Moneys allocated to sections 1002, 1003, and 1004 can be used for every type of fluoridation propaganda under the headings of "accord priority to projects designed to provide preventive services," "comprehensive projects," "prevention," "demonstrations," "experimentation," "establishing and carrying out programs to educate," et cetera.

In 1970, just one of the grants made by HEW, grant No. DH-00151-02 (ESR), to Department of Political Science, University of California, Riverside, Calif. This was given under the title of "Fluorida-

tion and Community Decisionmaking," $92,895. That would have bought an awful lot of fluoride tablets and would have helped some of the poor children to have some other dental care.

You gentlemen realize, that as young men you rarely saw a Public Health Service dentist in your area. Fluoridation has become a major program for the dental division in the health departments. As a young man, a father and a Senator you probably have had many dogs. Has it ever occurred to you that these animals have perfect teeth while drinking the same water as your family? What do you believe should be added to your dog's water to improve the quality of his teeth?

Your dogs provide a 10- to 15-year experiment, if you want to call it that, right in your own backyard. But if you vote against this bill, you may be called antipoor, antidental and antifluoridation.

Senator, if true words of intent had been used in this title, as publicized by the American Dental Association, the title should read "Grants for Fluoridation." I would ask that that which is publicized by the American Dental Association referring to this as a fluoridation bill or fluoridation be accepted by the committee.

So worded as it was referred to by the ADA, S. 1874 would have received large-scale public opposition and opposition has started as of July 10. I assure you it will gain momentum.

The massive evidence that documents the harms from fluoride could provide testimony for hundreds of pages and many previous hearings since 1954 have recorded the story of fluoridation and the promotion along with reports of the harms from fluoride. I will come back to this point.

Honorable Senators, some of you may have witnessed how the word fluoridation has been built up even in your own minds over a period of 27 years to being in the same category as a religion, a sect, political side, a word that can split a group or a family. The documented facts concerning these poisonous fluorides are overshadowed by the efforts of the promoters at fluoridation to influence one group against the other—all in the name of a children's dental health program. How this poisonous fluoride can be swallowed and only effect teeth, while all other foods and vitamins go to all parts of the body is indeed fantastic and a mystery to any thinking individual.

The congressional hearings in 1954 entitled "Fluoridation of Water" H.R. 2341, "A bill to protect the public health from the dangers of fluoridation of water" are probably unknown to most Congressmen.

These hearings exposed fluoridation as a scheme with no regard to the toxic effects as known and reported by officials in the U.S. Public Health Service and other professional men.

I ask that those hearings (H.R. 2341–1954) be placed into these records for guidance of this Congress.

Senator KENNEDY. Are you asking for the whole hearings?

Dr. MICK. It would be very, very fine, because there are none of these available. Would you accept that part that was put in there showing the harms from fluorides?

Senator KENNEDY. If you have got the particular citation, I will be glad to review it and if it is pertinent include it.

Dr. MICK. Thank you.

(The material referred to follows:)

Medical Evidence Against Fluoridation of Public Water Supplies

(By George L. Waldbott, M.D., Detroit, Mich.)

Note.—Dr. Waldbott has published more than 100 scientific papers on original research on various phases of allergy, and one book entitled "Contact Dermatitis," Dr. Waldbott is the vice president of the American College of Allergists, a Fellow of the American College of Physicians and of the American Academy of Allergists, as well as of other national and international societies in his specialty.

Health and dental groups introduced the project of adding fluorides to the domestic water supplies because a lowered incidence of dental caries was observed in areas where fluorides occurred in the water naturally.

May I preface my remarks by explaining why I am interested in this subject. As an allergist, I have seen much serious trouble in allergic patients caused by indiscriminate medication. Moreover, the opposition to fluoridation has thus far depended largely upon nonprofessional people for leadership. In general, competent medical men have either been too busy or have not yet given the problem adequate attention to oppose the powerful groups pressing fluoridation. Naturally, the view of a practicing physician like myself differs from that of health officers, research people and dentists.

In this controversy two facts must be acknowledged from studying the available literature: First, this drug has a tendency to settle in the tooth enamel rendering it denser, harder, and more resistant in children under the ages of 10 to 12. However, whether this actually means healthier teeth has not been proven. Second, in the concentration in which fluorides are being added to drinking water, they are not likely to induce acute fulminating poisoning. However, the probability of chronic poisoning will be discussed at length later. Do these two facts justify the "calculated risk" of which the proponents of this plan speak when they require every individual in the community to drink water containing fluorides, rather than to permit dentists to prescribe the drug when they consider it necessary?

I shall discuss the medical aspect of the fluoridation problem by elaborating upon the following points:

1. Can there be a "safe concentration"?
2. Is the value of fluorides scientifically proven?
3. Is there danger of disease and death from fluoridation?
4. What methods are being employed in some scientific circles to promote this program?

There are many political, social, and legal aspect involved in the controversy upon which I shall not touch.

I. SAFE CONCENTRATION

From animal experiments and statistical studies in humans, the proponents of the plan conclude that a concentration of 1 part of sodium fluoride in 1 million parts of drinking water by weight (1 p.p.m.) entails no harm. According to dental research authorities, mottling of the tooth occurs at 0.7 p.p.m. and a mottled tooth is a poisoned tooth. Therefore, how can the concentration of 1 p.p.m. be called "safe"?

If animals are fed diets containing 7 to 12 p.p.m. the first signs of poisoning begin to appear. The incisor teeth become chalky, pitted, and corroded. The bones and kidneys show minor degenerative changes.

Other findings are damage to the liver, to the stomach and bowels, and to the tissues surrounding bones and teeth. The animals loose their appetite, they may develop anemia and brain disturbances. (1.)

When fluorides are taken into the system through ingestion by mouth, a large portion reaches the bloodstream by penetrating the mucous lining of the inestinal tract. It is then distributed by the blood to bones, teeth, kidneys, liver, spleen, brain and other organs where about 10 percent is retained for many weeks even months. (2.) The remaining 90 percent is then eliminated from the blood mainly through the kidneys in the urine and through the skin in the sweat.

Reactions in the human body differ from those in a test tube. Every single phase of the above metabolic process is subject to tremendous individual variations. Blood samples, for instance, for individuals in the artifically fluoridated city of Newburgh showed variations of as much as 900 percent (3.) in spite of the attempted regulation of the "safe" 1 p.p.m. intake of fluoridated water.

There are many reasons why this intake of 1 p.p.m. cannot be properly controlled and maintained in a person drinking such water. What, for example, about simultaneous ingestion of fluorides in food? Tea, for instance, contains 30 to 60 p.p.m. For a habitual tea drinker, therefore, this drink would bring the daily intake of fluorides just within the safe limit. If, in addition, he were to eat food grown in a fluoridated area which contains much larger amounts than usual, and if this food were boiled in fluoridated water, thus concentrating the fluorine content further, the intake would most likely reach toxic levels. Furthermore, if an individual has diabetes or a disease accompanied by fever his water intake could rise so much higher that this might conceivably decide the course of his illness.

The amount of fluorides absorbed from the bowels is greatly influenced by the acidity of the bowel content. Furthermore sodium fluoride which is added to the water supply is much more soluble than organic compounds containing fluoride present in water of naturally fluoridated areas. Therefore, much more will be absorbed through the bowels under the artificial scheme than in an area where it occurs in nature. The condition of a person's teeth, bones, kidney, liver, and brain—especially their calcium content—determines how much fluorine is retained in these organs. Thus, under certain circumstances the 10 percent figure of fluorine retention may be considerably exceeded.

The elimination of the fluoride salt through the kidneys is of special importance for a patient with a diseased nonfunctioning kidney. Much less can be eliminated; in other words, much more is retained in his system for potential development of toxic symptoms. There is a great likelihood of extensive damage from this salt in elderly individuals who notably have a tendency to arteriosclerotic, poorly functioning kidneys. What will happen to such individuals after drinking such water year after year can only be imagined. Finally, there are further individual differences in the event that a person is allergic. I should like to refer to my own experimental work published a year ago on "Drug Tolerance in Asthma" (4.). It was demonstrated that an asthmatic patient may be poisoned by otherwise harmless doses of any given drug. I am not referring here to allergic symptoms, but to true poisoning from otherwise harmless amounts of such drugs. This was observed clinically and proved experimentally. One cannot escape the conclusion that there may be considerable damage to a large part of the population from artificially fluoridated water in the so-called safe concentration of 1 p.p.m. for everyone in an entire community.

II. APPRAISAL OF THE VALUE OF FLUORIDATION

In their pamphlets the health authorities promise a 63 percent reduction in dental caries if fluoridation is adopted. This figure is derived from statistical studies in such fluoridated cities as Grand Rapids and Newburgh. The teeth of school children drinking this water were examined and the number of cavities recorded periodically. This evidence is not accepted by some leading dental research authorities. Hurme (5), for instance, points to the many pitfalls in compiling statistics of this kind, especially to the lack of standardization of the methods employed, to the personal bias of the examiner, and to the relatively short period of observation.

Let me give an example of the confusion: Mottling of teeth is commonly found in fluoridated areas and is identified with beginning fluoride poisoning. (6.) Most proponents of fluoridation consider a mottled tooth aesthetically undesirable rather than diseased. Such a divergence of opinion is bound to affect the statistical appraisal of healthy teeth, and this alone renders the statistics inadequate. In addition, Boyd and Wessels (7.) state that repeated examinations of the same tooth made by the same examiner at different times may result in a different interpretation from one examination to another.

Furthermore, children who have periodic examinations of their teeth are usually at the same time alerted to the importance of good dental hygiene, good nutrition, and elimination of sweets and soft drinks.

Finally, most statistical reports disregard the observation of such thorough students of the subject as Smith and Smith (8). They found that individuals in fluoridated areas, who as children showed an apparent reduction in dental caries, after they had passed the age of 21 manifested much more extensive deterioration and weakening of the tooth structures than those in nonfluoridated areas. A similar observation is related by Newman (9.) in two suburbs of Shef-

field, England. He and other observers have noted in various publications that people in areas where the water is practically fluorine free have excellent teeth. Therefore, the 63 percent reduction in caries from fluoridation of water is not substantiated.

III. HAZARDS OF FLUORIDATION

Why are there no reports of disease and deaths from fluoridated water? In distinction from acute poisoning, symptoms of chronic fluoride poisoning are vague and insidious. Nausea, general malaise, joint pains, decreased blood clotting, anemia, and similar vague symptoms may result from a variety of causes and do not represent a clearcut disease syndrome. Even an extremely well-trained clinician is not likely to make the correct diagnosis. When a patient finally succumbs to a kidney or liver disease, it is practically impossible for the average physician or pathologist to trace the disease to its true cause. Health authorities and some dentists do not take this into count. Indeed, in two municipalities of metropolitan Detroit, physicians are so little aware of this problem that I found hardly a single doctor who knew that he, personally, was drinking fluoridated water.

Shouldn't we expect a significant rise in the death rate from kidney, liver, and brain diseases in fluoridated areas if there is chronic intoxication from poisoning? First let us consider that such diseases and death in naturally fluoridated areas are much less likely to occur than in artificially fluoridated ones because of the above-mentioned lower solubility of organic fluorides as compared to sodium fluoride. Furthermore, vital statistics on diseases which are difficult to diagnose, notoriously furnish very unreliable information. I personally observed, in reviewing deaths from bronchial asthma, that the majority of deaths recorded in death certificates represented asthmalike wheezing from other sources. Similarly, without an autopsy even the most expert clinician would find it extremely difficult to establish the diagnosis of fluorine poisoning. There is evidence which, however, cannot be fully corroborated because of insufficient published information that Grand Rapids deaths from kidney, heart, and brain diseases have increased since 1945 (10).

The benefits derived from fluoridation have been compared with those from penicillin. In 1949 I reported the first death from penicillin ever reported in literature (11) Since that time nearly every general practitioner, certainly every allergist, has observed serious reactions, near deaths, and even deaths from this drug. I recognize the value of penicillin as much as anyone; I use it extensively in my practice; however, like other competent physicians I am against its indiscriminate use. Assume, for instance, that this otherwise harmless drug were given every day to everyone in the country in very small doses for prophylactic purposes. Based on my extensive studies on human anaphylaxis which were carried out in 1933–36 (12), I would have to conclude that the results would be disastrous. Similarly, it will take many years and much careful and thorough clinical observations by competent physicians to evaluate the potential harm of fluorides. I predict that once the first fluorine death is reported, others will be recognized in rapid succession.

I have attempted to set forth why there can be no such thing as a safe concentration, why statistical evidence concerning the benefits of fluoridation is unreliable, and why thus far no serious illness and no fatalities from this cause have been reported. Whereas I have endeavored to keep this discussion on a factual basis, I cannot help but refer to the method used by health and dental authorities in promoting this program and smothering opposition.

IV. HOW THE FLUORIDATION PROGRAM IS PROMOTED

In practically all the voluminous literature on the subject hardly a paper is published which does not capitalize on the fact that there is no organized medical opposition. "No scientific point of view" (13). "Persons misled either by emotional prejudice or by lack of knowledge" (14).

In a very informative article issued by the Commission on Chronic Illness (15), such leaders of the profession as K. F. Maxcy, E. J. Stieglitz, and N. Shock present throughout the text the safety of the fluoridation project as an incontrovertible fact. In their last paragraph, however, there is the inconspicuous note "evidence does not absolutely exclude the possibility of risk."

Heyroth, of the Kettering Institute (16), another staunch proponent of fluoridation, assembles all the available data on the possibility of toxicity from fluorides

in an excellent contribution. The author sets out to convince the profession of the safety of fluoridation, yet at the end of the paper he makes a plea that evidence of toxicity in patients with chronic nephritis be sought. He recommends that such patients should buy nonfluoridated water if residing in a fluoridated community. He disregards the well-known fact that many patients are ignorant of suffering from this disease.

Practically all publications convey the impression to the reader that dental caries are primarily the result of lack of fluorides. Even if lack of fluorides in food and water were to play a part in the production of caries, the fact remains that such other causes as dietary digressions, lack of vitamins, glandular deficiencies, allergies, and many other factors are equally, if not much more, responsible.

In an attempt to prove the harmlessness of fluoridation, many of the articles claim that fluorine is a trace element necessary to good human nutrition similar in action to iron in forming red blood corpuscles and to iodides in counteracting goiter. This is contradicted by numerous sources (17).

None of the papers mention the excellent work by Taylor (18) who fed fluorides to a large number of mice in the so-called safe concentration. They developed cancer much sooner than the control group which was fed a fluoride-free diet. Also ignored is the work of Harris (19) which proved that hamsters fed corn and milk from Texas developed only half as much dental caries as those fed corn and milk from New England. His work clearly indicates that not lack of fluorides but vitamins were involved in the reduction of dental caries.

All this data indicates that most of the evidence presented by the proponents of fluoridation on the question of safe concentration, possible danger and on its value in preventing tooth decay is not convincing.

Why is there so little medical opposition to fluoridation? From personal contract with competent physicians and dentists, I know that there is a strong potential opposition. These never, however, wonder why scientific medical organizations officially endorse the program, I am told by a member of the house of delegates to the AMA who attended the meeting at which the principle of fluoridation was endorsed by this body that he personally was not informed sufficiently in advance to carefully appraise its drawbacks. He states that the vote was taken so precipitously that there was little chance to oppose it. Further you know that "the councils on pharmacy and chemistry of the AMA purposely refrained from making any recommendation that communities support or oppose projects for the fluoridation of water supplies." "The house of delegates did not urge or recommend that any communities undertake to fluoridate their water supplies." (Quotation from the statement of the AMA.)

Other physicians are overwhelmed by the vast repetitious information presenting the proponent aspect and puzzled by the absence of opposition. For instance, at present every member of the American Academy of Pediatrics is receiving a propaganda pamphlet—not a scientific paper—advocating fluoridation. This is likely to result in another endorsement of a scientific group. Furthermore, they cannot find literature against fluoridation in competent medical and dental journals. It is evident that conventional dental publications do not accept scientific material representing the other side. For such information one is obliged to search in second-rate journals. Moreover, doctors scientifically qualified, hesitate to oppose the project lest they jeopardize their standing among colleagues, their practice, and their medical appointments. They do not want to be identified with those who oppose the project on religious, political, and emotional grounds.

Let me conclude by reminding you of what happened in the early twenties. A drug much less harmful than sodium fluoride, namely, sodium iodide, was added to the public drinking water of some Michigan communities for the prevention of goiter. McClure and coworkers (20) soon noted a marked increase in the incidence of mortality from toxic goiter among those disposed to it. Immediately the health authorities who had promoted this scheme made iodine available in table salt instead. Now, anyone can partake of it or not according to his need.

Why do we not follow this example? Fluorides are now available to be taken as a tablet in water or milk, or they can be painted on the teeth of those who wish to avail themselves of their benefits. At present, neither the benefit nor the safety of fluoridation of water supplies are sufficiently proven to warrant experimentation with human life.

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Dr. MICK. The very request for section 1002 by HEW (USPHS) and the American Dental Association is more unbelievable when one has seen the minutes of the U.S. Public Health Service Conference of 1951, entitled "Promotion and Application of Water Fluoridation." I have that included in the testimony envelopes.

This meeting took place 6 years after fluoridation was started. It took 17 years to locate the one known true copy in the library of HEW. Its existence had been denied by the librarian up to May 1968. The call No. is 21.C55, 1951, "Proceedings—Fourth Annual Conference of State Dental Directors With the Public Health Service and the Children's Bureau, June 6–8, 1951, Federal Security Building, Washington, D.C." detailing, as entitled, "Promotion and Application of Water Fluoridation."

Dr. Knutson was also Chief, Division of Dental Public Health, U.S. Public Health Service. Dr. Leonard Scheele was Surgeon General and President of the World Health Organization.

The following should further influence your decision on section 1002, S. 1874. These are but a few statements from 21.C55, 1951, of Public Health officials who were promoting use of poisonous fluorides in your drinking water and had been for 6 years.

Dr. Scheele speaking, he is addressing this audience of approximately 50 Public Health Service representatives from the States:

I am sure you are going to have an interesting meeting. I did have a chance to look over your schedule. Obviously one of the biggest things facing us is the catalysing of real national program water fluoridation.

As you turn to various sections, these are Government records that are not available. I ask, Senator Kennedy, that this document No. 21.C55, 1951, be put into the record for the guidance of the Senators and the Congress.

Senator KENNEDY. We will accept it for the committee files.

Dr. MICK. You won't accept it?

Senator KENNEDY. We will review those parts that are particularly relevant to the legislation. We will include those in the record. But we are not at the taxpayers' expense just going to reprint a lot of material. I don't know what is in that record.

Dr. MICK. This particular official document of this meeting conducted by the U.S. Public Health Service is entitled "Promotion and Application of Water Fluoridation." It is to try to show those in attendance how to promote fluoridation. This meeting is taking place 2 years after some of the most fantastic reports on harms from fluorides had been published by Government officials. In this USPHS "Proceedings" is the following statement: "Well, we now have enough evidence from cities that had demonstrations to show that controlled fluoridation has the same effect as natural fluoridation. Incidentally, we never had any 'experiments' in Wisconsin. To take a city of 100,000 and say, 'We are going to experiment on you, and if you survive we will learn something'—that is kind of rough treatment on the public. In Wisconsin, we set up demonstrations. They weren't experiments.

"Now, in regard to toxicity—I noticed that Dr. Bain used the term 'adding sodium fluoride.' We never do that. That is rat poison. You add fluorides. Never mind that sodium fluoride business, because in most instances we are not adding sodium fluoride anyhow. Everything, except what Dr. Scheele said in the beginning, is being said by a Dr. Francis Bull from Wisconsin."

Senator KENNEDY. You have about 4 or 5 more minutes.

Dr. MICK (continuing). All of those things give the opposition something to pick at, and they have got enough to pick at without our giving them anymore. But this toxicity question is a difficult one. I can't give you the answer on it. After all, you know fluoridated water isn't toxic, but when the other fellow says it is, it is difficult to answer him. I can prove to you that we don't know the answer to that one, because we had a city of 18,000 people which was fluoridating its water for 6 or 8 months.

This is only part of what was told. These minutes of the Government were found 2 years after they took place, accidentally, by a Congressman from the State of Washington. They are so vital.

It is so vital that the people should know what took place in 1951 when the Government was trying to promote fluoridation and had no experiments done whatsoever, no experience on the harms to the people.

This book here was put out entitled "Dentistry and Public Health," Senator. It tells all the harms, the possible harms to kidneys, to teeth, to bodies from fluorides. This was all recorded in 1949 by some of the very same men that started to promote fluoridation in 1951. (Will return to these Government records.)

One of the men who you are led to believe in is Dr. David Ast, of New York State, who started the fluoridation program in Newburgh, N.Y. As of August 5, 1964, from a letter to a woman in Connecticut, Dr. Ast says:

I have your letter of August 3 and wish to advise you that this department has not done any original work dealing with fluoridation as it relates to the bill. Some of this work has been done in Connecticut. I would suggest you communicate with the Connecticut State Department of Health in this matter.

Senator, I did contact them. At no time has any of this work ever been done.

You are interested in cancer. So am I. I am interested in degenerative diseases. For your guidance on your cancer programs, this is from Times Section "medicine." At the bottom, on a report on radioactive diagnosis: "Fluorine, a related element, has a radioactive isotope, S. 18, that concentrates in bones facilitating the detection of bone cancer."

In my own animal research work, and Senator, I happen to be—I guess it is a disgrace—one of the men in the world to conduct research work into the third generation on rats and had the bones, the teeth, the kidneys, livers, and spleens analyzed for fluoride retention.

These findings were all published. I found up to 500 percent more fluorides in these tissues than in the control animals.

We learn, as stated (if I can't influence you in any other way) by a D.D.S., the Assistant Surgeon General, Director, Division of Dental Health, that in 1967, he wrote a letter concerning fluoridation and in it he stated, "Absolute safety can never be absolutely demonstrated."

In Year Book of Agriculture, by the U.S. Government, it tells that fluorine is a cumulative poison and long continued consumption of relatively small quantities produces chronic fluorosis in all farm animals and the general symptoms are abnormal teeth and bones, stiffness of joints, a loss of appetite, salt hunger, kidney damage, and injuries to other organs, such as the liver, the heart, the thyroid, and others.

Senator Kennedy, you are also interested in other research on cancer. So am I. I would suggest reading the fantastic work that has been done by Dr. Taylor on animals in relationship to cancer and how fluorides affect cancer prone animals and the shortening of life where fluoride is also used in these experiments.

Then, by the American Dental Association, Senator, there was published as the work of a physician a report of the harms to humans from the presence of fluoride in drinking water and how these symptoms were alleviated by the omission of the fluorides.

Senator KENNEDY. Doctor, do you want to sum up now? We are running into a time problem. We will make sure your statement is included in its entirety in the record.

Dr. MICK. Continuing from USPHS meeting, "Promotion and application of water fluoridation":

Then a campaign was started by organized opposition on the grounds of toxicity. It ended up in a referendum and they threw out fluoridation. So I would hate to give you any advice on that deal. It's tough.

So when you get the answer on the question of toxicity, please write me at once, because I would like to know. We have answers, but apparently in some places they don't work.

One thing that is a little hard to handle is the charge that fluoridation is not needed. They talk of other methods, and when they get through adding up all the percentages of decay that we can reduce by such methods, we end up in a minus. When they take us at our own word they make awful liars out of us.

If it is a fact that some individuals are against fluoridation, you have just got to knock their objections down. The question of toxicity is on the same order. Lay off it altogether. Just pass it over. We know there is absolutely no effect other than reducing tooth decay, you say, and go on. If it becomes an issue, then you will have to take it over, but don't bring it up yourself.

If you can—I say if you can, because five times we have not been able to do it—keep fluoridation from going to a referendum.

Honorable Senators, some of the most valuable documents on harms and possible harms from fluorides are recorded in a book entitled "Dentistry in Public Health" by Pelton and Wisan, published in 1949. That is 4 years after fluoridation was started. "Dentistry in Public Health" is edited by Walter J. Pelton, B.S., D.D.S., M.S.P.H., senior dental surgeon, U.S. Public Health Service, Colorado, and Jacob M. Wisan, D.D.S., M.S.P.H., director, Joseph Samuels, Dental Clinic, Rhode Island, State Hospital for the Dental Health Section of the American Public Health Association.

Some of the contributors to this book were: Francis A. Arnold, D.D.S., Dental Surgeon, U.S. Public Health Service, National Institute of Dental Research, National Institutes of Health, Bethesda, Md.; H. Trendley Dean, D.D.S., Dental Director, U.S. Public Health Service, Director, National Institute of Dental Research, National Institutes of Health, Bethesda, Md.; Harold Hillenbrand, D.D.S., Secretary of the American Dental Association; John W. Knutson, D.D.S., D.P.H. Senior Dental Surgeon, Chief, Dental Section, States Relations Division, U.S. Public Health Service, Washington, D.C., are but a few but these were the leading authorities.

As you listen to these statements on fluorides, as recorded, try to ascertain how or why these same men could possibly proceed with fluoridation and, in 1951, arrange for the Government meeting "Promotion and Application of Water Fluoridation."

At the same time, try to ascertain how our U.S. Public Health Service (HEW) could be so bold as to ask for "Grants for Water Treatment Programs" to reduce dental decay.

From page 161, "Dentistry in Public Health:" Statement by Dr. Dean:

> Conclusive evidence has been presented to show that this element (fluoride) is the etiologic factor in the production of one dental disease, fluorosis (mottled enamel).
>
> "The ingestion of such waters during the period of calcification of the crowns of the permanent teeth results in a disturbed calcification pattern. Both the severity of affection and the percentage of individuals affected are correlated with the concentration of fluorine in the water ingested. There is slight but discernible evidence of a disturbed calcification in a small percentage of individuals who have used domestic waters containing 0.5 or about 1.5 ppm of fluorine.

Gentlemen, that was later to be known as the safe range for artificial fluoridation.

From page 163, "Dentistry in Public Health," Dr. Arnold:

"Signs of toxic nephritis may follow the ingestion of toxic but not fatal doses." Dr. Knutson: "Little information is available to establish the acute toxic or lethal dose of fluoride compounds for human beings." From page 164: Arnold—

> Teeth showing fluorides have an increased fluorine content, and skeletal tissues showing typical fluorine pathology have proportional increases in fluorine.
>
> The histopathologic changes accompanying this fluorine increase in skeletal tissues represent on the whole a disturbed osseous metabolism . . . however, the results of these high doses do give warning of the potential danger of fluorine and fluoride compounds.

Concerning the effect of fluoride domestic water supplies on human populations: (Arnold) "Comparatively little information is available on this subject," (Gentlemen—this was 4 years after the start of fluoridation) (Arnold)—

Kemp, Murray and Wilson recently have sought to relate the ingestion of fluoride in a certain fluoride drinking waters in England with a kyphosis-like spinal change and "severe" dental fluorosis in children using domestic water containing 0.3 to 1.2 ppm of fluorine.

Page 166—Arnold—

There is a remarkably close correlation between urinary fluorine concentration and the fluorine content of the local water supply. With exposures as low as 0.5 ppm of fluorine in the local water supply, the urine specimens show an increase in fluorine.

Page 176—Dentistry in public health—Arnold:

It is essential, however, that any supplementary feeding of fluorides be under direct prescription and supervision of the child's dentist or pediatrician.

Gentlemen, these were the words of the men who, within a few months, planned the mass addition of poison fluorides in our drinking water.

On November 9, 1967, Dr. Viron L. Diefenbach, DDS, Assistant Surgeon General and Director, Division of Dental Health, wrote the following in a letter: "absolute safety (from fluoride) can never be absolutely demonstrated." Such plain and unequivocal proof of harmful effects of 1 p.p.m. fluoride in water demonstrates beyond question that the claim that fluoridated water is "perfectly safe" is simply not valid.

Water fluoridation is economically unsound—See references on Seattle, Washington and Toronto, Canada for tonnage of fluoride pollutants, corrosive—See Erco, compulsory medication, violates religious beliefs and freedom of choice and damages biological organs.

I trust that one of the witnesses supporting S. 1874 will supply you with at least one copy of any controlled experiments with the U.S. Public Health Service recommended parts per million, and water, that shows that poisonous fluorides are—as published as fact by promoters of fluoridation—safe, beneficial, and will cause no future body harms. There is a $100,000 reward offer—that can go to some military charity—if you can be provided with same. The statement "safe, beneficial and will cause no future harms" are statements of promoters.

You are probably familiar with the ban of fluoride tablets in 1966 for pregnant women; and yet, the U.S. Public Health Service, HEW, are putting fluoride, asking for fluoride to be put in the water for you, for me, for everyone, for the young, the old.

Senator, one of the most damaging of all things from fluorides, from 2 years of research at the Oregon Medical University was on prolapsed intestines. This was done with a mass of animals and wherever there was prolapsed intestines, it was found that the fluoride was in the animal pellets.

The U.S. Government, Navy, also had surprise findings. They did not do any fluoride research as such, but fluoride was found in the animal pellets that were being fed these animals.

The last two sentences sum this up: (This is from the Bethesda, Md., Naval Medical Research Division.)

Inasmuch as this investigation was not planned, or specifically controlled for the purpose of relating these substances to toxic effects the actual finding of fluorine in the rations of five of the swine in which serious lesions were observed is not conclusive evidence, but in view of the fact that many studies reported in the literature have shown that teeth and bones are subject to developmental changes by the addition of relatively small quantities of fluorine,

it is believed that these observations should be reported as specific cases wherein fluorine in the diet may be a factor and, Senator, it says nutritionists should be informed of the possibility of fluorine being present in food supplements in quantities approaching toxic level.

Senator KENNEDY. You have about 30 more seconds, Doctor.

Dr. MICK. For your information, there is such a mass of findings on fluorides that a journal on fluorides comes out every 3 months.

You had fine men testifying here. You have had "oodles" of information. Senator Kennedy, not one man offered you one reference. They told you there were 4,000 references. Not one man offered you a reference of research work on animals or humans with any of the fluorides at any of the recommended parts to prove what they said.

A group of professional men, there are approximately 20 of us, and these are some of the finest men interested in heart work, eye work, cleft palate, nutrition, have banded together because they are doing the same thing by showing that they are opposed to fluoridation.

This $100,000 reward offer is not a "screwy" thing. It is very simple. Anyone should be able to collect it. Fluoridation was started in 1945. Promoters claim up to 50 years of research with fluorides. I will read this last paragraph.

This reward offered of $100,000 will go to the first individual who can provide one copy of any controlled experiments with the United States Public Health Service recommended fluorides in water at the United States Public Health Service recommended parts per million, that shows that poisonous fluorides are—as published as fact by promoters of fluoridation—safe, beneficial, and will cause no future body harms.

I trust that you, Senator Kennedy, would take the challenge and say to these gentlemen—and call in the HEW—"Look, either we—Senator Magnuson and the committee—and I am going out on a limb for you, or let us expose Dr. Mick and all of these other men that are making this 'reward' statement. You said there are 4,000 of these experiments."

Senator, I have a lot of influence at times. I am half a gambler. As I said, I was one of the original promoters of fluoridation. It is a challenge. I trust that until you at least find one experiment or until one of the men that were here today provide you with one——

Senator KENNEDY. Who is going to decide? Are you prepared to let the American Dental Association appoint a five-man group and let them decide?

Dr. MICK. We will take it to any college that you state without me being there, that has a biology department, anyone that is interested in doing research work at all. The laboratories in Philadelphia and Washington; any college that does research work with animals of any kind. That is all you have to do.

Senator KENNEDY. What do they have to do then?

Dr. MICK. All they have to do, Senator, is the same as if you and I were doing an experiment. We have two groups of guinea pigs, two groups of anything.

Senator KENNEDY. What do they have to prove, that they are able to show that the number of cavities have gone down?

Dr. MICK. All they have to do is show that fluoridation is safe, as they say, that it is beneficial, that the cavities go down. And that it will cause no future body harms.

Senator KENNEDY. No future body harms?

Dr. MICK. It only takes 9 months for three generations. I have done this. So have many others. Dr. Taylor had 645 animals, 12 experiments. Senator, one other thing, please, for 9 months, it would only cost approximately $1,000—$1,000 of Government funds. Won't you have either Howard University or some university, unbeknownst to me, grant them this money and have them do this research? It only takes 9 months.

All they have to do is the same as I did, have the bones, the teeth, the spleens, the kidneys, and the livers analyzed for fluoride retention and see what happens to the bones and the teeth and bring this to you personally.

I will tell you what I will do. If you and I will go together, I will put up half of it, you put up half of it, and we will conduct a private experiment and then either you or I or both of us will learn something.

Senator KENNEDY. That is a very generous offer, but one which I don't think I will go along with.

Dr. MICK. It only costs us $500 each.

Senator, thank you for our courtesy.

Senator KENNEDY. Thank you. We appreciate your appearance here.

Dr. MICK. May I add one thing. I happen to be, I guess, one of those individuals that continue to try to present testimony before congressional committees and have done it for a good many years. Because I am just an individual, I guess the material is never observed in the congressional records. I too, attended that testimony that was referred to, and in that testimony under Congressman Fogarty, are untold references on harms from fluorides.

Thank you very much.

Mr. MILLER. Senator Kennedy, could we add one paragraph?

Senator KENNEDY. Yes.

Mr. MILLER. In the Times of April 14, there is a simple reporting which is headlined "Government Not Doing Job in Fluoridation Research—Nader." It has these three paragraphs. I would like to submit them for the record.

A serious and immediate re-evaluation of the fluoridation theory is overdue consumer advocate Ralph Nader declared during a press conference, preceding his address at the University of San Francisco Sunday afternoon. The subject was raised by a question posed by one of the reporters. The question was, "How does fluoridation of public water systems fit into the pollution picture?"

His crisp response zeroed in on an issue which until now has not been considered during the pro and con discussions of fluoridated drinking water. Said the fiery young crusador, "The urgent consideration is total fluoride ingestion. How much fluorides are people taking into their bodies from fluoride air pollution, from soil, from water, from water products processed in fluoridated water, from pharmaceuticals, pesticides, urbicides, et cetera."

"The Federal Government," Nader continued, "has not been willing to answer that question. No segment of the fluoridation problem, whether it is fluoridation of the water supply, or fluoride pollution, can be scientifically analyzed until we analyze the total fluoride intake."

For your information, Senator, our testimony before the House caused the Public Health Service to again report airborne fluorides. For some reason, after the Public Health Service started to promote fluoridation of public water supplies, they stopped reporting airborne fluorides and it was through Representative Ottinger's pressure on the Public Health Service that they again reported airborne fluorides.

Senator KENNEDY. Thank you for coming.

Dr. MICK. In courtesy of Dr. Cashmire Sheft, a dentist: you received a beautiful letter written by him. It was addressed to Senator Magnuson, dated June 4, 1971. Could I ask that this letter be put into the record.

Senator KENNEDY. We will include it in the file. The staff will include those parts in the record that are pertinent.

Thank you very much.

(The prepared statement of Dr. Mick, and excerpts from the letter referred to above follow:)

PREPARED STATEMENT OF ROBERT J. H. MICK, D.D.S., ST. PETERSBURG BEACH, FLA.

My name is Dr. Robert J. H. Mick. I have been in the dental profession for more than thirty-five years. During the last twenty-seven years I have been involved in experimental animal research and research studies on waters and foods as to their effect on animals and humans in the area of dental decay, perfect teeth, normal and malformed dental arches, cleft palate, etc. My research studies on humans was conducted in both Equatorial Africa and the United States.

The testimony I present will be on S. 1874. It is my hope that I may provide you gentlemen with some information to influence you to *not* vote for this Bill, whether you have already sponsored it or not. Each section of the bill adds more insult to anyone who knows the problems of degeneration—and dental decay.

I have volunteered to represent the millions of voters in this country who oppose fluoridation. I am one of the original promoters of fluoridation in the U.S. I learned in 1948 how I had willingly but unknowingly became involved in what was to become the biggest international scandal ever to be promoted in the name of a health program.

I have spent the last twenty-three years exposing the promotion of fluoridation by employees of the United States Public Health Service and defeating fluoridation at referenda. I believe I personally have a 100% average of wins by just telling the truth to the voting audience. Fluoridation, when allowed by city and state legislators to go to referendum, is the biggest voter interest issue that has ever been voted upon.

S1874 is cited as the "Children's Dental Health Act of 1971", but, on page 10 of the Bill, this act may be cited as the "Public Health Service Act." The children, the poor children, are used as a mask for S1874.

The double talk and unknowns for which graduated grants are sought in Sec. 1001, 1003 and 1004 *is beyond comprehensions.* The "poor children" will receive but a *trace of the grants that are being sought.*

Every section of S1874 except Sec. 1002 "Grants for Water Treatment Programs" can do no physical harm.

Monies allocated to Sections 1001, 1003 and 1004 can be used for every type of fluoridation propaganda under the headings of "accord priority to projects designed to provide preventive services", "comprehensive projects", "prevention", "demonstrations", "experimentation", "establishing and carrying out programs to educate", etc.

You gentlemen realize, that as young men you rarely saw a Public Health Service Dentist in your area. Fluoridation has become a major program for dental division in *the health departments.* As a young man, a father and a senator you probably have had many dogs. Has it ever occurred to you that these animals have perfect teeth while drinking the same water as your family? What do you believe should be added to your dog's water to improve the *quality of his teeth?*

But if you vote against this Bill you may be called anti-poor, anti-dental, anti-fluoridation.

That brings us to Sec. 1002, "Grants for Water Treatment Programs". I trust that you gentlemen will not become a party to that which is about to happen according to the American Dental Association. You Senators know that this title could only infer that water would be treated for quality and/or purity.

You cannot treat water to reduce dental decay. There is no mention in this Bill what the water would be treated with or how. The most important part of Sec. 1002 is in parentheses on page 4, lines 4 and 5, (b) section; namely, (but are not limited to) the purchase and installation of water treatment equipment.

If the true words of intent had been used in this title, as publicized by the

American Dental Association, the title should read "Grants for Fluoridation." So worded, as it referred to buy the ADA, S1874 would have received large scale public opposition. Opposition has started in mass as of July 10th. I assure you it will gain momentum.

The mass of evidence that documents the harms from fluoride could provide testimony for hundreds of pages. Many previous hearings since 1954 have recorded the story of fluoridation and its promotion along with reports of the harms from fluorides. I will come back to this point later.

Honorable Senators. Some of you may have witnessed how the word "fluoridation" has been built up over a period of twenty-seven years to being in the same category as a religion, a sect, a political side, a word that can split a group or a family. The documented facts concerning these poisonous fluoride are overshadowed by the efforts of the promoters of fluoridation to influence one group against the other—all in the name of a children's dental health program. How this poisonous fluoride can be swallowed and only effect teeth, while all other foods and vitamins go to all parts of the body is indeed fantastic and a mystery to any thinking individual.

The Congressional Hearings in 1954, entitled "Fuoridation of Water" H.R. 2341, "A Bill to Protect the Public Health From the Dangers of Fuoridation of Water" are probably unknown to most Congressmen. These hearings exposed fluoridation as a scheme with no regard to the toxic effects as known and reported by officials in the United States Public Health Service and other professional men. I ask that those hearings (H.R. 2341–1954) be placed into these records for guidance of this Congress.

The very request for Sec. 1002 by HEW (USPHS) and the American Dental Association is more unbelievable when one has seen the minutes of the U.S. Public Health Service Conference of 1951, entitled "Promotion and Application of Water Fluoridation." This meeting took place six years after fluoridation was started. It took seventeen years to locate the one known true copy in the Library of HEW. Its existence had been denied by the librarian. The Call No. is 21.C55, 1951—"Proceedings—Fourth Annual Conference of State Dental Directors with the Public Health Service and The Children's Bureau, June 6–8, 1951, Federal Security Building, Washington, D.C.,"—detailing, as entitled, "Promotion and Application of Water Fuoridation". Dr. John Knutson, the government's major promotor of fluoridation at that time was Chairman of the Conference. Dr. Knutson was also Chief, Division of Dental Public Health, U.S. Public Health Service. Dr. Leonard Scheele was Surgeon General and President of the World Health Organization.

The following should further influence your decision on S1874. These are but a few statements from 21.C55, 1951 of Public Health Officials who were promoting use of poisonous fluorides in your drinking water and had been for six years.

Dr. Scheele speaking: "I am sure you are going to have an interesting meeting. I did have a chance to look over your schedule. Obviously one of the biggest things facing us in the catalyzing of a real national program of water fluoridation."

"Well, we now have enough evidence from cities that had demonstrations to show that controlled fluoridation has the same effect as natural fluoridation. Incidentally, we never had any "experiments" in Wisconsin. To take a city of 100,000 and say, "we are going to experiment on you, and if you survive we will learn something"—that is kind of rough treatment on the public. In Wisconsin, we set up demonstrations. They weren't experiments.

"Now, in regard to toxicity—I noticed that Dr. Bain used the term "adding sodium fluoride." We never do that. That is rat poison. You add fluorides. Never mind that sodium fluoride business, because in most instances we are not adding sodium fluoride anyhow. All of those things give the opposition something to pick at, and they have got enough to pick at without our giving them any more. But this toxicity question is a difficult one. I can't give you the answer on it. After all, you know fluoridated water isn't toxic, but when the other fellow says it is, it is difficult to answer him. I can prove to you that we don't know the answer to that one, because we had a city of 18,000 people which was fluoridating its water for six or eight months. Then a campaign was started by organized opposition on the grounds of toxicity. It ended up in a referendum and they threw out fluoridation. So I would hate to give you any advice on that deal. (Laughter) It's tough."

"So when you get the answer on the question of toxicity, please write me at once, because I would like to know. We have answers, but apparently in some places they don't work."

"One thing that is a little hard to handle is the charge that fluoridation is not needed. They talk of other methods, and when they get through adding up all the precentages of decay that we can reduce by such methods, we end up in a minus. When they take us at our own word they make awful liars out of us."

"If it is a fact that some individuals are against fluoridation, you have just got to knock their objections down. They question of toxicity is on the same order. Lay off it altogether. Just pass it over, we know there is absolutely no effect other than reducing tooth decay, you say, and go on. If it becomes an issue, then you will have to talk it over, but don't bring it up yourself."

"If you can—I say if you can, because five times we have not been able to do it—keep fluoridation from going to a referendum."

Honorable Senators: Some of the most valuable documents on harms and possible harms from fluorides are recorded in a book entitled "Dentistry in Public Health", by Pelton and Wisan, published in 1949. That is four years after fluoridation was started. "Dentistry in Public Health" is edited by Walter J. Pelton, B.S., DDS, M.S.P.H., Senior Dental Surgeon, U.S. Public Health Service, Colorado and Jacob M. Wisan, DDS, M.S.P.H., Director, Joseph Samuels, Dental Clinic, Rhode Island, State Hospital for the Dental Health Section of The American Public Health Association. Some of the contributors to this book were: Francis A. Arnold, DDS, Dental Surgeon, United States Public Health Service, National Institute of Dental Research, National Institutes of Health, Bethesda, Maryland. H. Trendley Dean, DDS Dental Director, United States Public Health Service, Director, National Institute of Dental Research, National Institutes of Health, Bethesda, Maryland, Harold Hillenbrand, DDS, Secretary of the American Dental Association, John W. Knuston, DDS, D.P.H., Senior Dental Surgeon, Chief, Dental Section, States Relations Division, United States Public Health Service, Washington, D.C., are but a few, but these were the leading authorities.

As you listen to these statements on fluorides as recorded, try to ascertain how or why these same men could possibly proceed with fluoridation and, in 1951, arrange for the government meeting "Promotion and Application of Water Fuoridation."

At the same time, try to ascertain how our U.S. Public Health Service (HEW) could be so bold as to ask for "Grants for Water Treatment Programs" to reduce dental decay. (Sec. 1002, S. 1874.)

From page 161, "Dentistry in Public Health": Statement by Dr. Dean: "Conclusive evidence has been presented to show that this element (fluoride) is the etiologic factor in the production of one dental disease, fluorosis. (mottled enamel)". "The ingestion of such waters during the period of calcification of the crowns of the permanent teeth results in a disturbed calcification pattern. Both the severity of affection and the percentage of individuals affected are correlated with the concentration of fluorine in the water ingested. There is slight but discernible evidence of a disturbed calification in a small percentage of individuals who have used domestic waters containing 0.5 or about 1.5 ppm. of fluorine." Gentlemen, that was later to be known as the safe range for artificial fluoridation.

From page 163, "Dentistry in Public Health, Dr. Arnold:

"Signs of toxic nephritis may follow the ingestion of toxic but not fatal doses." (of Knuston) "Little information is available to establish the acute toxic or lethal dose of fluoride compounds for human beings."

From page 164 (Arnold) "teeth showing fluorides have an increased fluoride content, and skeletal tissues showing typical fluorine pathology have proportional increases in fluorine."

"The histopathologic changes accompanying this fluoride increase in skeletal tissues represent on the whole a disturbed esseons metabolism." "However, the results of these high doses do give warning of the potential danger of fluorine and fluoride compounds." Concerning the effect of fluoride domestic water supplies on human populations: (Arnold) "Comparatively little information is available on this subject, (Gentlemen—this was 4 years after the start of fluoridation) (Arnold;) Kemp, Murray and Wilson recently have sought to relate the ingestion of fluorine in a certain fluoride drinking waters in England with a kyphosis-like spinal change and "severe" dental fluoresis in children using domestic water containing 0.3 to 1.289 parts per million of fluorine."

Page 176 (Denistry in Public Health) (Arnold): "It is essential, however, that fluorine concentration and the fluorine content of the local water supply. With exposures as low as 0.5 ppm of fluorine in the local water supply, the *urine specimens show an increase in fluorine.*

Page 176 (Dentistry in Public Health) (Arnold): "It is essential, however, that

any supplementary feeding of fluorides be under direct prescription and supervision of the child's dentist or pediatrician."

Gentlemen, these were the words of the men who, within a few months, planned the mass addition of poison fluorides to our drinking water.

On No. 9, 1967, Dr. Viron L. Diefenbach, DDS, Assistant Surgeon General of Director, Division of Dental Health wrote the following in a letter: "*absolute safety* (from fluoride) *can never be absolutely demonstrated*". Such plain and unequivocal proof of harmful effects of 1 ppm fluoride in water demonstrates beyond question that the claim that fluoridated water is "perfectly safe" is simply not valid. Water fluoridation is economically unsound, (See references on Seattle, Washington and Toronto, Canada for tonnage of fluoride pollutants), corrosive (See Erco), compulsory medication, violates religious beliefs and freedom of choice and damages biological organs. I trust that one of the witnesses supporting S. 1874 will supply you with at least one copy of any controlled experiments with the U.S.P.H.S. recommended parts per million, that shows that poisonous fluorides are (as published as fact by promoters of fluoridation) safe, beneficial, and will cause no future body harms. There is a $100,000 reward offer (that can go to some military charity) if you can be provided with same. The statements "safe beneficial and will cause no future harms" are statements of promoters.

PASSAIC, N.J., *June 4, 1971.*

HON. SENATOR WARREN G. MAGNUSON,
U.S. Senate,
Washington, D.C.

DEAR SENATOR MAGNUSON: I read with interest your proposed omnibus dental bill (S1874) entitled "The Children's Dental Health Act of 1971." It is praiseworthy except for one section; the one that would authorize $15 million over five years as matching grants to communities wishing to fluoridate. From this proposal, I deduce that you are a proponent of fluoridation, and therefore must not be aware of the real danger of fluoridation.

I am a summa cum laude graduate of the University of Maryland Dental School (Class of 1944) and a member of the American Dental Association. I am also a member of dentistry's highest honor society, Omicron Kappa Upsilon, and have achieved many honors.

I, like you, have a strong humanitarian inclination—which is evidenced by my donating twenty years of dental service to the children of an orphanage; six years as an elected member of a Board of Education (two years of which I was vice president); five years' membership on a Youth Guidance Council; and five years of service as a member of a Juvenile Conference Committee. My altruism compels me to warn you (and other proponents of fluoridation) of your grievous mistake.

For twenty-five years I have been deeply engrossed in a comprehensive study and evaluaton of fluoridation and have spent thousands of hours in this research. My conclusions lead to the firm conviction that our health authorities are taking us down the road to disaster!

Some of the startling true facts—all documented—which bear me out are:

Sodium fluoride is one of the most toxic poisons known to man—and cannot be purchased without a prescription!

The dictionary describes sodium fluoride as "a colorless crystalline, water soluble poisonous solid, used chiefly in the fluoridation of water, as an insecticide, and as a rodenticide." (*Random House Dictionary*, p. 1352)

The Encyclopedia Americana (Vol. 25; p. 221) describes it as ". . . a poisonous insecticide for poultry and dogs."

Van Nostrand's Scientific Encyclopedia (4th Ed., p. 1643) states that: "Sodium fluoride is used as a poison for rats and cockroaches."

The Journal of the American Medical Association (Feb. 10, 1951) reported: "Fuorine also tends to accumulate in the bones leading to hypercalcification (over-calcification) and brittleness. Ligaments and tendons also become calcified. Serious symptoms may ensue such as loss of mobility of joints, easy fracture and pressure on the spinal cord. Other effects include decreased blood clotting power; and in women, painful menstruation, lowered birth rate, high incidence of fracture, thyroid alteration and liver damage."

* * * * * * *

"The plain fact that fluorine is an insidious poison, harmful, toxic, and cummulative in its effect—even when ingested in minimal amounts—remains

unchanged no matter how many times it will be repeated in print that fluoridation of the water supply is safe." (Dr. Ludwik Gross, M.D., Chief of Cancer Research of the V.A.)

Dr. Alfred Taylor of the Biological Institute of the University of Texas, found that sodium fluoride even in such very low levels as one part in 20 million stimulated the growth of cancer cells in mice and embryonated eggs. ("*Proceedings of the Society for Experimental Biology and Medicine*," Vol. 119, p. 252, 1965)

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Epidemic skeletal malformations have been reported among people drinking water containing as little as 0.8 ppm. of fluoride in Lebanon. (*Archives of Environmental Health*, May 1963)

One percent of children under ten years of age and pregnant women could not tolerate even the low-level dosages of fluoride that have been recommended by public health officials. (Feltman and Kosel: *The Journal of Dental Medicine*, Oct. 1961)

"Fluorides are violent poisons to all living tissues because of their precipitation of calcium. They cause fall of blood pressure, respiratory failure, and general paralysis. Continuous ingestion of non-fatal doses causes permanent inhibition of growth." (*The U.S. Dispensatory*, 24th Ed., pp. 1456–57)

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Fluoridated water aggravates arthritic conditions and is a "potential long-range danger to health." (Dr. William Gutman, M.D.; Flower Fifth Avenue Hospital, N.Y.C.)

* * * * * * *

The contention that fluorides will harden bone and help reduce the bone disease osteoporosis is false. That claim has been discredited and contradicted by no less than the illustrious British Research Council in a report published in the *Medical News* (London), on Sept. 26, 1969; and also in a report published in the *American Journal of Clinical Nutrition* (Jan., 1971).

In October, 1966, the Food and Drug Administration banned the sale of all prenatal fluoride products because of the recognized danger to unborn babies. If prenatal fluoride ingestion by way of a carefully controlled tablet dosage was found to be dangerous, how can it be claimed that the consumption of uncontrolled quantities of fluoridated water by a pregnant woman (or anyone) is safe?

* * * * * * *

To further compound the contamination: In fluoridated areas the processed foods, soft drinks, beer, and fruit punches to which water has been added will all contain fluoride. Marier and Rose of the National Research Council of Canada, have shown that processing of foods increases their fluoride content by as much as 5 times—which together with the fluoride intake from drinking water adds up to an estimated total daily intake per person of between 2 to 5 mg. of fluoride. This level of fluoride intake is recognized as toxic even by the most ardent of fluoridationists.

* * * * * * *

It is inconceivable that a toxic prescription drug listed as a dangerous cumulative proto-plasmic poison could be taken by every citizen from the cradle to the grave, sick or well, young or old, and the same dose given to a six-pound baby and a 250-pound man without somebody being harmed.

Your bill, Senator Magnuson, places you in the paradoxical position of having the commendable altruistic good intentions of a human benefactor, but actually aiding and abetting a scheme that has been proven harmful to millions.

I sincerely hope, sir, that you investigate thoroughly the con side of fluoridation and then reevaluate your position on this issue. I fervently hope also, that someone in the Congress will soon recognize the serious blunder of fluoridation and launch a Congressional investigation of fluoridation—which I am certain would result in a total rejection of this so called "health" measure.

Sincerely yours,

CASIMIR R. SHEFT, D.D.S.

Dr. Wesley Young (quoted in part)

The "Children's Dental Health Act of 1971" would represent a major step forward in solving some of the problems that have been of concern. First it would clearly place priority emphasis on prevention. This month the commissioner of health of a major State characterized fluoridation as "one of the four great preventive health measures of our time" comparing it with the pasteurization of milk, purification of water, and immunization against disease.

As long as 25 years ago, there was a massive amount of evidence available on the universal safety of fluoridation and its consistent effectiveness in reducing the attack of dental caries. This preventive procedure has been approved by almost every health organization in the United States and many in other countries.

Despite these facts, about 13,000 communities containing 57 percent of the Nation's population do not have fluoridated water. These communities are predominately small areas where the cost of initiating and maintaining fluoridation has proved to be prohibitive in terms of the tax funds available to the community. This bill authorizes appropriations of $15 million to provide Federal funds to assist communities or schools to fluoridate their water supplies.

It should be pointed out that the provisions of the bill in no way intrude on the right of the individual communities or States to decide whether or not to adopt this preventive measure. It merely makes available badly needed financial assistance to those communities that wish to fluoridate their water supplies and are unable to do so without help. 167/

167/ Ibid., pages 99-100, Statement of Dr. Wesley Young, Chairman Dental Care Program Committee, National Health Federation.

QUESTIONS SUBMITTED BY SENATOR EDWARD M. KENNEDY TO HAL M. CHRISTENSEN, AMERICAN DENTAL ASSOCIATION, WITH RESPONSES 168/

Does dental disease have characteristics sufficiently different from other medical problems to justify a federally supported "crash" program?

Dental disease, as it actually exists in this country, presents a combination of factors that make it nearly unique. Paramount among these factors are: 1) The incidence of the disease; 2) the nature of the disease, and 3) the demonstrated potential the nation possesses for readily eliminating many manifestations of it.

Incidence

Dental disease is all but universal. Its most common manifestations, tooth decay and gum disease, afflict nearly every human being to one degree or another.

In the case of most other diseases, by contrast, the rate of incidence is generally stated on a percentage basis. For example, about 25 per cent of American adults have either definite or suspected heart disease. Thus, about 75 per cent don't. Or, about 9 per cent of Americans are afflicted with arthritis severe enough to require medical care, which means that about 91 per cent aren't so afflicted. Or, about 1 out of every 200 Americans have Parkinsonism, which means about 199 out of 200 don't.

What is of significance here, of course, is not the seriousness of a given disease. Obviously, heart disease is more serious than tooth decay and severe arthritis is generally more critical than is periodontitis.

The fact, however, that relatively small percentages of people suffer from these ailments, while everyone suffers from dental disease, makes the latter a different sort of problem and one that needs a different sort of approach.

It is not, so to speak, John Doe's two decayed teeth that deserve national attention. It is the fact that we are all John Doe that makes the problem worthy of special attention.

In addition, there are some less common manifestations of oral disease that are life-threatening or that so seriously limit a person's ability to live a normal life. Oral cancer, for example kills some 7,000 people each year. Cleft lip and/or palate is a birth anomaly that afflicts some 6,500 babies born annually. It constitutes 13 per cent of all reported birth anomalies and can have a seriously unfavorable impact on general health as well as the emotional and psychological development of the child.

168/ Ibid., pages 108-10, 120-1, (quoted in part).

Nature of the Disease

There are some diseases known to man in which the bodily processes themselves help to restore health. In such cases, the body assists in the healing process and/or provides a compensatory mechanism that helps restore the lost function.

This is not true with respect to dental caries or periodontal disease, the two most common manifestations of oral disease. These are progressive and require the intervention of treatment by a skilled practitioner. Without such intervention, the progression is remorseless until the affected tissue is totally destroyed. Most dental diseases, in this respect, are like forms of cancer.

Potential for Prevention

Just as dental disease is perhaps the most universal ailment of man, it is also perhaps the most preventable. Further, many of the known preventive tools have been available for literally years. Among the most basic tools is regular attention by a practitioner, attention that comes early enough in life that it can focus on maintaining health rather than repairing disease.

It is in this regard that dental auxiliaries hold such high promise, if we can manage to train sufficient numbers of them. The hygienist and assistant in dentistry can constitute a vanguard in delivering many kinds of preventive service on a large-scale basis. In that sense, they have a special kind of potential usefullness in dental care that their counterparts in other health care fields do not always possess.

The combination of these three factors -- universality of the disease, the immense amounts of money (in excess of $4 billion a year) now being spent to combat its ravages, and the amount of possessed knowledge on how to proceed to better control of the disease -- tend to an objective conclusion that dental disease could amply justify special attention.

Such a program, it could also be said, would hardly inflate the percentage of federal health funds going to dental programs beyond comparative distribution in the private sector. The fact is that public sector attention to dental disease has traditionally been lacking. About 9 per cent of the private sector health dollar is devoted to dental care; the federal health care dollar spends barely 3 per cent for the same purposes. The almost total failure to fund Title V dental care projects is another example of public sector neglect of dental disease.

Passage of S. 1874, in fact, would not constitute a "crash" program for dental care so much as it would represent a balancing of the federal health dollar in a way that for the first time, begins to give dental disease attention that is reasonably proportionate to its rate of incidence and the fiscal and physical costs it exacts from all Americans.

Why do the grants for treatment of water supplies, authorized under Section 1002, decrease after the fourth year of the program?

The nation today spends well in excess of $4 billion a year in dental care. The philosophy embodied in all sections of S. 1874 -- a philosophy shared by the dental profession is that some relatively modest shifts in the way in which that money is spent could achieve substantial benefits with respect to oral health. It could achieve a more efficient and purposeful use of this money.

Section 1002 is a particularly good case in point. The first four years of the section will provide sufficient time to do three essential things: 1) assist communities of schools now wishing to fluoridate; 2) give notice of such potential assistance to other communities or schools, and 3) accrue sufficient experience with this approach to know how fruitful it is.

Section 1002 has a sufficient authorization to assist as many as 7,000 communities with a potential total population as high as 45 million. Extension of fluoridation to this point would mean a nearly 50 per cent increase in the number of Americans having the benefits of fluoridation available to them. It could increase the total number of Americans thus benefiting from about 92 million to almost 140 million.

After the first four years of the program, we believe a meaningful evaluation of the experience can be undertaken, something that can be done while the section still has one year of life.

This evaluation may show that an extension of this approach is desirable, that modifications should be made or that there is no further need for action of this sort.

This section, it should also be noted, authorizes a total of $15 million. This can be contrasted with the approximately $2 billion now spent annually by Americans for repair of tooth decay. A number of documented studies of fluoridation show reductions in tooth decay as high as 65 per cent.

What prominent national and international organizations endorse the fluoridation of water as being a safe or effective measure for reducing the incidence of dental decay?

American Academy of Pediatrics
American Association for the Advancement of Science
American Association of Dental Schools
American Association of Industrial Dentists
American Association of Public Health Dentists
American College of Dentists
American Commission on Community Health Services
American Dental Association
American Dental Health Society
American Dental Hygienists Association
American Federation of Labor and Congress of Industrial Organizations
American Heart Association
American Hospital Association
American Institute of Nutrition
American Legion
American Medical Association
American Nurses Association
American Osteopathic Association
American Pharmaceutical Association
American Public Health Association
American Public Welfare Association
American School Health Association
American Society of Dentistry for Children
American Veterinary Medical Association
American Water Works Association
Association of Public Health Veterinarians
Association of State and Territorial Health Officers
Canadian Dental Association
Canadian Medical Association
College of American Pathologists
Federation of American Societies for Experimental Biology
Federation Dentaire Internationale
Great Britain Ministry of Health
Health League of Canada
Inter-Association Committee on Health
National Congress of Parents and Teachers
National Education Association
National Institute of Municipal Law Officers
National Research Council
Office of Civil Denfense
Pan American Health Organization
U.S. Department of Agriculture
U.S. Department of Defense
U.S. Department of Health, Education and Welfare
World Health Organization

AFL-CIO Position

July 16, 1971

169/

Honorable Edward M. Kennedy
Chairman, Health Subcommittee
Senate Labor and Public Welfare Committee
United States Senate
Washington, D. C.

Dear Mr. Chairman:

I am writing you to indicate the support of the AFL-CIO for S. 1874. This bill would authorize the Secretary of the Department of Health, Education and Welfare to make grants to pay for part of the cost of providing comprehensive dental services for preschool and school age children from low-income families. Secondly, the bill would provide grants to assist communities in developing water treatment programs to reduce the incidence of oral disease. Lastly, S. 1874 would provide grants to train dental auxiliaries as well as to support programs to teach dental students and dentists the efficient and effective use of such auxiliaries and to train them in the team approach to delivering dental services.

Almost 50 percent of all children under the age of 15 have never been to a dentist. The need is greatest among poor families where 70 percent of the children have never seen a dentist. Dental disease and the need for adequate dental services is a general problem affecting the entire population but exists in its most acute form among low-income families. The AFL-CIO therefore favors a broad national dental program to implement the concept that dental care is a right for all children, as provided by the National Health Security program (S. 3) introduced by yourself and Senators Cooper, Saxbe and many other of your distinguished colleagues. However, until such time as a comprehensive health program can be enacted, S. 1874 is a step forward.

The grant programs for fluoridation and for the training of dentists and auxiliary personnel in the team approach to delivering dental care are most important. Fluoridation will substantially reduce dental disease. The training of dental auxiliaries will help relieve the shortage of dentists so that all Americans will eventually be able to receive all the dental care they need.

Our principal criticism of the bill pertains to the amounts authorized for these vital programs. We think the funds authorized under the bill should be substantially increased.

We urge speedy enactment of S. 1874.

Sincerely yours,

Andrew J. Biemiller

Andrew J. Biemiller, Director
DEPARTMENT OF LEGISLATION

FLUORIDATION

WHEREAS, Fluoridation has been approved by the American Medical Association, the American Dental Association, the American Hospital Association, the American Association for the Advancement of Science, the U.S. Public Health Service, the World Health Organization,

RESOLVED, That this Convention reaffirm AFL-CIO support to fluoridation of water supplies, and be it further

RESOLVED, That the AFL-CIO Executive Council continue to keep abreast of developments in the fluoridation program.

Adopted Fourth Constitutional Convention of the AFL-CIO, Florida, December 13, 1961

169/ Ibid., pages 138-40, AFL-CIO letter.

WATER TREATMENT PROGRAMS 170/

Effective techniques are available for the prevention of dental diseases. Appended to this statement are several reports of the American Academy of Pediatrics supporting the fluoridation of the communal water supply.

The Children's Dental Health Act provides that communities wishing to fluoridate their water supplies might receive Federal funds. This approach is consistent with the recommendations of the Academy, for in its Report on the Delivery of Health Care to Children to be published later this year the Academy recommends: "Federal and state support should be given to all communities for fluoridation, possibly in the form of a subsidy for the purchase of equipment and supplies and the employment of personnel for the fluoridation program."

A great cost-benefit ratio will accrue from the fluoridation of water for it has been reported that each dollar invested will yield forty dollars of benefit. It has been projected that the expenditure of $100,000 toward fluoridation will prevent 666,666 cavities.[2]

The November 1970 Bulletin of Pediatric Practice summarized the major recommendations contained in the forthcoming Report on the Delivery of Health Care to Children under preparation by the Academy since October 1967. The Academy's major recommendation in regard to dental care programs contained in the Bulletin reads:

> "Dental Care Programs: This section of the Report emphasizes the generally recognized fact that very large numbers of children in the United States are not presently receiving adequate preventive and corrective dental care. Therefore, WE RECOMMEND THAT
>
> 11. (a) There be provided improved education of the public and the health professions, with special emphasis on young children, stressing the importance of preventive and corrective dental care embracing, first, the use of fluoride in community drinking water; second, greater attention to the teeth during the examination of children; third, the value of regular visits to the dentist, and fourth, other prophylactic measures to prevent dental decay. (b) The more general acceptance of the concept that dental services are an integral part of child health care, and that a higher degree of cooperation be achieved between dentists and other members of the health professions.

170/ Ibid., pages 124-5, Statement of the American Academy of Pediatrics (quoted in part).

Resolution Adopted at the Annual Meeting of
the American Academy of Pediatrics, October 1953[171]

Whereas, No harmful effects of water containing one part in a million of fluoride have ever been demonstrated, and

Whereas, The addition of up to one part in a million of fluoride to communal water supply has decreased dental caries in children from fifty-five to sixty-five percent, and

Whereas, The American Medical Association, the American Dental Association, the United States Public Health Service and the National Research Council have all gone on record as recommending the fluoridation of communal water supplies, be it therefore

RESOLVED, That the American Academy of Pediatrics in annual session approve the addition of up to approximately one part in a million of fluoride to communal water supplies in order to reduce dental caries in the children of our nation.

171/ Ibid., page 128.

REPORT OF THE JOINT COMMITTEE OF THE AMERICAN ACADEMY OF PEDIATRICS AND THE AMERICAN SOCIETY OF DENTISTRY FOR CHILDREN 172/

In practice, the best proven way of increasing the resistance of the teeth and preventing dental caries is by the addition of fluoride to drinking water and the topical application of fluoride. Although other methods of prevention on a mass scale have been attempted in recent years, none has proven effective. The information now available clearly indicates that fluoridation of public drinking water leads to a significant decrease in dental caries. The observed reduction in the incidence rate of decayed, missing and filled teeth (DMF) among children drinking fluoridated water has varied between 30 and 70% in different studies. In general, the magnitude of the reduction is inversely related to the age at which the fluoridated water is first regularly consumed. The caries-preventive effect is comparable to that seen in populations drinking naturally fluoridated water.[24]

Most foods contain fluoride at a level of 0.2 to 0.3 parts per million (ppm) as consumed, except for seafoods and tea which contain considerably more. In this country about 3,500,000 people drink *naturally* fluoridated water. Excessive intake is known to result in mottled dental enamel in children and, when taken in very large amounts over long periods of time, in skeletal fluorosis in both children and adults.[25] No confirmed deleterious effects have been observed in the United States.[26]

The ideal vehicle for dietary fluoride should be such that its consumption is self-limiting, it is easily and cheaply available, and it is readily accessible to regulatory control. The fluoridation of communal water supplies meets these qualifications and is, in principle and in practice, the most effective approach to caries prevention on a large scale. The adjustment of the fluoride content of drinking water to 1 ppm in temperate climates (or about 0.7 ppm in hotter areas) appears to provide an *optimal* intake.* This amount results in significant reduction of caries without evidence of toxicity.[24, 26] To achieve maximal caries-preventive effect, fluoride should be ingested during that time when the teeth are in the formative stage and throughout the caries-susceptible years. This ingestion must cover a period from the fourth month *in utero* (when the first deciduous central incisors begin to calcify) to the age of 18 years.

Studies of children who have drunk artificially-fluoridated water for periods up to 10 years have failed to disclose any evidence of adverse effects on growth, or general health and well-being, or any changes in skeletal density or rate of skeletal maturation.[27] Twenty-six million people in the United States are currently drinking *artificially* fluoridated water. Fluoridation of communal water supplies is a safe and effective means of caries control and should be extended to as wide a segment of the population as possible.

In areas where fluoridated water is not available, the topical application of a 2% solution of a fluoride to the crowns of the teeth, soon after the teeth are erupted, should be substituted. Many studies indicate a 40% decrease in the dental caries attack rate after such applications. Evidence available suggests that the reduction of caries is related to lowered solubility of fluoridated enamel in acid. . . .

SUMMARY

As dental caries is primarily a disease of childhood and appears to be at least in part preventable, the pediatrician is obliged to be interested in this problem and can play an important part in prophylaxis. Present knowledge indicates that the most effective prevention available is the consumption of fluoridated drinking water containing a concentration of fluoride appropriate to the environmental temperature. . . .

THE JOINT COMMITTEE
WILLIAM E. BROWN, D.D.S.
E. H. CHRISTOPHERSON, M.D.
GILBERT B. FORBES, M.D.
MAURY MASSLER, D.D.S.
RALPH E. MCDONALD, D.D.S.
NORMAN H. OLSEN, D.D.S.
HEYWORTH N. SANFORD, M.D.
GEORGE W. TEUSCHER, D.D.S.
FRANK VAN SCHOICK, M.D.
CHARLES U. LOWE, M.D., *Chairman*

May 1, 1958

* Recently consideration was given to a plan to include fluoride in milk formulae fed to infants living in areas where fluoridation of community water supplies was not practiced. This plan was rejected as unsafe, since positive control of intoxication under these circumstances was not believed possible.[28]

172/ Ibid., pages 131-3 and 134-5 (quoted in part).

PTA Position

NATIONAL CONGRESS OF PARENTS AND TEACHERS

National Office

700 North Rush Street
Chicago, Illinois 60611
(312) 787-0977

STATEMENT ON THE CHILDREN'S DENTAL HEALTH ACT OF 1971

Submitted to the Senate Subcommittee on Health
Senator Edward Kennedy, Chairman

by Mrs. Walter G. Kimmel, Coordinator of Legislative Activities
National PTA

July 15, 1871

On behalf of National PTA, we appreciate this opportunity to express our long standing and continued concern for the general health of all children, including dental care. Our PTA Manual, directing the work of all local units carries the following suggestion, "Work for the fluoridation of the local central water supply and for all other means of reducing dental caries, including topical applications of fluoride, good nutrition and regular dental checks."

Also, many years ago the National Board of Managers of the National PTA adopted the following statement. "Since fluoridation of the water supply, one part in a million, has been shown to reduce dental decay by one half, PTA's should be encouraged to interest themselves in making this health measure available to the children in their communities." Probably updated and improved statistics are now available on the effectiveness of fluoride, however, we are told that communities containing 57% of the nation's population do not have fluoridated water. Our support of fluoridation has remained strong through the years and we continue to urge our people to work for fluoridation in their own communities. Passage of this act would provide financial assistance in their effort.

We are aware of the high rate of dental caries among children, and that dental defects and disease in children pose a substantial national health problem. The damage to the child's emotional health, due to dental neglect is also of concern. Recently a Juvenile Court Judge commented that it seemed to him the two most common factors among children in trouble were that they couldn't read and they had bad teeth. Admittedly, this doesn't prove anthing, but it said something to him. Millions of children in this country need dental care, both preventive and corrective, that is not available to them - mainly for economic reasons. We hope sincerely that this situation can be changed through federal, state, local and private funds and effort.

Thank you for receiving our views.[173]

173/ Ibid., page 137.

THE ASSOCIATION OF STATE AND TERRITORIAL HEALTH OFFICERS

WASHINGTON OFFICE—SUITE 61, 128 C ST., N.E., D.C. 20002
TELEPHONE: (202) 547-3470

July 14, 1971

Honorable Edward M. Kennedy, Chairman
Subcommittee on Health
Senate Committee on Labor and Public Welfare
U. S. Senate
Washington, D.C.

Dear Senator Kennedy: . . .

State health departments have long supported programs to provide fluoridated water to communities in the respective states. I take pride in the fact that some of the earliest studies which proved the efficiency of this procedure were done in my own state, by the New York State Health Department. Despite our best effort, there remain great opportunities to expand fluoridation programs to protect persons using a public water supply. For example, consolidated school districts where perhaps several hundred children receive their elementary and secondary education could provide fluoridated water for these children when it would be virtually impossible to so treat hundreds of individual water supplies in their residences. The support for fluoridation programs included in S. 1874 would be of great assistance to our efforts.

Both the provision to help in increasing the number of dental auxiliaries and the provision to help develop dental care programs so as to utilize this resource more effectively are worthy of support.

Thank you for your consideration of the views of the ASTHO in respect to this legislative proposal. It would be appreciated if this letter could be made a part of the hearing record relative to S. 1874.174/

Yours truly,

Hollis S Ingraham

Hollis S. Ingraham, M.D.
President

174/ Ibid., pages 141-2, (quoted in part).

Position of the American Public Health Association

July 14, 1971

The Honorable Edward M. Kennedy, Chairman
Subcommittee on Health
Senate Committee on Labor and Public Welfare
4230 Senate Office Building
Washington, D.C.

Dear Mr. Chairman:

I am pleased to inform you and your Committee of the support of the American Public Health Association of S. 1874, the Children's Dental Health Act of 1971. The severity of the problem of dental defects and disease of our population have been well documented and made a matter of public record. Knowledge of methods and procedures whereby this toll could be markedly diminished has been available, especially in the case of fluoridation, for decades. Since the 1950's the APHA has repeatedly urged fluoridation, at optimum levels, of community drinking water supplies. These positions, urged by APHA's Governing Council, were enunciated in 1950, 1955, 1956, 1959 and finally in 1969 when the Governing Council adopted a policy resolution especially pertinent to that portion of S. 1874 related to fluoridation as follows:

National Fluoridation Act

"Improvement of dental health, elimination of dental manpower shortages, and dental care of the indigent are problems which are national in scope and require national solutions.

"Community water fluoridation is a proven effective measure for preventing tooth decay. Since fluoridation cuts tooth decay by two-thirds, the costs of initial and maintenance dental care for children in fluoridated communities are one-half of such costs in comparable nonfluoridated communities. The effectiveness of fluoridation does not depend on family income, education of parents, or on the availability of dentists.

"Although nearly a quarter of a century has passed since Grand Rapids, Mich., first adjusted the fluoride content of its water supply to the optimum level for better dental health, almost half of the nation's population with public water supplies does not have access to this proven public health measure.

"The effectiveness of financial assistance in bringing about community fluoridation has been demonstrated. Utilizing dental health formula grants, funds for fluoridation equipment offered on a matching basis to small communities resulted in the fluoridation of a great number of communities within a two-year demonstration period.

"Incentives to initiate fluoridation would make possible substantial progress toward the fluoridation of all public water supplies in the United States and greatly improve the dental health of the nation.

"Universal fluoridation could cut the ultimate annual costs of comprehensive dental care for children by more than 50 percent.

"The American Public Health Association recommends adoption of legislation to provide federal grants to state health departments for a grant-in-aid program to assist communities to initiate and maintain fluoridation programs." . . .

On behalf of the APHA, may I express our appreciation for this opportunity to present this Association's views on S. 1874 and request that they be made a part of the hearing record on this legislative proposal. 175/

Yours truly,

James R. Kimmey

James R. Kimmey, M.D.
Executive Director

175/ Ibid., pages 143-5, (quoted in part).

[From the Alameda (Calif.) Times Star, Tuesday, Apr. 14, 1970]

GOVERNMENT "NOT DOING JOB" IN FLUORIDATION RESEARCH—NADER 176/

A "serious and immediate reevaluation of the fluoridation theory" is overdue, Consumer Advocate Ralph Nader declared during a press conference preceding his address at the University of San Francisco Sunday afternoon.

The subject was raised by a question posed by one of the reporters: "How does fluoridation of public water systems fit into the pollution picture?"

His crisp response zeroed in on an issue which until now has not been considered during the pro and con discussions of fluoridated drinking water. Said the fiery young crusader: "The urgent consideration is total fluoride ingestion—how much fluoride are people taking into their bodies from fluoride air pollution, from soil, from water, from products processed in fluoridated water, from pharmaceuticals, pesticides, herbicides, etc.?

"The federal government has not been willing to answer that question. No subsegment of the fluoride problem, whether it is fluoridation of the water supply or fluoride pollution, can be scientifically analyzed until we analyze the total fluoride intake. This of course focuses the need for a complete reevaluation of our policy toward fluorides.

"The only people who benefit from fluoridation are young children, therefore if fluoride is to eliminate cavities, then we should try to find ways to eliminate cavities. There is no such thing as being against fluoridation. The issue is how to eliminate cavities. If it can be done in other ways, without exposing 80 per cent of the population to what is conceivably a series of relative unknowns in terms of overall fluoride ingestion from air, food, water, etc, then it should. The Navy is developing other ways. Other groups outside the country are. The problems is, if there is a hardening of the intellectual arteries on this issue, it becomes a subject upon which no rationale nor scientific discussion can be deployed. We are not going to find the answers."

Nader charged that "pseudo-scientific handling of the problem by the Public Health Service is indicated by one outstanding point: PHS never has responded to any scientist—whether of the stature of Barry Commoner, Washington University Law School, or anyone else—on the question, 'Do you have data about total fluoride ingestion from all sources, products, etc.?'

"If they don't have the data and are making no attempt to get it, they are performing an article of faith rather than of science, and when it comes to a public health measure, we'd better have more science and less faith. A serious and immediate reevaluation of the fluoridation theory is in order."

Sources of the chemical are now far more extensive than the average person realizes. Fluoride pollution is involved in some 50 different types of industries. And research projects in Canada and the United States have established that a person may ingest up to 5 mgs of fluoride daily from food and beverages in a fluoridated area, alone.

This is considered to be in the toxic range by the very authorities who continue to advocate public water fluoridation, and who admit that water fluoridated at 1 ppm "poses no safety problem if it is the only source of added fluoride." (Letter from HEW, May 31, 1968). This is obviously an impossible proviso in view of the steadily-proliferating problem of total fluoride exposure from multiple sources. There is no longer a question of fluoride deficiency—a fluoride excess is now the name of the game.

As reported in a UPI story, Nader called on young people to "find constructive self-expression through action to achieve reforms." And "the average citizen should support those doing such a job. No longer can citizenship responsibilities be delegated. No longer can we look to ideology or charisma to do it—sweat and strain was needed. It's a myth that individuals can't change conditions."

176/ Ibid, page 156

[From the Alameda (Calif.) Times Star, Wednesday, Apr. 15, 1970]

THE FLUORIDE THING IN FOCUS—THANKS TO NADER[177]

If the highly-toxic fluoride is not safe in the air—and it is among the pollutants now on the list for ultimate removal from the atmosphere—how can it be termed beneficial when introduced into the human body through fluoridated water supplies?

The nation's top consumer advocate, Mr. Ralph Nader, came to grips with that issue during a press conference in San Francisco, and with his usual candor assailed the Public Health Service for its unscientific approach to fluoridated water.

Mr. Nader approvingly quotes Alfred North Whitehead who said: "Beware the scientific policy that does not keep open its options for revision."

The Public Health Service has served notice that fluoride's effect on the human body is a closed issue. The dictum has been made that children should have it to prevent tooth cavities, and no power on earth is going to change the minds of the bureaucrats.

At a press conference at the University of Kansas, Mr. Nader raised three points on which he bases his contention that far from being a closed issue, research should be heightened as to the potential deleterious effects of fluoride on the human body.

As Mr. Nader asks, how does fluoridated water affect the person who is allergic to fluoride in even infinitesimal amounts? Added to the intake via foods and air, what is its total ingestion when combined with drinking water? What effect might it have when concentrated in water pipes as it has been known to do?

Although the Public Health Service has not been interested in pressing research in these and related fields, this doesn't mean that all scientists have been asleep. As this newspaper has pointed out on previous occasions, there is increasing evidence in the scientific community that fluoride should indeed be kept out of the bloodstream. A few countries ban its use in drinking water altogether.

Yet the United States Public Health Service, ignoring the new information which pinpoints fluoride as a public enemy, goes blithely along, ordering its officials throughout the country to promote its introduction into water supplies. PHS serves as a propaganda center for dissemination of articles pooh-poohing fluoridation's toxic qualities, claiming that those who argue for unpolluted water are, as Mr. Nader says, "kooks."

As a matter of fact, political realists now acknowledge that for all practical purposes, fluoridation of drinking water is on its way out in this country. Its death knell has been sounded by the alert Mr. Nader who did what no one else has done—exposed the fallacy of adding it to drinking water while trying to keep it out of the atmosphere.

And we wonder how long it will take President Richard Nixon to realize this fact of life and get with it, ordering the Public Health Service to cease its fluoride promotion efforts and start listening to evidence of scientists who have been willing to continue searching for facts?

No one occupying the office of President during the 25 years of the fluoridation fraud has been exposed to such a volume of evidence against it as has President Nixon. Earlier administrations could perhaps have been deceived by the fluoride promoters into going along with the scheme. But on the record, in view of the enormous volume of evidence pouring in, as well as the detailed coverage of various fluoride pollution scandals in many sections of the country—the latest in Washington—during the past year, there can be no excuse for Mr. Nixon to give aid and comfort to fluoride promoters. His duty is clear: stop the promotion at its source, and then investigate the whole matter of who and why!

And if he fails to get the message, perhaps Senator Muskie might take the initiative in this pollution issue as he has so brilliantly done in other cases, and bring the practice to a halt. There must be people on the national political scene with the foresight and the courage to tackle this issue and bring to an end the grim threat of fluoridation—a threat to people, animals, plantlife and the entire agonized environment.

Do we hear a second?

177/ Ibid, page 155

CASIMIR R. SHEFT, D. D. S.
118 LEXINGTON AVENUE
PASSAIC, NEW JERSEY 07055
[redacted]

July 14, 1971

The Honorable Senator Edward Kennedy
Chairman
Senate Health Committee
United States Senate Office Building
Washington, D. C. 20510

Dear Senator Kennedy and Members of the Senate Health Committee:

On behalf of the New Jersey Council Opposing Fluoridation, Inc., representing fifteen hundred people, I would like to submit the following testimony to be placed in the Record of the Hearings being held currently by your Committee on Health on Senator Warren Magnuson's omnibus dental health bill S-1874 entitled "The Children's Dental Health Act of 1971."

The New Jersey Council Opposing Fluoridation, Inc. is strongly opposed to Section 1002 of S-1874 which proposes federal grants of 15 million dollars to assist communities wishing to fluoridate their water supplies.

Since sodium fluoride is defined in the dictionary as "a colorless crystalline, water soluble poisonous solid, used chiefly in the fluoridation of water, as an insecticide, and as a rodenticide" (Random House Dictionary, p. 1352) and in The Encyclopedia Americana (Vol. 25; p. 221) as ". . . a poisonous insecticide for poultry and dogs," if Section 1002 of Senate Bill S-1874 is approved, it would in effect make the Federal Government an accessory to the perpetration of the worst and most dangerous type of water pollution.

I am a summa cum laude graduate of the University of Maryland Dental School (Class of 1944) and a member of the American Dental Association. I am also a member of dentistry's highest honor society, Omicron Kappa Upsilon, and have achieved many honors.

I, like you, gentlemen, have a strong humanitarian inclination—which is evidenced by my donating twenty years of dental service to the children of an orphanage; six years as an elected member of a Board of Education (two years of which I was vice president); five years' membership on a Youth Guidance Council; and five years of service as a member of a Juvenile Conference Committee. My altruism compels me to warn you of the great danger to the health of all the people existent in fluoridation.

For twenty-five years I have been deeply engrossed in a comprehensive study and evaluation of fluoridation and have spent thousands of hours in this research.

Some of the startling true facts—all documented—which bear me out are:

Sodium fluoride is one of the most toxic poisons known to man—and cannot be purchased without a prescription!

CRS - 140

Hon. Senator Edward Kennedy and Members
of the Senate Health Committee

July 14, 1971

Van Nostrand's Scientific Encyclopedia (4th Ed., p. 1643) states that: "Sodium fluoride is used as a poison for rats and cockroaches."

The Journal of the American Medical Association (Feb. 10, 1951) reported: "Fluorine also tends to accumulate in the bones leading to hypercalcification (over-calcification) and brittleness. Ligaments and tendons also become calcified. Serious symptoms may ensue such as loss of mobility of joints, easy fracture and pressure on the spinal cord. Other effects include decreased blood clotting power; and in women, painful menstruation, lowered birth rate, high incidence of fracture, thyroid alteration and liver damage."

The British Medical Journal (Oct. 25, 1963) reported that: "Sodium fluoride destroys certain enzymes of the body, and so upsets normal metabolism. Laboratory evidence showing that sodium fluoride in minute amounts (one-tenth of the 'recommended' one part per million for humans) appreciably depressed the growth of human cells."

Two British scientists, Dr. Roger Berry, fellow in radiobiology, and Wilfred Trillwood, director of pharmaceutical services at Oxford United Hospitals—after experiments lasting two months, found laboratory evidence that human cells are killed by sodium fluoride one-twentieth the strength of fluoridated drinking water!! (Canadian Intelligence Service—Supplementary Section, Vol. 14, No. 2, Feb. 1964)

"The plain fact that fluorine is an insidious poison, harmful, toxic and cummulative in its effect—even when ingested in minimal amounts—remains unchanged no matter how many times it will be repeated in print that fluoridation of the water supply is safe." (Dr. Ludwik Gross, M.D., Chief of Cancer Research of the V.A.)

Dr. Alfred Taylor of the Biological Institute of the University of Texas, found that sodium fluoride even in such very low levels as one part in 20 million stimulated the growth of cancer cells in mice and embryonated eggs. ("Proceedings of the Society for Experimental Biology and Medicine," Vol. 119, p. 252, 1965)

A study by R. Herman reported in "Proceedings of the Society for Experimental Biology and Medicine" (Vol. 91, p. 189, 1956) tells us that fluorine was found in 8 out of 10 urinary tract stones in concentrations up to 1800 ppm. Dr. Alfred Taylor also found urinary bladder stones developing in his laboratory animals which were on fluoridated water. This condition had never before been observed in his experimental animals—which indicates that fluorine is related to the formation of at least some type of bladder stones.

Radioactive strontium 90 (from H-Bomb fallout) combines with accumulated fluorides in the body and precipitates as the highly insoluble Sr 90 F_2

within the body. This means that the rate at which the strontium 90 is excreted or thrown off will be even slower than ordinarily occurs. ("The Biological Hazards of Stronitium 90 and Fluoridation" by Dr. J. Kerwin: Dental Digest, Feb., 1958)

Epidemic skeletal malformations have been reported among people drinking water containing as little as 0.8 ppm. of fluoride in Lebanon. (Archives of Environmental Health, May, 1963)

One percent of children under ten years of age and pregnant women could not tolerate even the low-level dosages of fluoride that have been recommended by public health officials. (Feltman and Kosel: The Journal of Dental Medicine, Oct., 1961)

Independent studies by at least six groups of scientists have shown that fluoride causes hardening of the arteries even in young persons. (Dr. P. Zanfagna, M.D.; International Society for Fluoride Research)

Abnormal bone and osteomalacia is produced when fluoride supplements are given without a concomitant calcium supplement. (Dr. Jowsey; Mayo Clinic)

"Fluorides are violent poisons to all living tissues because of their precipitation of calcium. They cause fall of blood pressure, respiratory failure, and general paralysis. Continuous ingestion of non-fatal doses causes permanent inhibition of growth." (The U. S. Dispensatory, 24th Ed., pp. 1456-57)

Fluoridated water aggravates arthritic conditions and is a "potential long-range danger to health." (Dr. William Gutman, M.D.; Flower Fifth Avenue Hospital, N.Y.C.)

Use of fluoridated Ottawa City water in artificial kidney machines was accompanied by bone diseases, including pain in the bones, arthritic pains in the joints, nerve irritation, knobby growths on some bones and such marked dissolution of bone that spontaneous fractures occurred. Ribs even cracked under the pressure of breathing. (Dr. Gerald Posen, M.D., Ottawa General Hospital; Jan., 1969)

Because of its toxicity and danger to health, fluoridation has been rejected in Austria, Italy, Spain, France, Sweden, Denmark, Norway and Switzerland.

The contention that fluorides will harden bone and help reduce the bone disease osteoporosis is false! That claim has been discredited and contradicted by no less than the illustrious British Research Council in a report published in the Medical News (London), on Sept. 26, 1969; and also in a report published in the American Journal of Clinical Nutrition (Jan., 1971).

In October, 1966, the Food and Drug Administration banned the sale of all prenatal fluoride products because of the recognized danger to unborn babies. If prenatal fluoride ingestion by way of a carefully controlled tablet dosage was found to be dangerous, how can it be claimed that the

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consumption of uncontrolled quantities of fluoridated water by a pregnant woman (or anyone) is safe?!

The ingestion of 2 mg. of sodium fluoride per day is recognized as being toxic. This means that people drinking two or more quarts of fluoridated water per day are consuming a toxic amount of fluoride—harmful to their health. I need not point out that millions of people drink two or more quarts of water per day. For example; people working in iron and steel foundries, laundries; and ball players; diabetics, etc. Why should this real danger to those people be ignored—especially since the fluoride that they ingest will not benefit their teeth one iota! (Fluoride is only 'beneficial' during the formative years of tooth development)

Sodium fluoride will not boil off, but becomes more concentrated when water is boiled down—since it is a salt. This occurs because the given amount of fluoride salt remains constant while the quantity of water decreases. Obviously, there is great danger in boiling fluoridated water too long. Those of us who drink tea, coffee, or soup run the risk of ingesting two or three times the 'normal' amount of fluoride, if we allow the water to boil down to half or one-third of the original amount. Most serious of all is the danger to new-born bottle-fed infants, whose total source of food in the first few months of life consists of at least 90% water—which is used in the milk formula and juices. Can you see the danger in boiling down this fluoridated water for the infant's formula? If a mother starts with two quarts of fluoridated water (containing 2 mg. of fluoride) and boils it so long that half of it has evaporated, she ends up with <u>one</u> quart of water which now contains 2 mg. of fluoride—a toxic dosage!! Two milligrams of fluoride to a six-pound infant is the same ratio equivalent as 60 mg. to a 180-pound man!!! If this infant happens to be the one out of a hundred who is hypersensitive to the poison fluoride, could this daily dosage be fatal?? Could this possibly be the cause of Sudden Infant Death?? A true scientific investigation of this possibility must be made.

The claim that fluoridation will reduce tooth decay by 66% is untrue. Dental teams from the New York State Department of Education found the opposite—50% more dental defects in the fluoridated city of Newburgh than the unfluoridated 'control' city of Kingston. The independent New York State survey included gingivitis, pyorrhea, and malposition of teeth as defects. The fact is that fluoride poisons the tooth structure in the formative years; delays eruption of the teeth; does not produce permanent benefits to the teeth but merely delays the onset of tooth decay by one to three years. Children in fluoridated areas when they reach age 16 tend to catch up with the number of DMF (decayed, missing and filled) teeth of those in the unfluoridated areas. A fact that cannot be overstressed is that nutritional deficiency (<u>not</u> fluoride deficiency) causes tooth decay.

Even without water fluoridation many people are ingesting toxic amounts of fluorides in their food. There are many fluoride-containing foods, especially tea and wines. Some of the fluoride-containing foods and the

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amounts of fluoride they contain are listed in the 1964 issue of "Toxicology of Fluorine" as follows: Peaches up to 5 ppm; apples up to 4 ppm; carrots up to 5 ppm; spinach as much as 21 ppm; milk up to 2.3 ppm; and celery leaves up to 135 ppm.

Another way in which we absorb fluorides is through our lungs by way of fluoride-polluted air. Automobile exhaust contains hydrogen fluoride, and many factories belch tons of fluorides into the air through their smoke-stacks (e.g., aluminum and steel mills, phosphate and fertilizer plants, smelters, etc.). In European countries fluoride is now being recognized as the No. 1 air contaminant—much more damaging than sulfur dioxide (which in the past had occupied first place).

When we brush our teeth with fluoridated tooth paste we may not rinse our mouths thoroughly after brushing and swallow some fluoride residue.

Aerosol spray cans have fluoride in their charge which contaminates the air we breathe when we use a deodorant spray or hair spray, etc.

A widely used surgical anesthetic (Penthrane) contains fluoride—which was responsible for at least two reported deaths.

To further compound the contamination: In fluoridated areas the processed foods, soft drinks, beer, and fruit punches to which water has been added will all contain fluoride. Marier and Rose of the National Research Council of Canada, have shown that processing of foods increases their fluoride content by as much as 5 times—which together with the fluoride intake from drinking water adds up to an estimated total daily intake per person of between 2 to 5 mg. of fluoride. This level of fluoride intake is recognized as toxic even by the most ardent of fluoridationists.

In his newscast of October 1, 1970, Lowell Thomas announced that: "Scientists at the University of Barcelona in Spain—undertaking to determine the cause of death in a million year old Java man . . . their conclusions: The Java man said to be an apparent victim of fluorine poisoning."

A million years have passed, and fluorine is still not recognized as the deadly poison that it is! In fact, it is being legislated into millions of luckless people—who are misinformed and lulled into believing that it is a harmless and beneficial 'nutrient.' Instead of legislating poisonous fluorides into the people, every effort should be made by our government and health officials to remove this toxic pollutant from our air, food, and water!!

It is inconceivable that a toxic prescription drug listed as a dangerous cumulative proto-plasmic poison could be taken by every citizen from the cradle to the grave, sick or well, young or old, and the same dose given to a six-pound baby and a 250-pound man without somebody being harmed!

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In addition, fluoridation of drinking water is most wasteful and expensive, since 99.5% of the drinking water is used for purposes other than drinking; such as flushing toilets, washing cars, washing dishes, washing clothes, taking baths, watering lawns, and in industrial plants. So 99.5% of the fluoride which a community purchases to put into the water supply is 'wasted.' In addition, of the 0.5% of fluoride that is actually consumed by people, in the drinking water, only 8% of that amount reaches the young children for whom it is intended (i.e., those in the calcification stage of tooth development). For all the rest of the population (92%) it is of absolutely no benefit—and would be harmful ultimately, since 40% of the fluoride ingested daily remains in the body and gradually accumulates until a toxic level is reached. This fact was reported by Herta Spencer, M.D., and co-workers at the Metabolic Section of the V.A. Hospital in Hines, Illinois (Federation Proceedings, 20(2), Abstracts, 1440, March-April, 1970).

An alternative to water fluoridation, which is far more desirable and acceptable than water fluoridation, is to subsidize local school districts to add sodium fluoride to the milk in the elementary schools from kindergarten through the third grade. The fluoridation of milk in the elementary schools has the following advantages:

1. It would be consumed for only those few years of a child's life when it is most beneficial.

2. Only those children whose teeth are in the formative stage of tooth development would receive the fluoride.

3. It would be administered in the presence of large quantities of calcium—which enhances its safety to the health.

4. A more carefully controlled and accurate daily dosage can be administered.

5. There probably would be no appreciable danger to the health since the fluoride would be ingested for only the few formative years rather than for a lifetime.

6. There would be no opposition to it since it can be made a voluntary choice on the part of the children's parents as to whether or not their children should take fluoridated milk or plain untreated milk.

7. Any children allergic to the fluoride could receive unfluoridated milk instead.

8. There would be no expense to the municipality at all since the Federal Government would subsidize it.

9. The constitutional right of freedom of choice on the part of the individual would not be usurped since parents will have the right to choose whether or not their children will drink fluoridated milk.

10. It would not add to the contamination of all of our foods processed with water nor create any greater general pollution of our environment.

I contend that fluoridation of drinking water is not in the best interest of the majority; it is not the best nor most sensible method of administering fluoride; that it arouses much opposition; and that it is harmful to many and of no benefit to the great majority.

Therefore, gentlemen, I respectfully request that you carefully reconsider Section 1002 of Senate Bill S-1874 and fervently hope that in your sagacious wisdom you see fit to delete Section 1002 from this bill.

Thank you.

Respectfully yours,

Casimir R. Sheft, D.D.S.

Casimir R. Sheft, D.D.S. 178/

178/ Ibid, pages 148-54

COMMUNITY WATER FLUORIDATION AND TOTAL FLUORIDE INTAKE 179/

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In determining the fluoride level for drinking water which will have optimal dental health benefits but no adverse effects, the intake of fluoride from dietary sources has been taken into account. Studies have shown that the average diets of children and adults provide from one-fifth to one-half milligram of fluoride per day.[1-6] Further information on adult dietary fluoride intake is being obtained in a current Public Health Service-supported study. Atmospheric fluoride has been found to contribute relatively little to human intake (maximum: 0.046 milligram per day).[7-11] The available fluoride from pharmeceuticals, other than from those formulated as fluoride supplements for specific and known therapeutic use, is negligible.[12]

Because fluorides occur so commonly as natural constituents of water supplies, research scientists have had a great natural laboratory in which to work for several decades.[13-20] Studies of large numbers of long-time residents have been made in areas of the United States having naturally fluoridated water with up to 8 parts per million or more fluoride. In these areas, the water was used for drinking, cooking, and food processing. These studies include ten-year medical investigations of large groups of individuals, roentgenologic surveys for bone changes, postmortem examinations and chemical analyses of tissues, and metabolic assessments.[21-32] Extensive research also has been done using laboratory animals.[33-34] Health statistics in high-fluoride and low-fluoride areas have been compared.[35-36] The findings from these studies have provided consistent evidence that, in addition to all food and ambient sources of fluoride, humans may daily ingest water having up to at least eight times the amount of fluoride provided by optimally fluoridated water without adverse effect other than mottling of tooth enamel. Mottling, however, does not result from the use of optimally fluoridated water.[37-39]

179/ Ibid, pages 157-65

The Food and Nutrition Board of the National Research Council has stated that fluoride is a normal constituent of all diets and is an essential nutrient (1968).[40] The American Institute of Nutrition has recognized fluoridation as a safe, effective, and low-cost means of improving nutrition.[41] The U. S. Department of Agriculture Extension Service regards fluoridation as an important community health benefit.[42] Each of these organizations is directly concerned with proper nutrition; each endorses community water fluoridation.

In recognition of the dental benefits that accrue from fluoridation--benefits which continue in adult life[43-45]--the United States Army, Navy and Air Force provide fluoridated water at all bases where children are in regular residence.[46-48] For the military personnel who come to the bases at an age when water fluoridation is not effective, the Armed Forces have a dental preventive program which includes the clinical application and personal use of fluorides.[49-51]

Dental researchers who are exploring new techniques for combating tooth decay are not seeking to supplant water fluoridation. Rather, their successes will provide decay resistance for persons who have not had the protective benefits of water fluoridation and possibly provide some additional resistance for those who have.[52-61] However, not all of the new decay preventive methods envisioned will be adaptable to public health.[62]

The policy of the Public Health Service on fluorides and fluoridation is founded on extensive scientific knowledge. The Service makes every effort to develop, obtain, and evaluate current relevant information by supporting research, by reviewing current scientific literature and the popular press, and through interdisciplinary contacts with other governmental and professional organizations. The Service also makes every effort to share what is learned through these mechanisms with interested organizations, institutions and individuals.

Fluoridation has undergone a nearly constant process of reevaluation since its inception. Detailed reports have been published on all aspects of fluoridation from cities in the United States and other countries that have been fluoridating for 25 years, and from others with extensive but shorter

experience.[63-64] Publications of the National Council and the American Association for the Advancement of Science concerning the relationship of fluorides to dental health and general health appeared as early as 1942 and as recently as 1968.[4-40-65-70]

The accumulated dental, medical, and public health evidence concerning fluoridation has been reviewed and judged at various times by committees of experts and special councils of most of the world's major national health organizations. Their findings and conclusions are public information.[71-72] In several of the more than 30 other countries where fluoridation is practiced or planned, commissions have been appointed to obtain and review all information relevant to fluoridation and to make recommendations according to their findings. Some of these commissions made special efforts to seek out and consider the statements of both professional and lay critics of fluoridation. Such commissions reported to their respective governments in Great Britain in 1952 and 1962; in Canada in 1955 and 1961; in New Zealand in 1957; in Australia in 1954, 1963, and 1968; in Ireland in 1960; in South Africa in 1966; and in Norway in 1968.[73-83] In July 1969, the delegates to the World Health Organization of the United Nations, meeting as a body, considered the Director General's evaluatory report on water fluoridation.[84] They approved a resolution, co-sponsored by 37 nations, that embodied their findings and recommendations, which, like those of the other commissions, supported and encouraged fluoridation of community water supplies.[85]

The impressive body of information available concerning community water fluoridation and fluorides is constantly increasing and continues to support the validity of community water fluoridation as a safe and effective public health measure.[86] There is no evidential basis for questioning the medical safety, effectiveness, and practicality of community water fluoridation as a public health measure for preventing dental caries.

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DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

PUBLIC HEALTH SERVICE

Refer To: PS, CPB-10

September, 1969

RELATIONSHIP OF AIR POLLUTION TO COMMUNITY WATER FLUORIDATION 180/

Fluoride concentrations in ambient air (atmosphere) pose no problem for communities with water fluoridation.

Ambient fluoride concentrations are routinely measured at all of the National Air Sampling Network Stations. The data collected do not support claims of hazards from inhaled fluoride to people living in communities with fluoridated water supplies.

The following statement has been prepared by the National Air Pollution Control Administration:

> Assuming that the maximum fluoride concentration of approximately 2.0 micrograms per cubic meter, reported by the National Air Sampling Network was present continuously in the atmosphere of a city having 1.0 ppm fluoride in its water supply, intake of this atmospheric fluoride concentration could increase the total fluoride intake by only five percent. This figure was derived as follows: if an individual breathes 0.8 liters per breath at a rate of 20 breaths per minute for 24 hours per day and lives in an atmospheric fluoride concentration of 2.0 micrograms per cubic meter, he would absorb 46 micrograms of fluoride in one day. This assumes that 100 percent of inhaled fluoride was absorbed into the blood stream.

180/ Ibid, page 167

Simultaneously he would ingest 1000 micrograms of fluoride if he consumed one liter of water containing 1.0 ppm fluoride. Of the total intake of 1046 micrograms fluoride from these two sources, 46 micrograms (approximately 5 percent) would be contributed by inhalation. This small contribution would result only under conditions of continous and very high atmospheric fluoride exposure and under the unrealistic assumption of complete absorption of all inhaled fluoride.

Data reported by Edward J. Largent (A.M.A. Archives of Industrial Health 21: 318-323, 1969) and F. J. McClure and C. A. Kinser (Public Health Reports 59: 1575, 1944) give evidence for achievement of a metabolic balance in the human between total intake and total output of fluoride. This balance was achieved even in the presence of high levels of daily fluoride intake ranging from 3500 micrograms to 8000 micrograms. In the same article by Largent evidence is presented to show that when other sources of fluoride were controlled inhalation of high concentrations of particulate or gaseous fluoride resulted in a ready fluoride excretion closely related to the concentrations of fluoride in the inhaled air. This evidence supports the contention that fluoride concentrations in ambient air are unlikely to add to the total body concentration of fluoride in communities having fluoridated water.

Community Programs Branch
Division of Dental Health
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R-10-70

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

PUBLIC HEALTH SERVICE

NATIONAL INSTITUTES OF HEALTH

Refer: PPB-22
March 1971

REPEAT

SWEDEN DOES NOT BAN FLUORIDATION 181/ *

Opponents of fluoridation have again circulated information that Sweden has recently banned fluoridation. This is not true. The following are excerpts from a letter dated February 19, 1971, from The Swedish Dental Federation.

"To begin with, I would like to state, that the Board has not taken any action to ban fluoridation. These rumours are partly results of tendentious statements made by professor Arvid Carlsson, for which he has collected some criticism from the Director General of the Board.

"The real situation is, that we have by now in Sweden a law, which permits the different communities to demand from the National Board of Health and Welfare permission to add fluoride to their water supplies. The WHO resolution on water fluoridation, upon which Sweden has agreed, requests that the member countries should actively recommend water fluoridation. At the same time as the Board of Health and Welfare began to consider to take this further step, professor Arvid Carlsson started to write articles against water fluoridation in the newspapers. As professor Carlsson is a consultant to the Board of Health and Welfare as well as is professor Yngve Eriksson, the Board came in a difficult position. It was, of course, not easy officially to neglect one consultant in advantage of the other.

"So, the Director General of the Board arranged a conference on water fluoridation in June with some 40 experts on different parts of medicin (sic) and odontology. During this conference a great number of situations were discussed, in which one could eventually find a harmful effect of fluoride. In no case such effects were even made probable. On the contrary some speakers claimed an advantageous effect in cases of osteoporosis among old people. Professor Carlsson had to end his plead (sic) against water fluoridation by asserting that the epidemiological studies supporting water fluoridation were not new and accurate enough.

181/ Ibid, page 169

* Sweden's parliament recently repealed a 1962 law which in effect does ban fluoridation in that country. The vote was 137 - 126 (ADA News, Jan. 17, 1972, page 3). The law under which towns originally obtained permission to fluoridate tap water was thus removed from the books.

"The Director General had started the discussion by stating that it was not his intention that the conference should end in any decision or recommendation. He had arranged this conference, and intended to arrange a later one on other vehicles than water in order to get information on the latest research and opinions on water fluoridation before he decided upon the more activ (sic) recommendation.

"This later conference mentioned took place last autumn. It revealed mainly, that there are today no methods available that are as efficient as water fluoridation, although some interesting research work is going on for instance concerning immunisation.

"The Board of Health and Welfare is now preparing a document on water fluoridation, which is said to be ready towards the end of this year.

"It is absolutely not correct as is said in one of the articles cited by you that the Board of Health and Welfare has 'discovered that it had no really scientific basis for decission (sic) one way or the other'".

Division of Dental Health
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This information supplements information contained in CPB-13, January 1970.

THE QUESTION OF ALLERGY TO FLUORIDE AS USED IN THE FLUORIDATION OF COMMUNITY WATER SUPPLIES 182/

A request to the American Academy of Allergy has been made by the United States Public Health Service for an evaluation of the question of allergy to fluoride as used in the fluoridation of community water supplies. It was further requested that such an evaluation include a review of clinical reports on allergy to fluoride and express an opinion whether or not such reports constitute valid evidence of a hypersensitivity reaction.

The response to this request has been handled as follows:
Reports of allergic reactions have been reviewed. First, these reports were evaluated in an attempt to determine whether or not there is sufficient clinical or scientific information to classify any case of presumed fluoride allergy in one of the four major classes of hypersensitivity reaction (Type I-IV) (1). These immunologically mediated reactions are the anaphylactic or reaginic, the cytotoxic, the toxic complex and the delayed-type of reactivity (1). Second, the reports were evaluated to determine whether or not there was sufficient clinical evidence to support the possibility that intolerance or allergy to fluorides might occur as one of the less-well understood types of drug reactions that may or may not be immunologically mediated (2).

The reports of fluoride allergy reviewed (3, 4, 5, 6, 7) listed a wide variety of symptoms including vomiting, abdominal pain, headaches, scotomata, personality change, muscular weakness, painful numbness in extremities, joint pain, migraine headaches, dryness in the mouth, oral ulcers, convulsions, mental deterioration, colitis, pelvic hemorrhages, urticaria, nasal congestion, skin rashes, epigastric distress and hematemesis.

The review of the reported allergic reactions showed no evidence that immunologically mediated reaction of the Types I-IV had been presented. Secondly, the review of the cases reported demonstrated that there was insufficent clinical and laboratory evidence to state that true syndromes of fluoride allergy or intolerance exist.

As a result of this review, the members of the Executive Committee of the American Academy of Allergy have adopted unanimously the following statement:

> "There is no evidence of allergy or intolerance to fluorides as used in the fluoridation of community water supplies."

K. Frank Austen
M. Dworetzky
Richard S. Farr
G. B. Logan
S. Malkiel
E. Middleton, Jr.
M. M. Miller
Roy Patterson
C. E. Reed
S. C. Siegel
P. P. Van Arsdel, Jr.

February 18, 1971

182/ Ibid, page 171

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DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

PUBLIC HEALTH SERVICE

NATIONAL INSTITUTES OF HEALTH

Refer: PPB-30
July 1971

ALLEGED BAN BY F.D.A. ON USE OF FLUORIDE COMPOUNDS 183/
BY PREGNANT WOMEN

The policy of the Food and Drug Administration, first announced in October, 1966, does not forbid fluoride preparations to pregnant women.* It does forbid selling such preparations with representations, advertising, or labeling showing claims that such preparations taken during pregnancy will prevent dental caries in the offspring. The Administration has judged that there is insufficient evidence to support such a claim. There is no question of any adverse effect on the mother or child. Procedures for obtaining authorization for further use of such preparations in clinical studies are also presented, indicating that there is not a "ban" on ingestion--only on commercial sale with claims of benefit.

The inadequacy of evidence of the usefulness of prenatal fluoride preparations does not in any way detract from the proven effectiveness of childhood consumption of optimally fluoridated water in providing a lifetime of better dental health through reduction of tooth decay.

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*U. S. Food and Drug Administration (Commissioner): "Oral prenatal drugs containing fluorides for human use," Federal Register, Volume 32, No. 55, March 22, 1967 (Title 21, chapter 1, subchapter A, part 3).

183/ Ibid, page 174

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE

FLUORIDATION AND THE USE OF FLUORIDATED WATER IN ARTIFICIAL KIDNEYS 184/

Recently questions have been raised about the use of fluoridated water in artificial kidneys. The Public Health Service would like to issue some facts relative to the use of water fluoridation as a public health measure and the use of water containing fluoride and other elements in artificial kidneys.

Consumers of public water supplies enriched with minute quantities of fluoride in order to prevent tooth decay should not be misled by news articles which mention medical problems that may arise from using tap water in the artificial kidney. There is no relationship between the daily consumption of fluoridated water and the use of such water in artificial kidneys for the treatment of patients with total kidney failure.

The National Institute of Arthritis and Metabolic Disease (NIAMD), National Institutes of Health of the Public Health Service is responsible for research related to the use of artificial kidneys. The NIAMD estimates that 1800 persons in the United States depend upon "hemodialysis" by artificial kidney equipment for the preservation of life. These are persons who have suffered critical failure of natural kidney function through disease or accident. In hemodialysis, the blood of the patient with kidney failure is passed through a unit containing permeable tubing or membranes immersed in a water solution of special composition so that blood impurities will be removed. During this process, there is also transfer of dissolved substances from the water

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184/ Ibid, pages 175-77

solution into the blood. The dialysis techniques that have been developed permit patients to continue such treatments for years.

Under average circumstances such a patient's blood is "washed" in an artificial kidney two or three times a week for from 6 to 14 hours. In this process, in most cases, about 300 quarts of water to which helpful chemicals have been added are used to purify the patient's blood during a dialysis session. Thus the patient's bloodstream is exposed to tremendous amounts of water each week (which amounts in most cases to about 900 quarts). In many parts of the country it has long been necessary to purify the local tap water before using it in artificial kidneys in order to remove iron, calcium, magnesium, and other natural or added solutes before its use in dialysis. Such purification may be accomplished by distillation or by passing the tap water through a special device, not unlike a water-softener, which "deionizes" it. In the United States the overwhelming majority of dialysis treatments are given in special hospital centers, and most of these are using such-specially purified water for their artificial kidneys.

The desirable fluoride content of water to be used in dialysis has not been finally determined. Some clinicians have suggested that a small quantity of fluoride may counteract to a degree, undesirable bone demineralization that occurs in patients with kidney failure. There are also some indications that the absorption of fluoride during dialysis from the approximately 900 quarts of water used each week, an amount of water 50 to 100 times the amount of fluid consumed by the average person,

can result in increased storage of fluoride in the skeleton. Because various solutes may be absorbed from the water as it is normally supplied during long term dialysis, most water used in dialysis should be deionized.

It should be pointed out again that the need to process some water supplies before therapeutic use in large quantities in artificial kidneys has no bearing on the ingestion by anyone of optimally fluoridated water from community water supplies, recommended by health authorities as a medically safe procedure for the reduction of dental caries.

The United States Public Health Service endorses water fluoridation as a safe and effective public health measure and urges all communities to make its benefits available to people at the earliest possible time.

William H. Stewart

William H. Stewart, M. D.
Surgeon General

March 1969

LEHIGH UNIVERSITY,
COLLEGE OF ARTS AND SCIENCES, DEPARTMENT OF BIOLOGY,
Bethlehem, Pa., March 16, 1970.

Dr. FREDERICK J. STARE,
Harvard University School of Public Health,
Department of Nutrition,
Boston, Mass.

DEAR DR. STARE: Dr. Wm. Gross sent me a copy of your letter concerning the addition of fluorides to drinking water now being considered by some as a source of pollution. I have been involved in battles against water pollution for a half century. I have worked on biological surveys of inland waters for many years and I am quite aware of the different types of water pollution and their effects.

By no stretch of imagination can I or anyone else, rightly claim that the additional of one part per million of sodium fluoride or other fluorides to drinking water be considered a form of pollution. The word pollution comes from the Latin word "polluere" which means to make dirty. In general this literal meaning of the word pollution is satisfactory but in some cases the meaning must be expanded. The escape of phosphates into lakes and rivers from modern detergents does not make the receiving waters dirty but they do enormously increase the abundance of blue green algae which overgrow themselves, die, decay, disintegrate and foul water devastatingly. In general pollutants disrupt the normal aquatic biota, or act as actual poisons or in some way make the water unsuitable for some other use. The addition of 1 ppm of fluoride to the water does none of these. There is no evidence at all that the addition produces any harmful changes in the aquatic biota (plants and animals.)

The addition of fluoride may actually make the treated water more productive. Many animals as well as man need fluorides in the production of tooth enamel and strong bones. Some 450 million years ago some ancient fishlike creatures learned the trick of extracting fluorides and some other mineral salts from sea water, combining them and precipitating them as apatite mineral on the surfaces of scales. Later in the history of life on earth some of these enamel covered scales developed into enamel-covered teeth in the mouths of sharks and other fishes. Amphibians, reptiles (with the exception of turtles, ancient birds (but not modern)) and our own group the mammals followed. The ancient ability of enamel production on teeth has great survival value and has withstood the test of time.

Ancient sharks teeth, 50 million years old, dredged up from the ocean bottom or found in fossil deposits show beautiful, shiny enamel coverings and a cutting tooth edge as sharp as it was the day the shark died. The original method of enamel production invented as a natural process many millions of years ago has never been improved upon and there is no substitute for it. It depends upon the availability of the needed minerals including fluoride. No fluoride, no hard protective enamel.

We must always turn to Nature for understanding of life and living processes. To call the addition of the necessary amount of fluoride to allow the young animal, be it a chipmunk, a cow or the kid next door, to form its natural protective enamel on its teeth, a form of pollution is ridiculous. Were the waters of the earth polluted 450 million years ago when the process evolved?

Sincerely,

F. J. TREMBLEY, 185/
Professor of Ecology.

185/ Ibid, page 178

EFFECTS OF SODIUM FLUORIDE ON BONE; APPLICATION TO OTOSCLEROSIS AND OTHER DECALCIFYING BONE DISEASES 186/

Shambaugh, G. E., Jr., and Petrovic, Alexander: "Effects of sodium fluoride on bone; application to otosclerosis and other decalcifying bone diseases," Journal of the American Medical Association 204:969-73, June 10, 1968. (Abstract from American Journal of Orthodontics 54:794, October 1968)

The authors conducted experiments on the effects of sodium fluoride on bone with a view to its possible use in certain decalcifying diseases of bone, including the disease peculiar to the labyrinthine capsule known as otosclerosis. These experiments were prompted by the report of the use of large doses of sodium fluoride for postmenopausal osteoporosis, corticoid-induced osteoporosis, and osteitis deformans (Paget's disease).

A sufficient intake of fluoride in early life is necessary for the formation of caries-resistant teeth. In the later years of life, a higher intake of fluoride appears to be necessary to maintain normal calcification of bone. Experimental studies indicate that the principle action of fluoride on bone is a slowing of the resorptive phase of the remodeling process, with an additional promotion of calcification. For the prevention of osteoporosis induced by heparin, cortisone, or fracture, previous medication with large doses of sodium fluoride over a long period of time appears to be effective. When one of these forms of osteoporosis or localized osteoporosis of the labyrinthine capsule due to active otosclerosis develops in a patient not so protected, the favorable effect of fluoride appears to be enhanced by simultaneous administration of phosphates, as indicated by experiments still in progress.

The time may not be far distant when fluoride will be recognized as essential to health and when, in addition to being added to the water supply, it will be prescribed for older persons to prevent senile osteoporosis and frequent fractures.

186/ Ibid, page 179

1969 WHITE HOUSE CONFERENCE ON FOOD, NUTRITION AND HEALTH URGES FLUORIDATION 187/

Excerpt from 1969 White House Conference on Food, Nutrition and Health Final Report published in 1970.

Dental Health and Diet

"Dental health of adults is determined to a large extent by the nutrients ingested, personal oral hygiene, and preventive dental services experienced during infancy and childhood. For example, if a child is provided a balanced diet, devoid of excess sugar but containing fluoride in optimal amounts, dental caries experienced in a lifetime will be minimal.

"The fluoridation of public water supplies with 0.7 to 1.2 ppm of fluoride has been the most effective and economical means yet developed to prevent dental decay in masses of people. It has been shown to be completely safe. Yet opposition by antifluoridationists has deprived about 75 million people who are served by central water supplies of these benefits.

The Panel recommends:

1. That the Federal Government and all relevant State and local agencies, as well as professional groups, continue to give highest priority in supporting and promoting fluoridation of commercial water supplies. Further, in order to expedite the implementation of fluoridation in small communities that may be financially hard pressed, there be established a Federal grant-in-aid program to provide funds for the installation, initial operation, and maintenance of fluoride dispensing equipment.

2. That in areas lacking central water supplies, which applies to more than 40 million people, school water supplies, ingested on a 25 hour weekly basis, should be fluoridated with higher levels of fluoride, for example 3 to 5 ppm. This is equivalent to 1 ppm of fluoride in the central water supply. There is no evidence that such a practice will result in mottled tooth enamel

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187/ Ibid, pages 180-1

3. That a feasibility study be made on the practicality and effectiveness of providing fluoride in some other vehicle, such as lozenges or tablets, to children where neither fluoridation of central or school water supplies can practically be accomplished."

Division of Dental Health
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Fluoridation for All: A National Priority 188/

(By Roger O. Egeberg, M.D., Assistant Secretary for Health and Scientific Affairs, Department of Health, Education, and Welfare)

(After 24 years, little more than half of our population using public water supplies has fluoridated water. The nation's top health officer tells why fluoridation has not been implemented in some areas and why it should.)

A generation of young people in many communities has been raised on fluoridated water, with less tooth decay, more attractive teeth, and less malocclusion caused by early loss of teeth. This fluoridation generation will have better dental health for a lifetime.

The first priority in improving the dental health of this nation is to bring the benefits of fluoridation to all children. Our unmet dental needs are beyond the capacity of the dental profession to treat, and beyond the nation's private and public budgets to finance. Millions of dollars are spent every year on repairing the ravages of dental disease, through Medicaid, Head Start programs for children, neighborhood health centers, and other public and private programs. Yet, as things are now, treatment cannot catch up with the needs, and the needs grow relentlessly, particularly in areas where fluoridation is not yet in effect.

Fluoridation is not the total answer to control of decay, but it must be the basis of any response to the national dental problem. Fluoridation holds particular promise for the poor who do not have access to other elements necessary for good dental health—regular dental care, good nutrition, and proper home hygiene.

Prevention is imperative, and there is no prevention that can make a greater impact on our total dental needs than fluoridation of all public water supplies.

The benefits of fluoridation are now available to 88 million Americans in 7400 communities and to an estimated 30–40 million people around the world from Ireland to Russia to Australia to the Ryukyu Islands. Most of the major cities in this country routinely add fluoride to their water supplies. Seven states have enacted legislation making fluoridation mandatory and similar legislation is pending in other states.

The measure is approved by the American Medical Association, the American Dental Association, the Public Health Service, and every other qualified health and scientific organization in this country. In 1969, fluoridation was endorsed by the World Health Organization in a resolution that recommended the adoption of flouridation by member states. Flouridation is now in operation in more than 30 countries and is in extensive use in Ireland (where it is compulsory), the Netherlands, Canada, Australia, Czechoslovakia, Chile, Brazil, and Hong Kong.

This approval is based on proof of the safety and effectiveness of fluoridation which is demonstrated in literally thousands of studies on every aspect of its use. Fluoridation's safety has been proved many times over. The cautious few who have been waiting for a final judgment can be assured that the time of testing is past. Now is the time for action.

New impetus for prompt action comes from the documentation of economic reasons for instituting the measure. It has been reported from the landmark research project in Newburgh and Kingston, New York, that the cost of providing all necessary dental care to children aged five and six was twice as much in fluoride-deficient Kingston than in fluoridated Newburgh. The cost of regular maintenance care was also twice as much. The dentist chair-time needed to provide dental care in the nonfluoridated city was just about one and one-half times that needed in the fluoridated city.

Fluoridation's savings for public care programs were reported from Head Start projects providing dental care for preschool children in California. The average treatment costs per child in fluoridated San Francisco and Vallejo were $26.35 and $27.77, compared to $70.01 and $85.58 in the nonfluoridated areas of Berkeley and the San Joaquin Valley. Dental insurance administrators in California have reported that insurance claims for children are consistently less in fluoridated San Francisco than in fluoride-deficient Los Angeles.

These economic facts add a new dimension to fluoridation's importance as public and private spending for dental care increases dramatically with still less than half the population getting dental care in any year.

188/ Ibid, pages 182-9

Today, only a little more than half of our population on public water supplies has fluoridated water. Seven states have legislation requiring fluoridation. With so much to gain, why isn't fluoridation implemented in more areas? In the face of reason, research, experience, and qualified scientific judgement, there continue those who work to defeat fluoridation wherever and whenever they can.

Fluoridation's history in this country and others has clearly disproved the claims of the opponents. Adding fluorides to the water supplies of Grand Rapids, Michigan; Newburgh, New York; and Brantford, Ontario, in 1945 marked the beginning of fluoridation only as a controlled public health measure. Fluoridation has existed in nature for untold generations.

The role of fluoride as a natural protection against tooth decay was discovered in the 30's, when fluoride in the water was finally identified as the cause of the mottling of teeth which was common in high-fluoride areas of Colorado and Texas. Dentists had observed that the stained teeth were curiously resistant to decay. Long, careful, epidemiological research was carried on during the thirties to determine the exact relation of different degrees of natural fluoride in the water to decay and to mottling. The United States presented a vast natural laboratory for this research because of the wide extent of natural fluoridation. In 1969, it was reported that more than eight million people in 2630 communities in 44 states have water supplies naturally containing enough fluoride to have a significant effect on tooth development.

The trace of fluoride which confers the maximum prevention against decay with no danger of unsightly mottling was determined to be about one part fluoride per million parts of water. The next step was to add the optimum one ppm of fluoride to the water supplies of Grand Rapids, Newburgh, and Brantford to measure the effects of controlled fluoridation on tooth decay. It cannot be emphasized enough that when these test projects began, it had already been established that fluorides in water, even at levels much greater than one ppm, were not harmful to health. Studies of people who for generations had been drinking water with as much as eight ppm of fluoride found them to be healthy; the only adverse effect was the expected mottling of teeth. With fluoridation controlled at the optimum concentration, there is no mottling of teeth.

The results of these first fluoridation projects have since been duplicated all over the United States and throughout the world. From Watford, England, to Karl-Marx Stadt in East Germany, Tiel in the Netherlands, Curico in Chile, and Hastings in New Zealand, the findings have been the same—a dramatic reduction in the number of decayed, missing, and filled teeth in children and a dramatic increase in the number of children with no decay at all.

Children who have had fluoridated water from birth will have the greatest protection against tooth decay. Children exposed to fluoridated water at later ages will have less benefits. Longer term studies in Brantford and in Evanston, Illinois, have traced these dental health benefits through the teen-age years. We know from examination of the people in near-optimal naturally fluoridated communities that the improvement in dental health will last throughout life.

In its early history, fluoridation moved fast. Community after community was quick to adopt this benefit. But the opponents began to organize, to print their leaflets, to spread their antiscientific gospel, to contact their counterparts in other communities, and to turn to the polls. As a controlled public health procedure, fluoridation was consistently successful. Through the efforts of its opponents, fluoridation became a political issue and in politics it has been less than fully successful.

Why do people oppose fluoridation? To my certain knowledge, all the other questions relating to fluoridation have been answered satisfactorily by scientific research. The reasons for opposition are studied with diligence and even fascination by the social scientists, but no consensus has been reached.

As an observer of fluoridation experience, I distinguish between two general types of people who vote against the measure. There are the activists who strongly oppose fluoridation for a variety of reasons and who write, travel, quote, print, and testify to keep the measure from others. Then there are the passive voters who give a low priority to dental health and have little information on fluoridation. They are easily confused or alarmed by the scare propaganda of the activists. When in doubt, they vote against fluoridation.

The activist antifluoridationists range from the paranoid through the profit or publicly-oriented to the genuinely well-intentioned but misguided who are looking for a cause to make their lives more interesting. Many of those who oppose fluoridation at this stage are beyond accepting the scientific facts of the matter.

Among the active antis are individuals and organizations who oppose other scientific advances. There are still a few dissenting physicians and dentists, although I suspect some of these may oppose fluoridation for political or philosophical rather than scientific reasons. Some scientists reject the vast preponderance of evidence supporting fluoridation and advance their own personal studies.

Other opponents object on principle to what they see as tampering with their "pure water," unaware that water is routinely processed with as many as a dozen chemical substances to make it safe and drinkable. Others object to fluoridation as an example of unnecessary and unwarranted government action, although the courts have consistently upheld fluoridation. Even if these individuals are few in number they know how to make their voices heard, and they can turn a fluoridation campaign into a political and emotional controversy. The result is often the loss of fluoridation for a community.

No political losses or even political victories can alter the standing of fluoridation as a scientific measure, but such actions can win or deny the benefits for children. We can no longer afford to deny fluoridation for the many because of the opposition of a few. The crisis of health care in this country makes it absolutely necessary for us to make the most of our existing health resources.

Dentist time spent filling the teeth of children in fluoride-deficient communities is a grossly inefficient use of scarce dental manpower. It is wasteful to spend public funds for repair of dental needs which could have been prevented by fluoridation. It is tragic to doom underprivileged children to a lifetime as dental cripples because they have access neither to dental care, good nutrition, toothbrushes, nor fluoridation.

The state of dental need in this country and the status of fluoridation make it perfectly clear that the first national priority in dental health should go to fluoridation of all public water supplies. I urge public officials at all levels to take prompt action to implement fluoridation. In so doing, they will be acting in the best interests of the men, women, and children they represent.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

PUBLIC HEALTH SERVICE

NATIONAL INSTITUTES OF HEALTH

Refer: PPB-29
July 1971

$100,000 SO-CALLED REWARD OFFER -- A GIMMICK 189/

For years a so-called reward offer has been circulated by the opponents of fluoridation. The fact that the reward has not been collected has been used by them as substantiating their claims. Recently, a flyer has appeared in which the reward has been increased. The clever wording of this reward offer clearly exposes it to be an uncollectible gimmick. Examples of its inherent fallacies follow:

(1) The wording asks proof that fluoridation "will cause no future body harms." This would require proof of events which will take place in the future, which is impossible.

(2) The wording asks that, using PHS recommended fluoride levels (approx. 1 ppm), proof be given that "poisonous" fluorides are safe. Fluorides at PHS recommended levels are not poisonous, and proof of effectiveness and safety at such levels would be irrelevant to use at the much higher levels at which fluoride could be termed "poisonous."

(3) The so-called reward offer is ambiguous, with no indication of what would be considered a "controlled" experiment, what proof would be considered acceptable, or who would make the decision as to whether the proof was acceptable.

(4) The flyer requires the posting of a bond by anyone attempting to collect the reward to cover any costs which the offerors of the reward might incur if the proof is deemed invalid; this condition would be extremely difficult to comply with, for the amount of such possible costs would appear to be impossible to determine in advance. Moreover, in view of the difficulties and ambiguities in the nature and wording of the offer which are pointed out above, a person seeking to collect the reward could easily be placed in an impossible economic position.

(5) Posting of the bond, above, could make payment of the reward unenforceable, because the entire offer might be considered a wager, and the courts will not enforce the collection of a gambling debt.

189/ Ibid, pages 193-4

It is clear, therefore, that the so-called reward is a gimmick that serves to confuse and deter action on a proven public health measure. If after a quarter-century of demonstration of the use of fluoridation at Public Health Service recommended levels, with no clinically substantiated evidence of any bad or harmful effects from drinking such water, opponents still question the safety and effectiveness of fluoridation, it would appear that no evidence could ever be acceptable to them.

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FLUORIDES AND CANCER 190/

Research by Dr. Alfred Taylor and others

In a letter published in the Saturday Review in 1965, Dr. Taylor referred to his research purporting to show a cancer promoting property of fluoride in cancer-susceptible mice. However, similar experiments carried out by Dr. W.D. Armstrong of the Department of Biochemistry, University of Minnesota in collaboration with Dr. J. Bittner, the eminent cancer biologist, failed to confirm Dr. Taylor's work. In their experiments, Armstrong, Singer and Bittner used a blind testing technique to eliminate bias and showed that the cancer-susceptible mice drinking water containing 5-10 p.p.m. fluoride did not develop tumors any more quickly than those drinking fluoride-free water.

Statement by Director, Clayton Foundation Biochemical Institute

Later in 1965, the Director of the Clayton Foundation Biochemical Institute, where Dr. Taylor performed his experiments, wrote that ". . . I feel I must disassociate the anti-fluoridation opinions expressed by Dr. Alfred Taylor from the opinions of the other members of the Institute. At the time Dr. Taylor retired from the Institute, September 1, 1965, he had not convinced his colleagues of the soundness of his position on this matter. His results appear marginal; hence, carrying them over from inbred strains of mice to humans is questionable. The presence of fluoride in healthy teeth, its presence in many excellent potable waters, and the beneficial effects of fluoridation on tooth decay seem, in the minds of his colleagues to be overriding considerations."

Information from the Jackson Laboratory

The Jackson Laboratory at Bar Harbor, Maine, which raises millions of mice for biological laboratory use, including cancer-prone strains has noted that five years of using optimally fluoridated water has been compatible with a general improvement in the well-being and productivity of their colonies through 18 generations of mice.

Statement by the American Cancer Society

The American Cancer Society does not consider the common fluoride salts to be carcinogenic. Its position with respect to water fluoridation for the purpose of dental caries prophylaxis is that such treatment of public water supplies is without danger so far as cancer causation is concerned.

190/ Ibid, page 195

Summary

S. 1874, the Children's Dental Health Act of 1971, was reported out of committee by unanimous voice vote[191] with the fluoridation provision intact. The report stated that this provision, "Section 1102 by making fluoridation available to many more millions of people, would greatly reduce the incidence of tooth decay and, thus slow the growth of dental disease backlog".[192]

The Report makes no reference to the witnesses or statements in the hearings record made in opposition to the water treatment provision of the legislation. It states simply that "the Committee is convinced of the safety and effectiveness of fluoridation as a powerful preventive weapon in the battle against dental disease. The efficacy of fluoridation has been widely known for many years. And the Committee received overwhelming testimony from both scientific and professional groups to this effect".[193]

On December 10, 1971 the Senate passed the Childrens' Dental Health Act by a vote of 88 to 1. Companion bills pending in the House of Representatives are H.R. 9398 (introduced by Mr. James G. Fulton, and referred to the Committee on Interstate and Foreign Commerce) and H.R. 10356 (introduced by Mr. Henry Helstoski, and referred to the Committee on Ways and Means).

191/ "Childrens' Dental Health Act of 1971", U.S. Congress. Senate. Committee on Labor and Public Welfare, Subcommittee on Health. 92nd Congress, 1st session, Report No. 92-564 to accompany S. 1874, Dec. 8, 1971, page 9.

192/ Ibid., page 4.

193/ Ibid. pages 6-7.

A Final Comment

It is believed that the fluoridation issue will be more vigorously debated if and when the above and similar bills are considered by committees in the House of Representatives. Some arguments may demand that policy makers delete the water treatment provision of the Children's Dental Health Act on the grounds that fluoridation doesn't work anyway, that it is injurious to health, and that it constitutes further pollution of the environment with a class of chemicals already entering the environment from industrial effluents. The latter point, consistent with the contemporary ecological crisis, is being expressed as total fluoride pollution (intake or exposure). In this context one would expect those concerned with pollution abatement to address the problem of inadequately controlled and localized sources of industrial emissions of fluorine chemicals as well as the reliability of procedures in the fluoride treatment of drinking water.

Regardless of the outcome of the fluoridation provision in the proposed Children's Dental Health Act, community referendums will continue to be the principal point of public policy making in fluoridation decisions, and based upon past experience most of these decisions will oppose the treatment, thus rejecting the advice now consolidated in scientific, medical, and public health circles.

Since public health began as a layman's movement nearly one hundred years ago 194/ and now spreads far beyond the activities of any

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194/ See "The Politics of Global Health" by Freeman H. Quimby, printed by the Committee on Foreign Affairs, U.S. House of Representatives,

single national public health bureaucracy, it is difficult to understand how the public perception of its fundamental motives has become so confused in recent years. More often than not it has been genuine public outcry which has stimulated medical officialdom to action in the interest of public health. The result has been a virtual revolution in the improved status of disease control, national health, and life expectancy. That revolution will continue as the layman, scientist, engineer, and government respond to the advancements in knowledge and systems applications, and weigh them against possible undesirable consequences.

It is not yet clear why so many different techniques of persuasion across the intellectual spectrum of the American people have succeeded in attracting attention to and in suppressing a simple measure for influencing favorably the course of dental disease. Perhaps the answer lies in a common thread of conviction on an entirely different concern which weaves its way through the long and continued opposition to fluoride water treatment. That is to say, the real issue **may not** be the safety and efficacy of fluoridation as a proven and accepted public health procedure, but rather a larger surrogate issue embraced by a series of problems typical of large, complex, and competitive societies. As one reads the more comprehensive statements and papers by concerned fluoridation opponents, this surrogate issue will be seen to appear over and over again. But no one succeeds in articulating it so well as does A.L. Green in his paper "The Ideology of Antifluoridation Leaders."

The Image of an Alienated Society:

> "The image may be summarily described as follows: There are profound contradictions between fundamental American values and the current condition of American society. Power is dangerously concentrated in distant centers, and enriches itself through the exercise of coercive authority, hidden behind a baffling screen of vast government bureaucracies and giant corporations. Deception has become a practiced art in public affairs; actual motives are rarely revealed by professed reasons. The individual is increasingly manipulated and the scope of his initiative steadily contracts; the process is moving to an end that will find most men totally dependent on impersonal agencies." 195/

Whether or not Green's gloomy picture is true, it is surprising that fluoridation has come to be a kind of symbol of the overall trends he describes. It is equally surprising that this single issue should receive so much attention among the many forces at work in such a large composite of contradictions and conditions.

Fluoridation is "manipulative" but so is the clinical treatment of the disease it is designed to control. Of course, the individual has a greater choice to seek or not to seek the services of a dentist than he does with fluoridated water delivered to his home and community, but it is almost inconceivable that he would opt against having his badly decayed teeth filled or extracted on the ideological ground that manipulation after the fact is less manipulative than preventing the fact in the first place. To varying degrees this situation is characteristic of all preventive medicine and public health practices. For example,

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195/ in "Trigger for Community Conflict: The Case of Fluoridation" edited by B.D. Paul et al, Journal of Social Issues 17, No. 4, 1961, (pages 13-25).

certain international vaccination and quarantine regulations leave no option whatsoever to the individual in the interest of the public as a whole, unless, of course, that individual elects against foreign travel. Alternatives to chlorinated water and to water containing other added chemicals (some of which in addition to fluoride are intentionally designed to reach the consumer) 196/, and alternatives to pasteurized milk and to mineral and vitamin-supplemented food staples present approximately the same inconvenience and added costs to the "non participating" consumer as does fluoridated water.

Thus many public health practices may be considered to be an interference with freedom of choice and "impersonal" whether they are exercised by "vast government bureaucracies" or by local communities. By their nature these practices are aimed at and for the public rather than specific individuals; this is the only way such techniques can work - by protecting all the people actively the individual is protected passively.

Nevertheless, because they appear to some as manipulative and impersonal, public health measures do invite controversy. Vaccination, quarantine, chlorination, pasteurization, fluoridation and even the licensing of medical practitioners have produced some of the most bitterly fought campaigns in the history of the American people. 197/ Because of the high risk of prolonged and wasteful controversy in issues of this type, the choices and consequences of different approaches to policy decisions in the public health field deserve a brief review.

196/ Wolman, Abel. "Fluorine and the Public Water Supply" in Dental Caries and Fluorine edited by F.R. Moulton, AAAS, 1946, page 109

197/ see The Role of Fluoride in Public Health, the Kettering Laboratory, College of Medicine, University of Cinncinnati, 1963, page 77.

They are as follows:

1. Compulsory, as a result of a decision reached by public officials and experts. The result of this approach may serve to aggravate opponents of the decision, produce more controversy than a less obligatory approach, and result in continuing and often successful crusades against the policy. The resentment may spread from a specific policy to others already accepted with the entire public health machinery coming under doubt and criticism.

2. The referendum, born in controversy, and exercised in a climate of campaigns "for" and crusades "against". Voters are swamped with arguments, door-to-door appeals, and materials designed to persuade rather than inform. The voter may find he has exercised his franchise by making a choice in a technical field which under the circumstances of an emotionally driven campaign resulted in a policy against his own best interests. The issue is not settled, the seeds of truth and error sprout, the target disease is not totally eradicated, new symptoms are reported, and a new referendum invokes the measure or removes it.

3. Community Action. This approach to policy making in potentially controversial public health actions assumes that programs for the people should be planned with the people. Actually, the community approach may be used just as effectively to undo an established activity as to initiate a new one. In any case, the idea is to bring government, technical experts, and citizens together for purposes of evaluating and planning a new program. In principle, one would expect that decisions reached by this approach to be more acceptable and durable,

but this may not always be so.

An example of this approach in regard to fluoridation is that found in Appendix C of this report - "the Philadelphia Story." The community action sequence which led to a thus far unchanged policy decision in 1951 for Philadelphia involved the city's dental profession, a fluoridation study committee, the dental school faculties of local universities, a special dental and medical advisory committee, the women's club, representatives of the citizenry, the city health and water departments, the Mayor, and the City Council which finally passed the ordinance authorizing fluoridation of Philadelphia's water supply.

Science and policy in the public interest by means of community action is no guarantee against irrational debate and continuing controversy. However, the decision reached by this approach may be a more stable one. Here consumer representatives participate in the overall assessment of the factors involved, including the research data and health statistics. The materials utilized in arriving at a community consensus may indeed follow the general suggestion of Ludwig and Collett:

> "The consumer of health statistics, then, might do well to limit his consumption to full, concise accounts of research in their original form and carried out by reputable research agencies and individuals that are not influenced by strong ideological commitment." 198/

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198/ Ludwig, Edward G. and John C. Collett, "Some Misuses of Health Statistics" (Special Communication), JAMA, April 19, 1971, page 449.